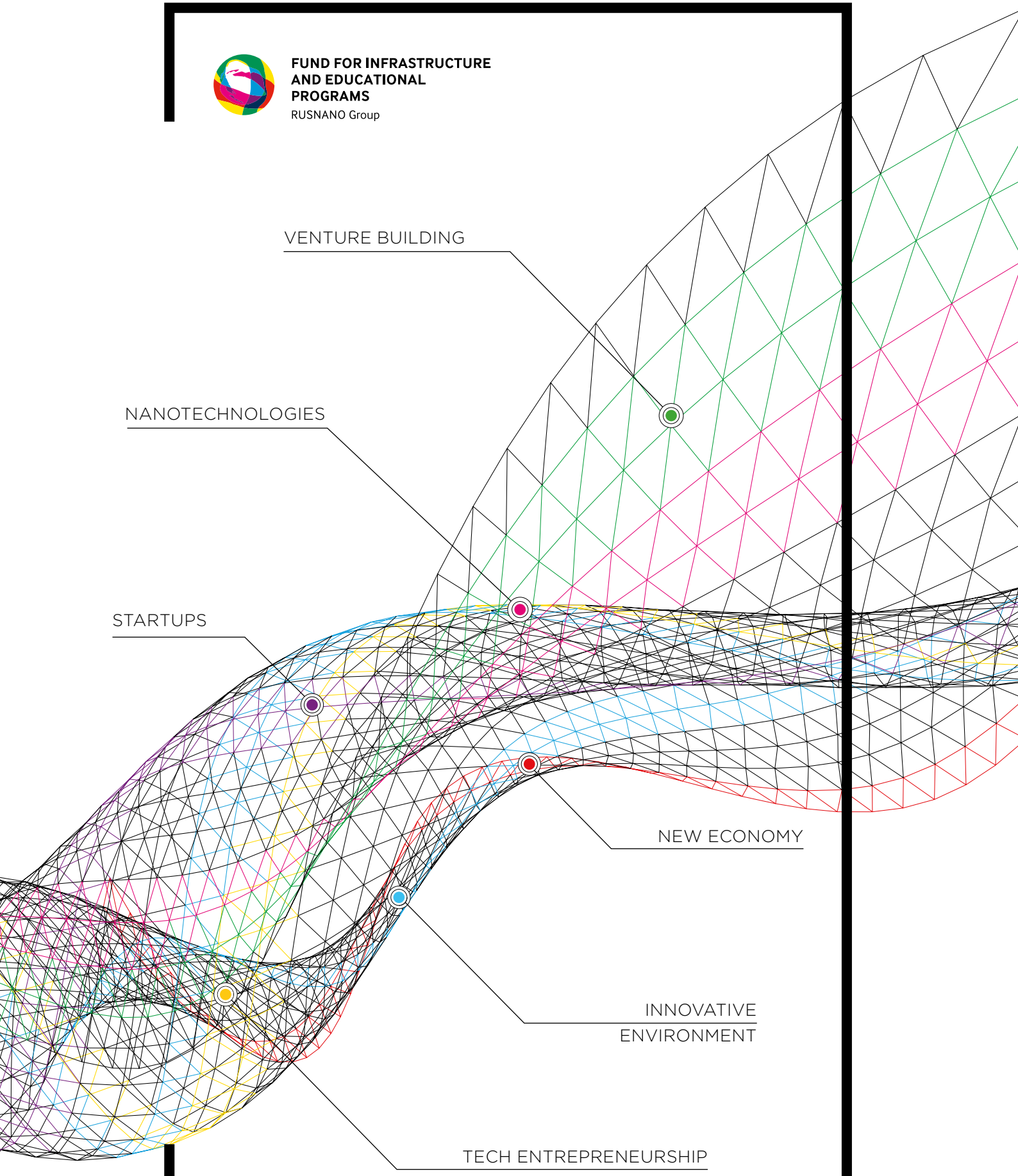
FUND FOR INFRASTRUCTURE AND EDUCATIONAL PROGRAMS
RUSNANO Group



ANNUAL REPORT 2019

CONTENTS

OPENING ADDRESS OF THE CHAIRPERSON OF THE BOARD

ANATOLY CHUBAIS

CHAIRPERSON OF THE BOARD, FUND FOR INFRASTRUCTURE AND EDUCATIONAL PROGRAMS

DEAR COLLEAGUES!

THE FUND FOR INFRASTRUCTURE AND EDUCATIONAL PROJECTS MAINLY SEEKS TO SUPPORT AND ENABLE INNOVATIVE COMPANIES TO DEVELOP AT THEIR VERY EARLY STAGES, I.E. AT PRE-SEED, SEED, AND VENTURE STAGES. TO DATE, WE ARE THE ONLY INSTITUTION FOR DEVELOPMENT THAT BOTH: FOCUSES ON CREATING AND ADVANCING INNOVATIVE INFRASTRUCTURES AS WELL AS DEVELOPING PROGRAMS AND TECHNOLOGIES FOR ADVANCED EDUCATION AND INSTITUTIONAL SUPPORT FOR HIGH-TECH ENTERPRISES, AND HAS ACCUMULATED SUBSTANTIAL EXPERIENCE IN THE SAME.

In 2019, 3.5 RUB billion of additional funding has been pledged for 2020-2022 under the Boosting the State-of-the-Art Innovative Infrastructure in Nanotechnology, Mechanisms, and Tools to Unfold the Potential of Nanoindustry section of the State Program for Economic Development and Innovation-Driven Economy, an important recognition of the Fund's competency.

Last year, the Fund adopted its new Strategy 2024, which, among other things, seeks to accomplish the goals and objectives of national and federal projects in Education, Science, Digital Economy and Artificial Intelligence, Small and Medium-Sized Enterprises and Support for Individual Entrepreneurial Initiative, Ecology, etc.

Accomplishing those will require much more innovative companies to emerge and have access to favourable institutional, legal, and regulatory frameworks beside an advanced digital educational environment, and a system for continuous professional retraining for employed people. A dramatic global economic shift caused by the COVID-19 pandemic makes these problems even more relevant rather than candidates for postponement, as it is small and medium-sized innovative businesses that suffer the most from the newly imposed restrictions.

Strategy 2024 sets forth ambitious targets; however, we have no shortage of experience in addressing one-of-a-kind problems thanks to our involvement in creating Russia's nanoindustry. Time is high that this experience be applied to the entire high-tech economy.

OPENING ADDRESS OF THE DIRECTOR GENERAL

ANDREY SVINARENKO

DIRECTOR GENERAL, FUND FOR INFRASTRUCTURE AND EDUCATIONAL PROGRAMS

DEAR FRIENDS!

THIS IS THE FUND FOR INFRASTRUCTURE AND EDUCATIONAL PROGRAMS' PUBLIC REPORT FOR 2019. THIS WAS AN IMPACTFUL YEAR MARKED BY MULTIPLE ACHIEVEMENTS, SUCH AS THE FACT THAT A COMPANY THE FUND INVESTED INTO, OCSIAL, ENTERED THE UNICORN LEADERBOARD AND RECEIVED INVESTMENTS HAVING BEEN VALUATED AT $1 BN OR MORE AND THAT TECHNOSPARK NANOTECHNOLOGY CENTER WAS RECOGNIZED AS THE MOST EFFECTIVE RUSSIAN TECHNOPARK FOR THE FOURTH TIME IN A ROW.

In 2019, we updated the foci of the Fund in its Strategy 2024 to ensure that its activity is aimed at accomplishing the set goals and objectives of national and federal projects.

For instance, support of technology startups facilitates fulfilment of the national objective of accelerating technological development of the Russian Federation. As of today, the Fund's infrastructure network supports more than 800 small technology businesses (startups). The steady increase in revenues of the infrastructure network and the supported technology businesses (more than 9.4 RUB billion in 2019) builds a foundation for attracting investments to infrastructure projects and for them to break even starting from 2023.

In terms of development of continuing education programs and the system of qualifications for the nanoindustry, the Fund contributes to the accomplishment of the objectives established by national projects to provide the economy with high-skilled professionals via working with all tiers of education. By 2020, the Fund had supported the creation of 199 advanced training and retraining programs for high-tech specialists and contributed to the development of 70 professional nanoindustry standards. Considerable attention is paid to creating state-of-the-art digital educational materials on nanoindustry, high-tech, and tech entrepreneurship for edunano.ru.

To provide early career guidance and stimulate interest of schoolchildren to innovations, the Fund carries out a range of projects to improve quality of natural science education and motivate children to choose research, engineering and technical, and tech entrepreneurship majors, primarily via the RUSNANO School League program and the Stemford e-learning platform that unite over 1,000 schools around Russia.

In terms of creating an enabling regulatory environment, the Fund aims to update the national legislation as needed and develop new tools to meet the current needs of the innovative sector of economy. In the reporting period, the Fund's main focus was made on improving the legislative and regulatory framework for the development of forms of business ownership and mechanisms of operations of innovative companies and funds.

The tools for advanced standardization, innovativeness evaluation, quality and safety assurance, special measurements, and testing of new products developed by the Fund as well as the regulatory and technical infrastructure may greatly contribute to the accomplishment of goals and objectives of a range of national projects. With the Fund's support, 680 documents had been issued to certify the quality, safety, eco-friendliness, and innovative nature of products, technologies, facilities, and management systems and 255 national and interstate nanotechnology standards had been developed by the end of 2019. The Fund established comprehensive regulatory and technical innovation support centers in 6 federal districts of the Russian Federation to facilitate rapid commercialization of new solutions.

The boost the domestic demand for innovations, the Fund cooperates with large-scale Russian companies, federal and regional executive bodies. For instance, in 2019, 22 nanotechnology-based solutions were added to the design documentation of Gazprom's investment projects; 19 technology solutions had been being implemented at Transneft's facilities. The Fund also used innovative materials to overhaul more than 5,000 apartment blocks for the lump sum of 4.5 RUB billion.

The Fund advances its communication channels and modern formats and supports projects that seek to engage young people in innovation and technology businesses. For instance, the audience of joint pop-sci projects of the Fund and the federal mass media and bloggers measures in hundreds of thousands; Science Bar Hopping festivals and Science Slam contests are the Fund's youth-targeted events that continue to gather thousands of people at urban venues.

The Fund accomplished all of its targets for 2019. 2020 promises a challenge given the global economic situation; however, we have every reason to be sure the Fund will remain a reliable partner in ensuring effective development of the Russian innovative sector of economy.

GEOGRAPHIC REACH

15
NANOTECHNOLOGY CENTERS

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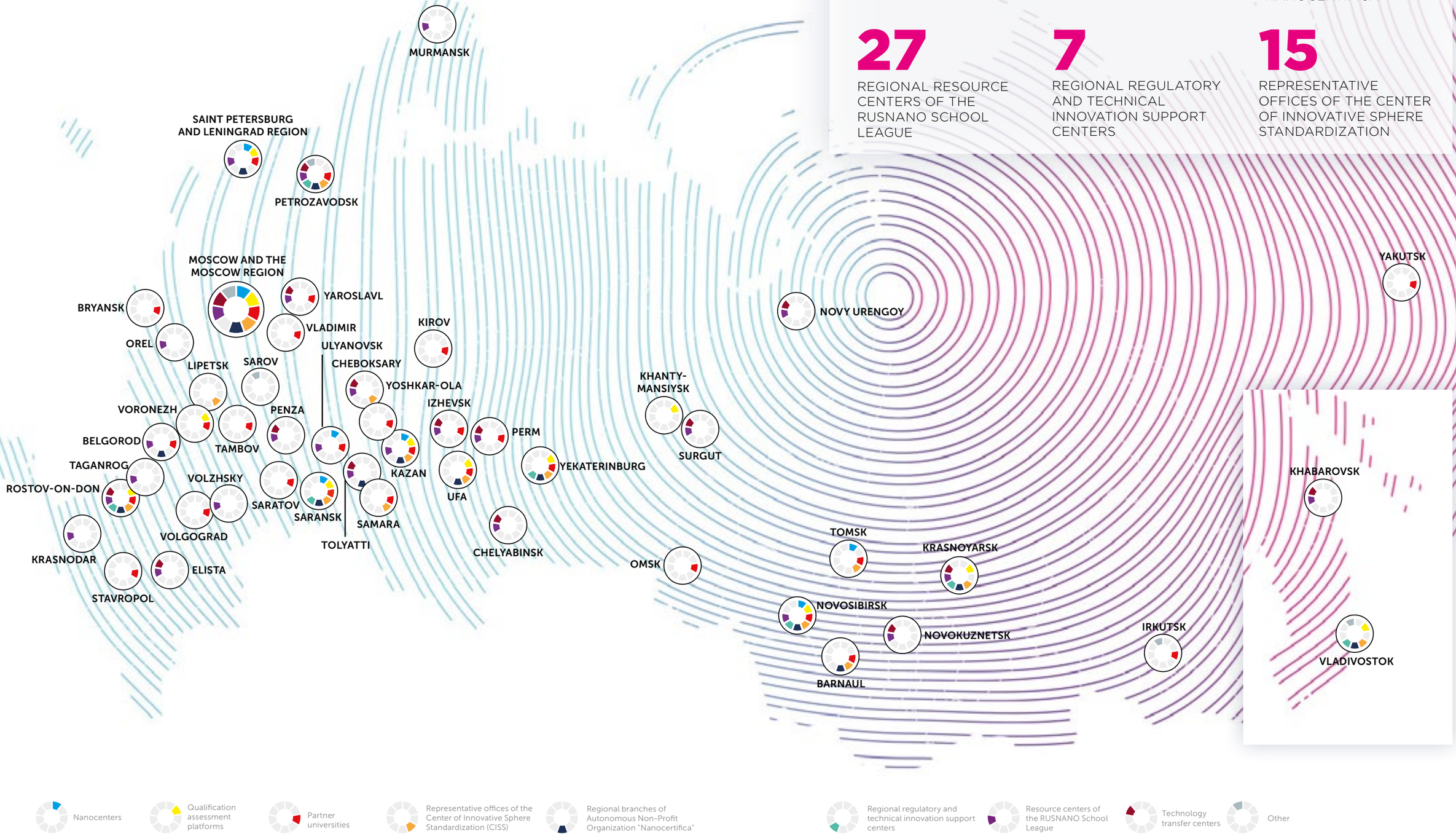


Nanocenters
Qualification assessment platforms
Partner universities
Representative offices of the Center of Innovative Sphere Standardization (CISS)
Regional branches of Autonomous Non-Profit Organization "Nanocertifica"
Regional regulatory and technical innovation support centers
Resource centers of the RUSNANO School League
Technology transfer centers
Other

THE FUND FOR INFRASTRUCTURE AND EDUCATIONAL PROJECTS

the only institution focusing on the innovative infrastructure development in the nanoindustry and the high-tech sectors related thereto in Russia

ABOUT THE FUND

THE FUND'S MISSION

PROMOTE INNOVATIVE DEVELOPMENT OF THE RUSSIAN ECONOMY IN THE NANOTECHNOLOGY SECTOR AND THE HIGH-TECHNOLOGY ECONOMIC SECTORS CONNECTED THEREWITH.

THE FUND FOR INFRASTRUCTURE AND EDUCATIONAL PROGRAMS

(HEREINAFTER REFERRED TO AS THE FUND) WAS CREATED ON THE BASIS OF FEDERAL LAW NO. 211-ФЗ "ON THE REORGANIZATION OF THE RUSSIAN CORPORATION OF NANOTECHNOLOGIES" DATED 27.07.2010 FOR THE PURPOSE OF INFRASTRUCTURE DEVELOPMENT IN THE FIELD OF NANOTECHNOLOGIES. THE FUND IS INCLUDED IN THE RUSNANO GROUP TOGETHER WITH RUSNANO JSC AND RUSNANO MANAGEMENT COMPANY.

In the system of development institutions of the Russian Federation, the Fund is the only innovative nanoindustry infrastructure development institution and ensures support at the pre-seed, seed, and venture stages of development of innovative companies by developing infrastructure and conditions for technology transfer, creating and supporting incubation of small innovative companies.

SUSTAINABILITY OF THE FUND, RELIABILITY AND ADAPTABILITY OF FINANCIAL AND NON-FINANCIAL SUPPORT MECHANISMS FOR INNOVATION, INNOVATION ECOSYSTEMS, AND ENTERPRISES IN NANOTECHNOLOGY AND RELATED SECTORS OF THE ECONOMY IS PROVIDED BY FOCUSING ON THE FOLLOWING PRINCIPLES:

PUBLICITY AND OPENNESS

- provision of wide access to activity results
- cooperation with Russian and foreign entities

PROJECT-BASED APPROACH

- aspiration to obtain a complete solution for specific partners
- use of co-financing mechanisms for all types of projects

INTERDISCIPLINARITY

- activity at the interface between subject areas
- acceleration of transfer of new knowledge and competencies, as well as creation of innovative companies

COOPERATION AND PARTNERSHIP

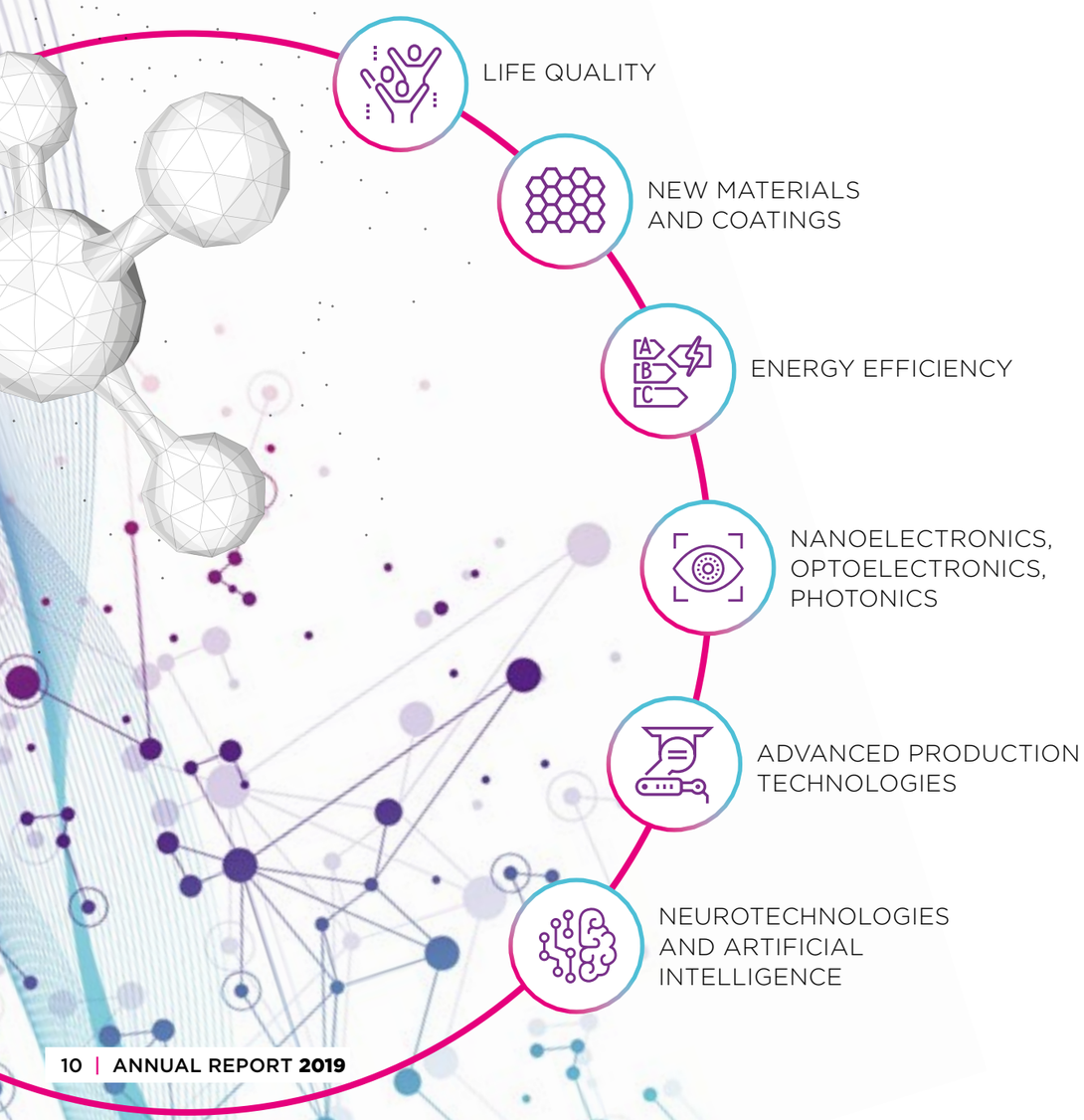
- coordination with Russian development institutions, government agencies
- combination of efforts in the field of infrastructure and ecosystem development

REGIONAL ORIENTATION

- activities in most regions of the Russian Federation
- promotion of wide use of innovative products in regional economies

1.1
FIELDS OF ACTIVITY

CONTINUOUS MONITORING OF MARKET NEEDS, TRENDS, AND PROMISING FIELDS HAS FORMED THE FUND'S INVESTMENT FOCUS FOR THE PERIOD UP TO 2024 THAT COMPRISES A NUMBER OF DYNAMICALLY GROWING MARKETS OF APPLICATION (IN THE SECTORAL CONTEXT) IN THE TECHNOLOGY SECTORS ASSOCIATED WITH THE PRODUCTS MANUFACTURED USING NANOTECHNOLOGIES (NANO-ENABLED) OR NANOMATERIALS, AND NANOCOMPONENTS:



THE FUND CONDUCTS COMPREHENSIVE WORK ON THE DEVELOPMENT OF THE TECHNOLOGY SECTORS INCLUDED IN THE INVESTMENT FOCUS OF ACTIVITY IN THE FOUR FIELDS:

1 INFRASTRUCTURE PROJECTS

Since 2011, the Fund's network of infrastructure centers has been being developed on a competitive basis to increase the scale and number of supported small innovative companies (startups) directly creating new products and solutions. There, startup selection and creation competencies have developed on the basis of understanding the primary technology areas, accumulated experience of interaction with various entrepreneurs and engaged companies. Specialized technological services have developed on the basis of several of the Fund's technological services, without which the access of independent small innovative companies to the necessary operations (prototyping, industrial design, etc.) is hindered or highly costly.

After the company's strategy had been upgraded, an "innovation conveyor"-based managerial model was introduced in 2016. We technologize activities in the sphere of establishment of new startups as much as possible to speed up the process of establishment and improve the quality of new startups for future sale or other cost-effective project exit by the nanocenter, as well as to develop technology solutions in more detail and market them.

The continuing nanocenter network optimization allows distributing the available funds between the most efficiently developing projects and programs by directing these funds to the potentially more efficient proposals.

THE FIELD'S KEY OBJECTIVES ARE AS FOLLOWS:

- attainment of self-sufficiency by infrastructure centers by 2023 and attainment of a self-sustained budget by the Fund by 2025[1];
- improved nanocenter project portfolio management efficiency[1];
- expansion in the number of organizations involved in technological innovations[1];
- creation of conditions for attracting investment from a wide range of sources, both domestic and international, intended to finance the Fund's projects and programs, including the ones fulfilled in partnership with the Fund;
- acceleration of established and supported companies to transit to further stages of readiness of technological products and services;
- improved access to technology transfer via collaboration with international companies and associations, participation in technological consortiums.

1 Introduced by the Strategy approved on December 18, 2019.

2 EDUCATIONAL PROJECTS

THIS FIELD INVOLVES DEVELOPMENT OF QUALIFICATIONS, ADDITIONAL EDUCATION FOR CHILDREN AND YOUTH, NEW EDUCATIONAL TECHNOLOGIES, INCLUDING E-LEARNING

Technological makeover of the Russian economy has resulted in increasing requirements to qualifications and relevance of continuous education. The educational projects and programs completed by the Fund help to develop the skilled personnel market and the professional education system in the sphere of nanoindustry and are intended to eliminate qualification shortages and ensure sustainable reproduction of quality human resources for the nanotechnology economic sector and the high-tech sectors related thereto.

The Fund aims to timely identify and supply new qualifications to the labor market to eliminate the imbalance between the employers' demand and the talent development framework supply. We examine the labor demand of businesses, foster demand of services of the industry segment of the national qualification system, and support involvement of children and youth to project-based and research activities in the spheres of natural sciences and technological entrepreneurship.

THE FIELD'S KEY OBJECTIVES ARE AS FOLLOWS:

- development and replication of efficient solutions and models of preparing highly qualified and sought specialists within the continuing professional education system given the speed of technology development;
- development of the national qualification system infrastructure in the nanotechnology economic sector and the high-technology economic sectors connected therewith, development and introduction of its instruments into commercial practice;
- development of a comprehensive continuing educational environment to ensure a continuous educational path for children and youths in the spheres of natural sciences, engineering, and tech entrepreneurship to help them build a professional career in the high-technology sphere;
- development of attraction mechanisms, financial and budgeting, research and methodological, and expert support of educational projects intended to develop modern educational content and technologies for training children, youths, and teachers in the spheres of natural science and technology.

3 INSTITUTIONAL SUPPORT

THIS FIELD INVOLVES ENSURING A FAVORABLE REGULATORY ENVIRONMENT, PROMOTING TERRITORIAL AND CLUSTER-TYPE DEVELOPMENT OF REGULATORY AND ENGINEERING INSTRUMENTS TO SUPPORT INNOVATION, AS WELL AS PROJECTS TO STIMULATE DEMAND FOR INNOVATIVE PRODUCTS.

Over the years, the Fund has participated in developing a set of suggestions to improve the regulatory environment in the interests of innovative development in cooperation with other innovative development institutions, professional communities, and other stakeholders; designed regional regulatory and technical services for developers and manufacturers of new products to help reduce the time and financial expenses to prepare new products for market launch; fulfilled the initiatives facilitating improvement of the legislative and regulatory framework for innovative activities. The Fund also opened regional markets for innovative products and services and successfully completed demand stimulation projects to facilitate scaling of use of innovative products in key economic sectors.

The Fund supports promotion of high-technology products of Russian innovative companies for federal and local government procurement and corporate markets and implements measures facilitating development of regulatory and legislative conditions for technology business operations and removing the institutional barriers preventing development of innovative companies.

The Fund has supported technology companies to develop advanced and sufficient regulatory and technical instruments intended to develop conditions for sustainable market launch and turnover of new quality and safe (competitive) high-technology products at early stages, developed the "Technology, Regulatory, and Technical Expertise Map" electronic resource.

THE FIELD'S KEY OBJECTIVES ARE AS FOLLOWS:

- initiation and participation in the implementation of significant country-wide programs and projects in the field of innovative development of the economy and other initiatives to facilitate development of high technologies and achieve the national development goals of the Russian Federation;
- support of development of a legislative and regulatory framework for innovative activities, including in the sphere of digital economy, to develop tech entrepreneurship and the private equity and venture capital market;
- cooperation with trade organizations as well as participation in the events aimed at improving relevance and transparency of the data about the Russian private equity and venture capital market, including to attract foreign investment to the Russian Federation;
- development and expansion of the demand for innovative products and services of the nanotechnology sector and the high-tech sectors related thereto on the part of regional and sectoral consumers;
- support of the manufacturers exporting nanotechnology and related high-technology products via cooperation with specialized development institutions;
- development of the regulatory and technical support infrastructure for accelerating innovative growth in the nanotechnology sector and the high-tech sectors related thereto in federal districts of the Russian Federation and expansion of the Fund's regulatory and technical support instruments to territories of the Eurasian Economic Union / the Commonwealth of Independent States;
- promotion of regulatory and technical services to introduce innovative solutions, replace obsolete technologies, and stimulate development of new competitive products, as well as organization of production thereof;

- improvement of quality of technology solutions and of the dominant technological expertise of regions by setting and confirming stricter regulatory and technical requirements to the parameters and specifications of products and technologies;
- development of favorable conditions for market launch and turnover of new products characterized by better consumer properties, as well as for wider use of state-of-the-art technologies via optimization of certification of advanced products and innovativeness evaluation of enterprises;
- promotion of generation, development, and compliance with international rules and standards of environmentally-friendly innovative technologies and enterprises, as well as of a nationwide system for ensuring safety of products.

INFORMATION SUPPORT

The Fund provides innovation consumers with information and organizational support for the purposes of searching for, selecting, and positioning innovations, exposing the most current and promising technological inventions, and improving efficacy of introduction and expansion of the scope of use of nanotechnology solutions, nanomaterials, and high-technology products.

Since 2016, the Fund has been carrying out the "Integrational program in the sphere of nanotechnology and nanoindustry popularization." It is aimed at stimulating interest and increase in innovative activities of existing and potential agents of innovation, raising their awareness of the innovative system, its main elements, facilities, and available services, developing the reputational attractiveness of innovation and technology to the youth.

THE FIELD'S KEY OBJECTIVES ARE AS FOLLOWS:

- promotion of products of existing and potential nanotechnology manufacturers and in the sphere of high-technology connected therewith;
- development of various systems of informing consumers and raising their awareness of innovative products, scope of its use, and the Fund's activities aimed at completing infrastructure projects and providing ecosystemic support to tech entrepreneurs;
- popularization of achievements of engineers and entrepreneurs and of their role in the country's socioeconomic development, including tech entrepreneurship development and commercial implementation of innovations;
- improvement of innovation susceptibility and involvement of the key target audiences (scientific and pedagogical communities, representatives of executive and legislative power at the federal and regional levels, business community, engineering and technical staff and professionals, representatives of the mass media and the expert community, schoolchildren, and students) in support of innovations and nanotechnology;
- observation of the current global technological agenda in the Russian Federation within the technology fields of the Fund's activity;
- raising the interest of media channels to the topic of innovation in the Russian Federation.

1.2 OVERVIEW OF THE GLOBAL AND RUSSIAN NANOTECHNOLOGY MARKET

OVERVIEW OF THE GLOBAL NANOTECHNOLOGY MARKET

IN THE PAST TWO DECADES, NANOTECHNOLOGIES HAVE REVOLUTIONIZED THE TECHNOLOGY MARKET. TODAY, THEY HAVE CONFIDENTLY MOVED FROM THE REVOLUTIONARY BREAKTHROUGH TO THE GROUP OF MOST HIGHLY SOUGHT AFTER SPHERES OF ADVANCEMENT OF SCIENCE AND TECHNOLOGY AROUND THE WORLD. TENS OF COUNTRIES HAVE IMPLEMENTED NATIONAL NANOTECHNOLOGY DEVELOPMENT PROGRAMS[2]. THE DEMAND OF A WIDE RANGE OF INDUSTRIES, BOTH NEW (E.G., NEW MATERIALS) AND TRADITIONAL ONES (MEDICINE, POWER INDUSTRY, ETC.), FOR NANOTECHNOLOGIES IS GROWING WITH EACH PASSING DAY.

IN TERMS OF THE AMOUNT OF INVESTMENT IN NANOTECHNOLOGIES, THE FOLLOWING COUNTRIES ARE AMONG THE GLOBAL LEADERS:

THE USA,

as they remain the leader in terms of federal investment in the nanoindustry (more than $1.4 bn in 2019 and ca. $29 bn in the accumulated debt)[3].

TAIWAN,

where the second phase of the national nanotechnology program with the budget of $0.7 bn was completed in 2015.

JAPAN,

as they have been maintaining the annual budget for nanotechnology development of ca. $0.9 bn since 2001[4].

GERMANY,

where more than €0.5 bn is annually assigned from the federal budget to finance the national nanotechnology program.

SOUTH KOREA,

as they have invested $3.1 bn to fulfill the nanotechnology development plan since 2011[5].

2 The first one of them was launched in the USA in 2000; Russia joined these countries in 2007.
3 The National Nanotechnology Initiative Supplement to the President's 2020 Budget, August 2019 (2001–2018—actual data, 2019—estimated data).
4 OG Analysis "Global Nanotechnology Market to 2025", 2018.
5 "The nanotechnology and nanomaterials global opportunity report", Future Markets, October 2016.

THE APPLIED NATURE OF RESEARCH IS THE REASON BEHIND AN ACTIVE GROWTH IN THE NUMBER OF PATENTS. FOR INSTANCE, IN 2019, THE NUMBER OF INTERNATIONAL PATENT GROUPS DEVOTED TO NANOOBJECTS, NANOTECHNOLOGY, AND NANOPRODUCTS EXCEEDED 200 THOUSAND, AND THE NUMBER OF PATENT APPLICATIONS ALMOST REACHED 400 THOUSAND[6].

China is the key player in this market—more than 65 thousand patents in the sphere of nanotechnology. It is followed by the USA (28 thousand patents), South Korea (17 thousand patents), and Japan (10 thousand patents). The leadership of Chinese corporations also grew stronger in 2019—Chinese universities occupy all the top 10 positions in the ranking of the universities most protected in terms of intellectual property in the sphere of nanotechnology.

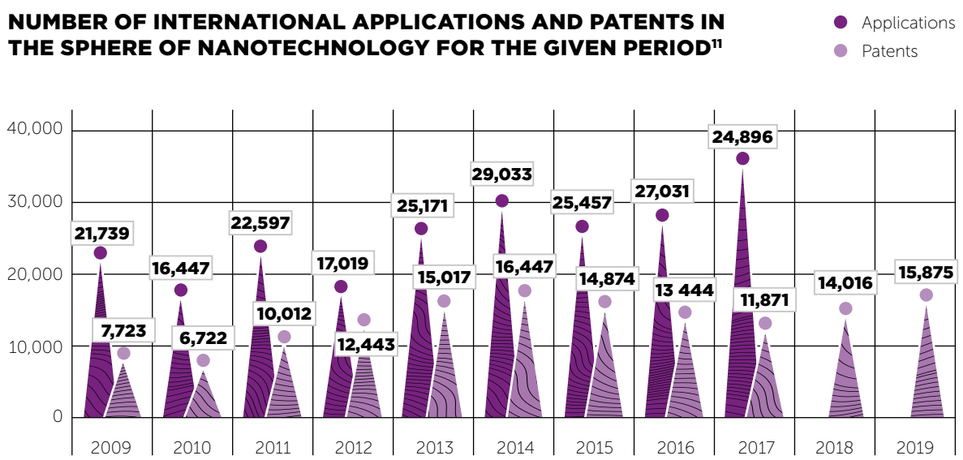
The main spheres of use of nanotechnologies—production of semiconductors (20.6% of the global market) and healthcare (16.4%)—hold more than a third of the global market.

The USA is the largest nanotechnology market. There, the nanotechnology research concerns medicine, production of semiconductors, and electronics. In Europe, nanotechnologies are also considered among the key innovative technologies: the EU Horizon program involves nanomodified multifunctional materials and components, nanosurfaces, surface and membrane modification, biological nanomaterials, functional construction nanomaterials, and nanopharmaceuticals. The Asia–Pacific market, particularly, Japan, South Korea, China, and Taiwan, is the fastest growing: its key segments are production of semiconductors and consumer electronics.

On the cusp of 2000–2010s, CMP Cientifica and Lux Research — the largest European information agencies[7] — estimated the nanotechnology market size highly. However, the overall estimate was based on the proceedings from "selling nanotechnology-containing products"[8]. Current approaches to estimates allow "isolating" the cost of nanocomponents.

New materials are among the primary components of technological development[9], as they play a crucial role in updating functions of any devices. At the same time, along with biomaterials, nanomaterials determine growth of the whole new materials market[10]. The nanomaterials market size in 2019 amounted to $49 bn. Analytical agencies are expecting a different growth rate until 2027: from 8.89% (Research Nester) to 18% (OG Analysis).

NUMBER OF INTERNATIONAL APPLICATIONS AND PATENTS IN THE SPHERE OF NANOTECHNOLOGY FOR THE GIVEN PERIOD[11]



6 *Data from RWS &Minesoft Ltd; http://patbase.com.*
7 *Lux Research, "Nanotechnology Market Update (2015–2020)."*
8 *The nanotechnology market size included not only the cost of the nanotechnological component, but also the total cost of the products containing such components.*
9 *Top Trends for 2020: 10 Growth Opportunities Shaping Businesses and Personal Lives, Live webcast Session 1, Frost & Sullivan, Feb 2020.*
10 *Global Advanced Materials Market Outlook: Industry Analysis & Opportunity Evaluation, 2017-2027F, Research Nester, Sep 2019.*
11 *The data on the number of applications for years 2018–2019 are not presented, because the time to publish an application may take up to two years.*

MAIN SPHERES OF USE OF NANOTECHNOLOGIES

20.6% OF THE GLOBAL MARKET ARE SEMICONDUCTORS

16.4% OF THE GLOBAL MARKET IS HEALTHCARE

The areas of implementation of nanotechnologies are constantly expanding covering the spheres of medicine, biotechnologies, agriculture, and food industry. In 2019, the size of the global nanomedicine market was estimated at $176 bn. It is expected to reach $277 bn by 2024 (CAGR 9.5%)[12]. American companies hold almost half the market. More than 100 nanomedical products, devices, and systems have been approved by the US FDA in the recent decades[13].

Renewable energy is an important area of implementation of nanotechnologies. Solar power has been becoming a leader in this area in the recent years. Since 2017, the total installed capacity of solar power stations has been higher than of wind, water, or biofuel power stations[14].

According to Bloomberg New Energy Finance, by 2040, the total installed capacity of solar farms will have amounted to 22% of the total global installed capacity of 13,919 GW, i.e., more than 3,000 GW. Furthermore, 10% of the global power capacity, or over 1,400 GW, will have been covered by small solar power systems operating at households and enterprises. By 2050, ca. 50% of the global power generation will have been covered by solar and wind power[15].

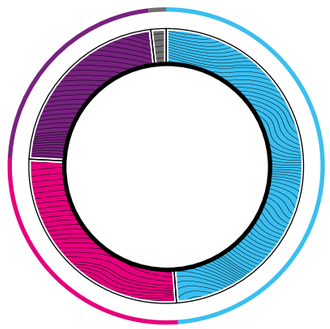
Such an active growth of this segment of renewable energy is caused by a drastic drop in the price of solar modules and a continuing increase in their energy conversion efficiency. In the past 10 years, the average efficiency of solar modules has grown from 14.7% to 18.4%: the average power of a standard module has grown from 241.5 to 302.5 W. At the same time, the price per W has gone down from $1.7 to $0.24[16].

Such a significant reduction in the price of solar batteries has been caused by the effect of economies of scale and the learning curve for the module price depending on the total scope of delivery (the slope of the curve is 40% for the past 10 years) in the industry of silicon photovoltaics—the dominant technology in the sphere of solar power.

SPHERES OF USE OF NANOTECHNOLOGIES[17], %

20.6 Semiconductors
16.4 Healthcare
10.8 Consumer electronics
10.6 Car manufacturing
10.5 Foodstuff production and agriculture
9.3 Defense and space industry
8.9 Chemical industry
4.6 Textile industry
3.7 Cosmetics
4.6 Other

GLOBAL NANOTECHNOLOGY MARKET BY REGION, %



49 America (North and South)
27 Europe
22 Asia–Pacific Region
2 Other World

12 *Global healthcare nanotechnology market grow (status and outlook) 2019-2014, LP Information, Dec 2019.*
13 *Farjadian F. et al, Nanopharmaceuticals and nanomedicines currently on the market: challenges and opportunities, Nanomedicine (Lond.), Future Science group, Nov 2018.*
14 *Renewables 2019: Global Status Report.*
15 *BNEF, New Energy Outlook 2019.*
16 *International Technology Roadmap for Photovoltaic (ITRPV), 10th Edition, March 2019.*
17 *Global Nanotechnology Market to 2025, OG Analysisis, 2018.*

OVERVIEW OF THE RUSSIAN NANOTECHNOLOGY MARKET

ACCORDING TO THE RUSSIAN FEDERAL STATE STATISTIC SERVICE[18], IN 2019, NANOINDUSTRY PRODUCTS WERE MANUFACTURED BY

524

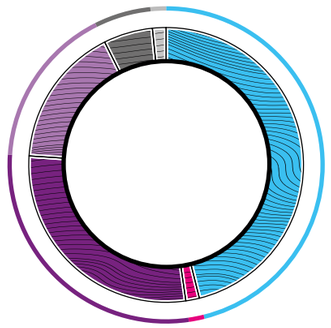
ENTERPRISES AND ORGANIZATIONS

THE SHARE OF NANOTECHNOLOGY PRODUCTS AMOUNTED TO

2.3%

IN THE TOTAL MANUFACTURING OUTPUT

SECTORAL MAKEUP OF NANOINDUSTRY ENTERPRISES, %



- **46** Manufacturing
- **2** Construction
- **28** Scientific and technological activities
- **16** Professional higher education services
- **6** Healthcare
- **2** Information and communications

According to the Russian Federal State Statistic Service[18], in 2019, 524 enterprises and organizations manufactured nanoindustry products. Furthermore, 2 companies produced high-technology materials for nanoindustry companies. RUSNANO JSC took part in the establishment of 83 of these companies[19].

More than 250 of these companies employing nanotechnologies are large and medium-sized. Of them, 94 (ca. 18% of the nanoindustry enterprises) exercised technological innovations. 99 nanoindustry enterprises and organizations exported their products. 186 organizations performed R&D in the sphere of nanotechnologies; 90 of them are specialized research organizations, 74—higher-educational institutions.

Apart from the aforementioned manufacturing companies, the infrastructure objects established in partnership with the Fund also conducted activities in the sphere of nanoindustry. By the beginning of 2020, there were 13 active nanotechnological centers, 9 technological engineering companies, and 2 technology transfer/commercialization centers. 811 small innovative companies were residents of infrastructure objects by that time.

In 2019, nanoindustry enterprises shipped 5.897 bn rubles of own products[20], including 600.1 bn rubles of products of special purpose entities. In comparison with the previous year, the proceedings of all nanoindustry enterprises and organizations from shipped products in terms of ex factory prices reduced by 1.6%; however, they increased by 7.8% in special purpose entities.

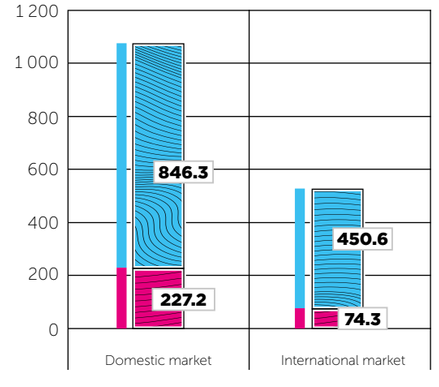
In 2019, the total amount of purchased products and services associated with nanotechnologies was 1.6 tn rubles[21], i.e., 27% of the total products shipped to the consumers by nanoindustry enterprises. Special purpose entities sold 301.5 bn rubles of products[22], i.e., half of the products they shipped. Therefore, special purpose entities furnished 19% of the total nanoproceedings in the year under review (in 2018—17%).

The share of nanotechnology products in the total industrial output was 2.3%.

In comparison with the previous year, in 2019, the amount of nanoproducts shipped to consumers remained almost the same. At the same time, the amount of R&D in the sphere of nanotechnologies reduced by 22%. The reduction took place in the setting of the increase of 1.7% in the industrial products shipped to consumers in 2019.

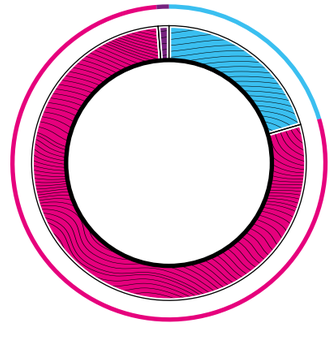
18 Hereinafter, only the companies that have filed their reports are taken into account.
19 By the beginning of 2020, RUSNANO JSC had 47 companies in its portfolio and had withdrawn from 36 companies.
20 Not only nanoproducts.
21 This amounts to ca. 2 tn rubles in terms of end-user prices.
22 Furthermore, 3.5 bn rubles of raw materials for the nanoindustry were produced.

AMOUNT AND DYNAMICS OF SHIPPING OF NANOPRODUCTS TO CONSUMERS, BN RUBLES



- Independent manufacturers
- JSC Rusnano project companies

STRUCTURE OF NANOPRODUCTION OUTPUT BY TYPES OF ECONOMIC ACTIVITY, %



- **21** Extraction of mineral resources
- **78** Processing industries
- **1** Other

In 2019, independent manufacturers insignificantly reduced shipments of nanotechnology products to the domestic and international markets. The gain in production of special purpose entities helped to compensate this reduction only in the domestic market. Exports decreased insignificantly, in some part due to Russian ruble's strengthening.

The reduction in the output of nanotechnology products took place mainly at large and medium-sized enterprises. In comparison with the previous year, these enterprises reduced shipping of nanoproducts to consumers by 1.6%. Small nanoindustry companies increased the output of nanoproducts by 6.2% in 2019. They manufacture ca. 1% of nanotechnology products.

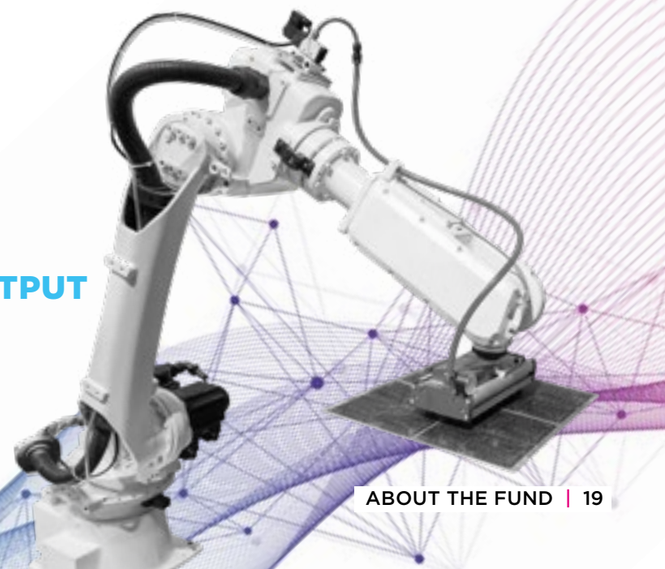
In 2019, the dynamics of output of the products and rendering of the services associated with nanotechnologies differed between companies of different types of economic activity. For instance, the extractive industry was characterized by a significant gain in production (by 39%), whereas process manufacturing companies—by a decrease (by 7%). The decrease in nanoproduction was reported by enterprises of almost all process manufacturing branches, except for pharmaceuticals and the materials used for medical purposes (increase of 50%), production of motor vehicles, trailers, and semitrailers (increase of 20%), metallurgical production (increase of 12%), and production of foodstuffs (increase of 9.8%).

IN 2019,

99%

OF THE NANOINDUSTRY OUTPUT

WAS CONCENTRATED IN THE SPHERES OF EXTRACTION OF MINERAL RESOURCES AND PROCESS MANUFACTURING.



SPECIAL PURPOSE PROCESS MANUFACTURING COMPANIES OF RUSNANO JSC

Branch	Number of companies	Output, bn rubles
Metallurgical production	7	208.9
Production of chemical substances and chemical products	9	40.1
Other non-metal mineral production	5	4.0
Production of computers, electronic and optical devices	10	19.7
Metal treatment and coating	7	0.7
Pharmaceutical production	3	5.9
Healthcare activities	10	1.7

DYNAMICS OF NANOTECHNOLOGICAL PRODUCTION BY TYPES OF NANOINDUSTRY PRODUCTS

Product type	Total, bn rubles	As a percentage over 2018
Total nanoindustry output including	**1,598.4**	**99.9**
Type A (primary nanotechnology products)	177.2	101.7
Type B (nano-containing products)	355.2	108.8
Type C (services / non-nano-containing goods, the rendering/ production whereof is performed using nanotechnologies and/or nanocomponents)[23]	1,064.4	96.9
Type D (special equipment for nanotechnologies)	1.6	200

In 2019, the nanotechnological production by types of nanoindustry products[24] was characterized by the gain in production of all types of nanoindustry production, except for the one with the highest specific weight in the output—type C.

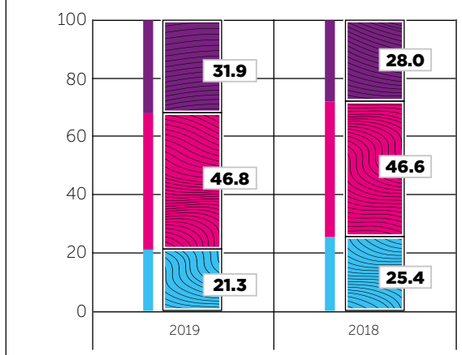
In 2019, the type A production increased by 1.7%. Special purpose entities increased the type A production by 27%, and the share of such products reached 39%. The type B production increased by 8.8%. Special purpose entities manufacture more than half of type B products and increased such production by 14% in the year under review. Type C products constituted two thirds of the nanoindustry output in 2019. The output thereof decreased by 3.1% in the year under review, including by 14% in special purpose entities. The type D production almost doubled in comparison with 2018. Special purpose entities reduced nanoindustry equipment production by 44%, and their share amounted to 12%.

In 2019, exports of nanoindustry products under direct contracts exceeded 0.5 tn rubles. The share of the nanoindustry in the total exports from the Russian Federation[25] amounted to 1.9%, i.e., at the level of 2018. When the total exports of goods and services decreased by 6.0%, the exports of nanoindustry products decreased by only 0.2%.

74.3 RUB BN

DIRECT EXPORT OF PROJECT COMPANIES (25% OF THE NANOINDUSTRY PRODUCTION OUTPUT)

NANOINDUSTRY PRODUCT EXPORT STRUCTURE, %



IN THE YEAR UNDER REVIEW, MOST NANOINDUSTRY EXPORTS WERE ATTRIBUTED TO FOUR BRANCHES:

32%
CRUDE OIL PRODUCTION

21%
PRODUCTION OF COKE AND PETROLEUM PRODUCTS

32%
PRODUCTION OF CHEMICAL SUBSTANCES AND CHEMICAL PRODUCTS

11%
METALLURGICAL PRODUCTION

Nanoindustry enterprises exported one third of the manufactured products. Direct exports of special purpose entities[26] amounted to 74.3 bn rubles[27] (25% of the nanoindustry production). Therefore, special purpose entities furnished 14% of all nanotechnology product exports.

Exports of special purpose entities increased by 9.3%. This indicates development of a competitive export-oriented nanoindustry sector. Nanotechnological output of export-oriented companies exceeds 80% of the total nanotechnological output. Exports of nanoproducts constitute a significant part of total proceedings of a wide range of companies.

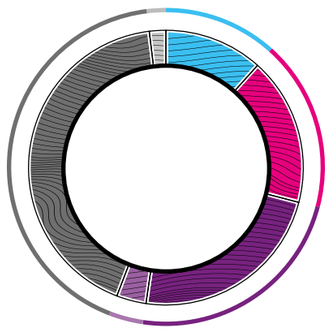
23 Including R&D.
24 Defined by Resolution No. 1192-p of the Government of the Russian Federation dated July 07, 2011.

25 According to the Russian Federal Tax Service.
26 Special purpose entities carried out only non-resource-based and non-energy exports.
27 Furthermore, exports of special purpose entities through intermediaries amounted to 3.8 bn rubles.

TYPES OF COMPANIES BY EXPORT SIGNIFICANCE

Export significance	Number of companies	Total output, bn rubles	Exports, bn rubles
Share of exports in the output less than 10%	43	311.3	16.1
including special purpose entities of RUSNANO JSC	14	91.0	5.7
Share of exports in the output from 10% to 25%	18	148.5	28.4
including special purpose entities of RUSNANO JSC	5	88.1	19.3
Share of exports in the output from 25% to 50%	13	70.9	31.2
including special purpose entities of RUSNANO JSC	3	60.3	28.0
Share of exports in the output over 50%	25	802.8	449.2
including special purpose entities of RUSNANO JSC	10	32.3	21.3
TOTAL	**99**	**1,333.4**	**524.9**

DISTRIBUTION OF LARGE AND MEDIUM-SIZED NANOINDUSTRY ENTERPRISES BY TECHNOLOGICAL DEVELOPMENT LEVEL AND RESEARCH INTENSITY OF TYPES OF ACTIVITY, %



12 High-tech activity types
17 Higher medium-tech activity types
23 Lower medium-tech activity types
4 Low-tech industries
42 Knowledge-based industries
2 Other

Both in 2018 and 2019, more than a third of large medium-sized nanoindustry enterprises exercised technological innovations. This figure is significantly higher than the average industry level of ca. 10%; however, it is significantly lower than the level of 50% to be reached by 2024 as per Decree No. 204 of the President of the Russian Federation dated May 07, 2018.

The share of innovative products (including not only nanoproducts, but also other innovative goods and services) in the products shipped to consumers by large and medium-sized nanoindustry enterprises in 2019 was 16% (the average industry level was ca. 6–8%).

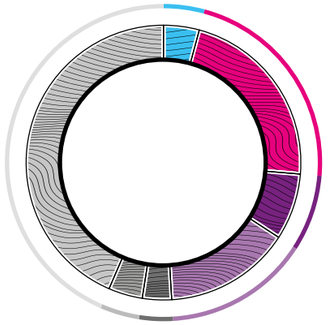
THE SHARE OF INNOVATIVE PRODUCTS IN THE OUTPUT OF LARGE AND MEDIUM-SIZED NANOINDUSTRY ENTERPRISES

16%

OWN PRODUCTS SHIPPED / WORKS AND SERVICES RENDERED WITHOUT SUBCONTRACTING BY SEGMENTS, BN RUBLES

	TOTAL	Including	
		Nanoindustry output	Innovative output
High-tech activity types			
Production of pharmaceuticals and materials used for medical purposes	44.7	24.8	6.5
Production of computers, electronic and optical devices	141.5	31.9	66.0
Higher medium-tech activity types			
Production of chemical substances and chemical products	455.8	319.7	26.0
Production of electrical equipment	23.2	8.8	12.9
Production of other machinery and equipment	23.3	9.1	2.9
Production of motor vehicles, trailers, and semitrailers	34.8	5.3	9.8
Lower medium-tech activity types			
Production of coke and petroleum products	1,416.8	453.4	187.8
Production of rubber and plastic articles	58.1	29.5	14.5
Other non-metal mineral production	52.2	14.9	5.0
Metallurgical production	1,382.4	269.6	40.2
Production of finished metal products, except for machinery and equipment	89.1	15.4	1.7
Low-tech industries			
Foodstuff production	12.1	2.5	0.4
Beverage production	11.3	10.6	0.1
Knowledge-based industries			
Computer software development, counseling services connected therewith, and other related services	3.3	0.8	-
Research and development	113.1	7.8	20.8
Education	54.4	1.5	1.1
Healthcare activities	23.1	2.6	-

REGIONAL DISTRIBUTION OF NANOINDUSTRY COMPANIES, %



- **4** Moscow Region
- **22** Moscow
- **8** Saint Petersburg
- **15** Republic of Tatarstan
- **3** Novosibirsk Region
- **4** Sverdlovsk Region
- **44** Other

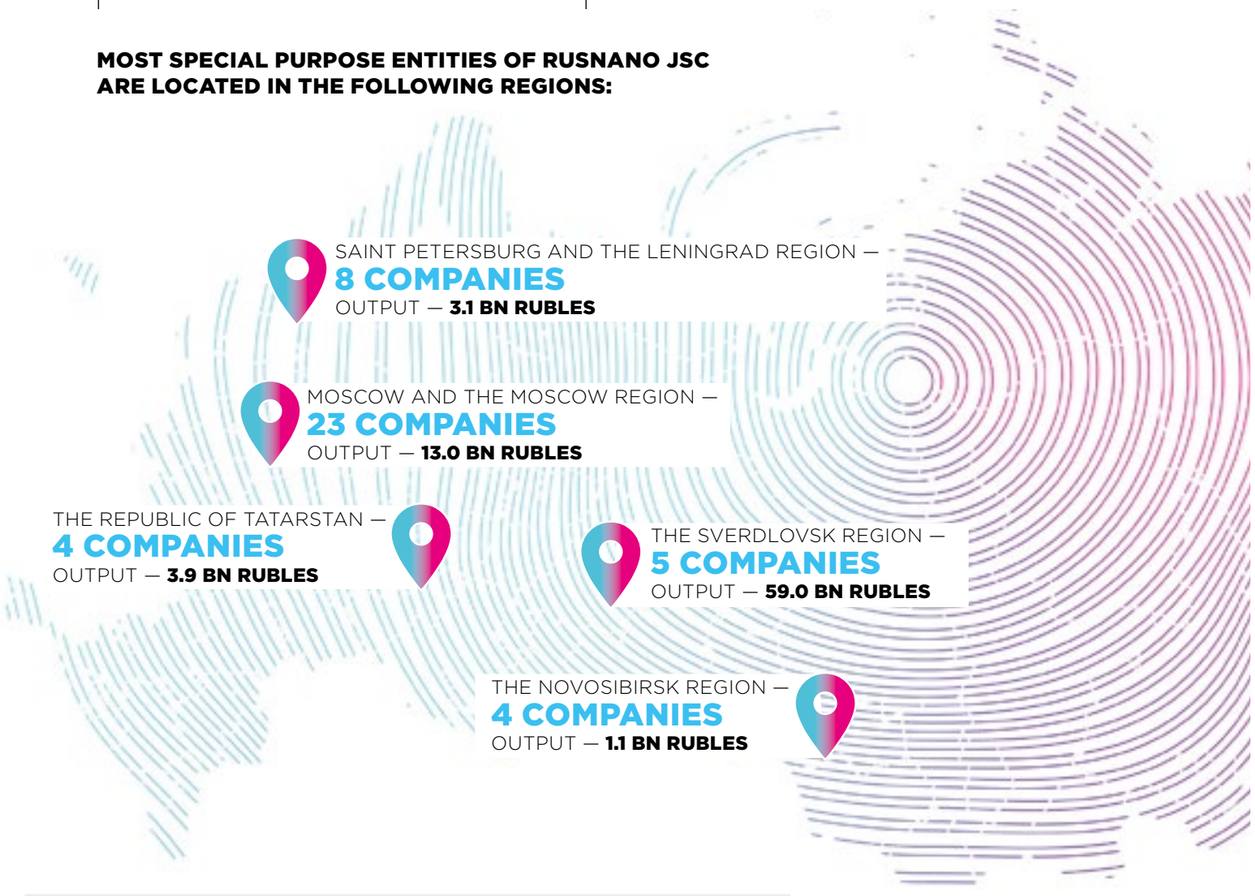
In 2019, the goods and services associated with nanotechnologies were produced and rendered by enterprises and organizations from 61 regions of the Russian Federation. More than 80% of the nanoindustry companies manufacturing 97% of all the nanoproducts are located in 26 regions.

The largest manufacturers of nanoproducts are the Republic of Tatarstan, the Perm Region, the Republic of Bashkortostan, the Samara Region, the Sverdlovsk Region, the Volgograd Region, and Saint Petersburg.

12 regions witnessed decreased nanoproduction, and this decrease was significant (more than 15%) in half the cases.

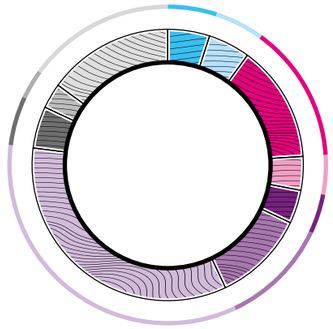
As of the beginning of 2020, the price of delivery contracts for nanotechnology-associated products in the nanoindustry[28] was 246.1 bn rubles (share of the federal and local government procurement—4.5%). The existing order portfolio furnishes[29] operation of enterprises for 1.9 months (at the beginning of 2019, the length of this period was 1.4 months). The order portfolio of special purpose entities amounted to 70.7 bn rubles, furnishing their operation for approximately 2.8 months.

MOST SPECIAL PURPOSE ENTITIES OF RUSNANO JSC ARE LOCATED IN THE FOLLOWING REGIONS:



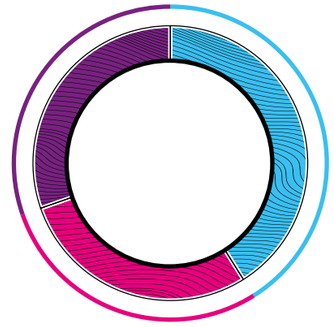
28 Not including R&D.
29 On the basis of the established monthly average output in 2019.

NANOPRODUCTION DISTRIBUTION BY REGIONS, %



- **5** Volgograd Region
- **5** Republic of Bashkortostan
- **14** Perm Region
- **4** Samara Region
- **4** Chelyabinsk Region
- **11** Saint Petersburg
- **34** Republic of Tatarstan
- **5** Sverdlovsk Region
- **3** Vologda Region
- **15** Other

STRUCTURE OF EXPENDITURES IN THE EDTECH SEGMENT, %



- **41** Equipment costs
- **29** Software costs
- **30** Content development costs

EDTECH GLOBAL MARKET

DIGITALIZATION OF ECONOMIC SECTORS IS BECOMING ONE OF THE MAIN FACTORS OF THE INCREASING ROLE OF CONTINUING AND CONTINUING PROFESSIONAL EDUCATION (CE AND CPE) AMONG ADULTS. DIGITAL EDUCATIONAL TECHNOLOGIES (EDTECH30) OPEN UP NEW POSSIBILITIES IN THE EDUCATIONAL ENVIRONMENT AS THEY HELP MAKE THE EDUCATIONAL PROCESS MORE EFFICIENT AND ACCESSIBLE TO ALL SEGMENTS.

According to the data published by the HolonIQ intelligence platform in 2019, in 2018, global education spending amounted to $5.9 tn. It is expected that the education spending will have reached $10 tn by 2030, i.e., ca. 6.5% of the global GDP annually.

The EdTech segment—digital education technologies combining pedagogics and information and communications technology—occupies a special place in the education market. EdTech integration in the educational process is intended to provide new, more contemporary ways of teaching and evaluating training results, as well as to improve efficiency of education on the whole.

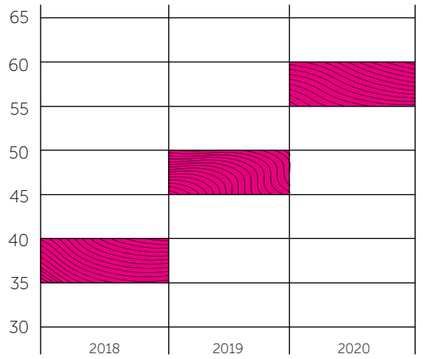
The EdTech segment holds ca. 1% of the global education market: in 2017, it was estimated at $57.7 bn[31].

However, according to projections, the compound annual growth rate (CAGR) of the EdTech market will amount to 14%, and by 2022, it will have reached $110.9 bn (1.5% of the education industry).

The EdTech market size and development rate vary greatly by regions. For instance, North America accounts for more than 40% of the global EdTech industry. At the same time, the share of Asia is estimated at about 30%, and China is especially prominent in some of the EdTech segments—its share there reaches 40%[32]. Russia

30 Educational technology refers not only to e-learning, but also to many other modern technologies that are becoming a part of the educational process: advanced smartphones, augmented and virtual reality, artificial intelligence, gamification.
31 BCC Research. October 2017. Educational Equipment and Software: Global Markets. BCC Report Code IAS118A.
32 Metaari (The 2018 Global Learning Technology Investment Patterns: The Rise of the Edtech Unicorns).

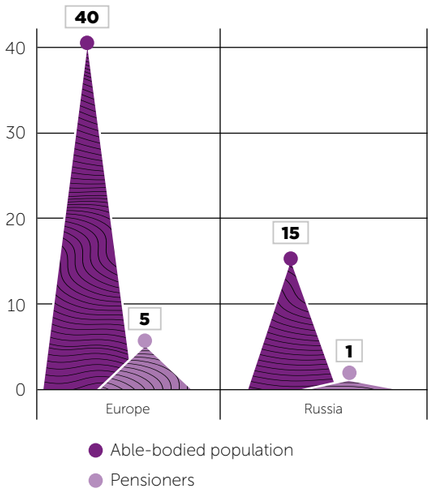
EDTECH MARKET ESTIMATES (HOLONIQ), BN RUBLES PER YEAR



RUSSIAN ADULT EDTECH MARKET POTENTION IN 2020 AMOUNTS TO

~30 RUB BN

EMPLOYMENT OF CE AND CPE BY DIFFERENT AGE GROUPS, %



holds ca. 1% of the global EdTech structure: in 2018, this market's capacity amounted to ca. $600-650 mn. At the same time, it exceeds the global growth rate—by various estimates, it grows by 20–25% annually.

The potential Russian adult EdTech market capacity is ca. 22–25 bn rubles in 2019 and will reach 27–30 bn rubles by 2020[33].

In 2018, more than a thousand EdTech companies around the world received investments, whereas the year before, there were only slightly more than 800 such organizations[34]. On the whole, China invested in the EdTech segment more than any other country—44.1% of the global investment ($16.34 bn), while the USA accounted for 32% of investment.

To date, the EdTech segment faces growing activity of venture investors: in the first six months of 2019, venture companies invested $3.5 bn in the EdTech segment.

State development institutions, as well as private venture capital funds operating in international innovation hubs play a large role in the structure of Russian investments to the EdTech. For example, the Fund carries out consistent and systemic operations in the EdTech sphere, and has developed an online CPE system for a wide range of training areas. The Fund develops the educational content without any external assistance and attracts leading professionals in various areas of expertise. Some of the programs are delivered on a philanthropic basis (mostly, STEM content and Nanotechnology 101 for schoolchildren, https://stemford.org/), but most courses are requested by large and medium-sized businesses (online training for high-technology specialists, https://edunano.ru/).

Large corporations also pay attention to the EdTech, for instance, Sberbank; they invested more than 10 bn rubles to their own corporate university.

The situation with CPE and CE programs in Russia differs significantly from developed countries. For instance, the spending of employers on training for their employees is 10 times lower than in Europe[35].

33 Digital adult educational technology study. Interfax Academia.
34 The 2018 Global Learning Technology Investment Patterns: The Rise of the Edtech Unicorns.
35 Russia 2025—from staff to talents. BCG, 2019.

TOP 20 RUSSIAN EDTECH COMPANIES BY THE REVENUE GROWTH DYNAMICS[36]

Rank	Companies
1	SkillBox online university
2	Yandex Praktikum
3-4	iSpring, Netology–Group
5-9	Lingualeo, Teachbase, HTML Academy, Uniweb, Mirapolis
10-11	Eduson, Otus
12	Infourok
13-15	E-Learning Development Fund, eQueo, GeekBrains,
16-18	SkillFactory, Multiurok, Skyeng
19	Skill Cup
20	Puzzle English

Implementation of such national programs as "Digital economy", "Education", "Science" and others will promote investment to the EdTech, because they feature the objective to develop personnel to have advanced digital expertise, as well as hard and soft skills.

The segment of corporate education organization services is rather attractive. Customers of such services include large financially reliable companies and corporate universities. That is why the largest EdTech actors launch educational programs, including in the spheres of CPE and CE.

The demand for the EdTech development in Russia is growing in many sectors—energy industry, metallurgy, construction, machine building, transportation, agriculture, healthcare, etc. Furthermore, many large companies are introducing platform solutions to develop personnel. More solutions appear each year and many of them become in demand for various sectors, e.g., for exploration, extraction, storage and logistics, processing, and sales. Each sector already has a developed need in the EdTech and it will only keep growing in the coming years.

36 Digital adult educational technology study. Interfax Academia.

1.3
PRECONDITIONS FOR DEVELOPMENT AND STRATEGIC VISION OF THE FUND

In 2019, executive authorities, development institutions, and the professional expert community mainly concentrated in their operations at the development of the innovative economy: Decree No. 204 of the President of the Russian Federation "On the National Goals and Strategic Objectives of the Development of the Russian Federation for the Period up to 2024" dated May 07, 2018 (hereinafter referred to as the Decree), approved the goal of accelerating technological development of the Russian Federation as a national objective. It requires significant growth in the number of innovative companies, development of favorable institutional, legal, and regulatory and technical conditions, creation of a modern and secure digital education environment that ensures high quality and accessibility of education of all types and levels, modernization of professional education, including introduction of adaptive, practice-oriented, and flexible educational programs, formation of a system of continuous updating of existing professional skills, and acquisition of new professional skills by employees.

The Fund has a number of relevant support instruments and considerable experience in solving the aforementioned objectives, which enables it to operate within the main fields of activities that contribute to achieving the objectives and target results of the national projects. The use of infrastructural, educational, and other ecosystemic support tools developed by the Fund will help achieve the innovative development goals set by the state, ensure accelerated incubation of small innovative companies (startups), expansion of the technology transfer, development of the human resources of innovative companies, removal of restrictions to manufacturing and use of new products, implementation and scaling of the nanotechnology sector and the high-tech sectors related thereto.

The expertise and non-financial support instruments developed within the framework of the Fund's ecosystemic activity may be actively used to help execute the national (federal) projects and other state projects and programs. The Fund's support instruments may help achieve goals and objectives of the following national and federal projects: the "Education", "Science", "Small and Medium-Sized Entrepreneurship and Support of Individual Entrepreneurial Initiative", "Ecology" national projects, the "Digital Economy" national program, the "Artificial Intelligence" federal project[37], etc.

Federal acknowledgement of the Fund's successes and expertise allowed receiving additional financing from the federal budget for 2020–2022[38] in the amount of 3.5 bn rubles within the "Modern Innovative Infrastructure Development Assistance in the Sphere of Nanotechnology, Mechanisms, and Tools to Fulfill the Nanoindustry's Potential" main event of the "Innovation Stimulation" subprogram.

All of these factors became prerequisites of updating the Fund Strategy—new Strategy–2024 was approved on December 18, 2019.

THE KEY STRATEGIC OBJECTIVE UNTIL 2024 IS TO LAUNCH THE SO CALLED "REVOLVING" MECHANISM OF INFRASTRUCTURAL ACTIVITY FINANCING, I.E., FOR THE NETWORK OF INFRASTRUCTURE CENTERS TO ATTAIN A SELF-SUSTAINED BUDGET.

37 In 2019, the list of technology sectors of the Fund's activities was supplemented by a new sector—neurotechnology and artificial intelligence.

38 The additional financing from the federal budget for 2020–2022 in the amount of 3.5 bn rubles is secured in Federal Law No. 380-ФЗ "On the Federal Budget for 2020 and the 2021–2022 planning period" dated December 02, 2019.

ACCORDING TO THIS DOCUMENT, THE FUND'S GUIDING PRINCIPLES UNTIL 2024 ARE AS FOLLOWS:

- to help fulfill the national (federal) projects developed in pursuance of the Decree and other state projects and programs in cooperation with the federal executive authorities managing the national (federal) projects, the public authorities of subjects of the Russian Federation administering execution of regional projects, and the organizations assisting in execution of the national (federal) projects;
- to improve efficiency of activity of the Fund's infrastructure centers under the "innovation conveyor" model;
- extension of the instruments used by the Fund for financial and non-financial support of innovative companies within the primary areas of activity, including in coordination with federal and regional development institutions and the existing state support instruments.

According to the Strategy, in 2020–2024, the Fund's activity will be characterized by extension of spheres of use of universal and flexible support instruments (primarily, in the areas of development of skilled personnel and expertise and of institutional support) to respond to needs of the partners, strategic investors, market community, various regional and municipal structures, including to participate in fulfilling the national and other state projects and programs.

Active increase in demand for education of various population groups and businesses, development of continuous education trend together with the appearance of investors and professional managers opens up possibilities for the Fund to both directly invest in the EdTech projects corresponding to the Fund's sphere of interest and invest in EdTech projects by establishing mutual primary equity and venture capital funds together with external investors with the Fund participating in the management thereof.

The Fund's experience and expertise helped to technologize establishment of new startups to the maximum possible extent to speed up creation and improve quality of new startups for further sale. Since 2016, infrastructure centers have been functioning under the "innovation conveyor" model[39],

THE STRATEGIC GOAL OF THE FUND'S ACTIVITY

CONSISTS IN FINANCIAL AND NON-FINANCIAL DEVELOPMENT OF THE NANOTECHNOLOGY SECTOR AND THE HIGH-TECHNOLOGY ECONOMIC SECTORS CONNECTED THEREWITH BY MEANS OF BUILDING AND DEVELOPING INNOVATIVE INFRASTRUCTURE, DEVELOPING CONTINUING EDUCATION PROGRAMS AND TECHNOLOGIES, INSTITUTIONAL AND INFORMATION SUPPORT TO PROMOTE COMMERCIALIZATION OF TECHNOLOGY SOLUTIONS AND FINISHED PRODUCTS, AND FULFILLING THE NATIONAL AND OTHER STATE PROJECTS AND PROGRAMS.

39 See more details in year reports 2017 and 2018.

according whereto the system of organizing activity of establishing innovative companies taking into account their profile is developed so that in the product development process, the basic technology expertise of one company is used as technology outsourcing for other companies.

According to Strategy–2024, the Fund's infrastructure centers must become more efficient under the "innovation conveyor" model. The key strategic objective until 2024 is to launch the so called "revolving" mechanism of infrastructural activity financing, i.e., for the network of infrastructure centers to attain a self-sustained budget. The primary priority at the new stage is to efficiently manage the portfolio of small innovative companies to ensure sustainable growth of value and investment attractiveness of startups and, later, successful exits from projects.

In order for nanocenters to attain operational sustainability in the framework of working with the project portfolio, the Fund will by identifying the companies having the potential for dynamic development and to become leaders (in terms of the potential activity scaling and capitalization). The leading companies will be receiving additional funds and becoming attractive to other investors. Thus, the share of the capital required to develop a leading startup will be being substituted by external sources. The Fund will keep holding a share in such projects throughout the value growth period to exit them as efficiently as possible.

In 2020–2024, the Fund will be forwarding most investments to the nanocenters, the activity whereof ensures exit from projects and a predefined rate of return on investment. The Fund is going to attract co-investor funds for financing, including in the framework of venture investment funds.

Given the updated goals and events of the Fund for the upcoming period, the list and values of the target Strategy–2024 indicators were adjusted (see the table below). For instance, the "Number of people employed in infrastructure projects and companies supported by them" indicator was removed, three new education and institutional support indicators were added, target values of a range of indicators were increased.

All the target indicators set by Strategy–2024 for 2019 in each field of the Fund's activity were achieved.

The Fund's strategic vision until 2024 is also oriented at the global sustainable development promotion trends. Integration of the UN Sustainable Development Goals to be achieved by the year 2030 (hereinafter referred to as the SDG) to legislation and financial system of the European Union[40] and Russia[41] led to the sustainable development becoming an aspect of positioning of most of the world's largest companies.

Most of the Fund's projects are essentially support of development and introduction of innovations to resolve public needs; they correlate both with the SDG and goals of the national and federal projects.

TARGET INDICATORS FOR THE IMPLEMENTATION OF STRATEGY–2024

Target indicator	Units of measurement	2019 planned	**2019 actual**	2020 planned	2024 planned
INFRASTRUCTURE PROJECTS					
Number of small innovative companies (startups) supported in the framework of the Fund's infrastructure projects	units (cumulative total)	800	**811**	900	1,020
Revenue from infrastructure projects and companies incubated/supported by them	mn rubles	4,160	**9,429**	7,900	10,550
DEVELOPMENT OF QUALIFICATIONS, E-LEARNING; CONTINUING EDUCATION FOR CHILDREN AND YOUTHS, NEW EDUCATIONAL TECHNOLOGIES					
Number of educational programs in the area of nanotechnology and the high-tech sectors related thereto	units (cumulative total)	195	**199**	210	258
Number of developed professional standards for promising engineering professions as per technological fields of the Fund's operations	units (cumulative total)	70	**70**	-	-
Number of qualification certificates and professional examination reports issued following the results of professional examinations	units (cumulative total)	800	**855**	1,200	2,800
Share of graduates of general education establishments participating in the Fund's program aimed at improving quality of natural science education and early professional orientation of students taking Unified State Examinations in natural science subjects.	% (annually)	25	**25.3**	-	-
Number of students trained using the digital education environment resources*	persons (cumulative total)	-	**-**	19,500	37,500
Number of technology cases developed for the purposes of continuing education of children and youths*	units (cumulative total)	-	**-**	85	105
INSTITUTIONAL SUPPORT					
Number of production units in the nanotechnology sector and the high-tech sectors related thereto, for which the minimum required set of regulatory and technical instruments for sustainable market entry and turnover has been created	units (cumulative total)	170	**172**	-	-
Number of national, preliminary national, and international standards developed and submitted for approval to the Russian Federal Agency on Technical Regulating and Metrology	units (cumulative total)	255	**255**	275	365
Number of documents that confirm quality, safety, environmental friendliness, and innovativeness of products, technologies, and management systems issued to the nanotechnology sector and the high-tech sectors related thereto	units (cumulative total)	665	**680**	735	1,100
Number of developed and certified measurement methods and reference samples for the nanotechnology sector and the high-tech sectors related thereto, as well as of certified product testing methods	units (cumulative total)	240	**240**	-	-
Number of innovative activity subjects provided with the regulatory and technical support, including via regional regulatory and technical innovation support centers and the Expertise map*	units (cumulative total)	-	**-**	260	570
Number of customers (contracting organizations, separate structural units) that take part in the projects aimed at the introduction of products and services of the nanotechnology sector and the high-tech sectors related thereto	units (cumulative total)	60	**63**	-	-

** Introduced in 2019*

40 The European Union adopted a new economic and political strategy "Sustainable Europe by 2030" based completely on the UN Sustainable Development Goals to be achieved by the year 2030; it is used to develop and adopt specific action plans, update the regulatory framework of the European Union and the EU member states.

41 On September 23, 2019, Russia ratified the Paris Agreement on climate change; the "On the Public Non-Financial Reporting" bill was developed and brought before the government; in April 2019, the Moscow Exchange joined the global Sustainable Stock Exchanges Initiative and started computing sustainable development indices for the Moscow Exchange and the Russian Union of Industrialists and Entrepreneurs; in August 2019, a sustainable development sector was established at the Moscow Exchange, which consists of three segments: "green bonds", "social bonds", national projects.

OBJECTIVES FULFILLED BY THE FUND TO ACHIEVE THE SDG AND GOALS OF THE NATIONAL/FEDERAL PROJECTS

Objectives fulfilled by the Fund	SDG	National/Federal project
• Creation of jobs in the regions of operation		**"WORKFORCE PRODUCTIVITY AND EMPLOYMENT SUPPORT" NATIONAL PROJECT** • "Employment support and labor market efficacy improvement to ensure workforce productivity growth" Federal project
• Development of education programs in healthcare • Implementation of innovative projects in healthcare		**"HEALTHCARE" NATIONAL PROJECT** • "Provision of medical healthcare organizations with qualified personnel" Federal project • "Cancer control" Federal project
• Development of continuing education programs, including e-learning programs, for general public: • Development of professional standards for promising engineering professions in the sphere of nanotechnology		**"EDUCATION" NATIONAL PROJECT** • "Young professionals" Federal project • "Digital education environment" Federal project • "New opportunities for everyone" Federal project • "Modern school" Federal project • "Success of each child" Federal project • "Teacher of the future" Federal project
• Implementation of innovative projects in the sphere of water purification and decontamination		**"ECOLOGY" NATIONAL PROJECT** • "Clean water" Federal project
• Implementation of projects in the sphere of alternative energy • System of green standards and Technical Committee 366		**"ECOLOGY" NATIONAL PROJECT** • "Clean air" Federal project
• Advanced training program development • System of adapting university graduates to working in real sectors of economy, science, and innovations		**"WORKFORCE PRODUCTIVITY AND EMPLOYMENT SUPPORT" NATIONAL PROJECT** • "Systemic measures on improving workforce productivity" Federal project • "Targeted support of measures aimed at improving workforce productivity of enterprises" Federal project

Objectives fulfilled by the Fund	SDG	National/Federal project
• Development of regulatory and technical instruments to support innovations • Certification of innovative products • Implementation of the projects aimed at initiating and increasing the demand for innovative products among state and corporate consumers • Implementation of the projects aimed at building technological and organizational infrastructure to develop high-technology projects		**SCIENCE" NATIONAL PROJECT»** • "Development of scientific and industrial cooperation" Federal project • "Development of advanced infrastructure for carrying out research and development in the Russian Federation" Federal project • "Development of human resources in the field of research and development" Federal project
• Implementation of the projects to introduce advanced technologies in the sphere of housing and comfortable urban environment • Projects to stimulate demand in the spheres of energy efficiency and road construction		**"HOUSING AND URBAN ENVIRONMENT" NATIONAL PROJECT** • "Development of Comfortable Urban Environment" Federal project • "Housing" Federal project **"SAFE AND QUALITY ROADS" NATIONAL PROJECT** • "System-Wide Measures of Road Infrastructure Development" • Federal project • "Road Network" Federal project • "Road Traffic Safety" Federal project
• System of evaluation and safety assurance in the nanoindustry		**"ECOLOGY" NATIONAL PROJECT** • "Introduction of the Best Available Technologies" Federal project
• Carbon neutrality calculations and verification		**"ECOLOGY" NATIONAL PROJECT** • "Introduction of the Best Available Technologies" Federal project

PARTNERSHIP

2

FUND'S ACTIVITY RESULTS

2.1 INFRASTRUCTURE PROJECTS

IN THE MODERN WORLD, TECHNOLOGICAL DEVELOPMENT SPEED HAS BECOME ONE OF THE KEY FACTORS DETERMINING MARKET POSITIONS NOT ONLY OF COMPANIES, BUT ALSO OF ECONOMIES ON THE WHOLE. THIS IS AN OBJECTIVE RECENT TREND, AND STATE POLICIES OF MOST DEVELOPED COUNTRIES ARE AIMED AT STIMULATING INNOVATIVE DEVELOPMENT.

The largest technology companies leading in their areas of operation are massively buying startups developing promising and potentially applicable technology packages.¬ It is unreasonable and cost-ineffective for large corporations to make thousands of attempts themselves; it is far more efficient to invest in the professional tech entrepreneurs who eliminate unpromising projects in the process of their business experiments.

In Russia, acceleration of technological development has also been approved as a national goal[42]. However, in the conditions of low innovative activity in Russia, the search for, selection, and support of projects are not very effective in real practice. Technological development requires activating mass creation of startups and eliminating the lack of tech entrepreneurs capable of generating high-quality startups.

IT IS THE FUND THAT PERFORMS TWO COMPREHENSIVE TASKS IN THE RUSSIAN MARKET:

- DEVELOPS TECHNOLOGICAL INFRASTRUCTURE FOR MASS CREATION AND DEVELOPMENT OF INNOVATIVE MATERIAL-BASED AND HARDWARE COMPANIES;
- TRAINING OF A NEW GENERATION OF TECH ENTREPRENEURS.

The business based on the model of mass creation of startups for sale—from concept definition, selection of the technology and the team to practical evaluation, production launch, commercialization, and sale to interested investors—is becoming cost-effective in the modern world as supported by experience of many of the advanced countries.

It is important to complete these tasks not only to contribute to the Russian innovation economy, but also to support the UN Sustainable Development Goals as confirmed by results of all types of technology projects. Furthermore, one of the SDG is essentially in tune with the Fund's mission: Goal No. 9, "Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation."43

The Fund has already proven its ability to establish companies of enormous potential.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

42 Acceleration of technological development of the Russian Federation was approved as a national goal as per Decree No. 204 of the President of the Russian Federation "On the National Goals and Strategic Objectives of the Development of the Russian Federation for the Period up to 2024" dated May 07, 2018.

43 Indicator No. 9.5 goes as follows: "To scale up scientific research, to ramp up the technological potential of industrial sectors in all the world's countries, especially in the developing countries, including by stimulating innovative activities by 2030 and significantly bumping up the number of R&D professionals per million people, as well as the state and private R&D expenditures."

FUND-SPONSORED COMPANY BECOMES A UNICORN

OCSiAl entered the Crunchbase Unicorn Leaderboard — the world's leading database of investments in innovative companies. The leaderboard includes 496 private companies that have demonstrated an explosive growth, the so called "unicorns." Each of them received investments having been valuated at $1 bn or more. Their aggregate valuation amounts to $1.8 tn.

For OCSiAl, a manufacturer of high-quality graphene nanotubes, this is the second time its "unicorn" status has been confirmed by the global venture capital community. In June 2019, the innovative additive manufacturer entered the Global Unicorn Club—the list of companies valuated at more than $1 bn according to CBInsights. The company became the only Industrial "unicorn."

OSCiAl became the first company in the RUSNANO investment portfolio valuated at $1 bn. This was the valuation Alexander Mamut's investment group A&NN was guided by when in January 2019 it bought OCSiAl from RUSNANO for $5 mn (0.5%).

The Fund and RUSNANO became the first external investors to believe in the Russian founding team and their graphene nanotube technology. Since then, OCSiAl attracted about $200 mn from Russian and foreign investors, and the first nanotube synthesis unit was created owing to the upfront investment made by the SYGMA.Novosibirsk nanotechnology center.

ANATOLY CHUBAIS

CHAIRMAN OF THE EXECUTIVE BOARD OF THE RUSNANO MANAGEMENT COMPANY

"OCSiAl, a graphene nanotube manufacturer, is the first and, at this point, the only Russian material-based "unicorn", and it is the "unicorn" by the book, as it was launched before our eyes as a startup at Akademgorodok in Novosibirsk with a very ambitious idea—to create an absolutely new material of the future—and has become the global market leader."

TECHNOLOGY INFRASTRUCTURE

THE TECHNOLOGY INFRASTRUCTURE CREATED BY THE FUND INCLUDES A NETWORK OF NANOTECHNOLOGY CENTERS AND A RANGE OF KEY AND/OR STRATEGIC ELEMENTS OF THE SOCIOINNOVATIVE INFRASTRUCTURE AIMED AT CREATING THE TECHNOLOGY AND ORGANIZATIONAL INFRASTRUCTURE TO DEVELOP HIGH-TECHNOLOGY PROJECTS.

A nanotechnology center is a center of expertise in certain technological areas, where technical, human, and financial resources are gathered to allow quick launch and development of projects as soon as a "window of opportunity" appears and up to the moment when the resulting company, in the material-based or hardware industries, is ready to be sold. Nanocenters take a direct part in managing the built companies and also attract investments.

The Fund's nanocenters operate as startup studios—a relatively new form aimed at organizing "serial startup production." The model is based on creating infrastructure to develop startups that would allow systemically and quickly assessing product concepts with minimum expenses, developing, and commercializing successful projects. Unlike incubators, venture capital funds, and accelerators focusing on mentoring external teams and investments in exchange for a share and infrastructure, studios create products, teams, and, eventually, companies themselves. A startup studio is entrusted to a chief executive officer to create and independent company, the major share whereof would be owned by the studio.

Another characteristic feature of startup studios is that one and the same team simultaneously works on several companies to find successful businesses capable of a substantial return on investment.

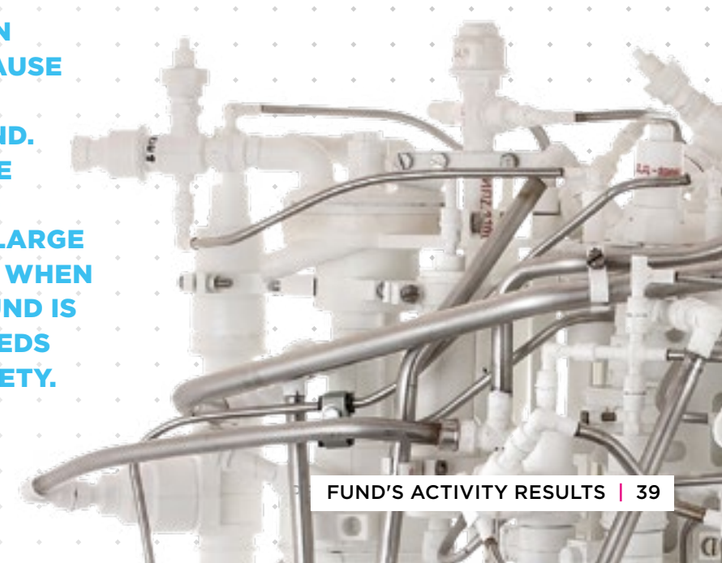
Continuous generation of business hypotheses, infrastructure, and internal funding help ensure consistent generation of successful startups. Such an approach allows reducing costs of any given startup and helps the team to accumulate valuable experience; this results in lower risks and a higher chance of attracting investors.

Specialized events are organized to attract investors, for instance, the #Kupislona Award (for details see section 2.6). As a result of the 2019 Award, Axion – Rare and Noble Metals nominated by the Russian Venture Company was sold to Krastsvetmet from Krasnoyarsk, while Ronavi Robotics attracted private investors; this confirms the Prize's reputation and efficacy.

The companies built by nanocenters can be divided into two types: contract (infrastructure) and product (startups) ones.

Product startups develop, manufacture, and launch sales of products. They do not have their own laboratory and production facilities and rely on contract companies to manufacture their products. Contract companies are not permitted to develop their own product: they only provide services to manufacture or develop products for other companies (including both product companies of the nanocenter and external clients).

THE FUND'S COMPANIES ARE IN DEMAND IN THE MARKET, BECAUSE THEY ARE CREATED WITH THE ACTUAL MARKET NEEDS IN MIND. IN SOME CASES, STARTUPS ARE BUILT TO SPECIFIC ORDERS OF VENTURE CAPITAL FUNDS OR LARGE CORPORATIONS. IN ANY CASE, WHEN DESIGNING A STARTUP, THE FUND IS GUIDED ONLY BY THE REAL NEEDS OF BUSINESSES AND THE SOCIETY.



CUSTOM PROTECTIVE MASKS FOR ATHLETES

In the beginning of December, Zenit basketball club's captain Evgeny Voronov suffered a nose injury in the match against Parma of Perm. He returned to the court as early as on December 18 thanks to a Zdravprint custom protective 3D-printed mask; this black plastic mask protects the face and allows playing even having sustained an injury. The very next day the team led by him won against the Turkish side Fenerbahce.

This was the second time that year that Evgeny Voronov saw action wearing a Zdravprint mask. His teammate Gustavo Ayon, as well as footballers Ilya Kutepov from Spartak FC and Maksim Grigoryev from the Kursk club Avangard FC, had also worn such masks before.

Zdravprint manufactures custom additive orthoses—special external medical devices for stabilization, unloading, rehabilitation, and functional correction of injured/broken joints or limbs. Orthoses take one day to be 3D-printed of a high-quality hypoallergenic plastic without having to take elaborate measures of patients. Orthoses are affordable and withstand transportation well. Zdravprint cooperates with the leading Moscow trauma surgeons. Hundreds of patients with bone fractures have already got through rehabilitation with the help of the company's products. Zdravprint orthoses are also used for recovery after strokes and for rehabilitation procedures in cerebral palsy patients.

EVGENY VORONOV,

ZENIT BASKETBALL CLUB CAPTAIN

"THE THOUGHT OF BEING UNABLE TO GO IN AN IMPORTANT MATCH AND HELP YOUR FOLKS IS ONE OF THE HARDEST TO HANDLE FOR ANY ATHLETE, ESPECIALLY FOR A CAPTAIN. IT IS A MIND-BLOWING MOTIVATION TO OWN THE GAME WHEN YOU CAN SLASH THE RECOVERY PERIOD AFTER AN INJURY BY USING A PROTECTIVE MASK."

EXAMPLES OF CONTRACT SERVICES OF THE NANOCENTER NETWORK INCLUDE THE FOLLOWING:

contract industrial design (design of 3D models of devices and creation of prototypes of new products);

contract industrial 3D printing;

contract manufacturing (precision machine processing of metals, alloys, and plastics, development and production of mechanical and mechatronic equipment and devices, assembly and shipping of devices and equipment);

contract composite production (the whole package of new technologies of working with composite materials, development and manufacturing of devices of any degree of complexity using composite materials).

In the year under review, the stage of development of the composition of infrastructure centers was completed. The Fund's activity was concentrated on developing the existing nanocenters without additional obligations to establish new nanocenters. The nanocenter network optimization[44] helped to improve efficacy of using the Fund's resources by redistributing them to the projects of the highest potential.

THROUGHOUT ITS HISTORY, THE FUND ESTABLISHED

15 NANOCENTERS IN 11 REGIONS OF RUSSIA.

BY THE END OF 2019, THE FUND'S PORTFOLIO FEATURED 13 OF THEM.

NETWORK OF NANOCENTERS

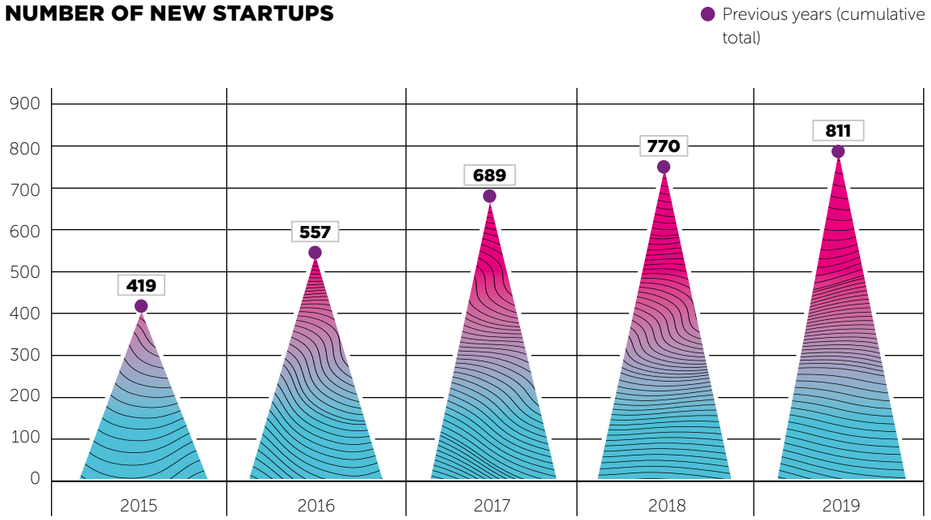
Nanocenter	Technological expertise
Zelenograd Nanotechnology Center	• Nanoelectronics and microsystems engineering • New materials and technologies • Clean technologies • Biotechnologies
Idea Nanotechnology Center	• Chemistry and petrochemistry • Biotechnologies • Composite materials
SYGMA.Novosibirsk Nanotechnology Center	• New materials • Biotechnologies • New energy • Robotics
SYGMA.Tomsk Nanotechnology Center	• Electron beam technologies • Modern agroindustrial technologies • Cold plasma technologies
Dubna Nanotechnology Center	• Smart coatings • New energy (energy transmission systems and sources) • New materials • Cosmeceutics
Nanotechnology Center of Composites	• Composite materials
Ulyanovsk Technology Transfer Center	• Construction • Auto parts • Aviation and space industry • Biotechnologies • Wind power
Nanotechnologies and Nanomaterials Center of the Republic of Mordovia	• Power electronics • Lighting engineering • Instrument engineering • Construction nanotechnologies
TECHNOSPARK Nanotechnology Center	• Applied laser technologies • Optical and plasma technologies for micro- and nanoelectronics • Synthetic diamonds and synthetic diamond-based equipment for industrial and medical applications • Industrial design and highly integrated electronics • Specialized instrument engineering and precision machine processing • Flexible electronics • Genomics • Additive technologies • Composite materials
T-Nano Nanotechnology Center	• Microelectronics • Robotics / artificial intelligence • Big Data / DSS / HPC • New breakthrough IT technologies
North-West Technology Transfer Center	• Nanoelectronics • Nanomaterials • Additive technologies
Nanotechnologies in Medicine Nanotechnology Center	• Regenerative medicine and cellular technologies • Personalized medicine and target technologies • New materials and new material-based medical devices • Hardware and software for medical technologies
Saint Petersburg Nanocenter Nanotechnology Center	• Additive technologies • Sensors • Photovoltaics

44 In 2019, the Fund successfully exited two nanocenters: the Nanotechnology Center in the Samara Region, and the Krasnoyarsk Nanotechnology Center.

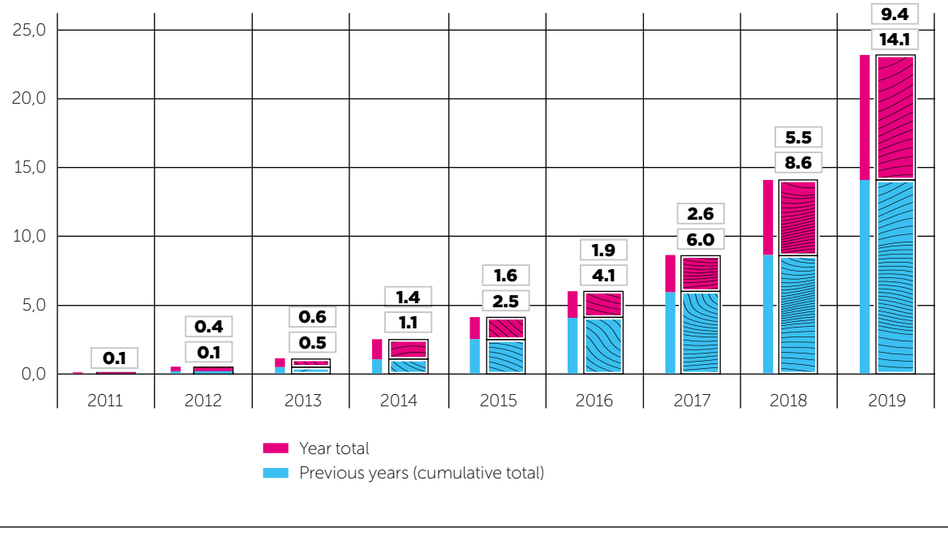
Since 2011, the first Russian venture-building network created by the Fund has already helped to establish more than 800 technology companies. Every year, 50–100 small innovative companies are founded, which amounts to about a half of all new material-based Russian startups.

The revenue of the network of nanocenters continued to grow in 2019 and amounted to 9.4 bn rubles—twice as much as planned. The total value accumulated since 2011 exceeded 22 bn rubles.

NUMBER OF NEW STARTUPS



REVENUE OF NANOCENTERS AND THEIR STARTUPS, BN RUBLES



TECHNOSPARK GROUP OF COMPANIES IS THE LARGEST NETWORK'S NANOCENTER GROWING STARTUPS IN A WIDE RANGE OF NEW MATERIAL-BASED TECHNOLOGIES.

TECHNOSPARK WAS THE RUSSIAN TECHNOPARK RANKING LEADER IN 2016–2019.[45]

>100
TECHNOLOGY STARTUPS

>450
NEW HIGH-TECH JOBS

REVENUE
>850
MN RUBLES

The "innovation conveyor" model was implemented owing to efficiency of the four key infrastructures developed by TechnoSpark in 2012–2019.

THE FIRST INFRASTRUCTURE TYPE received the most investments in the completed period and consists in creating a network of contract companies, i.e., the companies unable to invest in the development of own products and technologies, but working with the widest possible range of product customers strictly following the rules of protection of the customer IP.

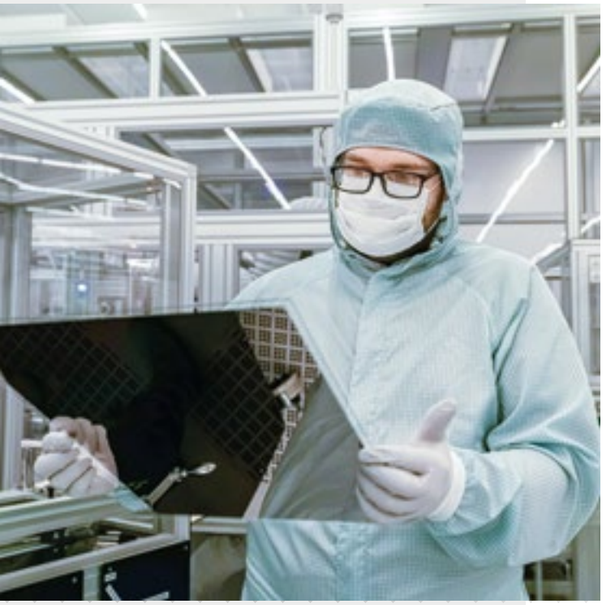
There are three key types of the TechnoSpark's contract companies at the moment:

- contract manufacturing;
- contract IP (IP-box) suppliers;
- contract laboratories.

THE SECOND INFRASTRUCTURE TYPE — investments into the TechnoSpark's team implementing serial startup development, financing, attraction of co-investors, and corporate operations.

THE THIRD INFRASTRUCTURE TYPE — management infrastructure for the portfolio of 100+ juridical persons and the back office. In 2018, in the process of preparation to receive external co-investment in the TechnoSpark's startups, the back office was made a separate company, TechnoSpark–Support, that renders startups services in the spheres of accounting, legal and human resources support, IT, and other functions. From 2020 onwards, this infrastructure will for the first time become open for any and all technology startups.

THE FOURTH INFRASTRUCTURE TYPE involves processes of involving students in the TechnoSpark's activity and career counseling for senior school students and also develops the TechnoSpark's brand for the general public. In the framework of this infrastructure, TechnoSpark established a city business incubator in the center of the city of Troitsk, takes a direct part in developing a new city plan, and opened a Boiling Point in Troitsk in cooperation with National Technological Initiative Platform and the Agency for Strategic Initiatives.



THE STARTUPS LAUNCHED BY THE FUND FIND THEIR PLACE IN MANUFACTURING CHAINS OF MANY SPHERES TRADITIONAL FOR RUSSIA: ENERGY INDUSTRY, LOGISTICS, RETAIL, CONSTRUCTION, ETC. MANY OF THEM ALLOW HOLDING OUT HOPE FOR ENTERING GLOBAL SUPPLY CHAINS.

In the beginning of 2020, the Mayor of Moscow Sergey Sobyanin and the Chairman of the executive board of RUSNANO Management Company LLC Anatoly Chubais opened the Russian Flexible Electronics Center at the TechnoSpark's technology campus in Troitsk.

The Russian Flexible Electronics Center is the first plant in the world to make such transistor packs. They localized several of the key world's technologies and create their own industrial technology on top of that. For instance, at the plant, they can manufacture multiple-use badges, fingerprint cards, as well as electronic price tags transmitting information about the product. Notably, these device save a significant amount of energy by spending it only to change the screen.

Almost all the manufacturing processes are automated. At the moment, there are 30 people working at the plant. When it reaches full capacity, the number of employees will grow to 100.

Completion of the second phase will allow manufacturing even more complex objects. There are prototypes made using transistor packs—these are flexible displays, liquid–crystal displays, only based on flexible electronics matrices and plastic matrices. In future, they are going to manufacture biometric sensors—an indispensable part not only of the modern electronics, but also of the personalized medicine, for instance, a band aid capable of transmitting health parameters of a pregnant woman and her fetus to a smartphone.

SERGEY SOBYANIN

MAYOR OF MOSCOW

"This is a major event in the innovative life not only for Moscow, but for the whole country. TechnoSpark has already been one of the best technoparks in Russia, and we are now launching the first phase of the Russian Flexible Electronics Center. However, we will not stop there. After the ceremony, we will discuss the question of completing the second phase of the center."

In September 2019, Visionix Rus (a joint venture of a French-Israeli concern, Luneau Technology Operations (LTO), and TechnoSpark, a part of the Fund's investment network) started manufacturing and selling in Russia ophthalmological equipment under the Visionix brand that belongs to LTO.

LTO is one of the largest companies developing and manufacturing ophthalmological and optical equipment in the world. Autorefractors, lensmeters, phoropters, and other devices required to diagnose glaucoma, cataract, and corneal pathologies, for high-precision measurements of an eye's optical properties, and for individual lens selection are manufactured under the Visionix brand. In terms of quality and functionality, the Visionix devices are comparable to the premium class Japanese and German devices. The target audience for these devices is comprised of public and private clinics, as well as the optical stores specializing in individual selection of corrective contact lenses.

No devices with such functions had been produced before in Russia. According to the DISCOVERY Research Group marketing agency, the Russian market is completely dominated by imported equipment, whereas the value of Russian-made devices amounts to only 4.4% of the total market value.

The Russian Federal Service for Surveillance in Healthcare issued a registration certificate for a diagnostic multifunctional autorefractor that permits sales of the localized equipment in Russia. The target audience is comprised of public and private clinics, as well as the optical stores specializing in individual selection of corrective contact lenses.

Basically, each nanocenter has high-potential startups in its portfolio. For instance, presentation of a new Russian processor, Baikal-M1000, manufactured under the aegis of the T-NANO nanocenter became one of the significant events of the year.

In October 2019, at the Open Innovations forum at Skolkovo, Baikal Electronics (founded by a Russian supercomputer manufacturer, T-platform, and T-NANO, one of the Fund's nanocenters) presented its new processor, Baikal-M1000, compatible with a wide range of devices in the consumer and B2B market segments. In particular, it is suggested for use in desktop devices: workstations, all-in-one PCs, laptops, and servers. This processor is a system-on-a-chip manufactured using the 28 nm lithography process with eight 64-bit cores and an eight-core graphics processing unit.

In November, an agreement was signed to produce a wide range of information kiosks and digital public services terminals with these processors. The serial

EKATERINA KHODUNOVA

CEO OF VISIONIX RUS

"Together with our partners, Medica, in two years, we developed an equipment localization roadmap, organized production thereof, trained Russian specialists at LTO plants, found manufacturers of Russian-made components, took part in several large-scale ophthalmological and optical exhibitions and, finally, received our registration certificates. Now, everything is ready for sales. Our equipment is perfect for clinics and optical stores with a high customer traffic, because the standard examination time goes down considerably—from 7–10 minutes to 90 seconds, so the physician may focus on the patient."

SVEN LINDSTROM

CEO OF MIDSUMMER

"We are pleased and excited to enter into this agreement with such a prestigious and visionary company as RUSNANO. This could open up a whole new market for our advanced manufacturing equipment for light, flexible, robust, and energy-efficient thin-film solar cells. Our DUO system has taken the position as the most widespread manufacturing tool for thin-film flexible CIGS solar cells in the world. We are especially impressed with the RUSNANO's focus on the building-integrated possibilities of the thin-film technology, a vision that we share."

production is to begin in the second half of 2020. The key customers are public agencies and state corporations using Russian operating systems.

GLOBAL COOPERATION IS AN IMPORTANT PART OF OPERATIONS IN CURRENT CIRCUMSTANCES.

In September 2019, the Fund and Midsummer of Sweden entered into a framework agreement to manufacture non-silicon flexible solar panels—lightweight flexible solar cells, copper indium gallium selenide (CIGS)-based modules, and end products for Russia and other member states of the Eurasian Economic Union. The first phase of the plant in Russia is to be launched in 2020.

Midsummer is a Swedish company, a technology leader in the sphere of solar power, one of the world's leading developers and suppliers of state-of-the-art integrated solutions in the sphere of flexible solar cells.

According to the Agreement, the RUSNANO Group will be using the Midsummer's state-of-the-art technologies to produce lightweight flexible solar cells, copper indium gallium selenide (CIGS)-based modules, and end products for Russia and other member states of the Eurasian Economic Union (Armenia, Belarus, Kazakhstan, and Kyrgyzstan). As for Midsummer, they will become one of the global distributors of the flexible solar modules manufactured in Russia and the Eurasian Economic Union.

Integration of flexible solar batteries in the existing buildings and the buildings under construction is one of the most actively growing markets in the energy industry at the moment. Technological breakthroughs in photovoltaics made at once by several research groups and companies in Europe and the USA in recent years allow placing solar panels where it has never before been possible: on non-accessible roofs, facades, and windows.

The process of manufacturing flexible solar cells using the Midsummer's technology ensures minimal carbon emissions in comparison with other solar module manufacturing technologies as confirmed by the lifecycle analysis performed by independent experts.

In the year under review, RUSNANO JSC and the global leader in wind turbine manufacturing, assembly, and maintenance, Vestas Wind System A/S, signed a memorandum of understanding in order to further evaluate the possibilities of localizing production of wind turbine (WT) components, as well as to develop the supply chain in Russia.

Vestas is a technology partner of the Wind Energy Development Fund (a joint investment fund of FORTUM and RUSNANO) that is to complete construction of wind turbines with the total capacity of almost 2 GW by 2023. In 2018, in response to the Russian demands of equipment localization, Vestas engaged in localization of WT elements (blades) in the Ulyanovsk Region in partnership with RUSNANO and the Ulyanovsk nanocenter.

Furthermore, in May 2019, Altren, a daughter company of ULNANOTECH, the Ulyanovsk nanocenter, and Freqcon of Germany signed an agreement of joint promotion and sales of the Freqcon's package solutions for isolated areas, control systems for energy storage units, and converters for wind turbines in Russia. According to the agreement, Altren will be distributing Frecqon's solutions.

In the future, the companies are going to keep up the wind turbine production localization program in the Ulyanovsk Region and establish a joint venture for assembly of the Freqcon-developed wind turbine converters, inverters, and other equipment.

Freqcon GmbH (Germany) was established in 1988 and is one of the leaders in the sphere of solutions for isolated areas, control systems for storage units and electric components for wind turbines; it is also capable of production, design, and technical support of wind energy solutions.

SERGEY MOROZOV

GOVERNOR OF THE ULYANOVSK REGION

"Vestas is already a core of the alternative energy cluster of the Ulyanovsk Region that also includes two industrial parks of wind turbines with the total capacity of 85 MW and we continue developing this sphere."

ALEKSANDR PROKHOROV

HEAD OF THE DEPARTMENT OF INVESTMENT AND INDUSTRIAL POLICY OF MOSCOW

"NCC is one of the oldest residents of the Moscow special economic zone benefiting from tax abatements and other support measures of the Government of Moscow. We are glad that the company is expanding its sales geography. This creates a positive image abroad not only of the company as a manufacturer of high-quality products, but also of the city in whole."

ANDREY TSYBULSKY

CEO OF KLEOFAS ENGINEERING

"We were looking for a contractor to help us select components and not look down on our "startup" design documents, because we did not want to waste time on non-specific operations. With TEN fab, we had a "one window" approach, we saved a lot of time and money, did not make many of the possible mistakes, and did everything just in time. Besides, the expenditures on manufacturing a prototype at TEN fab fully meet the budget, and cooperation with only one contractor makes reporting far simpler."

Nanotechnology Center of Composites (NCC) of Moscow started exporting their products to South America in 2019—the first sales to Peru took place in September. Exported NCC products include fiberglass extrusions and carbon fiber. South American partners are going to use extrusions to build various enclosures, the fiber—as an additive to improve concrete properties.

The company already exports to India, Kuwait, the USA, Kazakhstan, Belarus, and countries of Western Europe.

TEN fab of the TechnoSpark Group of Companies manufactured a preproduction prototype of a water and air decontamination system for Africa for Kleofas Engineering, a Skolkovo-based startup. After the TEN fab testing, the unit was sent to Africa for field testing.

The water and air decontamination unit is integrated into a pipe at a pumping station and UV-treats the running water. This unit works as a part of a water purification system together with mechanical cleaning filters. UV treatment affects not only vegetative bacteria, but also spores, and disinfects far quicker than water chlorination or ozonation. The startup has already entered into a contract with a company in Africa, where additional biologic purification is especially needed due to low quality of water.

The water and air decontamination unit consists of a body made of stainless steel, an electronic control unit, and an internal decontamination part, a UV radiation source that operates in combination with the electronic system.

After test completion, Kleofas and TEN fab are going to manufacture a small batch of decontamination systems in 2020.

ENRU.COM

SAVING POWER AT HOME

INVESTMENT CASE

Power storage systems for households

What is the business about?

EN.RU supplies ready-made power storage systems for households.

An 8.7 kWh-h EN.RU system composes a battery and an invertor and may be installed by a certified electrician in less than an hour.

The battery may be charged by connecting it to the main power, solar batteries, or a diesel generator and provides either permanent or backup autonomous power supply.

A powerful invertor's computer chip not only manages operation of the system, but also transmits system status data to a cloud storage and an owner's smartphone once connected to the home Wi-Fi network.

EN.RU is perfect for autonomous power supply. When there is not much sun, the battery may be fully charged using a diesel generator in just two hours. When not used, the battery only depletes by 3% in a month.

Technology: power storage

Company age: 4 years

Location: Troitsk

Imprinta

PRINT YOUR DREAM

INVESTMENT CASE

Manufacturing of Hercules personal 3D printers

What is the business about?

The company developed its own 3D printers having used its extensive experience of custom 3D printing.

The working area of the company's first printer, Hercules Strong, is significantly larger than in most personal printers. This allows producing parts without additional seams. The company has added a compact Hercules and a Hercules Strong Duo for simulatenous printing using two materials to the printer range.

Hercules 3D printers are used for versatile tasks: from production of dental aligners to sculpture printing.

In 2017-2018, Imprinta commissioned its own manufacturing site for printer parts, changed appearance their devices and launched marketing in Europe. They are now planning to rework their existing models, develop proprietary software 3D printer software and an industrial 3D printer.

The company's revenue has been stedily growing. In 2019, the company is planning to boost its growth tempo 2- or 3-fold by attracting new investment.

Technology: additive technologies

Company age: 5 years

Location: Krasnoyarsk

Optiplane

NOT JUST DRONES

INVESTMENT CASE

Hybrid vertical take-off and landing drones

What is the business about?

The company manufactures hybrid unmanned aircraft capable of vertical take-off and landing like helicopters or quadrocopters, yet flying as far as airplanes. Intended use: airborne monitoring of facilities and infrastructure for the oil-and-gas, mining, power, or construction companies.

UAV use helps to reduce the cost of airborne surveillance several-fold, because only one operator is needed to operate them. The economic effect is also achieved by regular surveillance and early detection of problems.

To reduce the fuselage weight and improve drone durability, Optiplane uses composite materials. Load-bearing elements are made using additive technologies. Weight reduction helps to significantly reduce power consumption and substantially increase the UAV range.

Technology: unmanned aircraft

Company age: 3 years

Location: Novosibirsk

Pozvonoq

SAVING THE SPINE

INVESTMENT CASE

Titanium intervertebral additive cages

What is the business about?

Cages are implants to replace intervertebral disks to stabilize the spine (spondylodesis). The implants featuring a special porous structure are 3D printed with titanium and titanium alloys. By 2020, Pozvonoq will have completed development of a full range of commercial standard-sized cages.

In Russia, ca. 10,000 operations are performed annually using foreign-made implants. The demand for Russian cages is estimated at 5,000 per year. These products may also be successfully exported.

We already manufacture custom-made intervertebral cages and plan to launch batch production in 2019.

Altermedica, one of the implant and endoprosthesis distribution leaders, partners with us to market our products.

Technology: titanium 3D printing - design, manufacturing, certification

Company age: 3 years

Location: Saint Petersburg

Ronavi Robotics

ROBOTIC LOGISTICS

INVESTMENT CASE

Logistic robots: robotizing warehouse logistics

What is the business about?

Ronavi Robotics is the first Russian company to develop, manufacture, and market robots for warehouse logistics automation.

Logistic costs are on the rise around the world owing to the growth in e-commerce, particularly, warehouse and distribution center expenses. At the same time, losses of retailers are also growing due to insufficient efficiency of traditional approaches to logistics. For instance, Amazon loses several billion dollars every year to store and deliver goods. One of the key solutions to this problem is warehouse robotization.

The Russian Ronavi H robot with the 1,500 kg capacity is intended for pallet transportation. Transportation robots form a group controlled by the central server, automatically move to charging stations when necessary, and do not need a human operator.

In 2019, the company manufactured the first commercial lot of robots and offered its customers a subscription model. Since 2020, a range of robots of various capacity will become available to Ronavi customers.

Technology: mechatronics, robotics

Company age: 6 years

Location: Troitsk

Solartek

SOLAR ROOFS AND WINDOWS

INVESTMENT CASE

Integration of flexible solar panels to roofs and windows

What is the business about?

Solartek develops industrial technologies for integration of flexible solar modules to roofs and windows.

Standard silicon solar panels cannot be used in hard-to-reach places, where panel mounting bases are weak, i.e., on most roofs and facades.

Flexible solar modules help a lot to create "local solar power stations." We may integrate flexible modules in roll roofing, roof tiles, sheet metal, windows, and facade panels.

In 2018-2019, the company completed a project to install roof-integrated solar modules in Moscow and Ryazan.

In 2020, the company will install the first semitransparent windows with integrated solar batteries in Russia and in Europe.

Technology: flexible photovoltaics, power electronics

Company age: 5 years

Location: Troitsk

SteelSun

SUN ON THE STEEL

INVESTMENT CASE

Manufacturing of steel-based flexible solar elements

What is the business about?

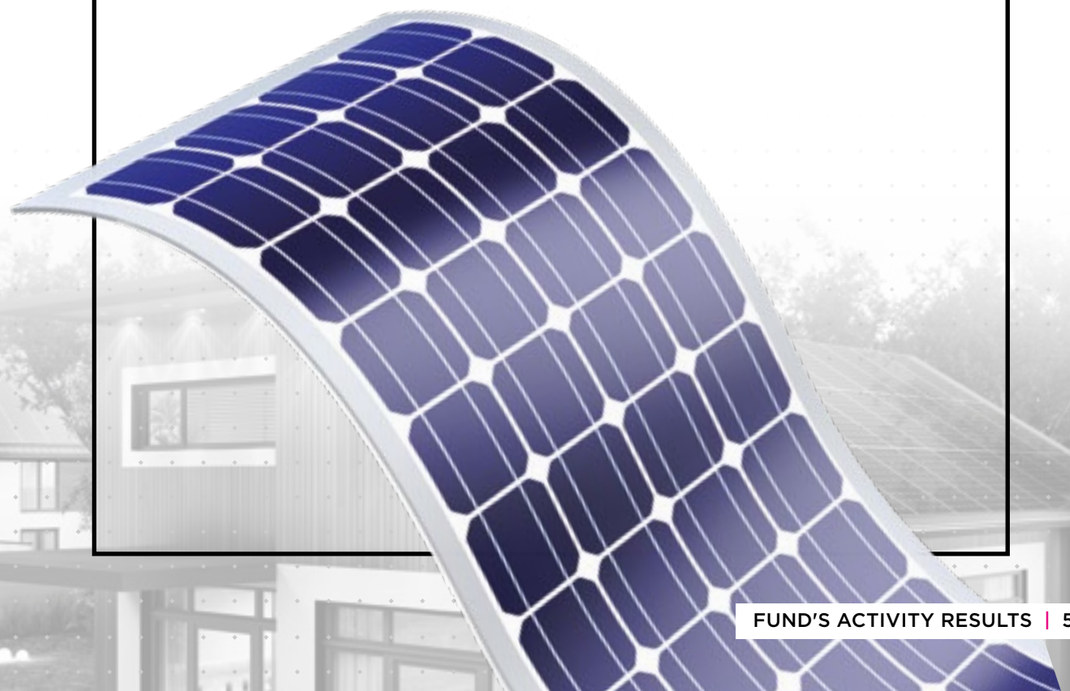
In 2019, SteelSun is launching production of flexible solar panels of up to 10 MW per year. The technology is peculiar in that thin-film CIGS layers are coated on a steel cell base and in the compact nature of production: the primary manufacturing module occupies not more than 40 sq. meters of floor space. Even though this is a small-scale production, flexible panels of custom shapes are absolutely competitive price-wise in comparison with conventional silicon solar batteries.

Flexible solar modules may be used by users, integrators, and developers of industrial and residential buildings. SteelSun flexible panels may be integrated in roofing, facades, and other functional surfaces.

Technology: photovoltaics

Company age: 3 years

Location: Saransk



TEN MedPrint

A PRINTER FOR A SURGEON

INVESTMENT CASE

3D printing of custom-made medical devices

What is the business about?

Design and 3D printing of medical devices - individual endoprostheses and implants: spinal cages, cranial plates, dentofacial implants.

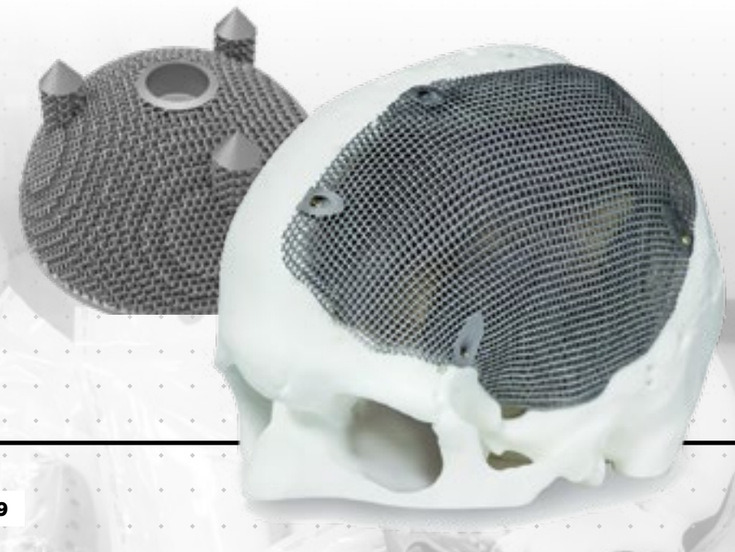
Our 3D printing company was the first in Russia to implement an ISO 13485 quality management system for medical devices and obtained a certificate of conformity for custom-made surgical implants. To print medical devices, we use a biocompatible titanium-based material.

TEN MedPrint's key customers are the largest Russian traumatology and orthopedics medical centers.

Technology: 3D printing

Company age: 4 years

Location: Troitsk



Tubot

PIPE INSPECTORS

INVESTMENT CASE

Robots for inline inspection of gas and oil pipes

What is the business about?

Development and production of innovative inline robots.

In Russia, similar systems are used in long straight parts of main pipelines, whereas geometrically complex parts are still inspected with complex and insufficiently accurate external diagnostic tools.

Preventive robotic diagnostics may dramatically reduce pipeline repair and maintenance costs and increase the inspection frequency several-fold.

The Russian market capacity for such inline robots amounts to more than 100 units per year. Tubot aims to occupy up to a third of this market within two years.

Technology: mechatronics, robotics

Company age: 3 years

Location: Novosibirsk

Zdravprint

WOKE UP — NO CAST!

INVESTMENT CASE

Custom-made 3D-printed orthoses

What is the business about?

The company manufactures custom additive orthoses—special external medical devices for stabilization, unloading, rehabilitation, and functional correction of injured/broken joints or limbs.

Orthoses take one day to be 3D-printed of a high-quality hypoallergenic plastic without having to take elaborate measures of patients. Orthoses are affordable and withstand transportation well.

Zdravprint cooperates with the leading Moscow trauma surgeons. Hundreds of patients with bone fractures have already got through rehabilitation with the help of the company's products. Zdravprint orthoses are also used for recovery after strokes and for rehabilitation procedures in cerebral palsy patients.

One of the company's areas of activity is production of custom-made protective masks for professional athletes. Zenit Saint Petersburg basketball players, Spartak Moscow and Avangard Kursk football players have already been using these masks.

Technology: 3D printing, 3D modeling, custom-made medical devices

Company age: 4 years

Location: Troitsk

TRAINING OF TECH ENTREPRENEURS

The Russian labor market is characterized by an acute lack of tech entrepreneurs at the moment. According to the Fund's estimates, the gap between the number of innovative startups and the managers capable of efficient management thereof will be widening considerably with each passing year. In these circumstances, it is becoming especially important not only to meticulously identify entrepreneurial potential among adults, but also to bring the new generation up in the tech entrepreneurship paradigm.

With that purpose in mind, the Fund is creating an environment to develop innovative creativity of schoolchildren; this makes it possible to count on a sufficient number of "ready" tech entrepreneurs in the strategic term (see section 2.2 for more details on the Project School of the Center for Youth Innovative Creativity of the TechnoSpark Group of Companies).

THE FUND IS IMPLEMENTING A RANGE OF PROJECTS AIMED AT DEVELOPING TECH ENTREPRENEURSHIP, INCLUDING GENERATION OF UNIQUE ANALYTICAL MATERIALS AND IMPLEMENTATION OF SPECIAL PROJECTS AND ORGANIZES A RANGE OF COMMUNICATION PLATFORMS.

By establishing startups, each year, the Fund opens tens of entrepreneurial vacancies attracting the candidates ready and willing to persistently work as entrepreneurs in the field of construction of a technology company. To stimulate participation of potential tech entrepreneurs in its projects, the Fund continues implementing the Business Debut program.

"BUILD A COMPANY. SELL THE COMPANY" BUSINESS GAME WITHIN BUSINESS DEBUT PROGRAM

The first Business Debut program was organized in 2018 by the Fund's venture-building networks companies in seven cities of Russia: Troitsk, Saint Petersburg, Saransk, Ulyanovsk, Kazan, Tomsk, and Novosibirsk. Program participants get an opportunity to try themselves as tech entrepreneurs avoiding characteristic professional risks. The "Build a Company. Sell the Company" business game is a one-day 10-hour-long real entrepreneurial activity simulator. The game helps participants to demonstrate their expertise and the main personality traits required of a contemporary tech entrepreneur, and facilitators are able to make a quality selection of startupers.

Winners of the qualification game get a 10-month employment agreement. Within the program, debutants invest in startups only their efforts, time, and endurance. Their income does not depend on the ups and downs in the business development's way; each participant gets resources to create a product, pay salaries and finance the company's operation. Debutants do not have to look for a unique idea for the startup—the best venture builders of Russia propose ready valuable business ideas for hardware industries. In the end, each participant gets a chance to become a tech entrepreneur or a business co-owner.

In March 2019, a new series of the Business Debut program's qualification "Build a Company. Sell the company" business games for first-time entrepreneurs was launched in ten regions of Russia.

~1,600

PEOPLE REGISTERED TO PARTICIPATE AND 600 OF THEM TOOK PART. FOLLOWING THE RESULTS,

23

PEOPLE WERE ACCEPTED TO WORK AT TECHNOLOGY COMPANIES OF THE FUND'S INVESTMENT NETWORK.

#STARTUPFORDIPLOMA ENTREPRENEURIAL INTERNSHIP PROGRAM

In 2019, the TechnoSpark Group of Companies launched the nine-month #StartupForDiploma entrepreneurial internship program for senior bachelor, specialist, and master students. The goal of the internship is for students to master the key tech entrepreneurial skills through building real startups. Upon completion of the internship, each student may defend his/her thesis in the form of results of a technology startup launch.

The candidates for entrepreneurial internship are qualified through a series of "Build a company. Sell the company" business games. Out of the 7,000 students invited to the qualification game, 7 were invited to undertake a startup internship and moved to Troitsk where the campus of the TechnoSpark Group of Companies is situated for a school year.

out of the
7,000
STUDENTS INVITED TO THE QUALIFICATION GAME,

7
WERE INVITED TO UNDERTAKE A STARTUP INTERNSHIP

ANNA ELASHKINA

HEAD OF THE TECHNOSPARK'S SCHOOL OF TECH ENTREPRENEURSHIP

"Only 1.5% of the people who want to become entrepreneurs are suited to it. It is not just our statistics, this is true for the whole country. A very low index of entrepreneurial activity. Our selection technology allows identifying and working with these 1.5% without losing anyone. The next year's goal is scaling—our instrument is becoming more powerful. We have learnt to run more players through one game without damaging selection quality. We are going to convert one game in more job placements."

2.2 EDUCATIONAL PROJECTS AND PROGRAMS

IN 2019, THE FUND IMPLEMENTED PROJECTS AND PROGRAMS AIMED AT CREATING A SYSTEM OF PROFESSIONAL QUALIFICATIONS IN THE NANOTECHNOLOGY SECTOR AND THE HIGH-TECH SECTORS RELATED THERETO TO PROMOTE INTERACTION BETWEEN BUSINESSES AND THE EDUCATION SYSTEM IN ACCORDANCE WITH THE FUND STRATEGY UNTIL 2024 AND THE CONCEPT OF ACTIVITIES OF THE FUND FOR INFRASTRUCTURE AND EDUCATIONAL PROGRAMS FOR THE FIELD OF "QUALIFIED PERSONNEL, PROFESSIONAL EDUCATION" (APPROVED BY MINUTES OF THE MEETING NO. 27 OF THE FUND'S SUPERVISORY BOARD OF MARCH 02, 2017).

The Fund's educational projects and programs correlate with a range of key ideas of national projects, as well as to global sustainable development goals, including creation of the modern digital educational environment to ensure high quality and accessibility of education; introduction of new methods of education and educational technologies; improvement of quality of life and continuous education of healthcare specialists, including by means of distance education technologies; development of skills and talents among children and youths; professional development of educators; introduction of applied and flexible educational programs; training of highly qualified specialists for the digital economy; transition to the ecologically friendly and resource-saving energy industry; development of a system of continuous education for the employed people to update their professional knowledge and learn new professional skills; popularization and development of innovative entrepreneurship; workforce productivity improvement, etc.

THE MAIN OBJECTIVES OF THE FUND'S ACTIVITY IN THE SPHERE OF EDUCATION AND LABOR MARKET IN 2019 WERE AS FOLLOWS:

DEVELOPMENT OF A COMPREHENSIVE EDUCATIONAL ENVIRONMENT TO SUPPLY THE NANOTECHNOLOGY SECTOR AND THE HIGH-TECH SECTORS RELATED THERETO WITH A SOUGHT-FOR SKILLED PERSONNEL.

INTRODUCTION OF A SYSTEM OF PROFESSIONAL QUALIFICATIONS BASED ON PROFESSIONAL STANDARDS TO THE NANOTECHNOLOGY SECTOR AND THE HIGH-TECH SECTORS RELATED THERETO.

PROMOTION OF INTEREST TO NATURAL SCIENCE-RELATED PROFESSIONS AMONG CHILDREN AND YOUTHS.

THE KEY MEASURES ENSURING COMPLETION OF THE AFOREMENTIONED OBJECTIVES WERE FULLY COMPLETED IN 2019.

EDUCATIONAL PROGRAMS IN THE AREA OF NANOTECHNOLOGIES AND THE HIGH-TECH SECTORS RELATED THERETO

The main focus of the educational projects and programs of the Fund as a development institution is aimed at creating the nanoindustry's human resources infrastructure in order for specialists of innovative technology production companies to rapidly obtain the lacking and much needed knowledge and skills. Upon receiving a request from an interested company (or a group of companies) to train personnel, the Fund's specialists and the requesting party develop the terms of reference taking into account both characteristic features of the technology used and the desirable level of training of the personnel. The Fund performs competitive selection of the new educational program development offers submitted by universities involving the requesting company in the process. The Fund supports companies of the real sector of economy in terms of continuing professional education upon the condition that these companies co-fund the educational project.

IN 2019, DEVELOPMENT OF THE FOLLOWING 17 NEW CONTINUING PROFESSIONAL EDUCATION PROGRAMS WAS COMPLETED:

1. **Program in the area of production technologies and use of human respiratory protection equipment based on nanostructured composite materials, including chemisorbents.**
2. **"Biotechnologies for Regeneration of Aquaculture Objects" program.**
3. **"Molecular Genetic Analysis for Identification of Product Composition Fraud" program.**
4. **Program in the area of development and production of carbon–carbon and carbon–ceramic materials and products made of superhard materials.**
5. **"Russian Innovative Resource-Saving Technologies for Cost Efficiency Improvement of Construction and Housing and Communal Services" program.**
6. **"The Internet of Things" program.**
7. **Program in the area of transparent laser ceramics manufacturing using micro- and nanopowder oxide composites.**
8. **"Use of molecular genetic markers for early prostate cancer diagnosis" program.**
9. **Program in the area of nanomodified binding materials and solders for manufacturing abrasive, metal cutting, stone-working, boring, dressing, and other types of tools.**
10. **"Chemical technologies in nanoelectronics" program.**
11. **Program in the area of thermoelectric generator and cooling units based on nanostructured thermoelectric materials.**
12. **Program in the area of computational biology.**
13. **Program in the area of manufacturing technologies for products made of nanostructured high-quality cast iron of special grades.**
14. **"Methods of local destruction of parenchymal organ tumors" program.**
15-16. **Set of advanced training and professional retraining programs in the area of wind energy.**
17. **Program for aseptic processing operators using virtual reality technologies.**

Aseptic area floor plans and the real equipment of Nanolek, LLC, a pharmaceutical company, were taken into account when developing a VR simulator for an advanced training program for the operating personnel of the aseptic production line.

The aforementioned programs were initiated by Roskhimzashchita Corporation, JSC; TestGene, LLC; BIOCAD, CJSC; RIF Corporation, JSC; Nanolek, LLC; RUSNANO Management Company, LLC; Wind Power Asset Management, LLC, etc.

AMONG THE EDUCATIONAL PROGRAMS DEVELOPED IN THE PERIOD UNDER REVIEW, THE FOLLOWING MAY BE HIGHLIGHTED:

"USE OF MOLECULAR GENETIC MARKERS FOR EARLY PROSTATE CANCER DIAGNOSIS" PROGRAM

The readiness of healthcare specialists to employ new methods along with the material and technical support facilitates introduction and spread of innovative cancer diagnosis technologies within the system of preventive and regular medical examinations.

Training of physicians and laboratory diagnostics specialists to use the Russian prostate cancer diagnosis method, the Prosta-test genetic test, and formation of positive motivation owing to the possibility of examination without injurious exposure among the risk group patients will help to extend population coverage, reduce the time of identifying pathological processes, and prevent overdiagnosis. In the long term, this will help to reduce mortality among the working-age population.

The program was developed by A.I. Yevdokimov Moscow State University of Medicine and Dentistry and the Kazan State Medical Academy under the initiative of TestGene, LLC (ULNANOTECH Nanotechnology Center), in 2019.

THE FIRST

27

PHYSICIANS FROM ULYANOVSK, SAMARA, KAZAN, AND YOSHKAR-OLA SUCCESSFULLY COMPLETED THE EDUCATIONAL PROGRAM; ALL THE LECTURES HAVE BEEN GIVEN IN THE DISTANCE MODE.

ANDREY TOROPOVSKY

CEO OF TESTGENE, LLC

"We represent business and, make no mistake, want the educational program to produce an instant effect. Time is money; it would be great if we received 25 requests from clinics to buy diagnostic systems after completion of training. This did not happen and we understand why: education is a long-term instrument. Our goal is to ensure that physicians see PCA3 tests as a standard and not as just another novelty. It takes time to change minds of physicians, and the educational program guides this change. Today, elements of the program are introduced in the process of education of resident physicians, advanced training and professional retraining of urologists and oncologists at the Moscow State University of Medicine and Dentistry. Our program is used to train physicians in Kazan. The method we developed is becoming more widely known and clear to a physician; that means there appear prerequisites for its wider use in diagnosis."

SET OF CONTINUING PROFESSIONAL EDUCATION PROGRAMS IN THE AREA OF WIND ENERGY

The Government of the Russian Federation approved prolongation of the renewable energy industry support program until 2035. This will form a long-term trend of large-scale introduction and development of wind energy technologies in Russia. Full-blown development of a new branch of industry leading to a growth in the number of commissioned wind farms and equipment localization is impossible without creating a modern human resources infrastructure to supply specialized companies with qualified specialists in the sphere of wind farm construction and wind turbine design and operation.

In 2018–2019, Bauman Moscow State Technical University in partnership with the Ulyanovsk State Technical University developed advanced training and professional retraining programs in the area of wind energy covering all the aspects associated with support of building and maintaining of wind turbines under the initiative of RUSNANO Management Company and leading wind energy companies (Wind Power Asset Management, LLC; Vestas RUS, LLC; Bashni VRS, LLC).

ANATOLY CHUBAIS

CHAIRMAN OF THE EXECUTIVE BOARD RUSNANO MANAGEMENT COMPANY LLC

"We are confident that by 2024, there will be built wind turbines and solar batteries with the total capacity of 5,000 MW, as well as new industrial capacities, schools of thought and the education cluster will appear; there will be a comprehensive system to technologically support operation of this cluster and enhance its technology level and exports."

THE FIRST

30

SPECIALISTS OF THE COMPANIES THAT INITIATED DEVELOPMENT OF THE PROGRAMS COMPLETED TRAINING.

Educational materials are used by the universities that developed them, including in the framework of basic educational programs.

The project resulted in a signed memorandum of cooperation and interaction between the Renewable Energy Development Association and Bauman Moscow State Technical University. This partnership is aimed at implementing joint projects in the sphere of enhancing professional activity of students in the area of renewable energy resources, research papers and R&D, as well as of introduction of innovative solutions.

Furthermore, in the period under review, the "Use of nanotechnologies in the wastewater purification processes for enhanced nitrogen and phosphorus removal" educational program developed by the Kazan National Research Technological University to erase the lack of currently needed qualified specialists at Nizhnekamskneftekhim, PJSC, won the Republican Prize, "Fifty Best Innovative Concepts for the Republic of Tatarstan", for "Innovations and Education."

By 2020, about 200 companies from 40 regions of Russia initiated creation of new educational programs and the Fund involved more than 75 universities and research organizations in development thereof. By the end of 2019, the total number of programs reached 199.

Efficacy of the developed educational materials is achieved by establishing active cooperation of the university with the company. The Fund supports networking of universities, involvement of leading Russian and foreign experts in the relevant fields, as well as introduction of e-learning. Special attention is paid to internships, practical and laboratory studies that ensure training of students in the conditions of an actual production site. Developers of educational programs receive consulting and methodological support at all stages of development: from clarification of the company's qualification needs to development of a modular educational program, evaluation tools, and educational materials.

Each projects starts with webinars where the Fund's experts clarify the university's activities to develop a new educational program to train an industrial company's personnel.

All the universities that developed new educational programs with the Fund's financial, advisory, and methodological support use these educational materials to train not only their students, but also personnel of other specialized organizations. This ensures the fan-like spread of advanced knowledge in the sphere of nanotechnologies and a multifold increase in the number of organizations whose specialists have mastered relevant competencies through the Fund's educational programs. As a result, the total number of trained specialists of companies, university instructors, and students exceeded 94 thousand people.

200

COMPANIES FROM 40 REGIONS OF RUSSIA INITIATED CREATION OF EDUCATIONAL PROGRAMS

75

UNIVERSITIES AND RESEARCH ORGANIZATIONS WERE INVOLVED BY THE FUND TO DEVELOP EDUCATIONAL PROGRAM

199

NEW ADVANCED TRAINING AND PROFESSIONAL RETRAINING PROGRAMS

INTRODUCTION OF A SYSTEM OF PROFESSIONAL QUALIFICATIONS BASED ON PROFESSIONAL STANDARDS TO THE NANOTECHNOLOGY SECTOR AND THE HIGH-TECH SECTORS RELATED THERETO

Development and updating of professional standards for the list of priority professions (specialties) in the sphere of nanotechnology is one of the key focuses of the primary measure implemented by the Fund in the framework of the "Economic Development and Innovative Economy" state program. Introduction of professional standards is the basis of development of a qualification system and promotes interaction between businesses and the education system in terms of the balance of demand and supply of nanotechnology qualifications. Professional standards are developed in compliance with the Rules of Development and Approval of Professional Standards approved by Resolution No. 23 of the Government of the Russian Federation on January 22, 2013, orders of the Ministry of Labor and Social Protections of the Russian Federation (in terms of the professional standard layout, qualification levels and other requirements) and contain a structured description of characteristics of generalized job functions.

7

PROFESSIONAL STANDARDS WERE DEVELOPED AND UPDATED IN 2019:

1. **"Technical support specialist for the petroleum product manufacturing process on the basis of nanostructured catalysts."**
2. **"Technology specialist in petroleum product manufacturing on the basis of nanostructured catalysts."**
3. **"Technical support specialist for the tyre material manufacturing process using nanotechnologies."**

4. **"Technology specialist in tyre material manufacturing using nanotechnologies."**

5. **"Specialist of standardization of nanoindustrial innovative products."**

6. **"Specialist in development of semiconductor lasers."**

7. **"Specialist in nanostructured polymeric material production."**

Specialists of the following companies were involved in development of the aforementioned professional standards: Non-Profit Partnership "Russian Nanoindustry Association"; TANECO, JSC; Kazan National Research Technological University; Cordiant, JSC; Vyatka State University; Autonomous Non-Profit Organization "Nanocertifica"; Non-Profit Partnership "The Technology Transfer Office of the Russian Academy of Sciences & RUSNANO"; National University of Science and Technology "MISiS"; Research and Production Enterprise Inject Ltd; Vladimir State University; Federal State Enterprise "GLP Raduga"; Plastic Processing Plant named after "Komsomolskaya Pravda", LLC; Institute of Polymers, LLC, etc.

BY THE BEGINNING OF 2020, 70 PROFESSIONAL STANDARDS FOR THE INDUSTRY HAD BEEN DEVELOPED OWING TO THE FUND. MORE THAN 200 ENTERPRISES, EDUCATIONAL AND RESEARCH ORGANIZATIONS, AND EMPLOYERS' ASSOCIATIONS TOOK PART IN THE DEVELOPMENT AND EXPERT EVALUATION OF PROFESSIONAL STANDARDS.

The Fund's "Development of the Assessment System of Professional Qualifications in the Nanoindustry" program implemented by Non-Profit Partnership "Russian Nanoindustry Association" as the base organization of the Council for Professional Qualifications in Nanoindustry (spknano.ru) promotes the development of a qualification assessment system as an instrument of creating a modern, highly mobile labor market in the nanoindustry.

Around 190 sets of assessment tools have been developed on the basis of professional standards and more than 200 qualifications required in the modern labor market have been approved within the Program. There are annual regional events promoting independent qualification assessment in the nanoindustry. Educational programs in the sphere of nanotechnologies undergo professional accreditation. To date, around 50 higher education programs have been accredited in 20 regions of Russia.

The sectoral—nanotechnology—segment of the national qualification system and the required infrastructure have been developed: qualification evaluation centers and examination platforms have been opened in 12 regions of Russia, and an online independent qualification assessment service has been launched as well. By the end of 2019, specialists from more than 150 enterprises had taken professional examinations: ca. 85% of the examinees successfully passed the examination and became listed in the Federal Register of independent qualification assessment.

To ensure more active involvement of students of tertiary and post-secondary non-tertiary institutions into the national qualification system, completion of the whole procedure or elements of the professional examination in the course of training or the final certifying examination was made possible. To carry out the necessary procedures for students (Entry to the Profession), the Methodological Recommendations for Adapting and Ensuring Accessibility of the Professional Examination Procedure to Evaluate Qualifications of Students of Educational Institutions, Including in the Course of the Final Examination, developed in cooperation with specialists of the National Agency for Qualifications Development were used. In 2019, a series of examinations was carried out; it involved 486 students from 18 universities and colleges of Saint Petersburg, Kazan, Voronezh, Tomsk, and other cities.

In 2019, the Fund started a new activity—development of a human resourcing model (formation of engineering crews) used to introduce state-of-the-art production technologies at the Plastic Processing Plant named after "Komsomolskaya Pravda", LLC. In the course of the project, a set of ready-to-use solutions was developed to, on the one hand, teach businesses to identify their qualification needs on the basis of their objectives and translate into an education request and, on the other hand, teach universities to adequately respond to such requests via formation of customized skills and business-oriented educational programs.

The synthesis of technology, education, and management solutions, formation of research skills in all the project's participants, their synergy as representatives of the real sector of economy, universities, and the expert community make the project truly unique. Essentially, an own ecosystem was developed with the core being a company of the real sector of economy. This approach allows replicating the whole qualification management chain, from the order in the form of description and translation of the business's needs to educational programs to qualification evaluation and, subsequently, to comprehensive personnel decisions. This ensures integration of resources of businesses, science, and education to implement specific innovative technology projects.

Furthermore, the Fund developed and tested a new multifunctional model of a qualification assessment center that consists in activity diversification and service portfolio extension. In its turn, this ensures comprehensive use of the national qualification system's tools for timely training of human resources: a qualification assessment center becomes an aggregator—a point of integration and support—of qualification system's business processes, a platform for refinement and translation of methodological solutions into applied technologies of human resourcing for target tasks of innovative enterprises or investment projects. Therefore, technology solutions are accompanied by personnel decisions to guarantee quality of the end product to consumers, reduced economic and reputational risks—to manufacturing companies, and confirmation and further capitalization of expertise and skills—to employees. The case of a multifunctional model of a qualification assessment center was successfully presented on December 05, 2019, at the Fifth All-Russian Forum "Russian National Qualification System."

DEVELOPMENT OF A CONTINUOUS EDUCATION SYSTEM AND ACCESSIBILITY OF MODERN FORMS OF EDUCATION

Implementation of the E-Learning Electronic Education System Development program aimed at resolving the issues of creation and distribution of the e-learning content continued in 2019 for the following purposes:

- professional development of specialists of technology companies, engineering and technical universities, and other institutions of professional education;
- early career counseling for schoolchildren in the sphere of natural sciences, basic nanotechnology and tech entrepreneurship using modern information, communications, and distance education technologies.

Development and use of forms of distance education and new educational technologies is an inseparable component of all the Fund's educational projects

ANDREY SVINARENKO

CEO OF THE FUND

"It is not the first year that the Fund develops educational programs focusing on needs of requesting companies. As for this project, our goal is to answer this question: how to quickly form and train teams of specialists of the group of companies to be able to complete engineering tasks. Businesses need a relatively easy-to-use mechanism of personnel decisions, the so called "qualification construction kit", that allows resolving the issues of personnel selection and training for specific tasks in a quality and inexpensive manner. On the other hand, it is important that the business's "signals" become clear to the education system with a minimum number of transactions in the course of the signal's convertation to educational programs."

and programs. The Program is implemented by the Fund's daughter company, Autonomous Not-for-Profit Organization "eNano" (edunano.ru).

One of the key focuses of this Program concerns development and extension of the collection of digital educational resources on current areas of technology development, engineering and tech entrepreneurship, as well as on digital manufacturing technologies and corresponding digital skills. As a result, 103 e-learning (online) modules for continuing education of engineers, managers, and educators were developed in the period under review.

Please find examples of the developed modules below: "Review of Methods of Obtaining and Studying Nanostructured Films and Coatings", "Study of Nanostructures by Means of Atomic Force Microscopy", "Selection of a Form of Business Ownership", "Theory of Inventive Problem Solving for Universities", "Industrial Design as a Stage of Development of High-Technology Products", "Technology Protection and Commercialization. Existing Ways to Protect New Technology Solutions. How to Build a System of Protection for a New Technology in Russia and Abroad. How to Commercialize Intellectual Property."

Many of the developed modules are integrated in such widely known platforms as Open Education (openedu.ru) and Coursera (coursera.org) and are also used in the educational process of 94 Russian educational institutions. Distance education courses based on the materials of the Inter-University Training Program for High-Technology Engineers[46] (www.techpred.ru) that is annually completed by 20 highly qualified specialists in particular are in great demand.

"SYSTEMS THINKING" E-LEARNING COURSE

Systems thinking is a general skill necessary for all the specialists taking part in teamwork to complete complex projects, it is the basis of operations of system engineers, managers, and tech entrepreneurs. Knowledge and systems thinking skills are indispensable to organize multidisciplinary operations and allow a project crew to efficiently communicate using a common system language. The course is based on current standards; materials are presented in the form of schematics and supported by exercises aimed at practical application of systemic approach concepts.

The course was developed by Autonomous Not-for-Profit Organization "eNano" in cooperation with the Department of Tech Entrepreneurship of the Moscow Institute of Physics and Technology / RUSNANO. It is used to train students of the Inter-University Program and of the online Master in Tech Entrepreneurship course at the Moscow Institute of Physics and Technology and is recommended for taking by the Russian branch of the International Council on Systems Engineering (INCOSE).

The course is available at the edunano.ru online platform, as well as at coursera.org, where it was chosen for studying by

>12,000

STUDENTS IN 2018–2019.

REVIEWS OF THE COURSE BY THE COURSERA.ORG PLATFORM USERS:

"A useful course, without any doubt. As an entrepreneur myself, I can say that it "put my brain in the right place." I understood the universal structure that allows quickly and conveniently analyzing any system, both the target one and the other related systems; how to work with the lifecycle; how to apply practices/methods/tools of organizing work processes at different stages of the lifecycle; what the purpose of description of the system and of the management of requirements and stakeholder interests is. What leadership and strategy are."

"This course helps learn the most modern way of thinking about the systems that have been or are being created by humans, and not exclusively the technical ones. The introduced concepts are not only explained in plain terms, but also supported by rather tricky exercises; I strongly recommend doing them—very interesting. In the course of studying, you start looking differently at the familiar work environment, paying attention to things you have never attached value to before. In my view, this course is a must for everyone who wants to create something, from spaceships to theater performances."

46 *A networking educational project (4 universities and more than 30 companies) based on cooperation of innovative companies and the leading universities to train engineers/tech entrepreneurs. During their master studies, students work for the company and take part in developing new technology products together with their project mates. In addition to the primary master studies at the university, students also take a course in tech entrepreneurship and innovative business development, upon completion whereof they receive a professional retraining diploma.*

The Stemford e-learning platform (stemford.org) was also created and is being developed in the Program's framework; this platform not only contains educational content in the sphere of natural sciences and Nanotechnology 101 for schoolchildren, but also lets educators improve their qualification in terms of the use of electronic resources in the educational process. This platform's modern digital educational resources may be used for training and early career counseling of schoolchildren, as well as to popularize natural sciences, basic nanotechnology, and tech entrepreneurship.

In 2019, the number of Stemford attendees rose considerably owing to participants from abroad. More than 4,000 students and educators from 129 Russian-speaking schools in 8 countries completed training in the course of the program of passing on best practices to develop digital literacy among schoolchildren with the support of Rossotrudnichestvo.

To date, Stemford brings together more than 650 educational organizations; more than 14,000 schoolchildren and educators trained using this online platform's materials. In 2019, 15 e-learning (online) courses were developed, such as "Development of Space Products with Innovative Components", "Big Data in Biometrics", "Effects of Electronic Switching and Memory in Low-Dimensional Structures as a Basis for Development of Nanoelectronic Elements", "Epigenetics, or When Understanding DNA is not Enough", etc., as well as new networking distance projects, 8 "Key to Nanoworlds" webinars were conducted, as well as a series of contests and promotions for schoolchildren.

A fully functioning version of the game-based online networking platform Allotrop:Reaction (reaction.allotrop.ru) was developed with the support of the Presidential Grants Foundation. In the period under review, the game-based online platform was tested, and a methodological online course for educators, "Application of Game-Based Learning Approaches and Methods of Using the Allotrop:Reaction Platform in and out of Class", was developed for its efficient application by educational organizations.

BY THE BEGINNING OF 2020, IMPLEMENTATION OF THE E-LEARNING ELECTRONIC EDUCATION SYSTEM DEVELOPMENT PROGRAM HELPED TO TRAIN

>20,000

SCHOOLCHILDREN, EDUCATORS, STUDENTS, AND SPECIALISTS.

MASSIVELY MULTIPLAYER ONLINE ROLE-PLAYING GAME (MMO RPG) ALLOTROP:REACTION (12+)

The plot of the game develops in the near future on a different planet. The enemy is represented by rioting robots who refuse boring the planet's surface and attack people and destroy machines. The goal is to restore order.

This game combines a shooter with crafting and economy, forms metadisciplinary and subject matter expertise on the basis of the school course of physics, as well as basic programming skills. The game is intended to enhance involvement of adolescents in the process of learning natural sciences and resolves the objective of conveying educational content in the form of a game (entertainment) by using the game-based learning technology. The plot involves a set of research and design tasks, teaches data collection and analysis.

The game was developed by Autonomous Not-for-Profit Organization "eNano" in the framework of the Fund's "E-Learning Development for Nanoindustry" program with support from the Presidential Grants Foundation.

EVGENY GUDILIN

DOCTOR OF CHEMISTRY, CORRESPONDING MEMBER OF THE RUSSIAN ACADEMY OF SCIENCES, DEPUTY DEAN OF THE FACULTY OF MATERIALS SCIENCE OF LOMONOSOV MOSCOW STATE UNIVERSITY

"I am certain that games are a part of the lifestyle of the generation commonly referred to as Generation Z."

FORMATION OF AN EFFICIENT SYSTEM OF IDENTIFYING, SUPPORTING, AND DEVELOPING SKILLS AND TALENTS AMONG CHILDREN AND YOUTHS

Under the terms of the agreement with the Talent and Success Foundation, the Fund takes an active part in preparation and implementation of the Science and Technology Program "Big Challenges" at the Sirius Educational Center: on July 01-24, 2019, the Fund organized a themed project shift, "Nanotechnologies." Together with scientists, experts, educators, mentors, and representatives of the high-technology economic sector, 31 schoolchildren divided into teams solved the following five complex engineering research tasks in the course of 21 days: "A meta-lens to focus Wi-Fi radiation", "Development of innovative antibacterial nanocoatings", "Analysis of the electroactive water obtained by membrane electrolysis and its effect on living organisms", "Development of an antifreeze system for wind turbines for northern regions", "Express testing of the content of natural antioxidants in foodstuffs using nanotechnologies."

In the course of the project shift, the Fund managed to make children plunge into problem areas of the themed projects. At the same time, a short-term continuing professional education program (48 academic hours), "Technologies of Organization and Execution of Science and Technology Contests", was implemented for 101 educators taking part in the project shift.

The RUSNANO School League program is the best known Fund's project for schoolchildren; it is aimed at improving quality of natural science education and motivating schoolchildren to choose research, engineering, technical, and tech entrepreneurial majors in the high-technology sphere (schoolnano.ru). To implement it, Autonomous Not-for-Profit Organization "School League" was established. The Program's key objectives consist in enriching the school education content with the context of modern development of science and business and introducing advanced methods of teaching natural sciences.

BY THE END OF 2019,

>1,000

SCHOOLS PARTICIPATED IN THE PROGRAM, AS WELL AS 27 RESOURCE CENTERS INTRODUCING THE TEACHING AND LEARNING RESOURCES, METHODS, AND TECHNOLOGIES DEVELOPED WITHIN THE PROGRAM INTO PRACTICE OF REGIONAL GENERAL EDUCATION INSTITUTIONS.

AS PART OF THE PROGRAM, THE FOLLOWING EVENTS TOOK PLACE IN 2019:

FROM JULY 01 TO JULY 10, KHANTY-MANSIYSK HOSTED NANOGRAD, THE FEDERAL SUMMER HOLIDAY SCHOOL;

it is a continuing education program in the form of a business game where high-technology companies "hire" students as interns and give them a task (case) that the interns need to complete before the summer school is closed under the guidance of companies' consultants and educators; completion of business cases helps schoolchildren to master modern business technologies, develop creative thinking, learn to work as part of a team, and present activity results to a panel.

- 352 people took part in the federal summer school, including 215 schoolchildren and students from 20 regions of the Russian Federation, as well as lecturers, educators, guests, and facilitators; 10 high-technology companies from different regions of Russia, children's technopark "Quantorium NEL" (Penza), and the research organization of the Russian Academy of Sciences provided 12 business cases that student teams worked on under the guidance of mentors; 36 lecturers, scientists, researchers, science journalists, and business representatives among them, took part in the 10 days of work of the Nanograd Academy, conducted lectures and workshops;
- 11 regional holiday schools were organized in 10 regions; they were visited by more than 1,400 people, and the 65 business cases designed for them as part of the program are documented scientific, engineering, technical, and/or marketing and economic workplace problems (tasks) prepared for children and youths.

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PEOPLE TOOK PART IN THE FEDERAL SUMMER SCHOOL, INCLUDING 215 SCHOOLCHILDREN AND STUDENTS FROM 20 REGIONS OF THE RUSSIAN FEDERATION, AS WELL AS LECTURERS, EDUCATORS, GUESTS, AND FACILITATORS

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HIGH-TECHNOLOGY COMPANIES FROM DIFFERENT REGIONS OF RUSSIA, 12 BUSINESS CASES THAT STUDENT TEAMS WORKED ON UNDER THE GUIDANCE OF MENTORS

The 8th All-Russian School Week of High Technology and Tech Entrepreneurship took place from March 11 to March 17 with the support of the Ministry of Education of the Russian Federation and the partners, such as the Rosatom State Corporation, the Roscosmos State Corporation, and the Sberbank's Charitable Foundation "Investment to the Future." Before that, in 2018, Autonomous Not-for-Profit Knowledge Organization "School League" obtained the status of a Federal Innovative Platform themed "School Week of High Technology and Tech Entrepreneurship" (an all-Russian network education project) for 2019–2023 (fip.kpmo.ru/project/1725/show). Educational trips to high-technology enterprises, meetings with scientists and tech entrepreneurs, engineers, and designers, business games, and foresight sessions were organized. Geography of the School Week: 437 cities and settlements, 83 regions of the Russian Federation. About 850 thousand schoolchildren and educators took part in the activities.

New continuing education programs were developed for schoolchildren and educators; all the distance programs could be accessed via the "School in Your Palms" digital education platform. All the educational content of the digital education platform is aimed at developing project and research activity skills, as well as flexible skills and may be used for extended school education.

Since 2007, Lomonosov Moscow State University and RUSNANO hold the All-Russian Internet Olympiad

for Schoolchildren, Students, PhD Candidates, and Young Scientists in Nanosystems, Nanomaterials, and Nanotechnologies called "Nanotechnology—Breakthrough to the Future!" (enanos.nanometer.ru); it unites primary schoolchildren, students, PhD candidates, and young scientists. "Nanotechnology—Breakthrough to the Future!" is a tier 1 (Top) olympiad from the list of the Russian Council for School Olympiads; this means that awardees from Russia and certain member states of the CIS enjoy privileged conditions for enrolment to Russian universities. The Olympiad is characterized by interdisciplinarity (theoretical tasks in a range of subjects—chemistry,

physics, mathematics, biology) and creative contests. As part of the Olympiad, schoolchildren and educators have access to free general education courses in nanotechnology, can attend interactive lectures.

In school year 2018—2019, 15.4 thousand people took part in theoretical and creative contests of the first phase of the "Nanotechnology—Breakthrough to the Future!" Olympiad. Following results of the correspondence (Internet) phase, 182 participants were invited to Moscow, 18% more than in 2018. The overwhelming majority of them (91%) represented 37 regions of Russia, 5% came from Tajikistan, 3%—from Kazakhstan.

THE XIV ALL-RUSSIAN INTERNET OLYMPIAD "NANOTECHNOLOGY—BREAKTHROUGH TO THE FUTURE!" STARTED IN AUTUMN 2019, AND THE RESULTS WERE OUT IN SPRING 2020.

THE NANOSYSTEMS AND NANOENGINEERING CONTEST

The Nanosystems and Nanoengineering contest (nti-contest.ru) organized with the Fund's support as part of the National Technological Initiative Olympiad is focused on a wide range of objectives associated with the use of nanotechnologies in various branches of the Russian industry: from building and construction to electronics and medicine. It is based on the interdisciplinary approach established on the interaction of physics, chemistry, and biology. Along with several other National Technological Initiative Olympiad's contests, the Nanosystems and Nanoengineering contest is included in the list of the Russian Council of School Olympiads and gives winners 100 points in a Unified State Examination of choice. In 2019, the Nanosystems and Nanoengineering contest's final took place in two cities at the same time, in Moscow and in Novosibirsk. The schoolchildren had a complex task: to develop a photonic light-emitting device based on semiconductor quantum dots. For three days, the children synthesized green, blue, and red quantum dots and used them as a basis for RGB matrices. The award ceremony took place in the Letovo School as well as in the Novosibirsk State University.

To popularize nanotechnologies among the schoolchildren enthusiastic about project and research activity, the Fund utilized resources of the Quantorium children's technoparks and provided for the development of the Nanoquantum continuing education program (roskvantorium.ru/programs/nanokvantum) as well as of educational modules in Nanotechnology 101 intended for participants in other "quantums" of the federal network of children's technoparks. The collaboration with Quantorium technoparks opened up the opportunity for continuing education in the sphere of nanotechnologies for a wide range of continuing education teachers and, in particular, for facilitators of project and research activity of schoolchildren.

INTERDISCIPLINARITY HELPS TO DEVELOP UNDERSTANDING OF NANOTECHNOLOGIES AND INTEREST THERETO, INCLUDING IN THOSE SCHOOLCHILDREN WHO DO NOT YET KNOW WHAT THEIR FUTURE PROFESSION WILL BE.

Participants in the NTI Olympiad

In August 2019, the Fund organized a project school for young tech entrepreneurs in cooperation with the Artek International Children's Center and implemented the Technology Leaders of the Future educational program on tech entrepreneurship for 12–17-year-old schoolchildren in the course thereof. This program is intended for the children who want not only to develop new technology solutions, but also to learn to follow them through to commercialization. 50 schoolchildren from 20 regions of Russia took part in the program; these were active participants of the ongoing high-technology projects, educational programs, and Quantoriums who submitted their own entrepreneurial projects for the competition organized jointly by the Fund and the Artek International Children's Center and were highly praised by the expert panel.

The Project School of the Innovative Youth Crafts Center (IYCC) of the TechnoSpark Group of Companies continues to function successfully. The first 30 schoolchildren older than 12 who are to take production, science, and business to a fundamentally new level in 10 years' time had mastered electronics and programming, robotics and mechanics, 3D–modeling, energetics, composite materials, and laser technologies in two years.

In October 2019, the Project School announced the second intake of students; the selected children started studies in January 2020. Plans for 2020 include development of new educational modules aimed at in-depth study of project activity.

"CARBON NANOMATERIALS" MODULE OF "NANOQUANTUM" EDUCATIONAL PROGRAM (12+)

Following suit of Nobel laureates Novoselov and Geim, students will try to obtain graphene with physical methods and compare this approach to the chemical method of obtaining graphene oxide (Hummers' and Tour methods). Examining graphene samples of differing degrees of purity, students will learn the method of X-ray fluorescence spectrometry and Raman spectroscopic methods. Using optical and probe microscopy, adolescents will assess quality and electrical conductivity of the graphene oxide films that they will have obtained themselves and analyze sorption properties of graphene oxide in comparison with silicate adsorbents.

The main educational goals are as follows:

- to learn about and master the fundamental norms of research and project activity essential for independent research;
- to complete design-and-engineering and engineering-and-technology projects.

ALEXEY ZHUKOV

DOCTOR OF PHYSICS AND MATHEMATICS, CORRESPONDING MEMBER OF THE RUSSIAN ACADEMY OF SCIENCES, VICE-PRESIDENT FOR SCIENCE OF THE SAINT PETERSBURG ACADEMIC UNIVERSITY OF THE RUSSIAN ACADEMY OF SCIENCES

"The educational program's logic is overall based on project activity approaches. Completion of practice-oriented engineering and research projects aimed at resolving applied and fundamental problems allows systematically developing creative abilities of students, their independence, and advancing personal qualities."

2.3
CREATION OF A FAVORABLE REGULATORY ENVIRONMENT

NOWADAYS, INNOVATIONS ARE AN INDISPENSABLE PART OF EFFECTIVE ECONOMIC DEVELOPMENT AND IMPROVEMENT OF WELL-BEING OF THE POPULATION. THAT IS WHY PRIORITY STATE OBJECTIVES INCLUDE DEVELOPMENT OF THE INNOVATIVE ECONOMY AS SET FORTH IN STATE STRATEGIC PLANNING DOCUMENTS, INCLUDING THE SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT STRATEGY OF THE RUSSIAN FEDERATION, THE LONG-TERM STRATEGY FOR RUSSIA'S INNOVATIVE DEVELOPMENT FOR THE PERIOD UP TO 2020, NATIONAL PROJECTS, THE STATE PROGRAM "ECONOMIC DEVELOPMENT AND INNOVATIVE ECONOMY", ETC.

Explosive development of technologies and digitalization touch upon every aspect of life making it more comfortable. However, timely amendment of the national legislation, development of new instruments to meet the market's relevant needs, access to "long-term" money, improvement of financial non-financial support mechanisms are required, because without them, high-technology businesses find it considerably hard to continue developing and move to foreign jurisdictions.

Resolution of the aforementioned problems is one of the Fund's areas of operation.

HAVING A COMPLETE AND RELEVANT UNDERSTANDING OF THE NEEDS OF INNOVATIVE COMPANIES, THE FUND TAKES AN ACTIVE PART BOTH IN DEVELOPMENT AND IMPLEMENTATION OF IMPORTANT STATE INITIATIVES AND IN NATIONAL LEGISLATION IMPROVEMENT.

PARTICIPATION IN THE DEVELOPMENT OF STRATEGIC PLANNING DOCUMENTS OF THE RUSSIAN FEDERATION

In 2019, the Fund prepared and sent suggestions regarding involvement of the Fund in a range of the national projects and programs, including "Education", "Science", "Small and Medium-Sized Entrepreneurship and Support of Individual Entrepreneurial Initiative", "Workforce Productivity", and "Digital Economy", to the federal executive authorities responsible for implementation of the national projects.

In particular, the Fund formulated suggestions of providing accelerator support, as well as of creation and further development of the "Artificial Intelligence" ecosystem in the framework of the "Artificial Intelligence" federal project of the "Digital Economy of the Russian Federation" national program in terms of open digital technologies.

THE FUND'S SUGGESTIONS ARE AIMED AT THE FOLLOWING:

DEVELOPMENT OF QUALITY ACCELERATOR PROGRAMS PROVIDING THE FOLLOWING:

- financial support, primarily as contributions to the authorized capital, extension of loans, and other "sustainable instruments";
- non-financial support, including educational projects and programs, measures of stimulating demand of interested Russian companies for the technology solutions provided by startups, measures of standardization, certification, and accreditation of promising solutions and products;

HIGHER AVAILABILITY OF SKILLED SPECIALISTS FOR THE RUSSIAN MARKET OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES ACHIEVED, AMONG OTHER THINGS, BY NEW CONTINUING EDUCATION PROGRAMS:

- to develop advanced digital intelligence technologies;
- for early career counseling, extended education, and motivation of schoolchildren to study natural sciences, mathematics, information technology, and engineering, and to the choice of a career in the sphere of artificial intelligence in the future.

Furthermore, throughout the period under review, the Fund assisted Skolkovo in implementing the Digividual concept as part of the "Digital Economy of the Russian Federation" national program. The Digividual concept is intended to simplify procedures by carrying activities out electronically using an electronic platform. According to the developers, a Digividual might not have a registered address obligatory for all juridical persons; they also suggest simplified (both for the Digividual and the auditors) bookkeeping; furthermore, the specific nature of the activity and decision-making processes allow avoiding hiring personnel for a back office. This concept is estimated to become widespread in the spheres of IT, services, global operations, and investment activity to ensure ease of launch, manageability, development, and continuing advancement of projects.

THE ACCUMULATED EXPERIENCE AND THE AVAILABLE SET OF INSTRUMENTS OF SUPPORT ALLOW THE FUND TO FACILITATE ACHIEVEMENT OF THE NATIONAL GOAL TO ACCELERATE TECHNOLOGY DEVELOPMENT OF THE RUSSIAN FEDERATION AND RAISE THE PROPORTION OF ORGANIZATIONS IMPLEMENTING TECHNOLOGY INNOVATIONS TO 50% BY 2024.

THE FUND FACILITATES ACHIEVEMENT OF THE GOALS OF

10

NATIONAL PROJECTS AND OF 28 FEDERAL PROJECTS AS THEIR PART IN THE FRAMEWORK OF THE PRIMARY AREAS OF ACTIVITY WITHIN THE STRATEGY-2024.

The Fund is responsible for implementing the "Promotion of Development of the Modern Innovative Infrastructure in the Field of Nanotechnology, Mechanisms, and Tools for Realizing the Potential of the Nanoindustry" project of the "Innovation Stimulation" subprogram of the "Economic Development and Innovative Economy" state program of the Russian Federation[47] and is also involved in the updating of the state program, including taking into account the extension of its implementation until 2024.

PARTICIPATION IN IMPROVEMENT OF THE REGULATORY ENVIRONMENT

IN ORDER TO SOLVE THE ISSUES RELATED TO ADMINISTRATIVE BARRIERS AND CREATE A FAVORABLE REGULATORY ENVIRONMENT FOR THE EFFICIENT DEVELOPMENT OF HIGH-TECHNOLOGY COMPANIES, THE FUND ACTIVELY COOPERATES WITH THE AUTHORITIES, DEVELOPMENT INSTITUTIONS, THE EXPERT AND BUSINESS COMMUNITIES, AS WELL AS PARTICIPATES IN WORKING AND INTERDEPARTMENTAL GROUPS, INCLUDING:

- the Expert Council on Science and Technology Development and Intellectual Property of the State Duma Committee on Education and Science;
- the Committee on Innovation Policies and Innovation Entrepreneurship of the Russian Union of Industrialists and Entrepreneurs, as well as the Expert Group of the Committee;
- The Russian Council of Private Equity Funds (RUSPEC);
- working groups of the Center of expertise on the "Statutory Regulation" project of the "Digital Economy" program;
- the Coordinating Council of the Innovation and Investment Market of Moscow Exchange, PJSC;
- the Committee on Development of the Innovation and Investment Market of the Coordinating Council of the Innovation and Investment Market (IIM) of Moscow Exchange, PJSC;
- the Venture Capital Market Council;
- the Expert Council of the National Rating of Special Economic Zones of Russia.

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INVESTMENT PARTNERSHIPS HAD BEEN ESTABLISHED

The bills developed in different legislation spheres allow creating an environment necessary for efficient development of the nanotechnology sector and of the high-technology economic sectors connected therewith; they are also intended to achieve goals and objectives of the national projects (programs) developed in accordance with Decree No. 204 of the President of the Russian Federation dated May 07, 2018, and other state strategic planning documents.

In particular, the bills developed with the help of the Fund—"On the Amendment of the "On the Economic Partnerships" Federal Law" and "On the Amendment of the "On the Investment Partnerships" Federal Law", as well as "On the Amendment of the Tax Code of the Russian Federation to Improve Income Taxation of Investment Partnerships" and "On the Amendment of the Tax Code of the Russian Federation to Improve Taxation of Economic Partnerships"—are intended to improve the instruments actively used in the investment sphere, optimize tax management, remove "grey areas" and unwarranted administrative barriers, and to bring these instruments to conformity with the international practices. All these measures will not only increase popularity of such forms of organization of pooled venture capital and private equity investment, but also increase the number of transactions of the foreign funds structured in the Russian jurisdiction and raise interest to Russian companies.

By the end of 2019, more than 70 investment partnerships had been established in compliance with Federal Law No. 335-ФЗ "On Investment Partnerships" dated November 28, 2011, including around 25 partnerships investing in wind energy, healthcare, and energy efficiency projects as well as in projects in other priority spheres, including:

47 *Resolution No. 392 of the Government of the Russian Federation "On the Amendment of the "Economic Development and Innovative Economy" State Program of the Russian Federation" dated March 31, 2017.*

THE RUSNANO–MEDINVESTGROUP PRIVATE EQUITY FUND

managed jointly by the RUSNANO Management Company and a Pharmstandard Group company specializes in projects in healthcare, medicine, medical services, and related spheres;

THE WIND ENERGY DEVELOPMENT FUND

managed jointly by the RUSNANO Management Company and Fortum, PJSC, specializes in projects in construction and operation of wind energy-based electricity generation facilities;

THE RUSNANO SISTEMA SICAR FUND

managed jointly by the RUSNANO Management Company and Joint-Stock Financial Corporation "Sistema" specializes in projects in the venture or growth stage in microelectronics, clean technologies, energy efficiency, and robotics;

THE RUSBIOVENTURES FUND (RBV CAPITAL)

managed by RusBioVentures, LLC, specializes in projects in biotechnology, pharmaceutics, medicine, and related spheres.

O.V. FOMICHEV

DIRECTOR FOR STRATEGIC PLANNING AND DEVELOPMENT OF KOMPLEKSPROM JSC

The Ministry of Economic Development of Russia is conducting systematic work aimed at stimulating the attraction of investments in the innovative sector of the economy of the Russian Federation.

The Fund for Infrastructure and Educational Programs and other development institutions are actively involved in the development of legal mechanisms aimed at creating conditions for attracting institutional investors' funds in the innovation sector of the economy, improving the organization of collective and direct venture investments and the legal forms of conducting innovative business.

In addition, with the participation of the Fund, proposals are prepared for regulating the use of alternative investment mechanisms in innovative companies, and practical measures are being developed to improve existing measures to support such companies and to formulate new tools to support the innovative sector of the economy."

Adoption of the aforementioned bills will allow for a multifold increase in the amount of investments in projects, including in the spheres of environmentally responsible and resource-saving energy industry, energy efficiency, quality of life, etc., and guarantee increase in the number of high-performance jobs to promote achievement of goals and objectives of a wide range of national projects, including "Small and Medium-Sized Entrepreneurship and Support of Individual Entrepreneurial Initiative", "Workforce Productivity and Employment Support", "Ecology", etc.

IMPROVEMENT OF TAXATION OF THE INVESTMENT ACTIVITY CARRIED OUT BY INVESTMENT PARTNERSHIPS AND REGULATION OF INVESTMENT PARTNERSHIPS IN GENERAL

IN 2018–2019, THE FUND DEVELOPED SUGGESTIONS IN THE FORM OF AN "ON THE AMENDMENT OF THE TAX CODE OF THE RUSSIAN FEDERATION TO IMPROVE INCOME TAXATION OF INVESTMENT PARTNERSHIPS" BILL[48] IN COLLABORATION WITH A WIDE RANGE OF REPRESENTATIVES OF THE INVESTMENT COMMUNITY.

The bill is intended to optimize tax management of investment partnerships and bring conditions of taxation of such partnerships to conformity with the best international practices. This will allow positively affecting development of innovative projects and increasing interest to this instrument of organization of pooled investment multifold. The bill was prepared on the basis of the accumulated experience of using this type of organization of pooled investment and the need of the Russian economy in modern investment instruments.

The Fund was also developing suggestions to improve the sectoral legislation to take into account peculiarities of private equity and venture capital investment funds operating in the Russian Federation as investment partnerships in the form of a bill. These bills are scheduled to be reviewed by the federal executive authorities in 2020.

The funds of institutional investors remain an important and considerable source of investment for financing projects in the sphere of private equity and venture capital investment. Some of the key institutional investors in the private equity and venture capital (PE & VC) investment market in the global practice are non-state pension funds; the "long-term" money they accumulate is a source of long-term investment growth for the economy and its harmonious, balanced development. It is impossible to make a transition to the innovation economy in terms of guaranteeing long-term sustainable economic growth without attracting "long-term" money.

In Russia, the assets of non-state pension funds may not be invested to private equity and venture capital investment funds and the instruments used by the PE & VC market actors are not listed as permitted for investment by non-state pension funds (trust companies). At the same time, there is a market demand for expansion of investment possibilities of non-state pension funds that would allow diversifying risks and ensuring a higher rate of return in whole with the balanced risk management at that.

Together with the investment community, the Fund helps to develop legislation for expanding the possible ways to invest assets of non-state pension funds in private equity and venture capital investment funds in the Russian Federation, establishing balanced practices and approaches to responsible investment of such assets.

The Fund pays active attention to the improvement of regulation of alternative (over-the-counter) ways of attracting investment. Federal Law No. 259-ФЗ "On the Attraction of Investment via Investment Platforms and the Amendment of Certain Legislative Instruments of the Russian Federation" dated August 02, 2019, was adopted in 2019. On the basis of its international experience, the Fund suggested additional instruments of encouraging investment to the innovative and high-technology business in

48 *Adoption of a corresponding Federal Law to create conditions for attracting investment to the innovation sphere is set forth in clause 6 of the action plan aimed at stimulating innovative development of the Russian Federation in 2017–2018 (approved by Resolution No. 1817-p of the Government of the Russian Federation dated August 25, 2017).*

VIKTOR NAUMOV

EXECUTIVE PARTNER AT THE DENTONS INTERNATIONAL LAW FIRM IN SAINT PETERSBURG, HEAD OF THE EUROPEAN PRACTICE IN THE SPHERE OF THE INTERNET AND TECHNOLOGIES

"Spring 2020 sees the whole world panic about the pandemic and oil price swings. This setting highlights the Russian economy's need in innovations especially well. However, innovations need a capital. We also see that while the government makes efforts to develop production and technologies of the future, the financial resources of businesses and households are almost never invested in innovations. Legal regulation of financial isntruments must become more flexible.

We at Dentons are glad that the Fund for Infrastructure and Educational Programs systemically focused on this problem in the beginning of 2019. As a result of the Fund's directed research, Russia now has a unique alternative financing development program. In cooperation with partners, including Dentons, the Fund has made an important step towards popularization of private venture investment by developing the long-needed corporate, financial, and fiscal stimuli. The program is based on successful solutions implemented in the world's leading economies, as well as an unparalleled solution — introduction of a new legal entity, a digital person.

We would like to thank the Fund for a timely task, professional cooperation in the idea generation process, and a professional approach to operations. We look forward to implementation of the program and are ready to fulfill it together."

the Russian Federation, including via investment platforms.

Throughout the year, the Fund took part in developing a range of other bills aimed at improving legislation in the innovative and high-technology spheres.

The Fund took an active part in fulfilling clause 2 of the List of Instructions No. Пр-2199 of the President of the Russian Federation dated September 18, 2019, regarding amendment of legislative instruments of the Russian Federation to actively develop innovations and grant tech entrepreneurs "the right to risk" when carrying out venture capital funding of innovative and/or technology projects.

Furthermore, the Fund developed and submitted suggestions and comments regarding the following draft Federal Laws:

- "On the Amendment of the "On the Securities Market" Federal Law";
- "On the Scientific and the Science and Technology Activity in the Russian Federation";
- "On the Innovative Activity Development in the Russian Federation, Capital Investment Protection and Promotion."

The Fund is listed in the List of Juridical Persons Providing State Support of Innovative Activity[49]. In order to ensure access of the Fund's small innovative companies[50] (founded or partly/fully owned by the Fund or its daughter organizations) to the existing mechanisms of state support of small and medium-sized entrepreneurship, including tax abatements and other preferences, the Fund continuously work to obtain confirmation of compliance with the established criteria for being qualified as such.

INTERNATIONAL COOPERATION

International cooperation is one of the significant drivers of innovative development in the age of globalization. Even one of the SDG is to "Strengthen the means of implementation and revitalize the Global partnership for sustainable development" and implies *"international cooperation in science, technology, and innovations and access to corresponding achievements."*

One of the successful examples of such cooperation is a Russian-Israeli program of cooperation in the sphere of industrial R&D that has been implemented by the Fund since 2012. The Fund has been authorized by the Russian Federation to implement the agreement .

The agreement provides for the annual selection and support of joint R&D projects in the sphere of nanotechnology and the high-tech sectors related thereto carried out by companies of the Russian Federation and the State of Israel.

A project receives funding upon a positive decision by the joint Russian-Israeli Commission. Russian companies receive the Fund's support in the form a grant, the average amount whereof is 30-40% (but not more than 50%) of the budget of the Russian part of the project, whereas Israeli companies are supported by the Israel Innovation Authority.

TO DATE, THE AGREEMENT HAS RESULTED IN THE FOLLOWING:

8
CONDUCTED PROJECT SELECTION ROUNDS

EXAMINATION OF
>70
APPLICATIONS

9
PROJECTS APPROVED FOR IMPLEMENTATION.

49 According to the Federal Law No. 127-ФЗ "On the Science and the State Science and Technology Policy" dated August 23, 1996.
50 If compliant with the other criteria set forth by article 4 of Federal Law No. 209-ФЗ "On the Small and Medium-Sized Entrepreneurship Development in the Russian Federation" dated July 24, 2007.

MEDICAL PROTON THERAPY SUITE PROJECT

SINCE 2013, THE FUND HAS BEEN TAKING PART IN A JOINT PROJECT TO DEVELOP A MEDICAL PROTON THERAPY SUITE. TO DATE, PROTON THERAPY IS THE MOST ACCURATE AND HIGH-TECH METHOD OF CANCER THERAPY. THE KEY ADVANTAGE OF PROTON THERAPY IS THAT PROTONS ARE CAPABLE OF RELEASING MOST OF THEIR ENERGY IN A TUMOR SITE UNLIKE THE STANDARD RADIATION THERAPY WHERE THE ENERGY IS RELEASED ALONG THE WHOLE BEAM PATH AND AFFECTS HEALTHY TISSUES AND ORGANS. AT THE SAME TIME, HIGH COST OF EQUIPMENT AND TREATMENT, AS WELL AS CONSIDERABLE OVERHEAD EXPENSES PREVENT WIDE SPREAD AND USE OF THIS METHOD. THE JOINT RUSSIAN-ISRAELI PROJECT IS INTENDED TO IMPROVE AVAILABILITY OF PROTON THERAPY OF CARCINOMAS.

The Russian part of the project is represented by PROTOM, CJSC (https://www.protom.ru/; Protvino, Moscow Region); since 2001, this company's crew has been developing and improving proton accelerators. At the moment, there are two proton therapy systems manufactured by PROTOM, CJSC, used in Russia: at a hospital in Protvino, Moscow Region, and in Obninsk, Kaluga Region.

The Israeli part of the Project is represented by P-Cure Ltd (http://www.p-cure.com); this company has been developing the treatment chair and the positioning system control.

Owing to the physical and design peculiarities, the proton therapy suite developed by PROTOM and P-Cure features technical properties that ensure a high level of proton therapy using current treatment methods, including the following:

- allows planning the treatment procedure highly accurately due to high precision of selection of the energy value (increments of 0.1 MeV; with other types of therapy, the increments are ~ 1 MeV);
- does not require a bulky gantry system (a device that allows rotation of the proton beam around the

patient to achieve the required radiation dose) of around 200 tons;

- patients are treated sitting in a mobile seat; the positioning element of the treatment chair helps to ensure proton beam delivery from the required directions;
- features small dimensions, i.e., may be used in existing hospitals and does not require building separate structures;
- requires less electric power (helps to save power and money when in operation).

The special-purpose medical installation's software also allows carrying out treatment, directing and correcting beam delivery, and monitoring the tumor in real time.

Before the Project, the companies had not collaborated with each other; each of them had taken part in isolated projects as a supplier of devices for building proton therapy suites, primarily, overseas with previous versions of their solutions.

Participation of PROTOM and P-Cure in the Russian-Israeli program offered potential for cooperation and financial support to create a full-blown ready-made solution, a unique product—a compact proton therapy suite.

Owing to the compact construction, the cost of the proton therapy suite and the overhead expenses associated with its maintenance will be multiple times lower than for the existing counterparts.

At the moment, in the course of building a prototype medical system, the last stages of coupling of the PROTOM proton accelerator to the P-Cure medical installation are conducted; the project representatives also applied to the FDA to certify the PROTOM/P-Cure proton therapy suite as medical equipment to start sales of medical proton therapy suites and use them for treatment.

THE PROTOTYPE OF THE THERAPY SUITE IS LOCATED AT THE P-CURE'S SITE IN ISRAEL IN A SPECIALLY EQUIPPED BUNKER; SINCE THE SECOND HALF OF 2020, IT WILL HAVE BECOME AVAILABLE FOR VIEWING BY REPRESENTATIVES INTERESTED IN ORGANIZING PROTON THERAPY AND SUPPORTING APPLICATION OF PROTON THERAPY AROUND THE WORLD.

2.4

REGULATORY AND TECHNICAL INSTRUMENTS FOR INNOVATIVE DEVELOPMENT OF THE NANOINDUSTRY AND THE HIGH-TECHNOLOGY ECONOMIC SECTORS

ACTIVE PARTICIPATION OF SUBJECTS OF THE RUSSIAN FEDERATION CONSTITUTES A SYSTEMIC OBJECTIVE OF INNOVATIVE ECONOMY DEVELOPMENT AND IMPLEMENTATION OF THE NATIONAL PROJECTS. THE REGULATORY AND TECHNICAL INSTRUMENTS AND INFRASTRUCTURE DEVELOPED BY THE FUND ALLOW TAKING PART IN IMPLEMENTATION OF THE NATIONAL PROJECTS BOTH DIRECTLY AND VIA ESTABLISHED RELIABLE CONNECTIONS WITH SECTORAL AND REGIONAL PARTNERS, INCLUDING COOPERATION WITH REGIONAL PROJECT MANAGEMENT OFFICES AND OTHER INNOVATION STRUCTURES RESPONSIBLE FOR IMPLEMENTATION OF THE NATIONAL PROJECTS.

The instruments of advanced standardization, innovativeness evaluation, quality and safety confirmation, the tools for special measurements and testing of new products, as well as the regulatory and technical infrastructure developed by the Fund may greatly contribute to achievement of the goals and objectives of the national projects in the sphere of small and medium-based entrepreneurship and support of individual entrepreneurial initiative, science, international cooperation and export, digital economy, workforce productivity, and employment support. Regional centers of regulatory and technical innovation support started applying the Fund's instruments to implement the national projects in regions of the Russian Federation.

The set of regulatory and technical instruments developed by the Fund guarantees support of innovative products and technologies starting from idea conception to their implementation in real projects and products. This is made possible by the following:

- regional centers of regulatory and technical innovation support established with the support from regional public authorities and in cooperation with innovative structures;
- a unique multifunction system of evaluating and confirming quality, safety, environmental friendliness, and innovativeness of products and technologies of the nanoindustry and the high-tech sectors related thereto, as well as of evaluating and confirming innovativeness of enterprises;
- use of the distributed electronic information resource "Technology, Regulatory, and Technical Expertise Map" created by the Fund and developed to support the regional innovative system;
- operations of the Center of Innovative Sphere Standardization and national and interstate technical committees (TC) 441 "Nanotechnologies" for standardization that allow developing advanced standards to speed up commercialization of new products of innovative enterprises;

- harmonization of Russian regulatory documents with international standards, control of development of international standards to ensure high-performance characteristics of Russian innovative products are accounted for and remove regulatory barriers to promote such products abroad.

To ensure regulatory and technical support, the Fund has three key areas of operation; they were structurally organized into three major projects to promote quicker commercialization of research results and efficient technology transfer:

"INNOVATION CERTIFICATION"

"REGIONAL CENTERS OF REGULATORY AND TECHNICAL INNOVATION SUPPORT"

"ADVANCED STANDARDIZATION"

"REGIONAL CENTERS OF REGULATORY AND TECHNICAL INNOVATION SUPPORT" PROJECT

AN IMPORTANT GOAL OF THE "REGIONAL CENTERS OF REGULATORY AND TECHNICAL INNOVATION SUPPORT" PROJECT IS TO EXTEND USE OF THE REGULATORY AND TECHNICAL INSTRUMENTS DEVELOPED BY THE FUND AND STIMULATING DEMAND FOR INNOVATIVE PRODUCTS AND THEIR COMMERCIALIZATION TO MOST REGIONS OF ALL THE FEDERAL DISTRICTS OF THE RUSSIAN FEDERATION.

The primary Fund's partners in this project are regional centers of regulatory and technical innovation support cooperating with innovative structures, development institutions, high-technology companies, as well as with regional public authorities and project offices of the national projects.

To ensure regulatory and technical support of innovative development of regional businesses, the Fund organized cooperation with executive offices of plenipotentiaries of the President of the Russian Federation in federal districts and involves regions of federal districts to regulatory and technical innovation support.

To date, the Fund has developed a network of 7 regional centers of regulatory and technical innovation support that as base platforms in federal districts ensured cooperation with 6 more regions in 2019 and created conditions for comprehensive regulatory and technical support of innovative activity.

Development of a network of regional centers of regulatory and technical innovation support guarantees local accessibility and faster rendering of services concerning innovation standardization and certification, development of product technical level maps, measurement and test methods to small and medium-sized enterprises to fulfill objectives of the "Small and Medium-Sized Entrepreneurship and Support of Individual Entrepreneurial Initiative" national project.

In 5 regions of the Russian Federation, the Fund organized development of Registers of Innovative Products supported by the Fund's regulatory and technical instruments and ready for commercialization. This helps investors and customers, including the state, to reduce risks of choosing innovative products for procurement.

7

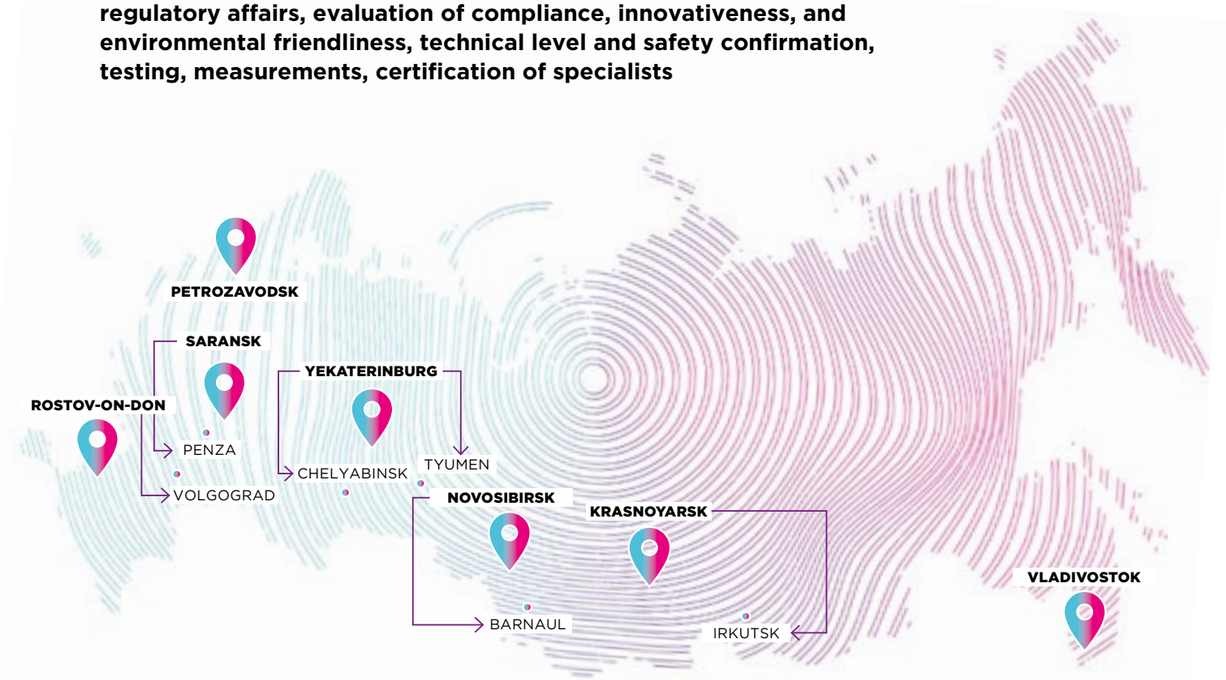
REGIONAL CENTERS OF REGULATORY AND TECHNICAL INNOVATION SUPPORT

in 5

REGIONS OF THE RUSSIAN FEDERATION, THE FUND ORGANIZED DEVELOPMENT OF REGISTERS OF INNOVATIVE PRODUCTS

INNOVATION SUPPORT FROM DEVELOPMENT TO PRODUCTION

regulatory affairs, evaluation of compliance, innovativeness, and environmental friendliness, technical level and safety confirmation, testing, measurements, certification of specialists



In 2019, the Fund secured participation in regulatory and metrological support of priority areas of innovative development of the nanoindustry in the Eurasian Economic Union and the CIS member states as part of international cooperation and implementation of joint projects with the Republics of Belarus and Kazakhstan.

Territorial expansion of transfer of the Fund's regulatory and technical instruments to territories of Russia and the Eurasian Economic Union is characterized by the number of subjects of innovative activity requiring regulatory and technical support for product manufacturing and commercialization. In these circumstances, the "Technology, Regulatory, and Technical Expertise Map" distributed electronic information resource developed by the Fund, employed at 5 regional centers of regulatory and technical innovation support, and aimed, among other things, at fulfilling objectives of the "Digital Economy" national project is becoming very important.

REGISTERS OF INNOVATIVE SOLUTIONS SUPPORTED BY REGULATORY AND TECHNICAL INSTRUMENTS—BENCHMARKS FOR CUSTOMERS

Registers of the innovative products supported by regulatory and technical instruments are compiled by regional centers of regulatory and technical innovation support in cooperation with regional public authorities and aimed at information support of manufacturers as well as contribution to marketing of new high-technology products.

Compilation and update of Registers of innovative products will ensure higher awareness of consumers (customers, developers, experts, investors) about the new characteristics and scope of use of products, advanced scientific and engineering solutions, successful experience of commercialization and facilitate expansion of the pool of legal manufacturers of new products.

The innovative products included in the Registers guarantees a high technical level, availability of the necessary standardization documents, confirmation of quality and safety.

The information specified in the Registers regarding advantages of new products, the regulatory, technical, and authorization documents supporting manufacturing and turnover thereof is sought for when drafting plans of procurement of innovative products for state, municipal, and corporate needs.

TECHNOLOGY, REGULATORY, AND TECHNICAL EXPERTISE MAP—DISTRIBUTED INFORMATION RESOURCE FOR REGIONS

INFORMATION SUPPORT OF THE NETWORK OF REGIONAL CENTERS OF REGULATORY AND TECHNICAL INNOVATION SUPPORT IS BASED ON THE ELECTRONIC INFORMATION PLATFORM CREATED BY THE FUND—THE TECHNOLOGY, REGULATORY, AND TECHNICAL EXPERTISE MAP (HEREINAFTER REFERRED TO AS THE EXPERTISE MAP).

The Expertise Map databases contain the following:

- technology expertise package—information on regional innovative companies, primarily the ones taking part in priority technology areas of innovative development (dominant regional technologies), including in the national projects;
- register of types of innovative products;
- list of the regulatory, technical, and authorization documents required for commercialization and turnover of innovative products;
- regulatory and technical expertise package—information on competent organizations developing standardization documents, certifying products and management systems, assisting in procurement of authorization documents, conducting special measurements and tests, and evaluating personnel qualifications in the sphere of technical regulation and on addresses of these organizations.

The Expertise Map is delivered as a web application with a user-friendly interface and possibility of fast search for the necessary information from the Map's database.

Use of the Expertise Map's resources allows doing the following:

FOR INNOVATIVE COMPANIES AND STARTUPS:

to determine composition of the package of regulatory and technical documents required for commercialization of innovative products and select qualified organizations to draft and obtain such documents. The Map also helps to choose the most conveniently located organizations on the map of the Russian Federation and address qualified experts to operatively resolve regulatory and technical problems;

FOR COMPETENT ORGANIZATIONS FROM THE MAP'S DATABASE:

to get new possibilities of searching for new customers and consumers of regulatory and technical products and services;

FOR THE FUND:

to ensure admission to regional components of the national projects via dominant regional technologies;

FOR INVESTORS:

to obtain reliable information and contacts of the innovative companies taking part in implementation of dominant regional technologies, including the ones enjoying comprehensive regulatory and technical support.

In the year under review, the Fund tested a new instrument of innovation promotion—a "technology corridor" intended to substitute obsolete technologies and ensure necessary regulatory and technical support of mass introduction of modern innovative solutions both at present and in the long term.

THE FIRST THREE "TECHNOLOGY CORRIDORS" WERE DEVELOPED FOR PRIORITY AND PROMISING NANOINDUSTRIAL CLUSTERS:

- lighting engineering and LED lighting products;
- lithium-ion batteries and electrical energy storage systems;
- flexible electronics and flexible electronic devices.

Results of the analysis of application of regulatory and technical instruments as part of development of "technology corridors" have already been applied to develop standardization program 2020 and cooperate with enterprises to organize testing and certification of innovative products.

IURII KOCHURA

HEAD OF THE REGIONAL CENTER OF REGULATORY AND TECHNICAL INNOVATION SUPPORT OF THE NOVOSIBIRSK REGION

"Use of the Technology, Regulatory, and Technical Expertise Map by the Regional Center of Regulatory and Technical Innovation Support of the Novosibirsk Region will help to significantly increase the number of innovative companies that the center may support, render the Fund's regulatory and technical services available to them, use combined resources of all the regional centers to fulfill objectives of marketing innovative products.

Практика использования в 2019 году Региональным центром нормативно-технической поддержки инноваций Новосибирской области возможностей Карты компетенций значительно увеличила количество инновационных компаний, которым центр оказал и может в дальнейшем оказывать поддержку, обеспечивать для них доступность к нормативно-техническим сервисам Фонда, использовать совокупные ресурсы всех региональных центров для решения задач продвижения на рынки инновационной продукции».

"TECHNOLOGY CORRIDOR"— INSTRUMENT OF MARKETING SCIENTIFIC DEVELOPMENTS

The Fund together with high-technology manufacturers and sectoral organizations offered the market an instrument to improve quality of technology solutions, substitute obsolete technologies, and introduce scientific developments to production processes—technology corridors consisting of a set of measures to develop an advanced regulatory framework for developed and promising innovation markets and regulatory and technical infrastructure, establish requirements for and remove restrictions of technical parameters of new products and technologies.

Technology corridors are aimed at creating conditions for improving quality and technology level of the manufactured products, technology modernization and refitting of production via establishing requirements for and restrictions of technical parameters of technologies and products.

The Fund implements two types of technology corridors:

- product technology corridors necessary for immediate introduction of scientific developments to industries and intended to improve the technology level of manufactured products via establishing requirements for and restrictions of technical parameters of applied technologies and consumer products.
- regional technology corridors aimed at facilitating creation of innovative activity conditions in regions and implementation of regional innovative strategies.

Use of technology corridors helps to improve competitiveness of the innovative economy, establish links between regulatory and legislative instruments, both active and potential, to obtain a balanced system satisfying current technology and economic requests, reduce risks of commercializing new products, and ensure expansion of regional sales markets.

ANNA SHAKHPARUNIANTS

CEO OF VAVILOV RUSSIAN LIGHTING RESEARCH INSTITUTE, LLC

"Development of a technology corridor in the lighting engineering sphere with support of the Fund allowed determining priority areas of regulatory framework development to facilitate use of modern LED nanoindustrial products.

Aviation lighting is one such area where standardization of requirements to methods of measuring LED-based security lighting to ensure promotion of LED technologies to the aviation lighting market as part of modernization of the aerodrome security lighting systems."

IN 2019, MORE THAN

200

INNOVATIVE COMPANIES FROM DIFFERENT REGIONS OF RUSSIA RECEIVED THE FUND'S REGULATORY AND TECHNICAL SUPPORT.

INNOVATION CERTIFICATION PROJECT

THE KEY GOAL OF THE INNOVATION CERTIFICATION PROJECT IS TO FACILITATE COMMERCIALIZATION AND STIMULATION OF DEMAND FOR NEW PRODUCTS AND TECHNOLOGIES BY PROVIDING EVALUATION AND VALIDATION SERVICES.

The major Fund's partners in this project are Autonomous Non-Profit Organization "Nanocertifica" with its 14 regional branches, the Distributed Collective Testing Center and competent test laboratories, regional and sectoral certification systems, the Intersectoral Association of Nanoindustry, institutions of the Russian Federal Agency on Technical Regulating and Metrology, institutions of higher education, regional development institutions, innovative organizations and enterprises. Seventeen regions of Russia taking part in the Nanocertifica certification system are involved in implementation of the "Innovation Certification" project.

To date, a multifunctional system of evaluation and confirmation of quality, safety, environmental friendliness, and innovativeness of products and technologies in the nanoindustry and the high-tech sectors related thereto, as well as of evaluation and confirmation of innovativeness of enterprises and certification of university graduates to work at innovative enterprises has been developed. More than 660 supporting documents were issued, including more than 420 certificates for nanoindustrial products and quality management systems, as well as more than 190 authorization documents, including expert reports on nanosafety.

The services are provided at one-stop sources and ensure saving resources and time of small and medium-sized enterprises from different regions of Russia to support implementation of the "Small and Medium-Sized Entrepreneurship and Support of Individual Entrepreneurial Initiative" national project.

THE MAJOR RESULT OF THE YEAR 2019 CONSISTED IN CREATION OF A UNIQUE SYSTEM FOR CERTIFICATION OF INNOVATIVE PRODUCTS AND EVALUATION OF INNOVATIVENESS OF COMPANIES THAT STARTED OPERATING IN DIFFERENT REGIONS OF RUSSIA; 20 CERTIFICATES WERE ISSUED TO INNOVATIVE PRODUCTS, 10 SMALL AND MEDIUM-SIZED ENTERPRISES WERE CERTIFIED AS INNOVATIVE.

17

REGIONS OF RUSSIA TAKING PART IN THE NANOCERTIFICA CERTIFICATION SYSTEM ARE INVOLVED IN IMPLEMENTATION OF THE PROJECT.

MORE THAN

660

SUPPORTING DOCUMENTS WERE ISSUED, INCLUDING MORE THAN

420

CERTIFICATES FOR NANOINDUSTRIAL PRODUCTS AND QUALITY MANAGEMENT SYSTEMS, AS WELL AS MORE THAN

190

AUTHORIZATION DOCUMENTS, INCLUDING EXPERT REPORTS ON NANOSAFETY

CERTIFICATION OF INNOVATIVE PRODUCTS—INNOVATION PROMOTION INSTRUMENT

The system of innovative products certification and evaluation of enterprise innovativeness developed upon an initiative of the Fund involving Autonomous Non-Profit Organization "Nanocertifica" is the only Russian system of evaluating compliance of products and enterprises with the innovativeness criteria established for certification procedures given the requirements of Resolution No. 773 of the Government of the Russian Federation "On the Classification Criteria of Innovative and/or High-Technology Products, Works, and Services" dated June 15, 2019.

The developed system is focused at the enterprises presenting themselves as innovative and is intended to promote new technologies, introduce innovative solutions by means of independent evaluation and confirmation of novelty and uniqueness. The enterprise is issued a certificate of innovative products and an enterprise innovativeness certificate upon completion of conformity assessment. These documents provide advantages for participation in state, municipal, and corporate bidding procedures and tenders, for supporting implementation of investment projects, and for compiling registers of innovative products in the course of interaction with regions.

Certification of innovative products and evaluation of innovativeness of enterprises involve regional centers of regulatory and technical innovation support and innovative structures.

The system of certification of innovative products and of evaluation of innovativeness of enterprises ensures the following:

- higher efficiency of interaction of customers and suppliers of innovative products;
- faster introduction of innovative solutions;
- lower risks of introduction of innovative solutions;
- faster commercialization of innovative products;
- higher trust of consumers to marketed innovative products;
- competitive advantages for participation in regional and federal procurement bidding procedures and tenders.

CERTIFICATION OF INNOVATIVE PRODUCTS AND EVALUATION OF INNOVATIVENESS OF COMPANIES ARE PERFORMED IN COOPERATION WITH REGIONAL CENTERS FOR REGULATORY AND TECHNICAL SUPPORT OF INNOVATIONS AND INNOVATIVE STRUCTURES.

ANDREI ELAGIN

CEO OF BIOMICROGELI, LLC

"BioMicroGeli was certified by Autonomous Non-Profit Organization "NANOCERTIFICA" in 2019. We decided to get out company and products certified, because we think this is a good instrument of promotion in the innovation market, quality improvement, and safety assurance. Furthermore, this is a working instrument for procurement. For instance, the fact that we have a certificate allows us to take part in tenders for innovative products."

IN THE CONTEXT OF DIGITAL TRANSFORMATION OF THE RUSSIAN ECONOMY, THE EXISTING TERRITORIAL INFRASTRUCTURE AND EXPERTISE OF THE FUND IN THE SPHERE OF CERTIFICATION MAY BECOME A BASIS FOR ORGANIZING DIGITAL CONFORMITY ASSESSMENT OF PRODUCTS, INCLUDING IN THE PRIORITY AREAS OF SCIENCE AND TECHNOLOGY DEVELOPMENT, WITHIN THE DEVELOPED NETWORK OF REGIONAL CENTERS, AT BRANCHES OF THE NANOCERTIFICA CERTIFICATION SYSTEM AND AT THE DISTRIBUTED SHARED TEST CENTER, THEREBY CONTRIBUTING TO IMPLEMENTATION OF THE "DIGITAL ECONOMY" NATIONAL PROJECT.

66

CERTIFICATES FOR ECOLOGICALLY RESPONSIBLE PRODUCTS AND ENVIRONMENTAL RESOURCE MANAGEMENT SYSTEMS, CALCULATED CARBON NEUTRALITY OF INNOVATIVE PRODUCTS AND COMPANIES

12

VERIFICATION STATEMENTS CONFIRMING REDUCTION OF THE CARBON PRINT IN THE PRODUCTION AND APPLICATION OF INNOVATIVE TECHNOLOGIES AND PRODUCTS

In order to commercially promote ecologically responsible products and introduce low-carbon technologies, the Ecology Center of Autonomous Non-Profit Organization "Nanocertifica" issued 66 certificates for ecologically responsible products and environmental resource management systems, calculated carbon neutrality of innovative products and companies, issued 12 verification statements confirming reduction of the carbon print in the production and application of innovative technologies and products. Carbon neutrality confirmation is one of the methods to reduce or prevent carbon dioxide emissions to the environment by innovative enterprises, including by means of supporting introduction of renewable energy resources and energy storage units.

Equipment of the test centers and laboratories of the Fund's distributed shared test center is becoming more frequently requested and used; we also see expansion of geography and scope of high-technology testing and measuring services in the interests of innovative companies from different regions of Russia. Therefore, conditions for reduction of time and administrative expenditures of small and medium-sized enterprises to test new products are created to fulfill objectives of the "Small and Medium-Sized Entrepreneurship and Support of Individual Entrepreneurial Initiative" national project.

To ensure reliability and comparability of results of measuring parameters of innovative high-technology products, measurement procedures were developed and qualified and types of reference samples were approved in the interests of nanotechnology enterprises from different regions of Russia in 2019. This was done for high-technology and often unique equipment of the organizations conducting research and development to help fulfill objectives of the "Science" national project concerning use of updated equipment of the leading scientific organizations and creation of advanced infrastructure for research and innovative activity.

To date, 219 measurement procedures have been developed, qualified, and included in the Federal Information Fund for Ensuring the Uniformity of Measurements, more than 20 reference samples of material composition and properties have been developed and approved, including 12 measurement procedures in 2019 for such companies as Novye Instrumentalnye Resheniia, CJSC, Rybinsk; Plazmokhimicheskie Tekhnologii, LLC (OCSiAl Group of Companies), Novosibirsk; New Diamond Technology, LLC, Saint Petersburg; Composite, JSC, Korolev; Ceramicfilter, LLC, Moscow; EcogeosProm, LLC, Tver; NanoTechCenter, LLC, Tambov; ZAVKOM–ENGINEERING, LLC, Tambov; Novye Materialy I Tekhnologii Grazhdanskogo Naznacheniia, LLC, Tambov.

MEASUREMENTS AND CONTROL—SAFE PRODUCTION FOUNDATIONS

In 2019, the Fund and the OCSiAl Group of Companies completed the work package for metrology support of production of TUBALL single-wall carbon nanotubes (SWCNTs). Identifier C1 intended to measure the shift average weight of SWCNTs accumulated throughout the shift on compact personal devices was tested for type approval and included in the Federal Information Fund for Ensuring the Uniformity of Measurements. The type of the state reference sample of weight concentration of single-wall carbon nanotubes in the organic solvent for Identifier C1 calibration was approved. The procedure for measuring the shift average SWCNT concentration in the workplace air by means of Raman spectroscopy was developed, qualified, and included in the state register. These works made possible joint efforts of the Fund and the group of companies to develop and introduce a corporate workplace air concentration limit for TUBALL SWCNTs at the OCSiAl Group's production sites. The obtained results may be used at other carbon nanotube production sites in Russia.

To help supply regional developing companies with qualified personnel, more than 540 students and specialists were certified with the help of the "Nanocertifica—Human Resources for Innovation" and the qualification evaluation center (QEC) of Autonomous Non-Profit Organization "Nanocertifica" given the requirements of professional standards in the sphere of technical regulation. This will help to remove the shortfall of young professional specialists in the standardization, metrology, testing, product and quality system certification services. Development of a certification system for university graduates taking into account requirements of professional standards and ensuring preparation and adaptation of future specialists to working in the innovative high-performance sphere is intended to fulfill objectives of the "Workforce Productivity and Employment Support" project.

ALEKSANDR BEZRODNYI

VICE-PRESIDENT OF OCSIAL

"OCSiAl commissioned a single-wall carbon nanotube (SWCNT) production line with the capacity of more than 50 thousand units per year in Novosibirsk. Single-wall carbon nanotubes are used as additives to improve properties of current sources, composite materials, paints, and coatings. Nowadays, many manufacturers around the world manufacture or test new SWCNT-enriched materials and experts expect an explosive growth of demand for nanotubes in the nearest future. At OCSiAl, we understand our responsibility for safety of the new nanomaterial for human health and environment and take all reasonable measures to minimize production risks. In partnership with the Fund for Infrastructure and Educational Programs, we completed toxicology studies of TUBALL SWCNTs, developed and approved a corporate workplace air concentration limit for TUBALL SWCNTs. A unique device, Identifier C1 (manufactured by Stat Peel Ltd.) purchased by OCSiAl to control weight concentration of nanotubes was legalized in the Russian Federation and included in the State Register of Measuring Instruments with the Fund's support."

IAROSLAV STANISHEVSKII

DIRECTOR OF THE INSTITUTE OF BIOCHEMICAL TECHNOLOGY AND NANOTECHNOLOGY AT THE PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA, DOCTOR OF CHEMISTRY, PROFESSOR

"Successful adaptation of a graduate to the modern labor market depends to a large degree on his/her understanding of the conditions and requirements set forth by his/her future employer; they have been introduced to professional standards and integrated into federal state educational standards.

Graduates of the Institute of Biochemical Technology and Nanotechnology work at air companies in the sphere of nanopharmacological technology, where safety assessment is the necessary condition of commencement of production and commercialization of innovative solutions.

A Kadry Dlia Innovatsii System certificate confirms expertise of our graduates and thus helps them land a job at nanoindustrial enterprises."

CERTIFICATION OF UNIVERSITY GRADUATES—VOCATIONAL GUIDANCE FOR FUTURE INNOVATORS

Together with the "Nanocertifica-Kadry Dlia Innovatsii" Voluntary Personnel Certification System for Innovative Enterprises, the Fund performs certification of university graduates in conformity with requirements of the professional standards used in the nanoindustry.

The goal is to develop human resources for the nanoindustry and attract young specialists meeting the contemporary requirements to the nanoindustry.

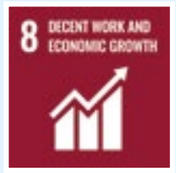
IN 2019,
219
GRADUATES OF 19 UNIVERSITIES FROM DIFFERENT REGIONS OF RUSSIA COMPLETED CERTIFICATION.

THE FUND DEVELOPED A NETWORK OF
8
EXAMINATION CENTERS AND A REGIONAL POOL OF TECHNICAL EXPERTS TO CERTIFY UNIVERSITY GRADUATES IN ALL THE FEDERAL DISTRICTS OF RUSSIA.

University graduates prepare themselves for certification using the distance education technologies developed by Autonomous Not-for-Profit Organization "eNano."

Certification is performed in cooperation with regional centers of regulatory and technical innovation support to identify innovation-focused university graduates who plan to start their professional activity in the nanoindustry.

Certification of university graduates helps them to undergo accelerated adaptation to perform the work functions characteristic of the selected areas of professional activity and enhance their competitive advantages in the labor market for the innovative sphere.



"RUSSIAN NANOTECHNOLOGY PRODUCT" SEAL

The Fund has been holding a traditional contest to award the "Russian Nanotechnology Product" Seal to confirm high quality, safety, and Russian origin of products and services since 2014. The "Russian Nanotechnology Product" Seal is an instrument of motivation to market innovative products and support Russian nanomanufacturers.

The "Russian Nanotechnology Product" Seal is awarded to the products manufactured in Russia with the raw materials originating in Russia using nanotechnologies or nanocomponents. Furthermore, the product must pass a test of safety for human health and environment, while the manufacturer must have the documents to confirm that it does not violate intellectual rights of any third parties. The Seal is also awarded to the Russian organizations rendering services to innovative nanotechnology companies.

The decision to award the "Russian Nanotechnology Product" Seal is made by a special Committee involving representatives of the Fund for Infrastructure and Educational Programs, scientific community, and the leading innovative companies, experts of the Russian Federal Agency on Technical Regulating and Metrology.

A laureate of the "Russian Nanotechnology Product" Seal (a manufacturer or a service organization) may use the Seal for commercial purposes at no cost. However, the Committee is entitled to deprive a laureate of the right to use the Seal if it is used unfairly or if the product/service is found non-conforming with the established requirements.

ALEKSANDR NARCHUK

CEO OF TEN.MEDPRINT, LLC

"TEN.MedPrint, LLC, is a contract manufacturer of endoprostheses and implants using additive technologies. It is an absolutely new and complex market of off-the-shelf and customized (according to the client's models) medical devices.

The company was awarded the "Russian Nanotechnology Product" Seal at the Congress of Nanotechnology Enterprises. It confirms quality and safety of our products, which are important for our customers.

The "Russian Nanotechnology Product" Seal clearly shows the customers that our company is not only reliable, but also innovative. Now, it is easier for us to convince potential clients to use promising technologies. This helps our company and the sector in whole to develop."

IN 2019, THE "RUSSIAN NANOTECHNOLOGY PRODUCT" SEAL WAS AWARDED TO

16

NANOINDUSTRY ENTERPRISES AND COMPETENT ORGANIZATIONS RENDERING SERVICES IN THE SPHERE OF NANOTECHNOLOGIES.

In 2019, an annual contest to award the "Russian Nanotechnology Product" Seal was held as part of the Congress of Nanoindustry Enterprises; it was awarded to 16 nanoindustry enterprises and competent organizations rendering services in the sphere of nanotechnologies.

The laureates included Lioteh-Innovatsii, a manufacturer of lithium-ion batteries; Impeks Elektro, a manufacturer of nanomodified fire-proof power cables; Thermoland, LLC, a manufacturer of facade heat insulation systems; TEN.MedPrint, a company specializing in the production of endoprostheses and implants using additive technologies; Federal State Unitary Enterprise "All-Russian Research Institute for Optical and Physical Measurements", the leading organization in the sphere of metrological, regulatory, and procedural services for high-technology nanoindustry enterprises; regional centers of regulatory and technical innovation support of the Novosibirsk Region, the Krasnoyarsk Region, and the Sverdlovsk Region providing comprehensive regulatory and technical support for innovative products of small and medium-sized regional enterprises.

ADVANCED STANDARDIZATION PROJECT

ONE OF FUND'S IMPORTANT GOALS IS TO DEVELOP AN ADVANCED STANDARDIZATION SYSTEM TO PROMOTE SUBSTITUTION OF OBSOLETE TECHNOLOGIES AND STIMULATE DEVELOPMENT OF NEW COMPETITIVE PRODUCTS. THE FUND'S MAJOR PARTNERS IN THE ADVANCED STANDARDIZATION PROJECT ARE REGIONAL CENTERS FOR REGULATORY AND TECHNICAL SUPPORT OF INNOVATIONS, THE CENTER OF STANDARDIZATION IN THE FIELD OF INNOVATION, INNOVATIVE ORGANIZATIONS AND ENTERPRISES, TECHNICAL COMMITTEES FOR STANDARDIZATION, AND INSTITUTIONS OF THE RUSSIAN FEDERAL AGENCY ON TECHNICAL REGULATING AND METROLOGY.

The Fund is actively expanding the scope of its technology activity beyond nanotechnologies to other high-technology economic sectors connected therewith, coordinating actions with regional development institutions, and introducing regulatory and technical instruments to innovative practice support mechanisms. This defined new challenges for standardization and set an objective to transform the standardization activity with due account of the new areas of operation.

In order to commercially promote innovative products, the Fund developed 255 national, preliminary national, and international standards (including the 15 standards developed in 2019) defining the advantageous characteristics of nanotechnology products of the new high-technology innovation market segments, including lithium–ion batteries for road transport, devices with flexible displays, fiber optic cables, "smart" LED-based lighting control systems, in cooperation with nanoindustrial companies and relevant technical committees of the Russian Federal Agency on Technical Regulating and Metrology.

This activity is conducted in compliance with the Nanoindustry Standardization Program that was transformed into the Innovative Standardization Program in 2019; it now covers the sphere of nanoindustry and high-technology industrial sectors and contains more than 480 standards.

The nanoindustry standardization program is one of the 8 sectoral targeted programs approved by the Russian Federal Agency on Technical Regulating and Metrology that constitute the basis of the national standardization program by virtue of their significance.

THE FUND DEVELOPED

255

255 NATIONAL, PRELIMINARY NATIONAL, AND INTERNATIONAL STANDARDS

INCLUDING

15

STANDARDS DEVELOPED IN 2019

ANTON SHALAEV

DEPUTY HEAD OF THE RUSSIAN FEDERAL AGENCY ON TECHNICAL REGULATING AND METROLOGY

"Standardization is an effective tool for fulfilling the national projects and supporting the real innovation economy.

The nanoindustry standardization program implemented by the Russian Federal Agency on Technical Regulating and Metrology in cooperating with the Fund for Infrastructure and Educational Programs involves development of a regulatory framework harmonized with the international regulatory framework for new segments of the high-tech innovation market: digital technologies and the Internet of things, power storage systems and renewable energy, flexible electronics and optical fiber technologies, nanomodified materials, innovative "green" products and technologies."

WITHIN THE NANOINDUSTRY STANDARDIZATION PROGRAM, IN 2019, SECTORAL INSTITUTIONS AND HIGH-TECHNOLOGY ENTERPRISES DEVELOPED

440

NATIONAL STANDARDS, INCLUDING THE 225 STANDARDS DEVELOPED WITH THE FUND'S DIRECT SUPPORT.

THE "NANOTECHNOLOGIES" TECHNICAL COMMITTEE FOR STANDARDIZATION (TC 441) BASED AT THE FUND AND INCORPORATING MORE THAN

30

ENTERPRISES AND ORGANIZATIONS BECAME ONE OF THE TOP 10 MOST EFFICIENT TECHNICAL COMMITTEES ACCORDING TO THE RUSSIAN FEDERAL AGENCY ON TECHNICAL REGULATING AND METROLOGY.

VALERII TATARINOV

CEO OF RESEARCH AND PRODUCTION ENTERPRISE "PIROUGLEROD", LLC

"Efficient cooperation with the "Nanotechnologies" technical committee for standardization (TC 441) based at the Fund allowed developing a national standard for our nanostructured carbon-based bulk material used by Russian high-technology enterprises, including the enterprises affiliated with the Rosatom, Rostec, and Roscosmos corporations, on a tight schedule.

We used the preliminary national standard developed with support of the Fund, the use whereof over a span of several years allowed our major customers to test the established requirements to nanotechnology products, as the basis for the national standard."

"NANOTECHNOLOGIES" TECHNICAL COMMITTEE FOR STANDARDIZATION (TC 441)— ONE OF TOP 10 BEST TECHNICAL COMMITTEES IN RUSSIA

The operation of TC 441 "Nanotechnologies" established under the auspices of the Fund for Infrastructure and Educational Programs and coordinating activities of more than 30 enterprises and organizations regarding comprehensive regulatory control of the nanoindustry guarantees a common technical policy on standardization in the nanoindustry and the high-technology sectors of economy economic sectors connected therewith.

Upon an initiative of TC 441 "Nanotechnologies", the Fund cooperates with interested manufacturers to support the Nanoindustry Standardization Program (more than 480 standards), prepare proposals and implement local technology-focused standardization programs, including in the sphere of fiber optic technologies, flexible electronics, renewably energy resources, etc., to contribute to the completion of the priority technology areas of development of the nanoindustry and the high-tech sectors related thereto and attract professional and financial resources to standardization efforts.

Activities of TC 441 "Nanotechnologies" ensure that the prudent harmonization of the national nanoindustrial standards with international and regional (European) standards is given due consideration.

Cooperation of TC 441 "Nanotechnologies" with international technical committees for standardization, ISO/TC 229 - Nanotechnologies and IEC/TC 113 - Nanotechnology for electrotechnical products and systems, ensures promotion of the national standards to the international community of nanoindustrial manufacturers in order to integrate Russian high-technology business to international technology chains.

Experts of TC 441 "Nanotechnologies" take part in the implementation of roadmaps of the National Technology Initiative in terms of development and introduction of necessary amendments to standardization documents, as well as current norms and rules.

VALERIY TELICHENKO

PRESIDENT OF THE MOSCOW STATE (NATIONAL RESEARCH) UNIVERSITY OF CIVIL ENGINEERING, CO-CHAIRPERSON OF TECHNICAL COMMITTEE 366 "GREEN TECHNOLOGIES FOR THE ENVIRONMENT AND INNOVATIVE GREEN PRODUCTS"

Such terms as "green technologies", "green products", "green standards", "green city", "green construction", "green environment", etc., have only relatively recently started to enter into use by the general public and professionals. The whold "green" environment paradigm is based on mankind's vital interests, development of understanding and cognition of the world where we, humans, live.

I believe that the demand for "green technologies" will keep growing in the years to come. Introduction of such terms as the "lifecycle", "energy efficiency", "comfort" and "safety" into professional use makes development of principles and provisions of "green standards" inescapable and much needed.

Technical regulation, standardization, and certification are very important for the development of "green" technologies. That is why Technical Committee 366 "Green technologies for the environment and innovative green products" was established by the Russian Federal Agency on Technical Regulating and Metrology at the Federal State Budgetary Educational Institution of Higher Education "Moscow State (National Research) University of Civil Engineering" and the RUSNANO Group's Fund for Infrastructure and Educational Programs.

We cooperate to develop a system of standards to promote development and implementation of promising "green" technologies, materials, and products and improvement of quality of the environment."

The Russian Federal Agency on Technical Regulating and Metrology received proposals of the Fund's participation in the development of the advanced manufacturing technologies standardization plan, including development of national standards for artificial intelligence, in the framework of completion of the "Regulatory Control of the Digital Environment" federal project's objectives within the "Digital Economy of the Russian Federation" national program and ensuring regulatory control of the digital interaction within the entrepreneurial community.

To support commercialization of new environmentally friendly and export-oriented products enjoying competitive advantages over Russian and foreign counterparts, the Fund runs the "Green Products and Technologies" subcommittee of Technical Committee 366 for standardization and ensures development and maintenance of product technical level maps for innovative products.

To date, 80 product technical level maps have been developed in cooperation with innovative enterprises (including 50 maps in 2019); they are used confirm innovativeness of products and develop preliminary national standards to secure advantageous characteristics of innovative solutions.

VLADISLAV MIRONOV

CEO OF LIOTEH-INNOVATSII, LLC

"The work on developing a product technical level map for lithium iron phosphate battery-based industrial uninterruptible power supplies manufactured by Lioteh organized by the Fund helped to evaluate and compare our products with the similar power supplies manufactured by the best Russian and foreign manufacturers and sold in Russia. We turned out to be the best!"

AS OF TODAY, IN COOPERATING WITH INNOVATIVE ENTERPRISES, WE HAVE DEVELOPED

80

TECHNICAL LEVEL MAPS, INCLUDING

50

MAPS IN 2019

PRODUCT TECHNICAL LEVEL MAP—GUARANTEE OF QUALITY AND COMPETITIVENESS OF INNOVATIVE PRODUCTS IN COMPARISON WITH BEST RUSSIAN AND FOREIGN COUNTERPARTS

Assessment of the technical level of innovative products is aimed at identifying Russian products of high degree of technical perfection featuring competitive advantages over Russian and foreign counterparts and is an instrument of rapid marketing of such products.

To ensure high quality of new products, the Fund cooperates with regional development institutions and regional centers of regulatory and technical innovation support to develop product technical level maps determining the primary technical and economic parameters of the object in comparison with aggregate requirements of international, regional, and national standards, as well as the best Russian and foreign counterparts.

Use of product technical level maps will help an innovative enterprise to assess and determine whether it is reasonable to master new products and improve quality, upgrade existing products, effect of introduction of new technologies and the quality of manufacturing, positioning of products in relation to the best Russian and foreign brands, as well as the chance of successful marketing.

Developed product technical level maps for innovative products help enterprises with certification, promote introduction of progressive advanced standards for products, and stimulate development of new types of products of a pre-defined high technical level.

2.5
DEVELOPMENT AND IMPLEMENTATION OF DEMAND STIMULATION PROJECTS

To market Russian products of the nanotechnology sector and the high-tech sectors related thereto in Russia and abroad, the Fund develops and implements projects aimed at the following:

- INITIATION AND INCREASE OF DEMAND FOR SUCH PRODUCTS AMONG CURRENT AND POTENTIAL CONSUMERS
- EXPANSION OF THE SCOPE OF USE OF INNOVATIVE PRODUCTS IN KEY ECONOMIC SECTORS
- LISTING OF RUSSIAN NANOMANUFACTURERS FOR STATE SUPPORT OF INTERNATIONAL COMMERCIAL TRANSACTIONS

In this matter, the Fund collaborates closely with regional executive authorities. Partner regions include the Altai Region, the Vologda Region, the Kaluga Region, the Nizhniy Novgorod Region, the Novosibirsk Region, the Perm Region, the Republic of Bashkortostan, the Republic of Tatarstan, the Rostov Region, Saint Petersburg, the Sverdlovsk Region, the Tomsk Region, the Udmurt Republic, the Ulyanovsk Region, and the Chuvash Republic.

Many of the Fund's large-scale partners take part in demand stimulation projects: Gazprom, PJSC; Transneft, PJSC; State-Owned Enterprise "Avtodor"; Russian Federal Road Agency (Rosavtodor); Russian Railways, OJSC; Ministry of Construction Industry, Housing, and Utilities of the Russian Federation; Ministry of Agriculture of the Russian Federation; Ministry of Industry and Trade of the Russian Federation; Ministry of Economic Development of the Russian Federation; Russian Export Center; trade offices of the Russian Federation in foreign countries; State Duma of the Federal Assembly of the Russian Federation.

The key projects cover the oil-and-gas industry, road construction, and urban facilities and directly facilitate completion of a range of national projects.

OIL-AND-GAS INDUSTRY

THE FUND COORDINATES COOPERATION OF THE RUSNANO GROUP (INCLUDING THE FUND'S PORTFOLIO COMPANIES AND NANOTECHNOLOGY CENTERS) AND COMPANIES OF THE GAZPROM GROUP.

The Fund regularly carries out activities to expand the range of certified nanotechnology products for introduction to design documentation of investment projects of Gazprom, PJSC. In 2019, the range was expanded to 22 solutions. Furthermore, the Fund developed a new model of cooperation of daughter companies of Gazprom, PJSC, with the RUSNANO Group in design and delivery of nanotechnology products in the course of implementation of investment projects of Gazprom, PJSC.

In the year under review, Gazprom, PJSC, and RUSNANO Management Company LLC continued developing the priority areas of cooperation established for the period 2019–2021. In 2019, certification procedures were launched at Gazprom, PJSC, for the following nanotechnology products:

- composite materials and devices made with composite materials;
- protective coatings for metal structures;
- universal mechanical protection coating for pipelines;
- anticorrosion coatings;
- cables;
- internal corrosion monitoring systems.

In the year under review, the Fund continued cooperation with Transneft, PJSC, aimed at implementing the projects related to the application of innovative products at the Transneft system's facilities to improve energy efficiency, operational excellence, reliability, and safety of transportation of oil and petroleum products.

FUND TAKES PART IN IX SAINT PETERSBURG INTERNATIONAL GAS FORUM

In October 2019, the Fund took part in the IX Saint Petersburg International Gas Forum.

The Fund's stand contained solutions of 28 innovative companies, members of the Russian Nanoindustry Association (nine of the represent the Fund's nanocenters); these solutions may be used by gas companies. New high-technology solutions provided by Profotech and Hevel help achieve goals of power saving and energy efficiency at gas industry facilities:

1) **Profotech** was the first company to offer forum participants current and voltage sensors (instrument transformers) manufactured using nanostructured optic fiber; these products feature unique specifications in terms of measurement sensitivity and environmental durability and provide the best possible protection of electrical networks.

2) **Hevel** presented new-generation solar modules weaving together advantages of the thin-film and the crystalline technologies; a cell's energy conversion efficiency is 22%, power—300–320 W.

The Fund's nanocenters also presented promising inventions: Nanotechnology Center of Composites, SYGMA.Novosibirsk, SYGMA.Novosibirsk, as well as the TechnoSpark Group of Companies.

As per usual, the Fund's platform served as a center for business contacts intended to market innovative products in Russia and abroad: there, working meetings with heads of daughter companies and divisions of Gazprom, PJSC, and of other key partners took place, as well as negotiations with representatives of foreign participating companies.

FUND AND TRANSNEFT SIGN AGREEMENT TO DEVELOP IN-LINE INSPECTION ROBOT

In March 2019, the Fund and Transneft, PJSC, Transneft–Diascan, JSC, and Tubot, LLC, signed an agreement to develop and manufacture a prototype robotic inspection unit to inspect process pipelines.

The cooperation is aimed at developing one of the promising areas of technology development of Transneft, PJSC—introduction of a robotic device for in-line cleaning and inspection of process pipelines and geometrically complex parts. The robotic rolling chassis will be developed and manufactured by Tubot, LLC, a company from SYGMA.Novosibirsk, LLC, of the Fund's investment network. Transneft–Diascan develops and manufactures the magnetic measurement system.

Tubot has been developing innovative in-line modules for various purposes since 2017 and applies the best foreign and Russian practices. The robotic unit for Transneft is the solution to automate diagnostic inspection of process pipelines of oil pumping stations that will allow detecting pipeline defects in time. The in-line robot will be able to move through three-way fittings and pipe angles and conduct pre-inspection cleaning of pipelines. The robotic unit's modular structure will allow connecting additional special purpose modules for inspection and repairs to the robotic rolling chassis.

ANDREI KOPYSOV

HEAD OF THE CHIEF POWER ENGINEER OFFICE, CHIEF ENGINEER OF TRANSNEFT, PJSC

"As part of cooperation of Transneft, PJSC, and the Fund, by 2019, we had implemented a range of projects to achieve energy efficiency and resource saving at the facilities of Transneft, PJSC, including installation of solar modules at a Transneft system's facility with the total power of 251.1 kW. In 2019, we continued cooperation with the Fund to implement a project unique to our company, "Digital substation", wherein we used digital optical current and voltage transformers supplied by a company from the RUSNANO investment portfolio and mapped out further activities within this project for 2020. The Fund and we continuously and share information about state-of-the-art technologies that may be used in our industry."

THE TOTAL NUMBER OF TECHNOLOGIES AT DIFFERENT STAGES OF INTRODUCTION TO THE TRANSNEFT SYSTEM AMOUNTED TO

19

SOLUTIONS IN 2019.

The Fund cooperated with Transneft, PJSC, in the following areas:

- replication (introduction) of the nanotechnology (high-technology) products previously tested by the Transneft Group's organizations;
- development of self-propelling inspection robots for inspecting process pipelines;
- testing of nanotechnology (high-technology) solutions;
- cooperation in R&D and review of scientific and technical solutions;
- review of new nanotechnology (high-technology) solutions.

As part of the R&D program implemented jointly by Transneft, PJSC, and the Fund, the parties determined the key groundwork to launch activities concerning the projects that had never before been used at the facilities of Transneft, PJSC.

In the year under review, the parties continued to implement large-scale energy projects intended to ensure resource saving and energy efficiency on the basis of advanced technologies. The parties also developed and presented a new pool of innovative solutions for introduction at oil and petroleum products pipeline transport facilities, including the IT technologies capable of automating data collection and processing in the course of routine maintenance at exploitation sites, petroleum products transportation and refining facilities, as well as the corrosion monitoring subsystem with wireless data transmission for inspecting the pipeline infrastructure.

Telemedical equipment had been tested at a facility of Transneft, PJSC, throughout 2019 to study capabilities of automated remote health management units for pre- and post-trip medical examinations of employees. In compliance with the current legislation, following test results, the equipment of Nobilis, LLC, may now be used at the facilities of Transneft, PJSC, for pre- and post-trip medical examinations of employees in the presence of a healthcare professional.

ROAD CONSTRUCTION

THE FUND ACTIVELY COLLABORATES WITH THE RUSSIAN FEDERAL ROAD AGENCY, STATE-OWNED ENTERPRISE "RUSSIAN HIGHWAYS", REGIONAL AND MUNICIPAL HIGHWAY AGENCIES AS PART OF THE "SAFE AND QUALITY ROADS" NATIONAL PROJECT.

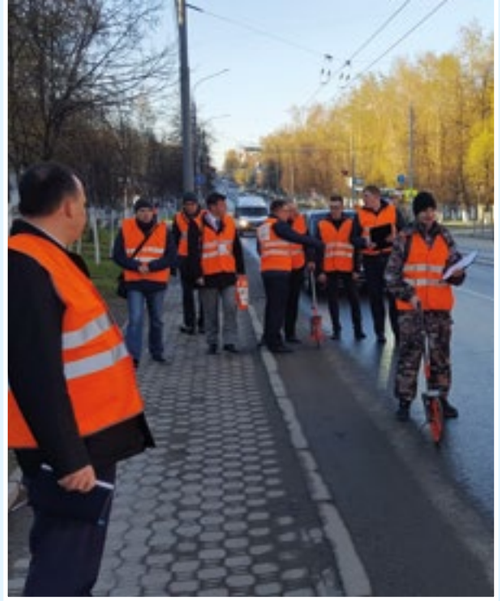
The Fund promotes solutions to modernize road construction in the following three key areas:

- roadbed (asphalt concrete modifiers, road surface marking materials, composite grid, geotextile, polyacrylonitrile (PAN) fiber, rebars, nanoconcrete, geocells for the road base course, foamglass gravel, and metallic slags);
- road facilities (composite light poles, guard rails, external reinforcement systems, drain inlets, tactile indicators, noise barrier panels, rebars, local treatment facilities, anti-adhesive and anti-icing thin-layer coatings);
- intelligent transportation systems (security systems, surveillance systems, event recognition systems, LED lighting and lighting control systems, cabling/wiring systems, practices of use of products and services of the nanotechnology sector and the high-technology economic sectors connected therewith in road construction, fiber optic geotechnical monitoring systems, autonomous pedestrian crossing lighting systems).

The Fund requested the leading Russian university for road construction, Federal State Budgetary Educational Enterprise "Siberian State Automobile and Highway University", to prepare proposals to develop the practice of using products and services of the nanotechnology sector and the high-technology economic sectors connected therewith in road construction. These materials were used to develop the innovative development program 2020–2024 by State Company "Russian Highways."

To implement a comprehensive approach to promote products of the nanotechnology sector and the high-

WORKSHOP AT U-NOVUS PREPARES SOLUTION TO IMPROVE ROADBED DURABILITY BY INNOVATIVE MATERIALS



AS PART OF THE U-NOVUS FORUM, THE FUND AND THE TOMSK STATE UNIVERSITY OF ARCHITECTURE AND BUILDING (TSUAB) HELD THE "USE OF MODERN TECHNOLOGIES FOR REPAIRING URBAN STREETS AND ROADS" WORKSHOP AND ITS PARTICIPANTS PREPARED A SOLUTION TO ENSURE ROADBED DURABILITY.

The workshop brought together representatives of technology businesses, universities, scientific organizations, and representatives of state and municipal customers. Together, they conducted visual and instrument-aided examination of a part of Lenin Avenue (Tomsk) from Herzen Street to Belenets Street Their conclusion was that if traditional materials are used, the established standards require the wearing course to be resurfaced every one or two years, whereas if the whole range of available innovative materials is used, this time to resurfacing may be increased to five or six years.

To reduce rutting, the participants suggested using the 6 cm thick stone mastic asphalt concrete polymerized with an active asphalt modifier (AM). It should also be covered with the so called wearing course (3 cm thick). The participants suggested to make it with "open bituminous-mineral mixtures" (OBMM) based on the extra high-strength gabbro-diabase gravel with synchronous application of a polymer-modified bitumen emulsion.

They also suggested the cold deep in-place recycling method to avoid cracks. It is 15% more expensive than the most commonly used technologies, but it ensures a 50% longer service life of the roadbed. The participants recommended reinforcing the road base course with flat synthetic geocells. This will reduce the cost of works by 15% and increase strength of layers of the road base course by 20%. To prevent transverse thermal cracks, the participants suggested to cut the upper layer of the road on purpose, fill the cuts with a rubber rope and brim with bitumen mastic.

To prevent widespread surface damage around manhole covers and manholes, sump gullies, and other inlets, the participants suggested using polymer concrete, as it features unique strength characteristics and is now used for expansion joints of bridges. This is approximately two times more expensive than the use of traditional methods and materials, but it ensures a 3–4 times longer service life.

The participants also suggested a comprehensive way to resolve two problems—virtual absence of curbs and drains in many parts of the road—with "one stone", polymer storm curbs; they collect water by means of internal ducts. They are stronger than concrete curbs: their service life is approximately 50 years. The use of such curbs will increase the costs of construction by a quarter, but it will reduce maintenance costs by a third.

The workshop participants find it necessary to use a mathematic model of the city's transport network for rational distribution of transport flow along the existing road network to remove "bottlenecks." This will help to reduce stress in the worst gridlocked parts and ensure longer service life of the roadbed.

The participants suggested digital solutions for the street and road infrastructure: daylight-controlled lighting, additional movement sensor-controlled lighting at pedestrian crossings, refitting of passenger shelters into information kiosks. Electronic road signs and "smart" traffic lights rapidly responding to the traffic conditions have also been proven effective. The experts believe that a geoinformation system with 3D models of the whole roadbed body and data on all the repairs and modernizations of the road network, including the materials and technologies used, will hugely help the city.

The project proved that the use of innovative materials and technologies makes road construction more expensive, but also ensures a much longer service life, which means that in the end, it helps to save a lot of money on maintenance. The project is scheduled to be completed in Tomsk in 2020–2021.

technology economic sectors connected therewith as well as to replicate the best practices in road construction on a large scale, in 2019, the Fund started an inter-related development of books of template technical solutions and continuing professional education programs to enhance qualification of specialists and take a large number of technical questions that customers, project, construction, and installation organizations might have off the table.

Furthermore, in 2019, the Fund applied a new approach to cooperation of interested parties in the road construction. On May 15–17, 2019, the Fund and the Department of Transport, Road Infrastructure, and Communications of the Tomsk Region successfully held the "Use of Modern Technologies for Repairing Urban Streets and Roads" workshop as part of the U-NOVUS forum of new solutions held at the Tomsk State University of Architecture and Building (TSUAB).

Cooperation of representatives of state customers, project, construction, and installation organizations, the scientific community, students, and manufacturers of innovative products of the nanotechnology sector and the high-technology economic sectors connected therewith resulted in development of efficient solutions for road repairs and construction.

URBAN ENVIRONMENT AND HOUSING

As part of the "Housing and Urban Environment" national project, in 2019, the Fund continued actively cooperating with participants in the apartment building renovation system: the Ministry of Construction Industry, Housing, and Utilities of Russia, the Housing Reform Promotion Fund, the Regional Apartment Building Renovation Operators Association (RABROA), regional apartment building renovation funds, regional development and construction organizations, as well as the Russian Nanoindustry Association. Several sections of the Fund's website (www.fiop.site) are dedicated to the construction and apartment building renovation demand stimulation Projects (https://fiop.site/stimulirovanie-sprosa/kapremont/), as well as to comfortable urban environment projects. They contain complete information on the ongoing projects of using innovations in these spheres and results of the completed projects. Users may also request completed design documentation or parts thereof for use for similar apartment building renovation projects.

To date, innovative products have been used to renovate more than 5,000 residential buildings. They improved housing conditions for thousands of families, including by means of overhauling the primary structural elements, as per one of the goals of the "Housing and Urban Environment" National Project.

The total cost of the innovative and high-technology (including nanotechnology) products manufactured in the Russian Federation and used for apartment building renovation projects in 2019 amounted to more than 4.5 bn rubles. Please see these 33 solutions offered by partner companies below:

- antibacterial and anti-vandal paints and varnishes for interior works;
- composite rebars, facade plugs, and fiberglass / carbon fiber ties, as well as composite fiberglass meshes;

AS OF TODAY, MORE THAN

5,000

RESIDENTIAL BUILDINGS FEATURE INNOVATIVE PRODUCTS

THE TOTAL COST OF THE INNOVATIVE AND HIGH-TECHNOLOGY PRODUCTS USED FOR APARTMENT BUILDING RENOVATION PROJECTS AMOUNTED TO

>4.5

RUB BN

- a frameless building facade heat insulation system;
- foamglass, steam glass, and diatomaceous gravel;
- foamgalss and diatomaceous building boards;
- composite (fiberglass) insulating glass units and insulating low-emissivity glass units;
- anti-vandal facade plaster;
- flock coatings for exterior and interior works;
- textured facade boards based on fiber cement and asbestos cement slabs with stone chippings;
- non-ventilated (warm) facades;
- an elastic heat-insulating plaster-based warm facade system;
- a carbon fiber-based external reinforcement system;
- innovative waterproof materials;
- automatic personified metering of thermal energy, electricity, hot and cold water based on modern microprocessor technologies and wireless sensor networks;
- wireless "smart" systems to automate metering based on wireless low-power wide-area networks (LPWAN);
- composite (glass-reinforced plastic / metal composite) pipes for hot water, cold water, and water discharge / sewerage;
- innovative (fire-proof and non-toxic) cabling/wiring products;
- LED lighting and an LED system with a light and movement sensor;
- anti-corrosion and heat-insulating materials, paints, and varnishes.

As part of the "Housing and Urban Environment" national project aimed at massive improvement of comfort of the urban environment by 2024, the Fund takes part in the activities to improve the urban environment, for instance, the Fund launched cooperation with the Ministry of Construction Industry, Housing, and Utilities of Russia to implement the "Comfortable Urban Environment Development" priority project approved by the Presidential Council for Strategic Development and Priority Projects of Russia. The key goal of the project is to ensure comprehensive development of the modern urban environment on the basis of common approaches.

As part of the project, municipal divisions develop comprehensive five-year programs for urban improvement, including:

- sports and leisure infrastructure;
- beautification of the grounds adjacent to residential buildings;
- beautification of popular trade areas;
- development of the pedestrian infrastructure, parks, places of public leisure;
- urban improvement and infrastructure development to ensure accessible urban environment for people with limited mobility (including creation of a barrier-free environment for people with limited mobility in public spaces, etc.) with due account of recommendations of the Ministry of Construction Industry, Housing, and Utilities of Russia.

Another area of the Fund's work is participation in implementing parts of the "Smart City", the agency-level project of the Ministry of Construction Industry, Housing, and Utilities of Russia within the "Digital Economy" and "Housing and Urban Environment" National Projects. The Fund's employees form a part of the inter-agency working group on the "Smart City" project launch.

The Fund took an active part in adding tested solutions to the Bank of Solutions for smart cities, including the ones suggested by the Russian Nanoindustry Association member companies. All of them conform with the baseline criteria set forth by the Smart City Standard and help to fulfill various objectives both in the Smart Housing sphere and in the sphere of environmental and public safety.

THE FUND DEVELOPED SUGGESTIONS FOR THE MINISTRY OF CONSTRUCTION INDUSTRY, HOUSING, AND UTILITIES OF RUSSIA REGARDING INNOVATIVE SOLUTIONS FOR IMPLEMENTING THE PROJECTS USING THE FOLLOWING CATEGORIES OF URBAN SPACES:

SMART CITY SOLUTIONS

Company	Solution
ELVEES NeoTek, CJSC	A multipurpose integration platform for command centers intended to integrate security systems, security and fire alarm systems, physical access control systems, alarm systems, RTLS, intelligent transportation systems, etc.
Moi Dom, LLC	Software suite—an integrated municipal housing utilities control system developed by Moi Dom, LLC
RuGadget (Ulyanovsk Nanotechnology Center)	An integrated technical building systems control system
STRIZH	Wireless "smart" systems to automate metering in the spheres of housing, agriculture, and urban infrastructure based on wireless low-power wide-area networks (LPWAN)
Energiia Optimum, LLC	Digital equipment to resolve problems associated with electric power quality and local Smart Grid construction
Nanotechnologies and Nanomaterials Center of the Republic of Mordovia, LLC	DALI and Bluetooth 5.0-based lighting control systems
Hevel, LLC	A rooftop photovoltaic power stations (PPS) to save mains power
Identity Technology, LLC	Tech-Id software and hardware suite for object identification and control of important environmental parameters

The Smart City Bank is an efficient platform for search of necessary technology solutions, including for the regional and municipal authorities responsible for implementing local urban improvement and urban facilities digitalization programs, in particular, it creates the conditions necessary to extend the Fund's cooperation with partner regions to stimulate demand for products of the nanotechnology sector and high-tech sectors related thereto.

At the same time, the Fund does not limit itself to digital technologies and actively promotes material-based solutions of Russian manufacturers to develop Smart City programs of various municipal divisions. The Fund's position is that a city cannot be truly smart if material issues have not been resolved, including, for instance, energy efficiency of buildings and structures, reduction of energy loss during heat transfer, reduction of accidents at pipelines and linear-type facilities, and other primary issues affecting comfort of living both in the city and in any given building.

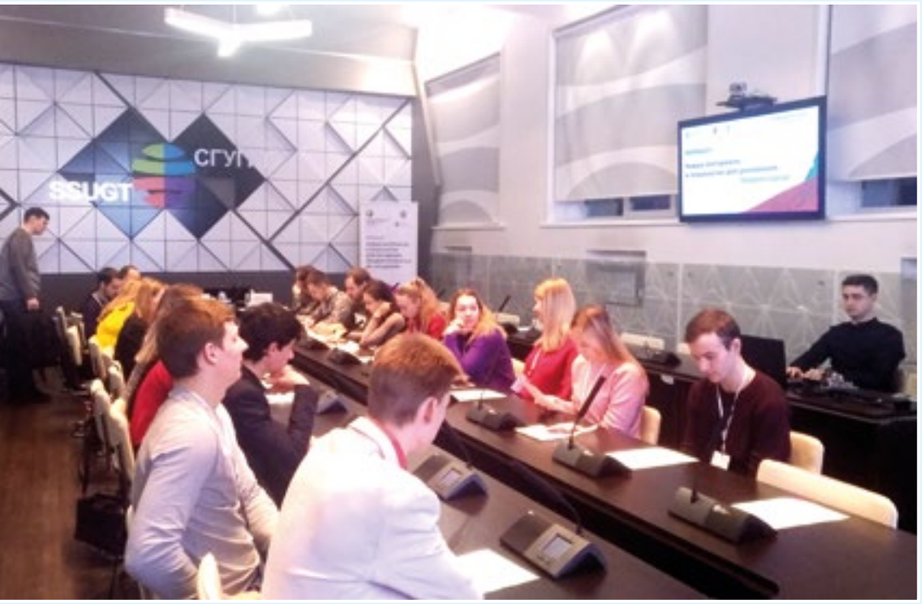
To increase the number of participants in urban environment and housing projects, in the year under review, the Fund suggested to actively develop unique instruments of stimulating demand for products and services of the nanotechnology sector and the high-tech sectors related thereto.

Workshops have become one of such instruments and they are becoming ever so popular. These are events intended to invent innovations, a means of attracting the target audience offering new approaches to resolving traditional problems. Organization of these events clearly demonstrates that the Fund follows progressive organizational trends successfully implemented around the world.

The key element of workshops is participation of students and PhD candidates, as well as of the regional and municipal authorities responsible for implementation of state programs in the sphere of housing, urban environment, and road infrastructure, representatives of contractors of the target objects used in tasks by workshop administrators, representatives of the sectoral expert community, and representatives of federal and regional development institutions, in the search for solutions of a given object or task and in further practical implementation of these suggestions.

"NEW MATERIALS AND TECHNOLOGIES FOR RENOVATION. AKADEMGORODOK 2.0: ACADEMIA PALACE OF CULTURE" WORKSHOP

IN DECEMBER 2019, THE "NEW MATERIALS AND TECHNOLOGIES FOR RENOVATION. AKADEMGORODOK 2.0: ACADEMIA PALACE OF CULTURE" TOOK PLACE IN NOVOSIBIRSK. THE FUND ORGANIZED THE EVENT WITH THE SUPPORT OF THE GOVERNMENT OF THE NOVOSIBIRSK REGION TO DEVELOP THE PRACTICAL SOLUTIONS TO ALLOW INTERESTED PARTIES (DESIGNERS, URBAN SPECIALISTS, CONTRACTORS, COMMUNITY) TO HAVE A LOOK AT NEW INNOVATIVE TECHNOLOGIES FOR URBAN IMPROVEMENT AND BUILDING RENOVATION THROUGHOUT THE RUSSIAN FEDERATION.



The workshop was attended by students of the Siberian State University of Geosystems and Technologies, the Novosibirsk National State Research University, the Novosibirsk State University of Architecture and Civil Engineering (Sibstrin), and the Novosibirsk College of Architecture and Civil Engineering.

The students toured the building of the Palace of Culture of Akademgorodok in Novosibirsk famous for its history, took council from experts and manufacturers from such companies as Sovremennye Radio Tekhnologii, LLC (STRIZH); NCC, LLC; Zashchita KONstruktsii-M Holding; IARA, LLC; DREAMWOOD; and Alpan, LLC, examined and selected materials and technologies.

The workshop resulted in a comprehensive renovation project for the Academia Palace of Culture and beautification of the adjacent area using innovative materials and technologies. In particular, the project calls for external reinforcement of roof slabs with composite bands, heat insulation of the roof and the facade with foamglass and innovative facade systems, respectively. Old windows will be replaced by low-emissivity glass units. The project involves using street furniture made of modified wood and LED light poles. The participants suggested to completely replace the utility systems and use the "Smart Home" and "Smart City" systems. To present the project, representatives of the Tertiary IT College of the Novosibirsk National State Research University used the augmented reality technology.

"NEW MATERIALS AND TECHNOLOGIES FOR URBAN IMPROVEMENT" WORKSHOP IN CHEREPOVETS

ON NOVEMBER 23–24, 2019, THE FUND AND THE CHEREPOVETS STATE UNIVERSITY JOINTLY HELD THE "NEW MATERIALS AND TECHNOLOGIES FOR URBAN IMPROVEMENT" WORKSHOP AS PART OF THE SCIENCE FESTIVAL OF THE VOLOGDA REGION.

In the course of the workshop, student teams of the Cherepovets State University (CSU) and of the Vologda State University collaborating with specialists of the Department of Fire and Rescue Service, Special Fire Protection, and Civil Defense Forces, professional architects and experts, as well as with manufacturers of innovative products designed area improvement and building renovation projects implying use of the best available technologies and formulated suggestions on design documentation of specific urban improvement objects (school No. 27 area, grounds adjacent to 137 Victory Avenue) using solutions provided by the nanotechnology sector and the high-tech sectors related thereto.

Over several months, these young people carried out research, talked to locals, and, under the supervision of professional, manufacturers, examined properties and carefully selected materials that they suggested to use as part of their projects.

The workshop participants presented ready projects to the inspection board chaired by Deputy Governor of the Vologda Region Vitalii Tushinov.

Materialization of the ideas developed in the course of workshops will help complete objectives of the "Housing and Urban Environment" national project, including quality apartment building renovation. The workshop's focus on development of practical solutions allows interested parties (designers, urban specialists, contractors, community) to have a look at new innovative technologies for urban improvement and building renovation and thus develops demand for introduction of innovative solutions throughout the Russian Federation.

"NEW MATERIALS AND TECHNOLOGIES FOR DEVELOPING A COMFORTABLE TERRITORIAL ECOSYSTEM AT ITMO HIGHPARK" WORKSHOP

IN DECEMBER 2019, THE FUND HELD THE "NEW MATERIALS AND TECHNOLOGIES FOR DEVELOPING A COMFORTABLE TERRITORIAL ECOSYSTEM AT ITMO HIGHPARK" WORKSHOP IN SAINT PETERSBURG WITH THE SUPPORT OF ITMO HIGHPARK, THE UNIVERSITY OF INFORMATION TECHNOLOGIES, MECHANICS, AND OPTICS, AND THE SAINT PETERSBURG STATE UNIVERSITY OF ARCHITECTURE AND CIVIL ENGINEERING.

This workshop carried out according to the standards of the Scientific and Technological Development Strategy of the Russian Federation and the "Digital Economy" and "Housing and Urban Environment" national projects attracted students of the University of Information Technologies, Mechanics, and Optics, the Saint Petersburg State University of Architecture and Civil Engineering, and the International Banking Institute.

The participants were presented with innovative solutions of the University of Information Technologies, Mechanics, and Optics as well as of the following companies: Led Energoservis, LLC; ELVEES NeoTek, JSC; Profotech, JSC; Membranium; NCC, LLC; Galen, LLC; DREAMWOOD; IARA, LLC; Scientific Production Association "Fabrika Krasok"; Smart Engineering, LLC; SYGMA.Tomsk Nanotechnology Center; ICM Glass Kaluga LLC; Alpan, LLC; Production Cooperative "SMI"; Zashchita KONstruktsii-M Holding; STiS Group of Companies; Guardian Glass; Sovremennye Radio Tekhnologii, LLC (STRIZH), etc.

The workshop's focus on development of practical solutions allows interested parties (designers, urban specialists, contractors, community) to have a look at new innovative technologies for urban improvement and building renovation throughout the Russian Federation.

The workshop participants presented their ideas and insights to the inspection board. The workshop resulted in a comprehensive project on the use of new materials and technologies in a dormitory, the first object built at ITMO Highpark, and beautification of the adjacent area.

"NEW MATERIALS AND TECHNOLOGIES FOR BUILDING RENOVATION" WORKSHOP

IN NOVEMBER 2019, THE "NEW MATERIALS AND TECHNOLOGIES FOR BUILDING RENOVATION" WORKSHOP WAS HELD IN CHEREPOVETS AS PART OF NAUKA 0+, THE SCIENCE FESTIVAL OF THE VOLOGDA REGION. THE WORKSHOP WAS ORGANIZED BY THE FUND IN COLLABORATION WITH THE APARTMENT BUILDING RENOVATION FUND OF THE VOLOGDA REGION, THE VOLOGDA UNIVERSITY'S TEAM, AND DESIGNER ANDREI KHOMENKO.

It was aimed at developing solutions involving the use of nanotechnology and high-technology products for renovation of the following residential buildings: 46 Herzen Street and 41 Worowski Street, Vologda.

The output report was presented to the inspection board chaired by Deputy Governor of the Vologda Region V.V. Tushinov. The project of the Vologda State University's team was successfully accepted by the inspection board. The board particularly noted reasonability of actually implementing the team's suggestions at the objects under consideration and further use of the developed solutions to implement projects around the Vologda Region.

ANDREI KHOMENKO

HEAD OF DESIGN FIRM NO. 1642

"Today, we are often faced with the need to use modern and innovative solutions for construction, especially when it comes to comfortable urban environment, efficiency and durability of buildings and structures. However, the education standards in effect and adherence to traditional construction methods prevent us from making a quality breakthrough in the use of available innovative technologies. To resolve this issue, it is very important for the next generation of specialists to get practical experience of working with innovative materials and learn to design the image of the future with these materials. In my view, workshops are a very effective way to organize such studies, as students and young specialists not only get acquainted with high technology and innovations, but also get to try using them in the field in a short span of time. These practical work methods yield good results in the long run, as all the different future specialists understand and accept new technologies."

Materialization of the ideas developed in the course of workshops will help complete objectives of the "Housing and Urban Environment" national project, including quality apartment building renovation. The workshop's focus on development of practical solutions allows interested parties (designers, urban specialists, contractors, community) to have a look at new innovative technologies for urban improvement and building renovation and thus develops demand for introduction of innovative solutions throughout the Russian Federation.

In order to develop use of innovative products, promote development of the innovative economy in the Russian Federation, and improve energy efficiency of the housing in the Russian Federation, the Fund has been organizing webinars aimed at informing regional apartment building renovation operators about the innovative products manufactured in the Russian Federation since 2017. These webinars are organized in the e-learning system of Autonomous Not-for-Profit Organization "eNano" for such attendees as regional apartment building renovation funds, as well as contractor and installation organizations. In 2019, the webinars were attended by representatives of housing cooperatives and property management companies involved in maintenance and renovation of residential buildings. In 2019, more than 1,000 people took part in webinars; they received comprehensive information on the following innovative and nanotechnology solutions, products, and services:

- energy-efficient ALPAN facade system;
- peculiarities of design using innovative products;
- efficient thermal insulation; modern thermal insulation materials;
- comprehensive smart solutions to automate housing facilities;
- interpanel and expansion joint sealing technology; mistakes, consequences, recommendations;
- organization of a quality control system for construction materials by a regional operator;
- ways to prevent replacement and faking of flame retardants for renovation works.

Recordings of these webinars can be accessed at the Fund's website in the section dedicated to demand stimulation or by following the link: https://fiop.site/stimulirovanie-sprosa/webinary/.

VITALII TUSHINOV

DEPUTY GOVERNOR OF THE VOLOGDA REGION

"New technologies are only rarely used for repairs and construction, we have always been scared of the price, but they are becoming more and more accessible with each passing day. We believe that the projects presented today by students from the Cherepovets State University and the Vologda State University are totally realistic and may become templates if refined. To continue this work, we need deep involvement of students, so we suggested that they, as authors, supervise completion of the project. On the part of the public authorities, we will be keeping in touch with young specialists and consider the possibility of completion of the developed projects. The innovations to develop regional infrastructure are introduced as part of cooperation of the Vologda Region and the Fund."

IN 2019, WEBINARS WERE ATTENDED BY

>1,000

PEOPLE

EXPORT AND INTERNATIONAL COOPERATION

AS PART OF THE INTERNATIONAL COOPERATION AND EXPORT NATIONAL PROJECT, THE FUND STIMULATES DEMAND FOR INNOVATIVE PRODUCTS IN RUSSIA AND ABROAD. IN 2019, THE FUND SUPPORTED 17 MANUFACTURERS IN THE NANOTECHNOLOGY SECTOR AND THE HIGH-TECH SECTORS RELATED THERETO TO DEVELOP EXPORTS.

FUND SIGNS AGREEMENT TO PROMOTE NANOTECHNOLOGY PRODUCTS IN PERSIAN GULF COUNTRIES

In summer 2019, the Fund and Nano Imports General Trading LLC (UAE) entered into an agreement to promote products of the Russian nanotechnology sector and the high-tech sectors related thereto to the Persian Gulf countries. The parties intend to promote implementation of pilot projects to demonstrate advantages of the nanotechnology sector and the high-tech sectors related thereto over traditional analogs in various economic sectors of the Persian Gulf countries. The agreement also involves joint development of the innovative nanoindustrial infrastructure and promotion of commercialization of promising projects. The parties agreed to stimulate development of cooperation of companies, including by means of the measures of state support provided for by legislation of the Russian Federation and the Persian Gulf countries.

Before that, Energy Storage Systems (ESS), a joint venture of the Fund and Sistemy Postoiannogo Toka of Novosibirsk, also entered into an agreement with Nano Imports General Trading. In May 2019, ESS finished testing the first Russian high-power storage unit with the rated power of 1.2 MW and energy capacity of 500 kW•h.

Distribution agreements were also signed with PROFOTECH, JSC, a manufacturer of digital substations, and Galen, LLC, a manufacturer of composite materials.

LEONID KRASNIKOV

GENERAL MANAGER OF NANO IMPORTS GENERAL TRADING

"The agreement is aimed at taking Russian high-technology products to markets of the Middle East countries. Our key partners in this region are state companies and private corporations. The operating procedure we use when working with Russian suppliers consists in guaranteeing the sales volume. To date, we already have fixed arrangements with three Russian companies that already work with the RUSNANO Group. We also have preliminary arrangements of purchase with state customers in the UAE. We are planning to start selling Russian products in the Emirates of Dubai and Abu-Dhabi and then spread the distribution network to Saudi Arabia, Oman, and other neighboring countries."

PARTICIPATION IN II INTERNATIONAL INDUSTRIAL EXHIBITION "EXPO-RUSSIA UZBEKISTAN 2019"

IN APRIL 2019, THE FUND'S REPRESENTATIVES TOOK PART IN THE II INTERNATIONAL INDUSTRIAL EXHIBITION "EXPO-RUSSIA UZBEKISTAN 2019", AS WELL AS IN THE TASHKENT BUSINESS FORUM "RUSSIA SMART INNOVATION."

The Fund also financially supported participation in these activities of eight Russian nanomanufacturers (ELVEES NeoTek, JSC; TIKR, LLC; RM Nanotech, JSC; IDENTITY TECHNOLOGY LLC; NTC EUROVENT, LLC; BT SVAP LLC; Arctic Technology, JSC; METACLAY, JSC) who presented information about their products at the following events:

- Smart City panel session;
- Cooperation Stimulation in the Agroindustrial Sphere panel session;
- roundtable on the issues of cooperation in the energy and the oil-and-gas industries;
- panel session on "Digital Sectoral Solutions—Transport Management."

RM Nanotech, JSC, and ELVEES NeoTek, JSC, took part in the exhibition with their own stands; the Fund covered 80% of the exhibition grounds lease and the logistic services to deliver exhibits.

As part of the meeting with the management of Uzbekneftegaz, JSC, and a subordinate organization, Neftegazinnovatsiia, LLC, organized by the Fund, Russian companies presented to these oil-and-gas enterprises their products for use at oil-and-gas industry facilities in Uzbekitstan. As a result, the Fund and Uzbekneftegaz, JSC, came to an arrangement to sign a memorandum of understanding and cooperation and the manufacturers started a business relationship with technical specialists of Uzbekneftegaz, JSC, to elaborate on the aspects of use of Russian innovative products in the Republic in detail.

2.6
INFORMATION SUPPORT

IT IS IMPOSSIBLE TO ACHIEVE A HIGH RATE OF INNOVATIVE DEVELOPMENT WITHOUT PROFOUND INVOLVEMENT OF PROFESSIONALS, CLEAR PROSPECTS FOR YOUNG SPECIALISTS, AND PUBLIC SUPPORT. THE FUND DEVELOPS MODERN COMMUNICATION CHANNELS AND FORMATS TO ENSURE ACCESSIBILITY AND RELEVANCE OF THE INFORMATION ABOUT INNOVATIVE PRODUCTS. DEDICATED SYSTEMS OF COMMUNICATIONS NATURAL FOR THE INTERESTED PARTIES, SUCH AS REPRESENTATIVES OF BUSINESSES, PUBLIC AUTHORITIES, TECH ENTREPRENEURS, ACADEMIC COMMUNITY, STUDENTS, AND YOUTHS, WERE DEVELOPED. THE FUND IMPLEMENTS MEDIA PROJECTS TO PROMOTE POSITIVE IMAGE OF NANOTECHNOLOGICAL, SCIENTIFIC, AND TECHNICAL ACHIEVEMENTS BY THE PUBLIC AT LARGE.

The Fund has specialists to work specifically with journalists, bloggers, and public experts as opinion transmitters on a large scale in order to enhance their expertise and interest in the topic of innovations in Russia. The Fund actively involves scientific, technical, and sociopolitical media channels to the popularization of achievements of the nanoindustry and the high-technology branch of industry.

The Fund organizes congresses, exhibitions, and forums, to stimulate higher activity of current and potential actors of the innovation process. The Fund supports the companies introducing innovations into their practice via information and administrative assistance in the search, selection, and extension of the scope of use of the most relevant and promising nanotechnology solutions and high-technology products.

INFORMATION DISTRIBUTION AMONG TARGET AUDIENCES VIA MEDIA CHANNELS

In the XXI century, the speed of receiving information is a key engine of efficient communication. This has resulted in a drastic change of the mass media: focus on the use of multiple platforms (platforms in social networks, video resources, blogs), tight limits on volume, and an intention to ensure a high click-through rate have all led to lower objectivity and quality of the information. As the scale of incorrect data in the information data grows uncontrollably day by day, development of proprietary channels of information and content for the popularization of science and nanotechnology as well as for building partnerships with reliable interest media channels becomes indispensable.

News agency TASS is the main such channel. Two projects were implemented in cooperation with this agency in 2019. "New Technologies for Smart Cities" demonstrated how nanotechnologies help solve problems in all kinds of spheres: healthcare and transport, energy industry and aviation, construction and urban environment. The "Five Threats to the Humankind. Can Technology Save Us?" multimedia project describes the major technology challenges of the 21st century and is based on the vision of the Club of Rome.

A project on comfortable urban environment was prepared for the vast audience of Rossiyskaya Gazeta. In this newspaper, 10 articles were published on the technology solutions proposed by nanoindustrial companies to change the quality of the urban environment. The readers were provided with the examples of how high-technology materials are not only able to ensure esthetic design and comfort, but also cost-effective. Furthermore, they open up possibilities for implementing new projects that have never been technically possible before.

Together with the Kultura TV channel and the Science Slam Association, a new season of seven Science Stand-Up episodes were released. Twenty one young scientists from different regions of Russia took part in the filming. In the stand-up form, they described how their laboratories work and what achievements they had attained. Each episode was viewed by 70–110 thousand people.

The Fund prepared a partner information project that consisted in narratives and discussions of the most significant events in the sphere of nanotechnologies by 24 Internet-based mass media for 24 hours for the 60th anniversary of the famous lecture given by American physicist and Nobel laureate Richard Feynman on the possibility of inventing materials with predetermined properties and of microscopic mechanisms with the needed functions.

The official website remains the Fund's major own information channel (https://fiop.site). Regular updating of its content helps to timely explain and correctly interpret the Fund's activities to the general public and professional communities (209 press releases were published in 2019). Considerable attention is paid to enhancing activities in social networks, as this is where opinions on various events are formed and communication with various population groups takes place nowadays.

IN 2019, THE FUND HAD

>16,000

SUBSCRIBERS IN THE VK AND FACEBOOK OFFICIAL GROUPS

In 2019, the Fund had more than 16 thousand subscribers in the VK and Facebook official groups.

To attract interest to the Fund's accounts, the following was done in 2019:

- original video content: more than 40 videos totaling more than 1.3 mn views in 2019;
- photo track record: more than 2.5 thousand photographs from various activities;
- more visual content: unique popular science categories (Nanodictionary, Nanoelements, and Nanoguess) were introduced;
- furthermore, about 60 thousand users took part in interactive contests and polls in the Fund's accounts;

Youth outreach is a strategic aim of the Fund. To create awareness among young people, the Fund targeted professional (sectoral) communities and interest groups. As a result, the target audience coverage tripled in comparison with 2018.

CROSS-PLATFORM COMMUNICATIONS ARE BECOMING AN IMPORTANT FACTOR OF SUCCESS. ALL THE FUND'S PROJECTS ARE INTEGRATED WITH EXTERNAL ONLINE AND OFFLINE PLATFORMS VIA CO-BRANDING WITH SUCH PROJECTS AS SCIENCE SLAM RUSSIA, SCIENCE BAR HOPPING, POSTNAUKA, SCIONE AND WITH POPULAR SCIENCE BLOGGERS (DMITRY POBEDINSKY, THOISOI, KHIMIIA PROSTO, ETC.).

SPECIAL PROJECT "WORLD OF THINGS. WHAT THE FUTURE IS MADE OF"

IN 2019, POSTNAUKA POSTED A PROJECT DEDICATED TO NEW TECHNOLOGIES, "WORLD OF THINGS. WHAT THE FUTURE IS MADE OF", IN COLLABORATION WITH THE FUND.

THE PROJECT'S MAJOR GOAL was to create a comprehensive guide through the world of the future through the lens of the new materials that are being developed today.

FORMAT: a multimedia guide on the PostNauka platform with multichannel content promotion. A separate unique project section was added to the PostNauka website: https://postnauka.ru/building_blocks_of_the_future.

The materials are compiled into four topical guides:

- **SMART ENERGY**—the guide on new technologies in energy accumulation and storage;
- **PRINCIPLE OF COMPOSITION**—the guide on new materials, invention and application thereof;
- **SENSITIVE MATTER**—the guide on new technologies in medicine, diagnosis, and therapy;
- **INTEGRAL WORLD**—the guide on digital technologies of the present and the future.

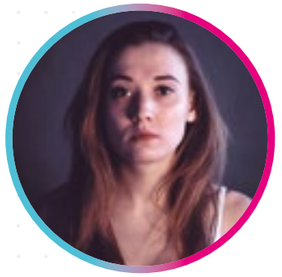
Forty-nine scientists from various walks of science—physics, chemistry, mathematics, biology, medicine—took part in the project, and 72 text, interactive, and video materials were designed. A visitor to the PostNauka website may listen to or read 25 video lectures, 28 FAQs, 2 "Viewpoints", 5 longreads, 4 games, 4 animated explainers, and 4 live radio broadcasts.

PROJECT RESULTS:

~1 MN VIEWS OF THE POSTNAUKA WEBSITE'S PAGES

>2 MN VIEWS OF THE PROJECT'S VIDEO MATERIALS ACROSS ALL PLATFORMS

~4.6 MN—THE TOTAL COVERAGE OF THE PROJECT'S PUBLICATIONS IN THE POSTNAUKA'S SOCIAL NETWORK ACCOUNTS



ELMIRA LIUBAEVA

PRODUCER OF "WORLD OF THINGS. WHAT THE FUTURE IS MADE OF"

"Throughout the project, we have regularly received positive feedback not only from users, but also from scientists. They say that we have managed to explain fundamental topics in detail and also touch upon the cutting edge of science. "World of Things. What the Future is Made of" may develop even further, and not only within the limits defined by the project, but also covering various new spheres of human life."

ALEKSANDR CHULKOV

CEO OF FISTASHKI

"I am glad we managed to continue the Nano-Disassembly project with a new format relevant for social networks. Nano-Bust helped make another step towards busting myths and fakes in the industry. This idea inspired and attracted popular science bloggers. It is the close collaboration with them that made possible such a useful material that is interesting to hundreds of thousands of viewers. In this kind of projects, it is crucial for the entire team to be ready to listen to and hear each other. That is why I would like to thank colleagues from the Fund for Infrastructure and Educational Programs, opinion leaders in bloggers, and, without any doubt, to the agency's team. Join the ranks of nanomythbusters!"

Understanding significance of professional growth of Russian journalists, the Fund held the Russian stage of the European Science Journalist of the Year contest together with the Association of Education and Science Communicators (AESC). The Russian stage was branded Rusnano Sci&Tech Writer of the Year. Twenty-six journalists from 13 mass media outlets (Biomolecula, Gazeta.ru, Popular Mechanics, Russkii Reporter, TASS, Troitskii Variant, Forbes, Khimiia i Zhizn, Cherdak, XX2 Century, N+1, Naked Science, oLogy.sh) were short-listed for the award. The award went to Evgeniia Shcherbina from the TASS' popular science outlet Cherdak. She went to the World Conference of Science Journalists in Lausanne (July 01–05, where the results of the European contest were discussed.

THE NANO-BUST PROJECT

The Nano-Bust project (https://new.nanorazborka.ru/) successfully followed the Nano-Disassembly and Nano-Disassembly 2.0 projects. It was intended to bust myths and fakes about the use of nanotechnologies.

Four of the top 10 popular science video bloggers from the Russian-speaking segment on YouTube took part in the project. In their videos, they emphasized that in most cases, the prefix "nano" added to one or another product name is just a manufacturer's ploy and is not related to any real nanotechnologies whatsoever.

Not only popsci bloggers in the Russian-speaking part of the Internet bust nanomyths, but also great scientific minds of the past—Tesla, Lomonosov, Einstein, Mendeleev. Bloggers give detailed explanations of myths and elaborate on the topic while scientists provide reasoning. The part with scientists is delivered through animated videos, voice acting is performed in a way to resemble actual voices of the scientists according to the available descriptions. Each scientist talks about 3 myths. Furthermore, to attract users even more, 10 memes suggested by users were used.

In comparison with the Nano-Disassembly projects, Nano-Bust became more virtual and interactive via interactive mechanisms and non-standard user involvement, integration of entertaining content with the educational one.

PROJECT RESULTS:

>1 MN VIEWS OF VIDEOS

>4 MN UNIQUE USERS IN THE RUSSIAN-SPEAKING PART OF THE INTERNET

>32 THOUSAND VISITS TO THE NANO-BUST WEBSITE

>62 THOUSAND USER REVIEWS OF THE PROJECT

ACTIVITIES FOR YOUTHS

INVOLVEMENT OF YOUTHS INTO THE SCIENTIFIC AND TECHNICAL ACTIVITY IS BECOMING CRUCIAL. ORGANIZATION OF FEDERAL POPULAR SCIENCE EVENTS IS ONE OF THE EFFECTIVE TOOLS TO DO THAT. IN 2019, TWO LARGE FEDERAL PROJECTS WERE IMPLEMENTED: FOUR SCIENCE BAR HOPPING FESTIVALS AND TEN SCIENCE SLAM UNIVERSITY 2019 CONTESTS FOR YOUNG SCIENTISTS.

SCIENCE BAR HOPPING

is an educational festival where scientists from different walks of science and technology speak to the audience in an informal setting. Talks are connected into an open program and take place simultaneously in several bars or cafes in two waves. Visitors may choose any lecture and hop from one bar to another to listen.

This is a new type of intellectual leisure activity that offers a scientific approach to interpreting the rapidly changing reality. Scientists explain their studies in clear and plain terms and show how technologies affect our daily life.

The festival's mission is to inform the urban community of the modern scientific and technical inventions, increase the public trust to high technology, improve reputation of scientists and engineers, introduce science and technology to the urban leisure activities.

In 2019, the Science Bar Hopping festival became a federal one: in March, July, September, and December 2019, 5,500 people listened to 128 lectures on different sciences in the bars of Saint Petersburg, Yekaterinburg, and Moscow.

FESTIVAL IN NUMBERS 2019

MOSCOW	**20** BARS	**40** LECTURES	**1,700** VISITORS	**1,830,529** CONTACTS (ONLINE COVERAGE)
ST PETERSBURG (two festivals)	**36** BARS	**72** LECTURES	**3,100** VISITORS	**2,450,060** CONTACTS (ONLINE COVERAGE)
YEKATERINBURG	**8** BARS	**16** LECTURES	**700** VISITORS	**502,505** CONTACTS (ONLINE COVERAGE)

MORE THAN A QUARTER OF THE LECTURES WERE DEDICATED TO INNOVATION STUDIES AND NANOTECHNOLOGIES, INCLUDING THE FOLLOWING:

- **Smart nanorobots in therapy. How to make incredible ideas come true** (Andrei Babenyshev, PhD candidate at the Moscow Institute of Physics and Technology, engineer at the nanobiotechnology laboratory);
- **Brain 3D-printing diagnosis and other adventures of additive technologies in medicine** (Iana Chekryzhova, startup CEO of CML AT Medical);
- **Genome eraser: why it is easier to correct genetic errors than we thought** (Dmitrii Madera, head of the molecular genetics department at BIOCAD);
- **How nanoparticles help study and fight tumors** (Stepan Vodopianov, PhD in Biology, engineer at the laboratory of biomedical nanomaterials, National University of Science and Technology "MISiS");
- **How neurotechnologies can change our life: from measuring biomarkers to indwelling electrodes** (Iana Makarova, clinical psychologist, specialist at the laboratory of neurobiology of action programming, Human Brain Institute of the Russian Academy of Sciences);
- **Why turn the lamp on to log in to Instagram and what is Li-Fi** (Emil Gareev, PhD candidate in Optical and Electro-Optic Devices and Systems at the University of Information Technologies, Mechanics, and Optics);
- **Quantum entanglement in 2019. From the "time crystal" to the "perpetual motion machine"** (Ivan Iorsh, Doctor of Physics and Mathematics, Head of the International Laboratory of Light-Matter Coupling in Nanostructures);
- **From rubbed rucks to self-driving cars: the future of the autonomous transport** (Aleksandr Karavaev, software developer at Scientific Production Association "StarLine",

research fellow at the Research University of Information Technologies, Mechanics, and Optics);

- **World of data: advantages and side effects of artificial intelligence** (Vladislav Gorbunov, expert on digital projects at Gazprom Neft);
- **Ecoculture development in 2019: from the Paris Agreement on Climate Change to ecological art at Garage** (Angelina Davydova, Head of the Russian–German Bureau of Ecological Information, permanent observer of the UN negotiations on climate change);
- **Biodegradable bags and artificial meat: eco-friendly or dangerous?** (Elena Bykovskaia, senior instructor at the Faculty of Low-Temperature Energetics, University of Information Technologies, Mechanics, and Optics);

93.4%

OF THE PARTICIPANTS STATED THE FESTIVAL WAS USEFUL AND INTERESTING

ONLINE COVERAGE OF THE EVENTS AMOUNTED TO ALMOST

5,000,000

USERS

Modern communication channels are used to maximize coverage:

LIVE BROADCASTS OF SPEAKER LECTURES AT EACH FESTIVAL POSTED IN VK GET 80,000 VIEWS AND MORE;

PODCASTS WITH SPEAKERS FROM MOSCOW AND SAINT PETERSBURG—10 EPISODES POSTED ON THE 6 MAIN PLATFORMS (APPLE PODCASTS, GOOGLE PODCASTS, CASTBOX, VK, YANDEX.MUSIC, BUMAGA)—GOT MORE THAN 25,000 PLAYBACKS.

IURII BAULIN

ENGINEER AT SECHENOV INSTITUTE OF EVOLUTIONARY PHYSIOLOGY AND BICHEMISTRY

"...Nice event and environment. Lectures are only rarely so popular that people are ready to listen standing."

MIKHAIL TUPIKIN

HEAD OF THE EVENTS DEPARTMENT OF THE MEDIA COMPANY BUMAGA

"The idea of Science Bar Hopping is very simple—we want science to be a popular topic for discussion, just like movies, news, or sports. It is the most organic way to popularize scientific knowledge—to make it interesting for people to discuss nanotechnologies or sociology with friends at bar. In two years, the Fund and we developed this idea into a well-rounded project of large-scale festivals consisting of 50 lectures per evening, regular meetings of the club of science speakers, and several popular science podcast seasons."

ON FEBRUARY 07, 2020, JUST BEFORE THE RUSSIAN SCIENCE DAY, THE AWARD CEREMONY FOR LAUREATES OF THE VI ALL-RUSSIAN "FOR LOYALTY TO SCIENCE" PRIZE TOOK PLACE AT THE MINISTRY OF SCIENCE AND HIGHER EDUCATION OF RUSSIA. THE POPULAR SCIENCE FESTIVAL SCIENCE BAR HOPPING WAS DECLARED THE BEST POPULAR SCIENCE PROJECT OF 2019.

SCIENCE SLAM UNIVERSITY 2019

is the first federal project to popularize science in the leading domestic universities; it is a joint project of the Fund and the Science Slam Russia Association supported by the Ministry of Science and Higher Education.

Science Slam is a popular science show format that came to Russia from Germany and spread all over the world.

The Science Slam University Project covered ten universities from nine Russian cities—from Kaliningrad to Vladivostok. It started in Krasnoyarsk on March 29, 2019, where the first slam of young scientists of the Siberian Federal University took place as part of the economic forum. The project was opened by the first Deputy Minister of Science and Higher Education Grigoryi Trubnikov. He appealed for a wider spread of the vogue of science talks at places popular among the youth and expressed confidence that it is such vigorous people as science slam participants that will make Russia greater.

After that, the festival was also held by the Novosibirsk State Technical University, the Bashkir State Medical University (BSMU), Lomonosov Moscow State University, Lobachevsky Nizhniy Novgorod State University (NNSU), the Tomsk Polytechnic University. At the Far Eastern Federal University, slam became a part of the program of large-scale IT events—Russian MeetUp-2019 and the Far Eastern Digital Forum. At the Saint Petersburg State Electrotechnical University "LETI", the science slam took place as part of the program of the XII Saint Petersburg International Innovation Forum. The total number of viewers across all the ten sites exceeded 2,000 people.

Over the year, fifty-six slammers got trained and took the stage for the first time. The range of studies presented by scientists was very wide: from economics and history to bionanomaterials and ultrasound microsurgery in ophthalmology. A considerable part of the studies presented at the festival were dedicated to resolving local regional problems, associated with functioning enterprises, offered ways to improve the area's economic potential.

Authors of 20 lectures discussed nanotechnologies. Three of them won the award and got a traditional Science Slam grand prize—boxing gloves. Assistant Professor at the Department of General Chemistry of BSMU Viacheslav Korolev intends to use fullerene molecules to develop drug delivery vehicles targeting infected body cells, including by HIV. PhD candidate at the Faculty of Physics of NNSU Evgenii Lantsev charmed the audience with the magic of controlling structure of materials; the audience also thanked the head of the Center for Genomic and Regenerative

IN RUSSIA, SCIENCE SLAM IS REGULARLY HELD IN

20

CITIES

IT IS ATTENDED BY

150-800

LOCALS

MORE THAN

800

SPEAKERS HAVE TAKEN PART IN IT SO FAR

Medicine of the Far Eastern Federal University Aleksandr Kaganskii for his search of natural substances capable of defeating cancer.

Slams started with an address by special guests, including representatives of portfolio companies of the RUSNANO Group. Manager of medical projects at PET-Technology Pavel Golovin and Andrei Timofeev, CEO of Optiplane. Unmanned Systems, technical engineer of the SYGMA.Novosibirsk Nanotechnology Center from the Fund's investment network, told about peculiarities of their work.

VK became an information partner of Science Slam University and broadcasted all the events live. Complete recordings are available at no cost. To date, they have got almost 900,000 views.

The Fund develops the Science Club—a community of scientists, popularizers, and entrepreneurs who have taken part in Science Slam, Science Bar Hopping, and the Science Stand-Up TV show. The project is aimed at creating an informal club of active young scientists, engineers, and tech entrepreneurs, as well as at supporting and expanding the community of popularizers of science and nanotechnologies. The first Science Club activities were held in Moscow and Saint Petersburg.

The UN and UNESCO announced 2019 as the International Year of the Periodic Table of the Chemical Elements. A global educational event Mendeleev Lab ("Chemical lab session") took place at the leading universities, museums, cultural centers, and other platforms on October 12. "Lab techs" (participants) tried to solve 39 different problems and then discussed them with "lab supers"—leading chemical scientists and popularizers. The Fund for Infrastructure and Educational Programs became the major partner of this event.

The Fund published three popular science books intended for the youth: Nanoelementy, Nanopank vs Nanohumanism, and Chasing New Horizons. Nanopank vs Nanohumanism is based on the texts on nanotechnologies from the culturological and philosophical points of view written by blogger Anna Klimenkova–Tenesheva for the magazine Snob. Each text featured unique illustrations by Aisha Gi. Nanoelementy was written by the member of the Board of Directors of the Russian Chemistry Society, editor-in-chief of Mendeleev.info Aleksei Paevskii. It was also timed to coincide with the 150th anniversary of the Mendeleev's Periodic Table and tells a story of the chemical elements forming the basis of the technology nanoworld. The Fund also partnered publication of Stern and Grinspoon's Chasing New Horizons prepared for print by the Polytechnic Museum in collaboration with publishing house Alpina.

GRIGORYI TRUBNIKOV

DEPUTY MINISTER OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION

"Such activities as Science Slam popularize science, attract as wide an audience as possible for the kids to see that successful scientists are not one-track minded, boring people."

40+

SLAMS IN CITIES OF OPERATION OF THE RUSNANO GROUP

100+

"NANOSPEAKERS"

10+

THOUSAND OFFLINE VIEWERS

2.5

MLN VIEWERS OF THREE SCIENCE STAND-UP TV SEASONS ON KULTURA CHANNEL

SCIENCE CLUB

We organize Science Club intellectual parties—private meetings of the academic expert community based on the Science Slam and Science Bar Hopping projects, as well as the Fund's brand.

DEBATES ON HOT TOPICS RELEVANT TO RESEARCHERS, SCIENTIFIC SPEED-DATING, AND INFORMAL ATMOSPHERE DRAW TOGETHER UP TO

100

SPEAKERS OF OUR PROJECTS

CONGRESS AND EXHIBITION ACTIVITIES

CONGRESS AND EXHIBITION ACTIVITIES REMAIN AN IMPORTANT INSTRUMENT OF POPULARIZATION OF NANOINDUSTRIAL ACHIEVEMENTS. THE FUND AND THE NANOCENTER INVESTMENT NETWORK'S COMPANIES PRESENT THEIR ACHIEVEMENTS AT LARGE-SCALE EXHIBITIONS, FORUMS, AND OTHER EVENTS FOR INTERESTED PARTIES.

The Fund became one of the participants of the Russian Construction Week that included RosBuild 2019, an international specialized exhibition of building and finish materials and technologies, that was held at Expocentre from April 02 to April 05, 2019. There, the leading Russian and global manufacturers demonstrated unique technologies ready to be used for project solutions.

The RUSNANO Group presented the innovative solutions already offered by Russian nanotechnology enterprises and intended to achieve goals of the national projects in the sphere of construction, renovation, housing, and urban environment. They demonstrated examples of use of high-strength architectural concrete, building coatings, and composite materials. Manufacturers of these products proved that they can make our homes and cities better and more comfortable and make their maintenance more efficient even now. Solutions for digitalization of urban facilities included in the Bank of Solutions of the Smart City program of the Ministry of Construction Industry, Housing, and Utilities of Russia occupied a distinctive place in the exhibition: software and hardware packages for housing utilities control, non-fiscal electricity meters, telemetry sensors, online metering systems for housing resources, and lighting control systems.

Companies of the Fund's investment nanocenter network presented the following:

- **Nanotechnology Center of Composites, LLC**—external reinforcement systems for simple and efficient repairs and reinforcing building constructions;
- **Lightnet, LLC, from the Nanotechnologies and Nanomaterials Center of the Republic of Mordovia**—a remote self-powered lighting control system;
- **Tekhnologicheskaia Kompaniia ZhNF, LLC**—anti-icing coatings reducing frost formation by 70% and snow load 2–3 fold;
- **CarbonLab, LLC, of SYGMA.Novosibirsk**—conductive carbon coating for electric heating applied as a paint to solve the problem of removing snow and ice off roofs for good;
- **Dreamwood, LLC, and Skyhouse, LLC, of ULNANOTECH, the Ulyanovsk nanocenter**—a modified rot-, fire-, and water-proof wood for urban beautification;
- **Identity Technology**, LLC—RFID solutions for cities for rational use of municipal resources.

The Fund co-organized the Moscow International Forum "Open Innovations 2019". The main idea of the Forum—"Digital Nation.Transition to Intellectual Economy." The RUSNANO Group presented for the first time an entire range of new projects capable of constituting the basis for upcoming digitalization of the Russian economy. Twenty-four nanotechnology companies were placed in the common exhibition area of the Startup Expo Forum, including 13 startups of 7 of the Fund's nanocenters.

There, one could see Solartek (SYGMA.Novosibirsk nanocenter) solar roofs and windows with integrated photovoltaic modules. Startup MoveCross demonstrated "smart" compression garments made using flexible printed electronics. Innopolymers of the Nanocenter of the Republic of Tatarstan presented information on the development of functional additives and compounds for materials with predefined properties. The Artmeat project of Kazan is developing an artificial meat production technology, while TechnoSpark's Fertek is offering laboratory and manufacturing services for the craft brewing market.

The first public presentation of a new Russian processor BE-M1000 (Baikal-M) by Baikal Electronics, a joint venture of the T-Nano nanocenter of the Fund's investment network, and T-platform, became one of the major events of the forum. Manufacturing of simpler boards was launched under the T-platform's license; they will go on retail sale in the second half 2020. Baikal Electronics intends to reach hundreds of thousands sales per year within 2–3 years.

Technologies presented through the lens of art become a powerful instrument of attracting attention. Visually bright works of art, art objects, and Art & Technology activities under the joint slogan #NANOart attracted attention of the Forum's participants to the Fund's exhibition stand. Visitors stopped at masterpieces of sculptor Dashi Namdakov, "digital works of art", designer suits with elements of augmented reality (AR) and 3D printing, took part in the renewable energy-themed performance.

A photographic exhibition dedicated to the Russian wind and solar energy industry that was supported by the Fund was organized as part of the Startup Village conference at the Skolkovo Innovation Center. Photographs were exhibited in the open. The photographic exhibition of renewable energy resources was visited by the Chairman of the Skolkovo Fund Arkady Dvorkovich and the Chairman of the executive board of the Fund for Infrastructure and Educational Programs Anatoly Chubais.

24

NANOTECHNOLOGY COMPANIES WERE PLACED IN THE COMMON EXHIBITION AREA OF THE STARTUP EXPO FORUM, INCLUDING 13 STARTUPS OF 7 OF THE FUND'S NANOCENTERS

SERGEY KALYUZHNYI

SCIENCE ADVISOR TO THE CHAIRMAN OF THE EXECUTIVE BOARD, CHIEF SCIENTIST AT RUSNANO

"Innovations are always about the future that is created by scientists and engineers in tight collaboration with the society. Our goal is to attract students, young specialists, and talented people to the scientific and technical sphere with artistic methods."

The photographs featured Russian plants manufacturing blades and towers for wind turbines, wind and solar power stations. To date, 60% of the wind turbine components are manufactured domestically, and the percentage shall continue growing. This means new jobs, educational programs, new knowledge and expertise. This is the very premise for technology and production development that may be enjoyed by those developers and investors who participated in the Startup Village, as well as other actors.

The Committee for Nanotechnology and Innovative Activity Popularization of the Fund's Executive Board continued its operations in 2019. They approved 25 applications for support of educational and scientific events and projects.

Among the significant popular science events supported by the Committee of the Fund's Executive Board, the Forums and Festivals organized by the Ministry of Science and Higher Education of Russia and Russian universities involving industrial enterprises should be noted.

The largest of these events is the Science Festival Nauka 0+ organized by Lomonosov Moscow State University,

POPULARIZATION ART PROJECT 2020 → 2070

Together with the Frida Project Foundation gallery, the Fund initiated the art project 2020 → 2070 aimed at popularizing science and technology by attracting attention of schoolchildren, students, and youths to career prospects in innovation and technology.

The art project includes artist exhibitions as well as roundtables dedicated to the role of technologies and art in creating the future. As part of the art project, more than 30 contemporary artists presented works reflecting their view of the future. The works of art that will be exhibited at contemporary art platforms and in universities of Moscow and Saint Petersburg were demonstrated at the #NANOart exhibition.

The artists made an important joint decision—they agreed to the Open Source format. It allows Russian universities to use images of art objects to popularize their activities and in popular science events.

THE PHOTOGRAPHIC EXHIBITION OF RENEWABLE ENERGY SOURCES WAS VISITED BY THE CHAIRMAN OF THE SKOLKOVO FUND ARKADY DVORKOVICH AND THE CHAIRMAN OF THE EXECUTIVE BOARD OF THE FUND FOR INFRASTRUCTURE AND EDUCATIONAL PROGRAMS ANATOLY CHUBAIS.

institutes of the Russian Academy of Sciences, and regional universities in Moscow and regions of Russia. Science Festival involves addresses of Nobel laureates and Russian Federation National Award laureates, heated scientific discussions, interactive exhibitions and much more. The major activities take place at Lomonosov Moscow State University, Expocentre (pavilion 2, halls 4, 5, and 6), Zaryadye Park, and the Russian Academy of Sciences. The Fund takes part in the Science Festival to tell the society in clear and plain terms what researchers, designers, and technologists do in the nanoindustry and related spheres, how application of new materials improves the quality of life, and about the prospects that the science and technology open up for young people.

The Popularization Committee supported the "Nanocamp: Nanotechnologies for Children" project multiple times; it consists in the network of specialized children's camps providing captivating activities, such as a cycle of gamified lectures and practicals at physical, chemical, and biological laboratories intended to explain unique properties of nanomaterials and help master the new knowledge in practice. About 400 7–16-year-old schoolchildren visit the summer camp every year. The Fund partnered with the All-Russian Forum of Scientific Youth "Step into the Future" held since 1993 and comprised of 38 specialized science sections on engineering and natural sciences.

Every year, the Fund supports Christmas meetings held by the National University of Science and Technology “MISiS” as a new way to popularize science; they consist of popular science lectures given in an entertaining manner by Russian and foreign scientists throughout December, as well as the Youth Award of the National University of Science and Technology “MISiS” that is intended to develop science and fulfill scientific and technical potential of youths; there are six awards, one for each of the priority focus areas of the university, including nanotechnologies.

The Fund partners two "A: START" accelerators of Akademgorodok of Novosibirsk (spring and autumn sessions). In 2019, the sessions concentrated on the following: cell technologies, biopharmaceutics, laboratory diagnosis, IT in medicine, big data, sensors and gadgets, telemedicine, technologies for preventive medicine and healthy aging. Another platform for young tech entrepreneurs is "Probing action"—a project for founders of new technology businesses willing to attract investment to their companies.

The Fund supported a range of science events concerning applied issues of nanoproduction of both global and Russian significance, in particular, the 16th Science and Technology in Society (STS) forum in Kyoto, Japan; the Advanced Carbon Nanostructures (ACNS) 2019 conference in Saint Petersburg (Ioffe Institute for Physics and Technology of the Russian Academy of Sciences); the All-Russian School–Conference "Additive Technologies in Digital Production. Metals, alloys, composite materials"; the International Forum on Energy Efficiency and Energy Industry Development, and the innovative forum SmartTRANSPORT.

As usual, the Fund partnered the Contest of Innovative Aerospace Projects organized by the Federal State Unitary Enterprise "Zhukovsky Central Aerodynamic Institute." In 2019, the final part of the contest took place at the International Aviation and Space Show. The target audience of the Contest consists of young scientists and specialists interested in implementing innovative projects. CEO of the Fund A. Svinarenko was a member of the Contest's organizing committee. In total, 50 applications to take part in the contest were received from research organizations, universities, and enterprises. The most topical projects this year concerned supply of remote areas of Siberia, the Far East, and the Arctic with modern aircraft, including unmanned ones, aviation mobility in urban agglomerations, and new composite materials. Summing up the contest results, A. Svinarenko emphasized that developers are offered technology solutions featuring nanotechnologies that have become indispensable for the modern aerospace industry. As he said, it is very important that, according to the contest's conditions, developers must cooperate with industrial partners—manufacturers or consumers.

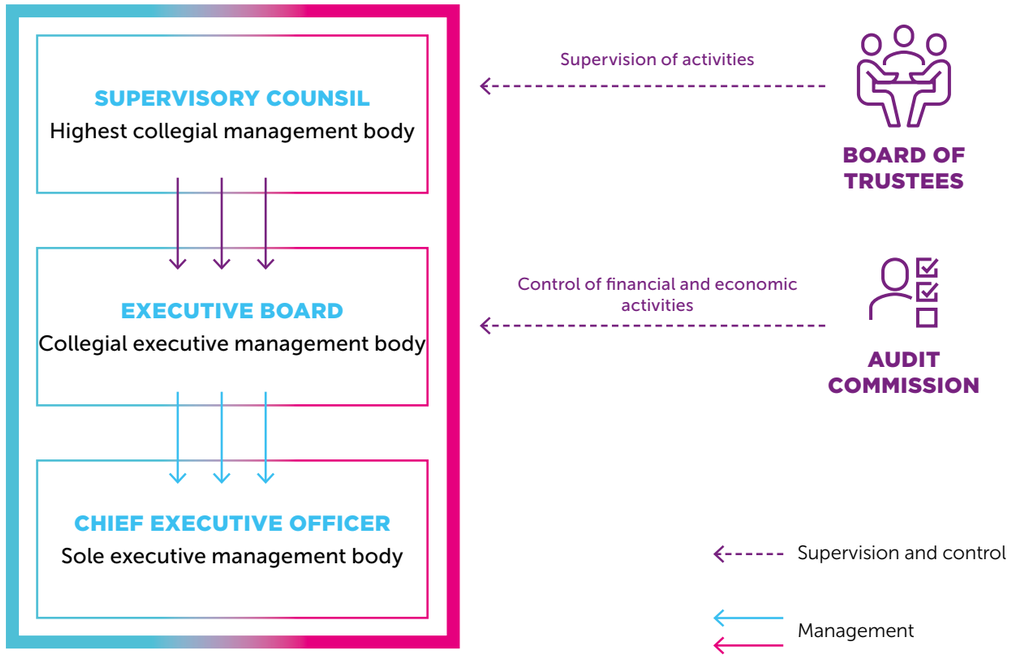
3

CORPORATE MANAGEMENT SYSTEM

3.1
CORPORATE MANAGEMENT BODIES

THE MANAGEMENT AND CONTROL BODIES OF THE FUND WERE FORMED BY THE SOLE FOUNDER OF THE FUND—RUSNANO JSC. THE COLLEGIAL BODIES ARE FORMED IN ACCORDANCE WITH THE FUND'S ARTICLES OF ASSOCIATION.

CORPORATE MANAGEMENT STRUCTURE



SUPERVISORY BOARD OF THE FUND

According to the Fund's Articles of Association, the supreme collegial management body of the Fund is the Supervisory Board that makes decisions on the most significant issues, including the definition of priority areas of activity, strategy, and budget. The Supervisory Board's powers and operating procedure are determined by the Fund's Articles of Association and the Statute of the Supervisory Board of the Fund.

The Supervisory Board consists of 14 members (the Articles of Association determine that the Supervisory Board must not be comprised of more than 15 members) as approved by Resolution of the Board of Directors of RUSNANO JSC (minutes of the meeting No. 65 dated March 04, 2019).

THE SUPERVISORY BOARD CONSISTS OF

14

MEMBERS

MEMBERS OF THE SUPERVISORY BOARD AS OF DECEMBER 31, 2019

Full name	Position
Alfimov Mikhail Vladimirovich	Member of the Supervisory Board of the Fund for Infrastructure and Educational Programs
Gorkov Sergei Nikolaevich	CEO, Chairman of the Executive Board of Rosgeologiia, Joint-Stock Company
Ivanov Vladimir Viktorovich	Deputy President of the Russian Academy of Sciences
Komissarov Alexei Gennadievich	Vice-President of the Russian Academy of National Economy and Public Administration, Director of the Higher School of Public Administration
Nazarov Vladimir Pavlovich	Adviser to the Secretary of the Security Council of the Russian Federation
Nikkonen Albina Ivanovna	Executive Director of the Russian Venture Capital Association
Osmakov Vasiliy Sergeevich	Deputy Minister of Industry and Trade of the Russian Federation
Petrov Andrey Nikolayevich	Director General of the Federal State Budgetary Research Enterprise "Directorate of Scientific and Technical Programs"
Povalko Alexander Borisovich	CEO, Chairman of the Executive Board of RVC JSC
Polyakov Sergei Gennadievich	CEO of the Fund for Assistance to Small Enterprises in Science and Technology
Ponomarev Alexei Konstantinovich	Vice-President for Industrial Cooperation of the Skolkovo Institute of Science and Technology (Skoltech)
Trubnikov Grigoryi Vladimirovich	First Deputy Minister of Science and Higher Education of the Russian Federation
Fomichev Oleg Vladislavovich	Chairman of the Supervisory Board of the Fund for Infrastructure and Educational Programs
Chubais Anatoly Borisovich	Chairman of the Executive Board of the Fund for Infrastructure and Educational Programs

IN 2019,

5

MEETINGS OF THE FUND'S SUPERVISORY BOARD WERE HELD: FOUR IN-PERSON MEETINGS AND ONE MEETING BY CORRESPONDENCE.

AT THE MEETINGS OF THE FUND'S SUPERVISORY BOARD, 36 ISSUES WERE DISCUSSED IN THE YEAR UNDER REVIEW, INCLUDING:

1. **STRATEGY OF THE FUND FOR INFRASTRUCTURE AND EDUCATIONAL PROGRAMS UNTIL 2024 AND ASSOCIATED LOCAL STATUTORY INSTRUMENTS.**

The Fund Strategy until 2024 was updated and adopted in order to bring it to conformity the adopted decisions on the Fund's funding, including from the federal budget, taking into account the Fund's initiative to take part in implementation of the national (federal) projects aimed at achieving the goals set forth by Decree No. 204 of the President of the Russian Federation "On the National Goals and Strategic Objectives of the Development of the Russian Federation for the Period up to 2024" dated May 07, 2018, and other state strategic planning documents.

2. **AMENDMENT OF THE ARTICLES OF ASSOCIATION OF THE FUND FOR INFRASTRUCTURE AND EDUCATIONAL PROGRAMS**

The Fund's Articles of Association were updated and adopted in order to bring their provisions to conformity with the current legislation of the Russian Federation and the updated Fund Strategy until 2024.

3. **WITHDRAWAL FROM PROJECTS "ESTABLISHMENT AND FUNCTIONING OF A NANOTECHNOLOGY CENTER IN THE SAMARA REGION" AND "ESTABLISHMENT OF A KRASNOYARSK NANOTECHNOLOGY CENTER"**

The Board made a decision to withdraw from projects "Establishment and Functioning of a Nanotechnology Center in the Samara Region" and "Establishment of a Krasnoyarsk Nanotechnology Center" in order to optimize the infrastructure network.

BOARD OF TRUSTEES

The Board of Trustees of the Fund supervises the activities of the Fund. The scope of responsibility of the Board of Trustees includes control over the intended use of the funds received by the Fund, approval of the audit organization, as well as monitoring of the Fund's compliance with the existing legislation of the Russian Federation.

Currently, the Board of Trustees consists of three members as approved by Resolution of the Supervisory Board (minutes of the meeting No. 35 dated September 30, 2019).

IN 2019,

2

MEETINGS OF THE BOARD OF TRUSTEES WERE HELD, IN APRIL AND IN NOVEMBER

MEMBERS OF THE BOARD OF TRUSTEES AS OF DECEMBER 31, 2019

Full name	Position of the member of the Fund's Board of Trustees
Saltykov, Boris Georgievich	President of the Polytechnic Museum, Chairman of the Board of Trustees
Fortov, Vladimir Yevgenievich	Director of the Joint Institute for High Temperatures of the Russian Academy of Sciences
Khlunov, A Alexander Vitalievich	CEO, Russian Science Foundation

EXECUTIVE BOARD OF THE FUND

THE BOARD IS A COLLEGIAL EXECUTIVE BODY OF THE FUND THAT MANAGES THE CURRENT ACTIVITY AND CONDUCTS PRELIMINARY CONSIDERATION OF THE ISSUES UNDER THE SCOPE OF RESPONSIBILITY OF THE SUPERVISORY BOARD.

As of December 21, 2019, the Executive Board consists of ten members as approved by Resolution of the Fund's Supervisory Board (minutes of the meeting No. 30 dated March 30, 2018). The Executive Board consists of heads of the Fund. The Chairman of the Fund's Executive Board is Anatoly Chubais.

MEMBERS OF THE FUND'S EXECUTIVE BOARD AS OF DECEMBER 31, 2019

Full name	Position of the member of the Fund's Executive Board
A.S. Zhizhin	Deputy CEO—Executive Director of the Fund
S.V. Kalyuzhnyi	Science Advisor to the Chairman of the Executive Board of RUSNANO Management Company LLC—Chief Scientist
A.R. Kachai	Deputy CEO of the Fund for Strategy
D.A. Kolesnikov	Deputy CEO of the Fund for Economics and Finance
A.G. Svinarenko	CEO of the Fund, Deputy Chairman of the Executive Board of RUSNANO Management Company LLC
E.N. Soboleva	Educational Projects and Programs Director of the Fund
R.V. Titov	Deputy CEO of the Fund for Infrastructure Projects
A.V. Trapeznikov	Deputy Chairman of the Executive Board of RUSNANO Management Company LLC for External Communications
Y.A. Udaltsov	Deputy Chairman of the Executive Board of RUSNANO Management Company LLC
A.B. Chubais	Chairman of the Executive Board of RUSNANO Management Company LLC, Chairman of the Executive Board of the Fund

IN 2019,

22

MEETINGS OF THE FUND'S EXECUTIVE BOARD WERE HELD, WHERE

67

ISSUES WERE DISCUSSED, INCLUDING:

1. **PROGRESS REPORT ON THE "DEVELOPMENT OF THE PROFESSIONAL QUALIFICATION EVALUATION SYSTEM FOR THE NANOINDUSTRY IN 2019–2021" PROGRAM**

The Board reviewed a progress report on the Program aimed at developing a qualification evaluation system as an instrument of creating a modern, highly mobile labor market in the nanoindustry. The progress report included information on the three main areas of the Program:

- "Digitalization of qualification evaluation facilities, services, and procedures";
- "Qualification evaluation system development: infrastructure quality, management, and promotion";

- "Introduction of mechanisms of applying labor market requirements to qualifications in the talent development system for the nanoindustry."

All the set results of the Program had been achieved by December 31, 2019.

2. PROGRESS REPORTS ON THE FUND'S INFRASTRUCTURE PROJECTS

The Board reviewed progress reports on the Fund's infrastructure projects and adopted the corporate decisions required for further implementation of the projects, including determination of project funding conditions and main transaction parameters.

3. "E-LEARNING ELECTRONIC EDUCATION SYSTEM DEVELOPMENT UNTIL 2022" PROGRAM

The Board reviewed a progress report on the "E-Learning Electronic Education System Development Until 2020" Program and approved the "E-Learning Electronic Education System Development Until 2022" Program.

CHIEF EXECUTIVE OFFICER OF THE FUND

The sole executive authority of the Fund rests with Chief Executive Officer of the Fund elected by the Supervisory Board for a term of five years. As per decision No. 20 of the Fund's Supervisory Board dated September 28, 2015, Andrey Svinarenko, a Fund's Executive Board member, was appointed Chief Executive Officer of the Fund.

AUDIT COMMISSION

The Fund's Audit Commission acting on the basis of the Articles of Association and the Statue of the Audit Commission of the Fund, is a monitoring body of the Fund that reviews financial and economic performance of the Fund at the end of each year, as well as upon the initiative of members of the Audit Commission, upon the decision of the Supervisory Board, the Board of Trustees, or the Executive Board.

The Audit Commission consists of three members as approved by Resolution of the Supervisory Board (minutes of the meeting No. 34 dated April 22, 2019).

MEMBERS OF THE AUDIT COMMISSION AS OF DECEMBER 31, 2019:

- **T.G. Bessonova—Chair;**
- **L.S. Volkova;**
- **A.A. Kudryavtseva.**

IN 2019,
2 MEETINGS OF THE AUDIT COMMISSION WERE HELD

3.2 PROJECT IMPLEMENTATION MONITORING

Project implementation is monitored using the corporate governance system and financial instruments. At the same time, the Fund does not aspire to take a significant operational part in management of the organizations where the Fund is a stakeholder to maintain the balance between corporate control and entrepreneurial independence as required by the "innovation conveyor" model.

Main mechanisms of controlling efficiency of expenditures and implementation of stages of the projects where the Fund is a stakeholder:

- development of local model regulatory documents (articles of association, statutes of governing and monitoring bodies, etc.) to unify the scope of responsibilities of governing bodies of the companies, including for effective financial and KPI monitoring of investment projects;
- participation of the Fund's representatives in governing and monitoring bodies of the companies;
- analysis of project progress reports and of reports on financial and operating activities of the portfolio companies;
- monitoring of appropriate use of invested funds.

Expenditures of the portfolio companies are in strict compliance with the budget approved by the Company's governing bodies. The Fund's infrastructure department exercises operational monitoring over budgetary processes of the portfolio companies.

3.3 PROCUREMENT ACTIVITY

The Fund's procurement procedures are regulated by the Procurement Regulation.

Fundamental principles of the Fund's procurement activity:

- openness in cooperation with suppliers;
- transparency;
- optimality of procedures and outcomes;
- compliance with the interests of the Fund.

The Fund uses the www.b2b-rusnano.com electronic procurement system to improve efficiency and auditability of the use of procurement funds as well as to ensure compliance with the principles of procurement activity.

Procurement procedures are held in an open form (open contest, open request for proposals, open simple procurement), and any party may participate in them.

In 2019, the Fund conducted 126 procurement procedures.

3.4 CORRUPTION CONTROL

The Corporate Ethics Code (hereinafter referred to as the Code) was adopted in 2018 to enhance corporate culture and ethical behavior of the Fund's specialists. According to the Code, the employees shall not cause by their action or inaction any financial damage, damage to property and/or public image or any other harm to interests of the Fund in whole and of its structural divisions, employees, as well as daughter, affiliated, and portfolio companies.

The employees must observe the anti-corruption legislation of the Russian Federation regardless of their position in the Fund. The employees must report any and all corruption suspicions to their direct supervisor, including attempts to induce the Fund's employees to corruption offences. Upon receiving an offer to commit a corruption offence, the employee must immediately report it to the direct supervisor or, if such an offer was made outside of working hours, as soon as possible.

The Code also elaborates on the issues of insider information, conflict of interest, as well as on the plan of actions in such instances for employees.

The Fund has a Corporate Ethics Committee to resolve the situations associated with compliance with the Code.

3.5
HUMAN RESOURCE MANAGEMENT

A TIGHT-KNIT TEAM OF STRONG PROFESSIONALS IS A RECIPE FOR THE FUND'S SUCCESS. KEY PRINCIPLES OF RELATIONSHIPS WITH THE FUND'S EMPLOYEES: LONG-TERM COOPERATION, MUTUAL RESPECT, AND STRICT FULFILLMENT OF MUTUAL OBLIGATIONS.

The employees remain loyal to the Fund not only because of interesting tasks, global challenges, and a unique possibility to personally contribute to the innovative development of Russia, but also because of the conditions for professional growth, upgrade of skills, and education created by the Fund.

The Fund employs 87 people: 38 men and 49 women.

All the employees have higher education, eight of them are PhDs in Physics and Mathematics, Engineering, Geography, Chemistry, Economy, or Law, one—Doctor of Economics.

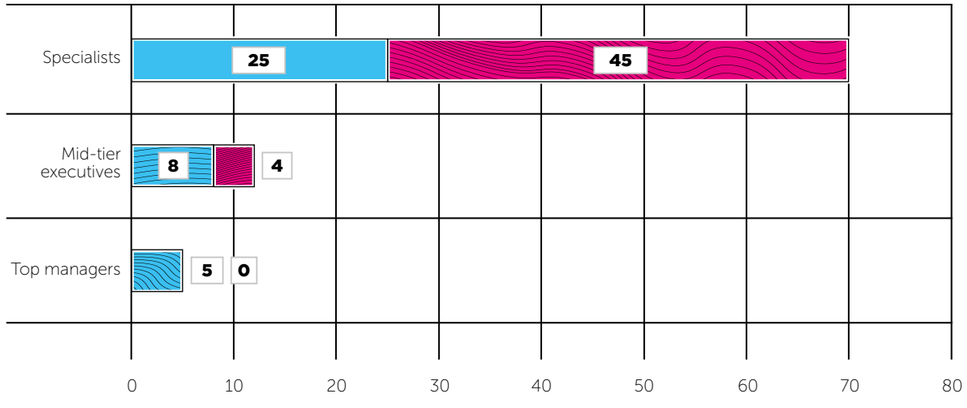
The Fund maintains high standards of personnel care, observes all of its social obligations, provides employees a generous benefit plan, and covers optional medical insurance (OMI).

The Fund attaches high importance to professional development of the employees, which is why they receive maximum support in terms of education. Employees may apply to any retraining or continuing education programs they need and the Fund organizes the rest.

Health of the employees is the Fund's unconditional priority: the Fund organizes corporate sports sessions in yoga, table tennis, volleyball, running, and other kinds of sports.

Motivation of employees is an important factor of efficiency of human resource management. The Fund provides employees not only with fair compensation based on a well-established incentive system, but also with non-financial recognition.

GENDER DISTRIBUTION BY PERSONNEL CATEGORIES (PEOPLE)



THE FUND EMPLOYS

87

PEOPLE: 38 MEN AND 49 WOMEN

MORE THAN HALF OF THE FUND'S EMPLOYEES WORK THERE FOR MORE THAN

5

YEARS

The success of each employee is determined by his/her direct supervisor in terms of efficiency, timeliness and quality of performance, suggestion of new ideas and solutions, etc. Employees with proven efficiency have opportunities for promotion within the Fund.

The system of key performance indicators (KPIs) of the Fund provides for efficiency assessment of the employees in terms of reaching the strategic goals of the Fund (see section 1.3). It consists of three levels:

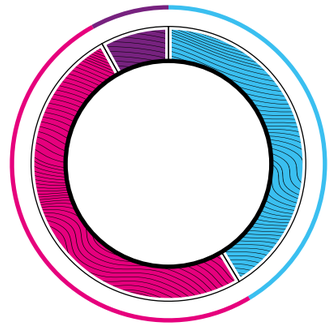
- corporate: reflects results of the Fund's activity in whole;
- functional: reflects results of activity of a structural unit of the Fund;
- individual: reflects results of activity of an individual employee of the Fund.

The list and annual values of the KPIs for the year 2019 were adopted by Resolution of the Supervisory Board. The KPI progress is monitored and assessed throughout the year, current activity plans of employees are corrected on the basis of updated projections, and a KPI progress report is regularly provided to the Executive Board and the Supervisory Board.

The fact that more than half of the Fund's employees work there longer than 6 years confirm satisfaction of employees and their loyalty to the Fund.

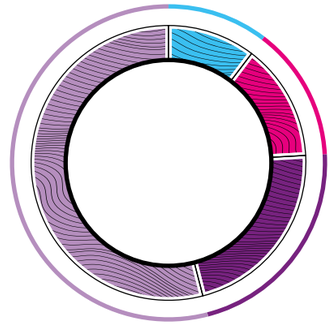
The Chairman of the Executive Board of the Fund personally hands out awards to the employees who have worked at the Fund for 5 or 10 years.

AGE DISTRIBUTION (PEOPLE)



36 25-40 years old
44 40-60 years old
7 Over 60 years old

DISTRIBUTION OF EMPLOYEES BY DURATION OF WORK AT THE FUND (PEOPLE)



9 Under 1 year
12 1-3 years
19 3-6 years
47 6-9 years

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