RVC

RVC 2019 ANNUAL REPORT

# OUR STEPS TO A BETTER FUTURE

## TOP 2019 STORIES FROM THE PEOPLE WHO MADE THEM HAPPEN

+

ANNUAL REPORT IN FACTS AND FIGURES

RVC is a government fund of funds, an operator of state projects, and a development institute for the venture capital market and innovation ecosystem.

We are acting in the interests of Russian entrepreneurs that are able to ensure Russia’s leadership in the global technology market. The heroes of this report share what they’ve managed to achieve in this area in 2019 in collaboration with RVC.

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## ANNEX

# ALEXANDER POVALKO

## RVC CEO SUMS UP THE RESULTS OF 2019 FOR THE TECHNOLOGY BUSINESSES IN RUSSIA

**Swift adoption of digital technologies underlies Russia's competitive advantage.** We quickly get used to technological innovations, and if we'll be able to create systems to scale it up and transmit it beyond Russia, then we'll be able to secure our financial well-being. And I don't see why we won't be able to bridge this gap in a short space of time.

**There are now a number of people in Russia who've become serial venture capital investors.** Some of the teams, which have previously collaborated with RVC in the first cycle of investment, are coming back to join other funds. There are many active players who aren't just looking to give out money but systematically searching for projects instead.

**Corporations have become fully-fledged participants in the venture capital market.** About 130 deals with corporate capital involvement have been completed last year. For example, we've created a venture fund with Gazprom Neft. At some point, we were concerned that this fund would be used to finance Gazprom Neft's own developments. But our concerns were unfounded, and the fund is a fully functioning structure.

**We intend to work more closely with corporations.** Our goal is to integrate long-term corporate strategies with the capabilities of small innovative companies.

**Corporations have become fully-fledged participants in the venture capital market.**

**29** **VENTURE FUNDS**
in RVC's portfolio

# Our goal is to integrate long-term corporate strategies with the capabilities of small innovative companies.

**We want to support companies with considerable potential for growth.** As a result, they'll be able to enter foreign markets with high-tech products. In fact, they will be creating new markets. These are the type of companies that we're aiming to work with.

**In updating our investment proposal, we are making an assumption that RVC is a smart investor.** This means that we provide expertise as well as capital. At the moment, we are building a service platform for portfolio companies, investors and management teams. We are ready to help funds finalize their pipelines and prepare for exits. As for the projects, we can help them find customers among corporations and to enter foreign markets.

**The National Technology Initiative is not just an intellectual plaything for us.** We are investing public and private money in it, so these investments should be able to yield meaningful results. We'll continue to measure key indicators, such as market volume and the share of Russian companies in this market. In turn, these key indicators take into account a few intermediate indicators, such as the number of scientists or patents, but the final result is what's most important for us.

**As part of NTI, we have roadmaps and plans for the development and enforcement of regulations that will remove barriers currently blocking the development of new markets.** It hasn't been a smooth process so far, because these roadmaps represent a break away from the stereotypes and go beyond the usual norms of government activity. The working groups come up with legislative initiatives independently.

**The goal of NTI Competence Centers is to institute a continuous process of creating technologies,** transforming them into products or licenses, and sharing these products with market agents within the business environment. By 2021 or by the end of the program's implementation, NTI

**64,4**

**RUB BN**

the total amount of RVC-backed funds

**325**

**INVESTMENTS**

approved for portfolio companies of RVC-backed funds



Competence Centers will share 1,200 innovative developments with their partners — this is in line with the commitments they've made in terms of volume. These developments will be projects with specific market applications, not just research projects. The commitment for the number of developments is certainly ambitious, but it's now in our power to transform the relationship between science and business.

**The country's investment development strategy, priorities and agenda have changed in recent years.** More and more startups are being created by first-class professionals, who are not afraid of investing their own funds in project development. Many of them have histories of both successes and failures. On balance, this experience is crucial for future development of the venture capital industry.

**From my perspective, a failure of a startup is also an astonishing success.** It means that we're investing in the technology team, and it gains experience — that's the main thing.

**It's time to move away from the traditional paradigm, which stipulates that one has to work in the Russian market before winning in other markets.** We must forget that. Exporting is the first key objective.

**On one hand, there's a lot of talk about exporting and entering global markets, while on the other hand, it's argued that companies should remain Russian. This doesn't happen with technological solutions and platforms.** One needs to attract foreign investment to enter large foreign markets. And external investment is inevitable for medium-sized companies worth up to one billion dollars.

**We shouldn't forgo opportunities, and we shouldn't be afraid of making mistakes.** We have to take risks. And most importantly, we need the energy of the people who are fully dedicating themselves to their work.

**28,9**

**RUB BN**

the cumulative amount of approved investments in portfolio companies

**946**

**RESULTS**

of intellectual activity achieved by companies as of the end of 2019

**We'll continue to measure key indicators, such as market volume and the share of Russian companies in this market.**

# RVC IN NUMBERS

**29**
**VENTURE FUNDS**
in RVC's portfolio

**37,3**
**RUB BN**
RVC's share in the total volume of funds

**325**
investments approved for portfolio companies of RVC-backed funds

**296,3**
**RUB BN**
total revenue of portfolio companies

**64,4**
**RUB BN**
the total amount of RVC-backed funds

**28,9**
**RUB BN**
the cumulative amount of approved investments in portfolio companies

**9,7**
**RUB BN**
the cumulative amount of RVC funds' exits from portfolio companies

**10,6**
**RUB BN**
taxes paid by portfolio companies

## Investments by economic sector in 2019


| | |
|---|---|
| Information technologies, Internet technologies and services | 29,2% |
| Medicine/healthcare | 25,1% |
| Electronics | 11,7% |
| Energy | 9,1% |
| Telecommunications | 7,1% |
| Industrial equipment | 3,8% |
| Chemicals | 3,6% |
| Biotechnologies | 3,0% |
| Consumer market | 3,0% |
| Consulting and education | 2,2% |
| Construction | 1,0% |
| Industrial production | 0,6% |
| Transport | 0,4% |
| Financial services | 0,3% |


| | |
|---|---|
| Moscow | 46,93% |
| St. Petersburg | 5,78% |
| Moscow Oblast | 2,52% |
| Perm Krai | 2,28% |
| Nizhny Novgorod Oblast | 2,02% |
| Bryansk Oblast | 1,76% |
| Chelyabinsk Oblast | 1,10% |
| Republic of Tatarstan | 0,89% |
| Sverdlovsk Oblast | 0,76% |
| Tomsk Oblast | 0,63% |
| Republic Of Mari El | 0,47% |
| Saratov Oblast | 0,31% |
| Ryazan Oblast | 0,21% |
| Tyumen Oblast | 0,19% |
| Udmurt Republic | 0,16% |
| Sakhalin Oblast | 0,15% |



## The National Technology Initiative

**59**
**PROJECTS**
in the NTI portfolio as of the end of 2019

**9,7**
**RUB BN**
the cumulative amount of RVC funds' exits from portfolio companies

**240**
**RESULTS**
of intellectual activity created by NTI projects

**20%**
**OF NTI PROJECTS**
have successfully completed the R&D stage and started their first sales

**2,5K**
**COMPANIES REGISTERED**
on the RVC Digital Platform

**981**
**PROJECTS**
received financial, expert, and administrative support from NTI

**7**
**NTI INFRASTRUCTURE CENTERS**

**4**
**NTI TECHNOLOGY CONTESTS**

**14**
**NTI COMPETENCE CENTERS**
in which more than 150 research projects are being implemented

**60K**
**GUESTS ATTENDED**
the Rukami Tech and Creativity Festivals

**>1,5K**
**EDUCATIONAL INSTITUTIONS**
joined the NTI Class campaign

**>123K**
**SCHOOLCHILDREN HAVE TAKEN**
part in the NTI Contest since 2015

## Digital technologies

**11**
**PROJECTS APPROVED**
for funding as part of the "Digital Economy of the Russian Federation" program

**1,8**
**RUB BN**
amount of planned co-financing

**2,8**
**RUB BN**
approved amount of state funding

# NEW INDUSTRY VENTURES

**“THE OIL AND GAS INDUSTRY IS A LOGICAL CHOICE FOR A STARTUP”**

In 2019, Gazprom Neft, Gazprombank, RVC and VEB Ventures created the “New Industry Ventures” venture capital fund. The focus is on investing in companies developing new materials, technologies, products and services for the oil and gas industry. Tatyana Morozova, CEO of “New Industry Ventures”, spoke about the Fund, the criteria for selecting projects and the Fund’s first outcomes.

## CHALLENGES FACING THE INDUSTRY

“New Industry Ventures” venture capital fund is focused on the needs of the Russian fuel and energy complex. We are focused on investment in innovation for the entire domestic oil and gas sector. Developing products that will be in demand in the future by the entire industry is not only our mission, but also a part of our financial strategy.

The oil and gas industry is a logical choice for a startup. It is a very innovative field. We are facing challenges that are interesting to overcome. This industry is filled with the organizational, financial and technological resources necessary to implement the most ambitious projects. Besides, entering the Russian market is an opportunity to give the project a spotlight on an international level.

Russia has an expert community and all expertise necessary to create breakthrough technologies and solutions for the development of the global fuel and energy complex.

When we determined the challenges and strategies of our Fund, we considered the developmental challenges of primarily Russian oil companies. The top priority of the Fund was to focus on those products that are required in Russia. This is related to the development of both offshore projects and technologies for hard-to-recover and unconventional hydrocarbon reserves.

"New Industry Ventures" venture capital fund is focused on the needs of the Russian fuel and energy complex.

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FOTO: GAZPROM NEFT

## THE WAY EVERYTHING WORKS

The Fund was created at the initiative of Gazprom Neft in form of an investment partnership. Among its partners - Gazprom Neft, Gazprombank, RVC and VEB Ventures. Each partner is a financial investor that brings his knowledge, experience and expertise to the project.

The deliberations took more than a year and all necessary arrangements were finalized in April 2019. The Fund's team consists of 10 specialists with experience in the oil and gas industry, development institutes, venture and direct investment, M&A and corporate finance.

Besides rendering financial assistance to the projects, we believe that the goal of the Fund is to find talented teams, help them critically reflect on their project and contribute to its implementation.

We did not anticipate such a high level of interest. We've received more than 200 applications and we're still receiving more and more. Such interest coming from the market, of course, is encouraging.

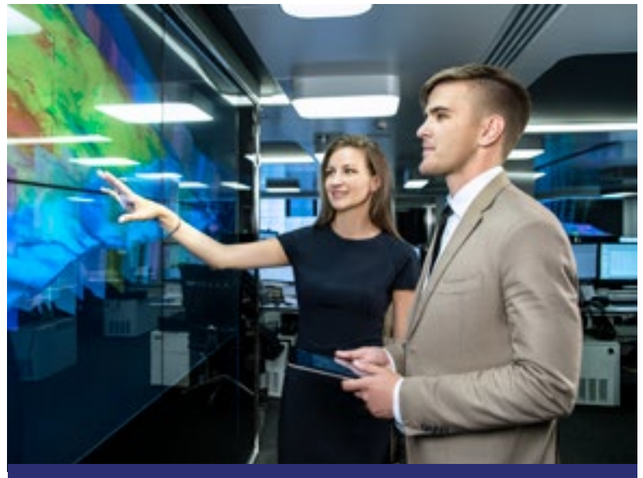
The office of Fund is located at the Moscow State University Science Park, where we are integrated into the innovation and scientific environment. This gives us the opportunity to attract university students as interns and young specialists.

## SELECTING PROJECTS

In order for it to be approved by the Fund, the project must meet a number of conditions. First and foremost, it should be consistent with the investment focus of the Fund. It is important that the team should be the driving force behind a project, and that the proposed technology be tested and have obvious advantages over analogues within the next 3-5 years. In this sense we are talking about projects at an advanced stage of implementation, when the product already passed laboratory or experimental-industrial trials. One more condition - investment attractiveness. Besides solving the industry's problems, the Fund is also looking to ensure a return on its investments.

It is crucially important that behind every project stands a strong team of individuals. The project will fail if the people behind a brilliant idea are not determined to bring it to life.

We have a special scale where we consider team experience in terms of individual parameters. We have developed special formulas. I would say that our approach is quite technical, for every type of activity we have matrices and structures.



### Considering a project

We have several stages of examination and assessment. We obtain technical expertise from Gazprom Neft, including the Gazprom Neft Scientific and Technical Center. An independent technical council determines which projects are the most promising. Afterwards it undergoes a two-stage approval of the Fund's Investment Committee that includes representatives of each partner.



If a team receives red or yellow flags as a result of an assessment, then there is a potential to step into a "danger zone". Such projects are either put on hold until the time comes to consider the risks or they're taken off the table altogether. We evaluate not only the innovativeness and value of the product for the industry, but also its profitability, so the selection process is very rigorous.

Many initial stage projects that were proposed to us had to be put on hold since the Fund's mandate does not allow to finance them at this point in time. Of course, this does not mean that we won't be taking them into consideration. We continue communication and observe as they develop.

## OUTCOMES OF THE YEAR

In the first year, we created a platform for effective work, we assembled a team and set up the assessment process. he Fund has a strategy and a portfolio of projects it's working on.

There are 16 promising projects in elaboration.. Almost half of them are related to the digitalization of the industry, a lot of them have to do with introducing elements of Industry 4.0 (such as robotization, automation, AI). There are interesting projects in such areas as chemistry, drilling equipment, work on the shelf, ecology and safety at work.

A variety of projects allows us to be more aware about forming a portfolio within which projects can complement each other. We are counting on a synergy effect from parallel development.

Our first investment is with "ADL Completions". The company helps to significantly reduce costs during well construction by organizing multi-barrel and multi-hole completion solutions. Even though there has been a considerable decline in hydrocarbon prices, the demand for the company's services has increased. We see that there's an interest both in the domestic and in the Middle East market. There is a good team behind this project. The guys clearly found their calling, we received positive expert reviews from service companies and subsoil users about the technology and the company. Moreover, we've determined that within 4–5 years together with our colleagues we will be able to achieve a multiple increase in the company's capitalization.

### Criteria for assessing projects

**TEAM**

Relevant experience, qualifications, motivation

**PRODUCT / TECHNOLOGY**

Innovativeness, scientific feasibility and technological feasibility, technology readiness level

**POTENTIAL FOR GROWTH**

Market potential for growth, significant market capacity, exit options

**FINANCE**

Profitability indicators (IRR, NPV, revenue growth and EBITDA, etc.), capital requirements, year of reaching the break-even point, etc.

**COMPETITION**

Number of competitors and their level of development

**PROMOTION OPPORTUNITIES**

Partnerships, pilots, customers, market share

**SHAREHOLDER STRUCTURE**

Reputation, number, share of founders

**LEGAL ASPECTS**

Registration of a legal entity, IP rights, patents, licenses, contracts, trademarks

## PLANS FOR THE FUTURE

One of the projects that we will submit to the Fund's Investment Committee in the near future is the creation of a downhole tractor by Russian developers from the city of Tver. The project is of very high interest.

Over the next three years, we will continue to invest in technology and participate in the management of portfolio companies.

We expect that our projects will be of interest to the majority of Russian and international hydrocarbon production and processing companies, as well as construction, service and logistics companies.

# LEADER-INNOVATIONS AND VOCORD

**“A GOOD PRODUCT OR TECHNOLOGY WILL ALWAYS FIND ITS BUYER”**



There were 21 exits of RVC funds from portfolio companies in 2019 with positive financial results. In June 2019, the Chinese IT giant Huawei acquired part of Vocord — a portfolio company of the Leader-innovations and S-Group Ventures funds. Vocord specializes in the development of intelligent video surveillance systems, biometrics and computer vision. We spoke to Sergey Kerber, Managing Director, Head of the Directorate for Investment Projects and Programs at Leader Asset Management, about the deal, which has generated multiple return on initial investment.

**WHAT WERE THE REASONS BEHIND THE DECISION OF THE LEADER-INNOVATIONS FUND TO INVEST IN VOCORD IN 2011?**

— During the initial stages of investment, our strategy was to find projects, which combined the potential for rapid growth with a relatively low level of risk. And Vocord met these criteria. At that point, the company was a fairly large-scale producer of various security systems. It had ambitious founders and a highly professional team of engineers, who were perfectly capable of solving complex scientific and technical problems. We understood that by providing Vocord with additional finance, we would allow the company to direct a considerable share of its resources into the development of technologies, which wouldn’t immediately generate commercial returns, but would be in demand in the future. At the same time, the company maintained the continuity of its existing business operations. Thus, even if new developments wouldn’t have achieved the expected result, we were confident that the value of our share in the project wouldn’t be lost.

**HOWEVER, THE TECHNOLOGIES DEVELOPED BY THE COMPANY WERE NOT AS POPULAR IN 2011 AS THEY ARE TODAY. AND THE COMPANY WAS RECEIVING SERIES A ROUND.**

— Yes, indeed. In 2011, DL and AI technologies were not yet mainstream, and not all of Vocord’s R&D resulted in the development of sought-after technologies. However, the fact that Vocord had a sufficiently funded team, which was motivated to follow emerging technology trends and come up with first-class solutions, allowed the company to become one of the first developers of AI-based intelligent video surveillance systems. This lead to the company’s high capitalization, which yielded financial returns for the fund and its investors.

**Leader-innovations CEF for high-risk (venture) investments**

Interested in energy and energy conservation, alternative energy, new materials and chemical compounds, network technologies and services

**2008**

**CREATED IN**

**3**

**BILLION RUBLES**

Target amount of the Fund

Vocord specialized in the development of intelligent video surveillance systems, biometrics and computer

### WHAT EXIT SCENARIOS DID YOU FORESEE?

— There were two options. First was an optimistic scenario, which is quite common for ventures, whereby a strategy-oriented buyer acquires technologies that would create long-term competitive advantages for his core business. In this case, the value of the transaction and the buyer's interest are proportional to the effect that the acquired competitive advantages would have on his business. And the second option was conservative, whereby a buyer acquires market share.

### WHAT WAS THE GROWTH OF THE BUSINESS BEFORE THE DEAL WITH HUAWEI?

— In line with the arguments laid out above, the increase in Vocord's capitalization wasn't directly associated with the growth of the business, which has, of course, grown considerably. However, this is not an extraordinary result, if you take into account the eight-year investment period. By the time of the deal, the scientific and technical accomplishments of the Vocord team were already notable on a global level. This allowed us to go with the optimistic, venture-backed exit scenario.

### HOW DO YOU EVALUATE THE DEAL WITH HUAWEI?

— From a financial point of view, it's a very lucrative deal for the Leader-innovations fund. We cannot disclose the terms, but we can confirm that the return on investment is close to what venture investors would normally expect.

### HOW LONG DID IT TAKE FROM THE START OF NEGOTIATIONS TO THE SIGNING OF DOCUMENTS?

— A little over a year, which is probably the usual length of time when you're working with a large corporation. It took a while to discuss the perimeter and the key terms of the transaction, as well as the system of certifications and guarantees that the sellers had to provide. It also took a few months to restructure the assets, which had to be done as part of the deal.

### ARE THERE ANY OTHER DETAILS THAT YOU'RE ABLE TO SHARE?

— The main difficulty that came up on our side — the side of the CEF management companies (Leader-innovation and S-Group Ventures both acted as sellers) — was that some of the seller's obligations, which the buyer requested, could not be legally assigned to the CEF. Thus, the management companies had to absorb some of the risks themselves in order to finalize the deal in the interests of the funds' investors.

### IS IT EXTREMELY RARE FOR RUSSIAN FUNDS TO INVEST IN A COMPANY THAT DEVELOPS A TECHNOLOGY, WHICH IS THEN ACQUIRED BY AN IT GIANT?

— We cannot really view this deal as a rare stroke of luck. The fund has invested in 10 projects and exited from 6 so far. Two exits involved the sale of technologies to specialized IT giants. One was Vocord, and the other was the sale of the CDNvideo project to Wangsu Technology Company Ltd (ChinaNetCenter) — one of the largest CDN companies in the world. The rationale for this deal was similar to the rationale for the deal with Vocord: the buyers realized that these technologies would help them develop their core business, so they were willing to negotiate. a number of even bigger deals with assets that have Russian roots took place recently. This indicates that projects that attract the interest of global players are not so rare in Russia.

### HOW DOES ONE RECOGNIZE SUCH COMPANIES?

— Obviously, they need to have a first-class — by international standards — technical team and ambitious founders who are results-motivated and able to focus the company's efforts on solving the most important and lucrative tasks. Success won't be possible otherwise. On the other hand, success isn't guaranteed even if all these elements are present. One also needs some luck with risky venture capital investments.

### THERE IS SOME BIAS RELATED TO GOVERNMENT FUNDING. ALLEGEDLY, INVESTMENTS FROM FUNDS WITH GOVERNMENT'S PARTICIPATION CAN LIMIT THE COMPANY'S ACCESS TO FOREIGN MARKETS. THE DEAL WITH HUAWEI AND SIMILAR DEALS — ARE THEY PROVING QUITE THE OPPOSITE?

— We do not believe that government funding of Russian technology companies considerably affects their chances of operating abroad. And, what's more important for us, it doesn't affect the chances of selling assets to foreign buyers. There are, of course, potential partners who wouldn't want to work with such companies. But they probably wouldn't want to work with any Russian company, regardless of its list of investors. Does it mean that one shouldn't consider Russian jurisdiction when establishing a company? We don't think so, because our own deals and the deals of other funds involving RVC capital as well as the projects of other companies in our fund clearly show that a good product or technology will always find its buyer.

### WHAT OTHER INTERESTING COMPANIES DO YOU HAVE IN YOUR PORTFOLIO?

— The fund's portfolio includes four companies: Russia's largest supplier of automation solutions for catering companies, a developer of new video coding technology, a manufacturer of the world's most efficient passive devices for heat removal and cooling systems based on them, and a company producing separation systems for the gas industry. In line with the fund's strategy, we are planning to exit these companies and expecting that they will yield substantial profits for the fund's investors.

**49%**
RVC SHARE

**7**
PROJECT EXITS

**11**
PROJECTS RECEIVED INVESTMENT




# HOW IS THE MICROPROCESSOR MARKET CHANGING AND WHAT DOES THE RUSSIAN STARTUP SYNTACORE HAVE TO DO WITH IT

In November 2019, Terra VC Venture Capital Fund, which has been created with the support from RVC, announced the sale of its stake in Syntacore — a Russian developer of microprocessor cores. YADRO technology company bought 51% of the startup's shares. The sale resulted in three-digit profit for the fund. Alexander Redkin, CEO of Syntacore, explained how the RISC-V computing platform ecosystem will transform the world in the near future.

## WHAT DOES SYNTACORE DO?

The company specializes is semiconductor IP (Intellectual Property), and processor cores are our key products. The company sells rights to use its intellectual property, which it has developed independently. In simple terms, there is a certain code that Syntacore sells to the semiconductor manufacturers, which they then use in the production of microcircuits. In terms of volume: hundreds of thousands of microprocessors have been created with Syntacore's IP-cores. The company has customers in Europe, Asia and the United States.

## IS THIS A UNIQUE PROPOSITION OR ARE THERE MANY PLAYERS IN THIS MARKET?

It is not entirely unique: similar solutions are available. However, we are one of the leaders in the RISC-V ecosystem in terms of the scope of our product portfolio and its technical characteristics. Syntacore's key competitive advantage lies in our capacity to significantly optimize the architecture and microarchitecture of the processor for each task and each customer individually. The company has developed a technology, which adapts the properties of the processor so that it has differentiating characteristics.

The company is one of the founding members of the RISC-V Foundation — an open international consortium, which develops and promotes open microprocessor architecture. This is a unique ecosystem offering once-in-a-decade opportunities.

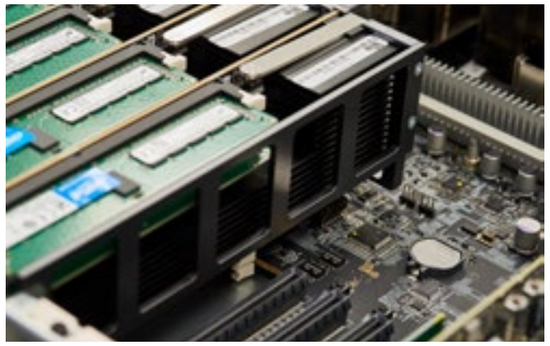
## NOW IT'S GETTING MORE INTERESTING, BUT IT IS STILL UNCLEAR WHAT RISC-VL IS.

Currently, there are two main established ecosystems of computing platforms: x86 (Intel and AMD) and ARM. Key players within these

**Artem Ikoyev**

Technology Director, YADRO

— It's been six months since the date of the deal, and in this short space of time we've already managed to integrate our product strategies in the first approximation. Together with our Syntacore partners, our joint long-term plans include the production of high-tech products with our own general-purpose as well as specialized processors, which would allow us to develop our semiconductor IP portfolio.

ecosystems have been around for such a long time that it is extremely difficult for a new company to enter the market. It's hard to imagine that a new producer of microprocessors based on these architectures would be able to compete with existing manufacturers. Nevertheless, the inconveniences and restrictions, which are associated with such monopoly, are becoming more and more evident.

On the other hand, RISC-V is a high-quality open standard for the architecture and command system of the processor. The standard is managed by the RISC-V Consortium (RISC-V Foundation), which is a non-profit organization that develops and promotes the technology in the industry. You could say that RISC-V is the first open alternative to the closed x86 and ARM ecosystems. For a number of reasons, a universal vendor-neutral ecosystem has grown around RISC-V. It is supported by many leading players and is rapidly expanding.

At the beginning of 2020, the consortium had more than 500 members from 33 countries. There is already a significant number of solutions based on RISC-V, despite the fact that the development cycles of semiconductor devices are quite long (over two years). Some of the existing solutions are based on our technologies. We are very proud that Russian companies — our clients — are among the pioneers of the ecosystem, which is still in the early stages of its development. The situation is ripe with unique opportunities for all, including local companies.

### WHAT IS THE CURRENT SITUATION IN THE MARKET FOR MICROPROCESSORS?

The semiconductor industry is currently at a turning point. Moore's law no longer applies, at least in terms  of economics: it's now impossible to cut



## RISC-V-based technologies are catching on very quickly, and the markets for microprocessors are changing.

the cost of microcircuits with a decrease in design specifications, processors do not become twice as productive every few years. At the same time, applications are quickly becoming increasingly complex, which is mostly due to artificial intelligence and high-speed wireless communication technologies.

As a result, there is a demand for specific solutions, such as processors that can efficiently perform highly specialized calculations. Since its inception, the RISC-V architecture has been designed with such specialization in mind (a team of researchers from the University of California, Berkeley started working on the specification in 2010). The RISC-V ecosystem is, in fact, an ideal environment to search for and to promote such solutions.

### ARE YOU SAYING THAT RISC-V IS THE ANSWER TO MONOPOLY?

Yes, and it's also a reaction to the technological challenges of our times. RISC-V-based technologies are catching on very quickly, and the markets for microprocessors are changing.

It's interesting that many countries are recognizing and reacting to this extraordinary opportunity. Thus, in August 2019, the RISC-V architecture was selected for the implementation of the European Processor Initiative. One of its goals is to create microprocessors and accelerators to build a European exascale supercomputer, a new generation of autonomous transport systems, and a line of processors for cloud data centers with fundamentally improved characteristics. The Israel Innovation Authority is using RISC-V to create a GenPro platform; whereas China launched a government subsidy program for RISC-V-based solutions and created three major industry organizations that include more than 300 companies.

RISC-V can potentially open up other markets, which are currently protected by patents for processor command systems. These markets include data centers, personal computers and mobile. RISC-V-based solutions have the capacity to outperform x86 and ARM in terms of computational speed and

RISC-V can potentially open up other markets, which are currently protected by patents for processor command systems. These markets include data centers, personal computers and mobile.

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**THE TERMS OF THE DEAL ARE NOT TO BE DISCLOSED. HOWEVER, IN THE HISTORY OF THE GLOBAL MARKET, SIMILAR COMPANIES FROM THE RISC-V ECOSYSTEM HAVE BEEN SUCCESSFUL IN SECURING INVESTMENTS OF TENS (OR HUNDREDS, WHEN ESTIMATED) OF MILLIONS OF DOLLARS. THESE INCLUDE, FOR EXAMPLE, SIFIVE (TOTAL INVESTMENT $129 MILLION) OR ESPERANTO TECHNOLOGIES ($58 MILLION).**

energy efficiency. Even now, in the initial stages of development, products based on RISC-V are in demand for the Internet of things and embedded systems. Thanks to this new ecosystem, producers are now able to quickly enter the markets, which might have been inaccessible to them before, and become leading players.

## SO WE CAN EXPECT WINDOWS FOR RISC-V?

It's unlikely in the short term. Although Microsoft has recently become quite dynamic and full of surprises, so I wouldn't rule that out.



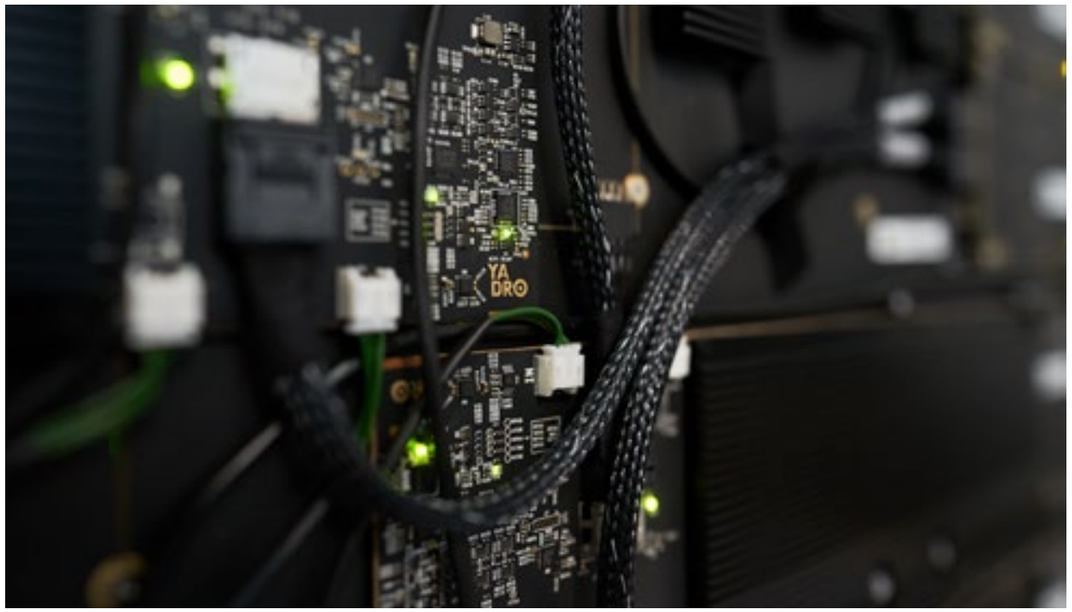
## LET'S GO BACK TO THE DEALS.

Terra VC fund was one of the early investors in Syntacore. We used these investments to develop our technologies and new products, while also gaining invaluable experience from working with the fund's team of specialists. Terra VC exited Syntacore in November 2019 during a deal with YADRO.

With our new shareholders, Syntacore is planning to expand in a number of key areas. First, we have to establish physical presence in the major markets — Asia, Europe, and the United States — by opening offices there. We'll announce that in the next few months. Second, we will be expanding the product line. Syntacore mostly produces general-purpose processors, but it's much more interesting to make specialized ones — this IP is currently in development.

### Moore's Law

In 1965, Gordon Moore, the founder of Intel, noticed that the amount of transistors per square inch of integrated circuits is doubling every two years. This lead him to conclude that computational power of CPUs (Central Processing Units) will increase exponentially, while their cost will drop every two years.




Terra VC fund was born in 2019 and reached $40 million by pooling together two venture funds (Phystech Ventures and North Energy Ventures). Out of 24 investors in the new fund, 17 have previously worked with Phystech Ventures and North Energy Ventures. The investors of Terra VC include major banks, corporations, RVC, proprietors of oilfield services companies, and international technology entrepreneurs. The fund's portfolio boasts a number of Russian technology companies, which operate in the Middle East, Southeast Asia and North America.

# RVC'S INVESTMENT ACTIVITY IN 2019

RVC is the only fund of funds in Russia. We do not invest directly in companies. Instead, we create new venture funds in collaboration with professional investors and managers. These funds are created by RVC in partnership with private, institutional and foreign investors, as well as large corporations. The funds, in turn, invest in technology companies. This is one of the main areas of RVC's work, the results of which we summarize and report annually.

**4**

**NEW RVC-BACKED**
funds announced in 2019

**15,6**

**RUB BN**
cumulative amount of new funds

**NEW INDUSTRY VENTURES**
in partnership with Gazprom Neft and co-investors

**A FUND FOR SUPPORTING PROJECTS IN THE PHARMACEUTICAL AND MEDICAL INDUSTRIES**
created in partnership with the Ministry of Industry and Trade of the Russian Federation

**A FUND FOR SUPPORTING PROMISING EDUCATIONAL TECHNOLOGIES**
in partnership with the Ministry of Economic Development of the Russian Federation

**TERRA VC FUND**
for investments in energy, smart networks, industrial Internet of Things, robotics, artificial intelligence, and machine learning



RVC has 29 funds in its portfolio. In 2019, their cumulative volume grew by 32% and reached 64.4 billion rubles

**37,3 RUB BN**
RVC share in funds

**27**

**INVESTMENTS APPROVED**
by RVC funds in portfolio companies in 2019

**1,9**

**RUB BN**
in investments in portfolio companies approved in 2019

**167**

**PORTFOLIO COMPANIES**
in RVC funds as of the end of 2019

**325 investments** approved for portfolio companies of RVC-backed funds

**28,9 RUB BN** the cumulative amount of approved investments in portfolio companies

**43**

**EXITS**
from portfolio companies in 2019

**2,5**

**RUB BN**
cumulative exit volume, which is 35% more than in 2018

**117**

**EXITS FROM PORTFOLIO COMPANIES**
with a cumulative amount of 9.7 billion rubles have been made by RVC funds for the entire period of their operation, as of the end of 2019

Exits are the key performance indicator for venture funds. Having invested in a company, a fund exits after some time (usually 7-10 years) by selling its share in the company's capital. The exit is considered successful, if the fund makes a profit from the sale of its share. For RVC, which is a fund of funds, the main result is the closing of the fund. In 2019, Maxwell Biotech — the first fund from RVC's "historical" portfolio — closed with a positive financial result. Maxwell Biotech was created in 2008, and since then it has invested in nine medical projects and become Russia's first venture capital fund focused on innovations in biomedicine.

**12,9%** average return (Gross IRR) of all RVC funds' exits in 2019

The cumulative financial result of RVC's exits has been positive for the fifth consecutive year.

# RVC-BACKED FUNDS

### SUBSIDIARY FUNDS

| FUND NAME | FUND AMOUNT AS OF THE END OF 2019, RUB MLN |
|---|---|
| RVC Biofund | 1 500,000 |
| RVC Seed Fund | 1 982,000 |
| RVC InfraFund | 2 600,000 |
| Civil Technologies MIC | 500,000 |

### CLOSED-END VENTURE FUNDS (CE VF)

| | |
|---|---|
| Bioprocess Capital Ventures CE VF | 3 000,000 |
| VTB — Portfolio Investments CE VF | 3 061,000 |
| Leader-Innovations CE VF | 1 380,406 |
| S-Group Ventures CE VF | 1 160,645 |

### MICROFUNDS

| | |
|---|---|
| Softline Seed Fund IPA | 136,000 |
| High-Tech Seed Fund IPA | 133,600 |
| ACP Seed Fund IPA | 33,400 |
| Venture Fund Accelerator IPA | 133,400 |
| Life Sciences Seed Fund IPA | 133,600 |
| Tomsk State University Seed Fund IPA | 33,400 |

### IPA FUNDS (SECTOR-SPECIFIC FUNDS AND RBF VENTURES)

| FUND NAME | FUND AMOUNT AS OF THE END OF 2019, RUB MLN |
|---|---|
| RBV Capital | 2 070,700 |
| Da Vinci Pre-IPO Fund | 4 272,914 |
| Da Vinci Pre-IPO Tech Fund | 6 000,000 |
| Terra VC | 2 550,55 |
| RBF Ventures (Russian-Belarusian Venture Investment Fund | 1 400,000 |
| Skolkovo Venture Fund — IT I | 2 303,030 |
| Skolkovo Venture Fund — Agrotechnological I | 250,000 |
| Skolkovo Venture Fund — Industrial I | 2 424,242 |
| Far East Fund for the Development and Implementation of High Technologies | 4 900,500 |
| National Technology Initiative Venture Fund | 1 870,000 |
| New Industry IPA | 4 040,404 |
| Pharmmed Innovations IPA | 4 568,528 |
| Venture Fund to support promising educational technologies in the digital economy IPA | 7 002,020 |

### FUNDS IN FOREIGN JURISDICTIONS

| | |
|---|---|
| Russian Venture Capital I LP | 2 779,633 |
| RVC IVFRT LP | 1 454,853 |



All around the world, venture capital investments are associated with high risks — even the most experienced investors sometimes invest in projects that won't "take off". Hence, the success of portfolio companies is crucial for venture funds. We continue to follow the delevopment of projects, which have received investments from RVC-backed funds, and we regularly share news about their progress.

**167**

**THE NUMBER OF PORTFOLIO COMPANIES**
of 29 RVC-backed funds as of the end of 2019. These include projects in IT, telecommunications, medicine and healthcare, energy and other industries

**79**

**RUB BN**
revenue of portfolio companies in 2019

**96,6**

**USD MLN**
export revenue of portfolio companies

Top markets with high demand for the products of RVC's portfolio companies

Japan USA South Korea China UK

In 2019, top positions in terms of the volume of exports were attained by the following RVC's portfolio companies: Perm Chemical Company (fine and specialized chemical products), RMT (technologies for the production of thermoelectric materials), Pogarskaya Potato Plant (potato flakes producer), National BioService (research biobank), and Cinemood (portable projectors producer). Moreover, a number of companies including liko, iVideon, GFS, Visitech, ExoAtlet and others are successfully selling their products and services on global markets.

**946**

**RESULTS OF INTELLECTUAL ACTIVITY ACHIEVED BY COMPANIES AS OF THE END OF 2019**

**8673**

**PEOPLE EMPLOYED BY COMPANIES**

**3,8**

**RUB BN — THE AMOUNT OF TAXES PAID BY PORTFOLIO COMPANIES IN 2019**




In the last decade, gadgets and services, which previously could only be found in science fiction books and films, have become a staple of our daily lives. The National Technology Initiative estimates that in the next 10-15 years we will encounter greater changes, and the emergence of new technologies will create new markets. Therefore, the concept of NTI markets has been developed, and it includes markets, which are expected to emerge in the foreseeable future. One of these is the Energynet distributed energy market. Here, we're looking into two key questions: why the energy industry requires transformation and whether Russian companies will be able to take up leading positions in this new market.

## NEW ENERGY ARCHITECTURE

The NTI isn't inventing new markets just for the sake of a beautiful concept. Instead, it responds to global trends, consumer demand and business initiatives. Evidently, the energy industry is facing a crisis. Centralized infrastructure is outdated, and energy costs too much for consumers. Traditional energy sources are exhausted, and, furthermore, they are considered to be major offenders in terms of greenhouse gas emissions. Thus, new technologies and business practices are needed globally.

## HOW ENERGYNET IS REMOVING BARRIERS

Market development efforts are based on the Energynet roadmap. The roadmap is an action plan for the development of technologies, products and services that will help Russian companies compete in the new market. a further regulatory roadmap aims to remove barriers and simplify relevant legislation. These roadmaps have been developed by the Energynet working group, which is now also leading their implementation. The working group consists of representatives of government departments, the science community and large businesses, including companies such as T-System, Smart Electric Grids, Rosatom, Rosseti, RusHydro and others.

In 2019, six comprehensive pilot projects were launched as part of the Energynet market development. Each project aims to solve a specific problem in energy supply by testing complex solutions that include technological, operational, economic, organizational and regulatory elements. Each project is also linked to a particular location, because, for example, it makes sense to deal with the problem of energy availability in an isolated area, which is actually experiencing such problem. This approach allows to evaluate results and implement technological solutions with greater speed and efficiency.

## Why does Russia need new energy explains Dmitry Kholkin, Head of the Energynet Legislative Working Group

It's vital that Russia doesn't just follow trends in the energy sector, but stays ahead of them, and there are two main reasons for that. First, the decarbonisation policy is related to climate change, and Russia joined the Paris Agreement on climate in 2019. The drive for decarbonization is likely to continue, and our country will need to do a certain amount of work to remain compliant with international agreements, as it normally does. Furthermore, products with a hefty carbon footprint will be subject to carbon tax on import into Europe. So, for example, if steel isn't produced using a clean source of energy, then it automatically becomes more expensive in export markets, and its Russian manufacturer becomes less competitive.

The second reason relates to the peculiarities of our energy sector — Russia is a country with a large territory, long distances and low consumption density, so maintaining a centralized energy supply is expensive in these conditions. The fact that we have access to cheap fuel resources doesn't mean that the electricity is cheap for its end users. It is expensive, because most of the cost covers the maintenance of a large infrastructure and various types of reserves.

Thus, we assume that switching to new energy, which will be distributed and decentralized, together with the traditional approach, will eventually allow us to use the existing energy capacity more efficiently and cut the investments needed for the construction of centralized infrastructure. This will restrain price growth. Moreover, we know that without the development of new energy in Russia, we won't be able to create high-tech export products for global markets.

Demand Management is the first pilot project within Energynet market. Using it as an example, we will explain how the projects work, what barriers have to be removed for their implementation and how this creates real change in the market.

Users can earn money by limiting their consumption during certain hours. This practice is wide-spread in Europe, while in the US it accounts for approximately 10% of total power consumption. Expensive generation is used during peak hours, which mostly happen in the mornings and evenings. Thus, it is much more economical to reduce consumption during these hours. The use of electricity demand management technologies in Russia can help save up to 105 billion rubles per annum and limit tariff growth. However, it hasn't been possible to implement this model yet. The price-dependent consumption reduction (PDCR) mechanism for the wholesale market was launched in 2017, but its effect was weak due to a small number of participants, which only included large consumers.

The Energynet working group set out to remove this barrier by using demand management aggregators to bring together a large number of retail consumers, thus transforming them into fully-fledged market participants. In 2018, the working group developed and presented its concept outlining the operational specifics of demand management aggregators in the retail market for electricity. The concept was the first product of the Energynet roadmap. Having been approved by the working group, the document was then forwarded to the Ministry of Energy. It was assumed at the time that the concept would establish the foundation for a regulatory framework required for the development of demand management mechanisms in the retail market for electricity. The working group suggested that the role of demand management aggregators, which could be taken up by independent companies or electricity suppliers, should be set out in the legislation. Thus, the document described the following arrangement: the market operator asks the aggregator to reduce consumption among a particular user group, for which the aggregator receives payment proportionate to the cumulative economic effect. The users, in turn, are remunerated by the aggregator for reducing the volume of their consumption.

On 20th March 2019, the government approved a resolution to ratify the rules for the new demand management mechanism aided by demand management aggregators. The timeframe for the pilot implementation of the mechanism has been set for 2019-2020. It has also been decided that those users that can cut their consumption without jeopardizing their performance, such as production sites and commercial properties, will become pilot consumers. For example, ventilation systems and air conditioners in shopping malls, business centers,

### Pilot projects implemented in the Energynet market

Active energy structures (complexes)

▽

Demand management aggregators

▽

Energy supply in isolated and remote territories

▽

The implementation of energy storage systems

▽

Smart grids

▽

User energy services

## How has the pilot project transformed the market explains Dmitry Kholkin, Head of the Energynet Legislative Working Group

Due to the implementation of the pilot project in demand management, tens of companies acting as demand management aggregators entered this new market. When selecting their business models, they are considering the fact that the volume of this market may amount to 30-50 billion rubles in the medium term. However, to ensure success in this new and highly competitive market, these companies will have to make active use of new technologies including digital transaction platforms, modern measurement systems, solutions based on big data, artificial intelligence, the Internet of things and wireless communication systems. To that effect, the Energynet group of companies is preparing technology proposals for aggregators and conducting pilot testing.

## It is expected that retail consumers providing demand management services will be able to cut their electricity costs by 20%.

The Energynet roadmap has a number of goals. For example, the annual revenue of Russian companies working in smart energy sectors of the global market (with BRICS and developing countries being a priority) has to grow to $40 billion by 2035. In the key segments, their share should be 3–12%. According to the working group's projection, the Energynet market in BRICS and developing countries could grow to $746 billion by 2035. One of the goals of NTI is to ensure that Russian companies can enter this market with competitive products and services and win a considerable market share.

warehouses, container terminals, sorting centers, and ice palaces can be turned off at times, in which their use is non-essential.

The pilot project started in June 2019. The system operator of the Unified Energy System was responsible for selecting companies that would assume the roles of demand management aggregators. By the beginning of 2020, it had conducted three rounds of selections. In the third quarter of 2019, 20 aggregators provided price-dependent consumption services, and in the fourth quarter — 19 aggregators. For the first quarter of 2020, the operator has selected 47 companies.

### WHAT'S NEXT?

Continuous efforts are required to build a new system of smart energy in Russia. These include launching comprehensive pilot projects, adapting regulations, and supporting companies that offer technological solutions for the Energynet market. Energynet became the first officially approved long-term program for the development of technologies, standards and communities, which are essential for building new technological structures in the electric power supply industry. Hence, the experience of the working group is important for the creation and development of other strategic initiatives in the industry.

It must be noted that the market roadmap is based on the "Internet of Energy" concept — an innovative approach to creating ecosystems connecting energy producers and consumers, so that they are then able to exchange energy. In 2019, the Internet of Distributed Energy Architecture (IDEA) was developed, which marked an important milestone for the roadmap. This development gained interest among both Russian and global experts. Two preliminary national standards have been drafted on the basis of IDEA. Therefore, complex technical solutions of the Energynet companies will now be supported by a common system of specifications, architectural solutions, and interaction protocols.

According to the experts of the working group, Energynet solutions can be assigned to three major market segments:

### RELIABLE AND FLEXIBLE DISTRIBUTION NETWORKS

**A set of solutions ensuring efficient and reliable operation of the distribution network, which is open and adaptable to new sites and market participants.**

### SMART DISTRIBUTED ENERGY

**The integration of distributed generation, storage, and micro-grids into the energy system, and the creation of virtual electric power stations to combat the problems of network overload.**

### CONSUMER SERVICES

**New types of energy services that will replace traditional energy market entities with network software applications for end consumers.**

The new architecture is decentralized, flexible, more advanced in terms of implementing new business models, and more user-friendly for end consumers. The Internet of Energy will make energy cheaper, more accessible, and more reliable. Moreover, it will also drive the development of the Internet of things, other utility infrastructures, and smart cities.

# NTI IN 2019: MARKETS AND ROADMAPS

The National Technology Initiative is a long-term program aimed at creating new global markets, which will emerge in the next 10-15 years, and achieving Russia's technological leadership by 2035. Global leadership refers to the success of Russian companies at the international level. Today, the NTI unites thousands of people including technology entrepreneurs, scientists, inventors, representatives of development institutions, government agencies, as well as expert and professional communities. Schoolchildren and university students, who will be shaping the development of new markets in the future, are also included in the NTI ecosystem via a number of educational initiatives. RVC has played a key role in the implementation of the NTI since 2015, and it has been functioning as its Project Office since 2016. This means that RVC is providing project management, organizational, technical, expert and analytical support, as well as informational and financial assistance for the development and implementation of roadmaps and NTI projects.

## WHAT ARE THESE MARKETS?

Eight markets and cross-market areas have been selected for NTI in line with the following criteria:

1. THE MARKET WILL ACHIEVE GLOBAL SIGNIFICANCE AND VISIBILITY, EXCEEDING 100 BILLION DOLLARS IN CAPITALIZATION BY 2035.
2. THERE IS NO MARKET AT THE MOMENT, OR THE MARKET LACKS ESTABLISHED TECHNOLOGICAL STANDARDS.
3. THE MARKET IS FOCUSED, FIRST AND FOREMOST, ON THE NEEDS OF PEOPLE AS END USERS (B2C TAKING PRIORITY OVER B2B).
4. THE MARKET IS A NETWORK, IN WHICH INTERMEDIARIES ARE REPLACED BY MANAGEMENT SOFTWARE.
5. THE MARKET IS VITAL FOR RUSSIA IN TERMS OF PROVIDING FOR BASIC NEEDS AND SECURITY.
6. THERE ARE CONDITIONS IN RUSSIA THAT ALLOW COMPANIES TO DEVELOP COMPETITIVE ADVANTAGES AND GAIN CONSIDERABLE MARKET SHARE.
7. THERE ARE TECHNOLOGY ENTREPRENEURS IN RUSSIA WITH AMBITIONS OF CREATING LEADING COMPANIES IN A NEW HIGH-TECH MARKET.

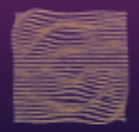
The experience of various countries, including Russia, shows that administrative barriers often impede technological development. The NTI set out to develop legislative roadmaps that will allow to enhance legislation and eliminate these barriers. Such roadmaps for seven market areas have already been developed and approved by the government, and working groups started to implement them. In 2018-2020, working groups submitted 60 bills and draft regulations designed to weaken business barriers, 40 of which have been approved. In 2019, 33 such regulations were passed.

**AUTONET**

Telematic transport systems, intelligent urban mobility, transport and logistics services

**AERONET**

Remote sensing and monitoring of the Earth's surface for agricultural purposes, goods and cargo transportation, emergency search-and-rescue operations

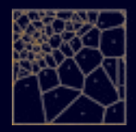


**MARINET**

Digital navigation and telecommunications, innovative shipbuilding, and ocean resource development

**NEURONET**

Neuro-assistants, neuroeducation, neural medical equipment and pharmaceuticals, neuro-entertainment

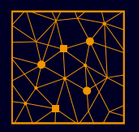


**HEALTHNET**

Preventive medicine, clinical genetics, IT in medicine, healthy longevity, and biomedicine

**ENERGYNET**

Distribution grids, smart distributed energy, personal power generation and services



**TECHNET**

Digital design and modeling, new materials, additive technologies, robotics, big data, and the industrial Internet of Things

**THE KRUZHOK MOVEMENT**

Nurturing the next generation of entrepreneurs, engineers, scientists and managers in Russia by getting the core of this generation engaged in technological clubs

## STANDARDIZATION

Standardization is another area of RVC's work. In 2019, we initiated the creation of the "Artificial Intelligence" Technical Committee 164. In December 2019, the first two national standards in this area were approved: GOST R 58776-2019 "Mechanisms for monitoring behavior and anticipating people's intentions. Terms and definitions". and GOST R 58777-2019 "Air transport. Airports. Technical means of inspection. Methodology for determining indicators of quality recognition of illegal items from shadow X-ray images". And thanks to the efforts of the RVC-based "Cyber-physical systems" Technical Committee 194, the first national standard for the Internet of Things — the IoT Protocol NB-Fi developed in Russia — was approved. International experts supported another option presented as a standard for the Internet of Things — as a fully-fledged protocol of the LoRaWAN family. Moreover, TC 194 has shown impressive growth, reaching 100 participating organizations by the end of 2019.

# NTI PROJECTS

## WHO SELECTS NTI PROJECTS AND HOW THE PROCESS OF GRANTING SUPPORT HAS BEEN SIMPLIFIED



The National Technology Initiative (NTI) introduced business support measures in 2016, but they were not made immediately accessible or easy to navigate. To enable companies to access all support measures in one place and submit applications in just a few clicks, the RVC Digital Platform was launched in May 2019. It's designed to work as a one-stop-shop. By the end of the year, 1,144 companies have registered on the platform and 551 companies submitted their applications to the NTI. We explain how the selection process works and what you can do to receive support.

The Digital RVC platform lists key NTI support measures. There are four of them: NTI Infrastructure, NTI Technological Breakthrough, NTI Spin-off and NTI Export. These measures include various types of support: from funding provided by the NTI Project Support Fund, which has been created by RVC, to help with finding customers. It is easy to apply: you have to register on the platform, log in to your account, choose a relevant support program and fill out a form.

"We receive applications and send them to RVC for express assessment, which doesn't take longer than three days. Our experts carry out basic scoring, evaluating each project across 10 parameters, before sending the results back to the applicant. If the applicant disagrees with the assessment, he or she has three more days to provide feedback and additional information — in this case, the application is re-assessed by the experts. Previously, we didn't have regulated deadlines for evaluating applications. Now, after we've introduced programs and express assessment, it takes no more than ten days from the moment of submitting the application to receiving the final assessment from RVC", — says Ilya Kurmyshev, Director for Businesses Growth Support, NTI Office. It is already at this stage, that the applicant can receive advice on the project's positioning in terms of which NTI market it would be most suitable for.

### 10 parameters for express assessment of projects:

**1.** **Technology.** The degree of innovation; how easy is it to use, copy and promote the technology

**2.** **Uniqueness.** Are there similar solutions available on the local and global markets

**3.** **Technology maturity.** Evaluated on the technology maturity cycle (Gartner Hype Cycle)

**4.** **Technological readiness .** Defining the TRL and MRL of the project

**5.** **The team's experience.** Successful technology startups created by project initiators

**6.** **Applicant (company).** Is it able to co-finance at least 50% of the project's cost

**7.** **Target market.** Its volume, competitiveness and growth rates

**8.** **Investment potential.** Estimated revenue and capital intensity of the project

**9.** **Benefit for NTI.** What systemic benefit will the project provide for the initiative

**10.** **Social impact.** Project-related social risks and opportunities

If express assessment is successful, the project receives RVC approval and continues to the second stage. It consists of a preliminary technical assessment by the NTI Profile Working Group, which — in case of a positive result — is followed by a further evaluation by the Project Committee, which includes representatives of the NTI, RVC and other development institutions, and holds weekly meetings. The applicant presents the project, describing in detail his or her ideas, plans, deadlines; explaining how the project will fit into the NTI ecosystem, and why a particular support measure has been chosen. The Project Committee, having already reviewed the details and the Project Office's assessment, can then reject the project, recommend revisions, or decide that the project is suitable for development and selection, and then — for consideration by the NTI Expert Council and the Interagency Working Group (IWG).

The IWG is the highest decision-making body within NTI, and it determines which projects receive support. Before making final decisions, members of the IWG scrutinize the projects that have passed all the previous stages and study the recommendations of RVC, the Project Committee, the Expert Council, and the working group, which specializes in the project's target market.

### What support programs are available via Digital RVC and how to choose the right one?

## NTI INFRASTRUCTURE

| FOR WHOM? | FOR WHAT? | HOW MUCH? |
|---|---|---|
| Large high-tech companies with no experience in creating global businesses / Technology startups, research institutes and reputable teams with a strong set of competencies | Infrastructure projects helping the development of companies, which are targeting global markets. These could include, for example, test sites, centers for research, engineering and certification, or business accelerators for NTI end-to-end technologies | Up to **495 million rubles** in contribution to the company's authorized capital / of which **155 million rubles** can be potentially provided in the form of a grant |

## NTI TECHNOLOGICAL BREAKTHROUGH

| FOR WHOM? | FOR WHAT? | HOW MUCH? |
|---|---|---|
| Medium-sized high-tech companies with experience in global markets / Technology startups, research institutes and reputable teams with a strong set of competencies | The creation of working prototypes of breakthrough innovative products with unique characteristics, which surpass similar products available on the global markets | Up to **100 million rubles** in contribution to the company's authorized capital / up to **200 million rubles** in grants — these can be combined to the maximum total amount of **300 million rubles** |

## NTI SPIN-OFF

| FOR WHOM? | FOR WHAT? | HOW MUCH? |
|---|---|---|
| Large high-tech companies with no experience in creating global businesses / Large high-tech companies with experience in creating global businesses | New launches, which are based on technological developments | Up to **300 million rubles** in contribution to the company's authorized capital |

## NTI EXPORT

| FOR WHOM? | FOR WHAT? | HOW MUCH? |
|---|---|---|
| Large high-tech companies with no experience in creating global businesses / Medium-sized high-tech companies with experience in international markets | Final stages of development and launch of technological products onto the global markets (technological readiness level TRL 6+) | Up to **200 million rubles** in contribution to the company's authorized capital / up to **100 million rubles** in grants — these can be combined to the maximum total amount of **300 million rubles** |



According to Natalia Erdem, Director of Project Management, NTI Office, the company's ability to carry out its plans is evaluated at all stages: "First and foremost, we are evaluating the company's relevant experience with regards to the idea that it came up with. If a group of scientists is confident that they will be able to launch their product onto international markets and gain 25% share, then our first question would be: "Who in your team has experience in launching products onto global markets?". If there are no such people, then we assume that the team's goal isn't achievable. And often in such cases, the Project Committee makes recommendations, such as bringing in marketing specialists to join the team or attracting a technology partner with relevant experience in launching products onto the market".

A distinctive feature of NTI support measures is that many projects do not reach the selection stage, because they are able to get what they want earlier, says Natalia. The applicants and their projects are immediately immersed in the NTI ecosystem, because they start communicating with members of the working group specializing in their target market, and often find partners or customers among them.

Each working group includes companies that are market leaders, representatives of relevant government departments and experts. At this stage, applicants start implementing their ideas in collaboration with other market players.

Those applicants, who have reached the selection stage and gained IWG's approval, will continue onto the fourth stage, which is the most interesting and entails the implementation of their project in line with the previously drawn up plans. Each NTI project teams is assigned two personal managers — a Project Manager and a Finance Manager.

"The teams and their managers keep in touch on a daily basis. Teams often write and call their managers, asking for advice or sharing new information. Communication never stops and includes meetings, calls, and consultations. The teams may have all sorts of questions and requests, and we're always there to help them by providing our own expertise or introducing them to potential investors, experts, representatives of relevant government departments", — says Natalia. Managers help to keep projects on track, meet KPIs and, most importantly, to wisely spend the funding received as part of the NTI support measures. Each project team has to submit two monthly reports: on the work done and on their expenses.

There are two kinds of KPIs: intermediate and final. At the approval stage, NTI project teams commit to carry out their plans by a certain deadline (in three years, normally). a project is considered to have been completed when funding from the NTI fund is drawn out, and all KPIs are achieved. Then, of course, the project continues to live on independently — having "grown up" and become part of the ecosystem, it no longer needs financial support from the NTI. However, the Project Office continues to follow the performance of the applicant's company as part of post-monitoring and assists in maintaining the results obtained during project implementation stages.

### Most popular support measures in 2019

**NTI TECHNOLOGICAL BREAKTHROUGH**

**351**
applications

**NTI EXPORT**

**138**
applications

**NTI SPIN-OFF**

**31**
applications

**NTI INFRASTRUCTURE**

**26**
applications

# NTI PROJECT SUPPORT IN 2019

Throughout the year, RVC has been working on improving its interactions with NTI market roadmaps' working groups for searching, initial structuring and prompt assessment of NTI project requests. To that effect, we have developed key critical requirements for project goals and KPIs, as well as a number of requirements for results and justification approaches, selection and administration of support measures.

## FUNNEL OF NTI PROJECTS IN 2016–2019

**1977**
IDEAS AT THE START

**390**
PROJECTS PASSED THE NTI WORKING GROUPS ASSESSMENT STAGE

**232**
PROJECTS PASSED THE PROJECT COMMITTEE ASSESSMENT STAGE

**157**
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## NTI REGIONAL STANDARD

In 2019, RVC actively promoted the implementation of the "NTI Regional Standard" in the regions of the Russian Federation, which is a set of guidelines for regional authorities, fast-growing technology companies and leading universities that want to participate in NTI. As part of this effort, RVC is actively working with regional partners to develop NTI projects. In 2019, targeted work was organized to involve regional projects, particularly, in those parts where the NTI Roadmaps were approved. For these purposes on-site consultation sessions were put in place.

This work format involves a trip to the region by a team of RVC representatives to give presentations about support programs, provide consultations for project teams and preliminary project reviews. In 2019, consultation sessions were held in Novosibirsk, Tomsk, Perm, Saint-Petersburg, Chelyabinsk, Rostov, Yakutsk and Krasnoyarsk. As a result, over 100 project applications were proposed by regional companies to the NTI support programs, 25 of which were supported (received approval) by the Project Committee.



# TECHUP–2019

The TechUp national rating of fast-growing Russian technology companies — another support measure — has been compiled annually since 2012. It is aimed at identifying, monitoring and promoting promising technology companies with strong leadership potential in both Russian and global markets. The companies in the rating also get on the priority lists for government support and receive PR and GR assistance for the Russian market.

## TOP-5 LARGE COMPANIES

1. PROTEI LLC STC
2. VIC GROUP LLC
3. ICL GROUP JSC
4. STARLINE LLC SPA
5. ELECTRONIC COMPUTING INFORMATION SYSTEMS JSC SPC

## TOP-5 MEDIUM-SIZED COMPANIES

1. INFOTRANS JSC SPC
2. FORT-TELECOM LLC
3. INFOWATCH
4. T8 LLC
5. ITT JSC

## TOP-5 SMALL COMPANIES

1. PROMOBOT LLC
2. DSS LAB
3. EIDOS-MEDICINE LLC
4. PROFOTECH JSC
5. RUBIUS GROUP LLC

In 2019, the total revenue of companies in the TechUp national rating amounted to 220 billion rubles. IT companies demonstrated dynamic growth, as did the companies in industrial equipment and engineering — they made up 29% and 23% of the total number of companies in the rating, respectively. More than 40% of TechUp-2019 companies came from the regions of Russia — with Kazan, Tomsk, Novosibirsk, Perm and Kaluga emerging as major regional innovation centers.

**55%**
**OF COMPANIES IN THE RATING ARE**
small and medium-sized

**17%**
**AVERAGE SPEND**
on innovation as a percentage of revenue

**76%**
**OF COMPANIES IN THE RATING ARE EXPORTING**
products and/or services




In 2018, Russian developer and entrepreneur Stanislav Ashmanov set out to launch SOVA — an Open Source platform for creating chatbots and voice assistants. a year later his project got a green light from The Project Support Fund of The National Technology Initiative (NTI). The Fund will award Stanislav more than 300 million rubles to develop the platform. Read more to find out how SOVA will work and why it is crucial to make technologies accessible.

Stanislav created his first virtual assistant at the age of 12 and taught it to solve simple maths problems. Interest in science and technology runs in the family: Stanislav's grandfather worked in linear programming (a field of mathematics), while his father became interested in speech technologies at the Computing Center of the Academy of Sciences in the 1980s and was the first in Russia to develop automatic spell checking. As a child, Stanislav was interested in robots: he studied mechanics and programming, participated in student competitions and followed robotics contests held at the Lomonosov Moscow State University (MSU). Eventually, he became a student at the MSU's faculty of mechanics and mathematics.

In 2015, a year after his graduation, Stanislav founded "Ashmanov Neural Networks". "I've always been interested in the synergy between man and machine. In my final years at university I realized that I should start a project in artificial intelligence. After launching the company, we tested a number of robot-related projects. For example, in 2013, we were busy with the launch of the "Lexi" project and we were also developing a smart speaker with voice assistance. Eventually we started working with big data analytics: we received orders, created recommendation systems, built recognition algorithms for faces and car number plates, and so on", — Stanislav recalls. His clients included Mail.ru, NEC and other major companies. In 2017, Stanislav took over the management of his father's company "Nanosemantics". Although a business merger hadn't formally taken place, "Ashmanov Neural Networks" and "Nanosemantics" started working as a single entity.

### What is Open Source?

**Open Source software, as opposed to paid software, is accessible to all — in full or in part.**

Such software is distributed under an open license, thus, anyone can use it. GitHub is the largest archive of Open Source solutions in the world. Independent developers as well as large companies such as Facebook, Apple, Google and others upload their repositories (code archives) there. The IT community views Open Source as one of the key drivers of technological development in recent years.

The business kept growing. However, in 2018, Stanislav realized that he wanted to launch a non-profit project, which would benefit the IT community, and the idea of an Open Source platform was born. It would allow users to create a virtual text or voice assistant. "After researching the market, I realized that there were mostly open access kits for programmers, which could not be used by a non-professional. Whereas I believe that a teenager should be able to create a virtual assistant in half an hour", — says Stanislav.

Stanislav confirms that creating projects in speech technologies is not an easy task. The essential components of a voice assistant include speech recognition (the virtual assistant's "hearing") and speech synthesis (its "voice"). Before teaching a virtual assistant how to understand human speech and "talk", you need to amass data (a dataset) for training neural networks and to mark it up. Datasets with voice recordings are freely available in the public domain, however, they might be of poor quality or unsuitable for the developers' requirements. One would also need to pay to have large volumes of data marked up. While corporations and banks can afford to hire professional speakers to record high-quality datasets and then pay for marking them up, the start-ups and independent developers cannot.

**8 billion**

**voice assistants will be in use globally by 2023, according to the forecast by Juniper Research.**

This means that each active user will have two to three virtual assistants. At the same time, according to a study by CB Insights, the market for voice assistants grew to $49 billion in 2019. Corporations such as Apple, Google and Amazon are the main beneficiaries of this trend, as smaller companies and independent developers do not have enough resources to create comparable technologies.

He named his new project SOVA (Smart Open Virtual Assistant) and engaged part of his team in its implementation. However, both "Ashmanov Neural Networks" and "Nanosemantics" were still mainly engaged in commercial work. At this point Ashmanov started looking for funding. "I knew that the project would be worthwhile, if we were able to create a platform for users from around the world. Thus, besides Russian, we would have to work with other languages such as English, Chinese and Spanish. We worked on the budget and started looking for an investor. We considered a number of options — from crowdfunding platforms to venture funds. The funding eventually found us, and it happened quite quickly. It was sometime in 2018, when I was alone in the office late one night and heard a phone ringing in the commercial department. I picked it up and spoke to people from NTI and RVC — they were interested in SOVA. I knew about RVC, but didn't think that they would be interested in our project. They explained that in order to receive funding, a project must provide a platform solution, which would benefit the entire market. I replied that our product does just that," — remembers Stanislav.

Negotiations lasted for almost a year, during which the project had to be significantly re-worked. "We got rid of some parts of the project, and added others. For example, Dmitry Peskov [CEO of the "NTI Platform" NGO and a special representative of the President of the Russian Federation for digital and technological development] specified that the project must be implemented as a consortium — in other words, a team of developers should be contributing to our Open Source platform. So, for example, MIPT and FEFU joined our consortium —

**Projects supported by NTI in 2019:**

"CableWalker" drone-based electric grid maintenance system

▽

"Kursir" mobile complex for inspections of flight support radio equipment

▽

"Sputnix" scalable platform for low-orbit small spacecraft

▽

"AntionkoRAN-M" gene therapy antitumor pharmaceutical

▽

Digital technologies used in the production of high-temperature superconductors (implemented by "S-Innovations")

▽

ERA cargo drone

▽

Competitions in engineering and marine robotics

▽

Russia's first testing site for the certification of unmanned aircraft

Russian Unmanned aircraft system Traffic Management RUTM-1

▽

"A-Platform" distributed energy management

▽

SOVA open platform for virtual assistants

▽

Virry virtual reality for psychoprophylaxis

▽

"Russia is a country of seafarers of the XXI century" project

**Users will be able to create personal voice assistants and customize them by choosing a voice, character, sense of humor, and much more.**

**The launch of the SOVA Store — a marketplace for the community of developers — will be a logical next step. Users will be able to upload modules for creating and training virtual assistants onto the SOVA platform, so that other developers can use them.**

they now share audio recordings of their lectures with us. Functioning as a consortium gives more weight to the non-profit idea behind the project" — he says. In August 2019, the project received final approval from the Interagency Working Group (IWG), which is responsible for the implementation of the NTI. The NTI Project Support Fund, which has been created by RVC, decided to invest more than 300 million rubles in SOVA. "When we learned that our project was approved by the Fund, and that we will be receiving investments, we immediately started looking for new staff. At that point we realized that we had enough resources to launch the platform", — says Stanislav. "It's not just money to spend. We have KPIs, and the Fund makes sure that they are achieved. Like any investor, the Fund wants to ensure that we use the money effectively to attain results. Hence, we receive funding in parts".

At present, approximately 80 people are working on the development of SOVA platform — these include developers, data scientists, linguists, and other specialists. Stanislav highlights the fact that the project didn't start from scratch, as the team had access to all previous work-in-progress created by "Ashmanov Neural Networks" and "Nanosemantics", which implement projects for the largest companies in Russia and the CIS, as well as for government departments. The team started working on launching the company's products onto global markets. The first release is scheduled for August 2020: programmers from around the world will be able to download Open Source codes from GitHub. "Any programmer will be able to download everything that he or she needs. We will publish algorithms and data (high-quality marked-up voice recordings, texts, dictionaries, etc.), which can be used to train these algorithms. We will also provide development tools, so that users can add skills for chatbots or voice assistants", — explains Stanislav. Then these virtual assistants, whether text or voice, can be used in a number of ways — embedded in websites, mobile applications, or even in external devices (smart speakers, vehicles, etc.).

It's important to give developers the ability to create virtual assistants to suit their needs, says Stanislav: "For example, someone would want to develop a virtual assistant that will speak about birds. We cannot foresee this, but we can allow this user to upload a reference book about birds and train the algorithm to answer relevant questions". Developers without personal datasets will be able to choose a "voice" for their assistant: SOVA will provide high-quality datasets with pre-recorded voices of men, women, and even children. Programmers will also be able to use ready-made dictionaries and scripts, which will help train virtual assistants to engage in dialogue, for example, greeting users in response to their greeting, and so on.

The launch of the SOVA Store — a marketplace for the community of developers — will be a logical next step. Users will be able to upload modules for creating and training virtual assistants onto the SOVA platform, so that other developers can use them (some modules will be free, some would need to be purchased). In essence, modules allow to expand the capabilities of virtual assistants created on the platform. Stanislav is certain that a complex SOVA ecosystem will gradually emerge, and the platform will grow thanks to its users. Initially, only programmers will be able to use the platform. However, developers are working to ensure that people without special training will also be able to access SOVA in the future: there will be no need to dig deep into the code to make amendments, as all functions will be accessible via a simple and intuitive interface. "We envision, that the majority of our users will be independent developers and small businesses. We are already working with large companies: our current customers include corporations, Telecom operators, and ministries. We will continue working with them, whereas the SOVA platform will meet the needs of those companies and individuals who cannot afford to pay for the development of expensive software", — Stanislav explains.

The team is also working on creating its own SOVA voice assistant and the accompanying hardware, but its key goal is to launch the platform. Stanislav is certain that the market for virtual assistants will be transformed in the future, and they will become more and more customized. Users will be able to create personal voice assistants and customize them by choosing a voice, character, sense of humor, and much more. Mass distribution is another trend: people around the world are getting accustomed to using their voices to communicate with their devices, and soon vending and washing machines with built-in voice assistants will become commonplace. On balance, Stanislav believes that virtual assistants will no longer be perceived as robots, and that's the most important trend. "I think that people need voice assistants that are able to communicate with them, and not just perform simple functions like playing music or ordering pizza. Such communication is especially vital for older people, who might find smartphones too complicated to use, and for children. I'm sure that voice assistants will become much more humanlike".

# PROJECTS THAT RECEIVED NTI SUPPORT IN 2019

15 new projects approved by the Interagency Working Group on the Implementation of the NTI have already started to receive support and funding.

## 01

PROJECT
**CMN Platform**

ROADMAP
**Marinet**

APPROVED AMOUNT OF SUPPORT
**263** rub mln

EXTRABUDGETARY FUNDS
**176** rub mln

**Platform for crewless maritime navigation (CMN)** is the full name of the project, which aims to create a technological platform with a virtual environment for practicing maneuvers of unmanned vessels. Such platform will allow vessels to interact safely and effectively with each other and with coastal services. It can be used by the operators of autonomous transportation, shipping companies, and unmanned navigation training centers. A high degree of automation will allow to decrease the number of crew on board, which accounts for 30–40% of the vessel's average daily operating expenses. Hence, this is one of the key options for cutting costs for shipping companies.

## 02

PROJECT
**Autodata**

ROADMAP
**Autonet**

APPROVED AMOUNT OF SUPPORT
**325** rub mln

The objective of the **Autodata** project, which is unique on a global scale, is to collect an array of big data in the automotive sector. The Autodata platform will accumulate full information about a vehicle's operation during its entire life cycle. In the future, the data collected from millions of cars in Russia can be used in a variety of services, for example, when insuring a vehicle or issuing a loan for its purchase.

## 03

PROJECT
**UAS test site**

ROADMAP
**Aeronet**

APPROVED AMOUNT OF SUPPORT
**496** rub mln

EXTRABUDGETARY FUNDS
**74** rub mln

The first of its kind in Russia, the **UAS testing site** will be used for testing and certification of unmanned aircraft (UAV). It will be located on site of the Orlovka laboratory in the Tver Region, which has already been accredited for conducting such tests by Rosaviatsiya (Federal Agency for Air Transport). The project might be replicated in other regions in the future. The test site will speed up the assessment of UAVs — the certification process is currently mandatory for UAVs weighing more than 30 kg, which accounts for about a half of the existing models of unmanned air fleet in Russia.

## 04

PROJECT
**RUTM-1**

ROADMAP
**Aeronet**

APPROVED AMOUNT OF SUPPORT
**492** rub mln

EXTRABUDGETARY FUNDS
**62** rub mln

**RUTM-1** is a system for integrating unmanned and manned aircraft into common airspace. The system will automatically allocate air space for UAVs, providing safe intervals between flights and preventing potential conflicts in the air. The concept of RUTM-1 also provides for the creation of information services and zones for joint air navigation for unmanned and manned aircraft. These measures will make flights safer and more efficient.

## 05

PROJECT
**Kursir**

ROADMAP
**Aeronet**

APPROVED AMOUNT OF SUPPORT
**119** rub mln

EXTRABUDGETARY FUNDS
**206** rub mln

**The Kursir company** created a mobile complex for flight inspections of radio-technical flight support facilities. It can be used to measure a number of radio engineering flight support parameters, such as the automatic direction finder; marker, course and glide path radio beacons; azimuth and range-measuring radio beacons; drive radio station and lighting equipment. The complex is light and small, so it can easily fit on board of an UAV. In comparison with traditional measuring systems, this innovation will allow to cut the cost of flight checks by reducing the cost of performing long flights in the airfield area and between airports. Furthermore, the complex eliminates the need for flight crews, thus considerably reducing labor costs of inspections.

## 06

PROJECT
**Sputnix**

ROADMAP
**Aeronet**

APPROVED AMOUNT OF SUPPORT
**476** rub mln

EXTRABUDGETARY FUNDS
**204** rub mln

The objective of the **Sputnix** project is to create a satellite platform, which will be competitive both in its characteristics and price and will be used for remote Earth sensing. In the future, it could also be potentially used for scientific purposes and space communications. Thanks to the development and production of unique onboard systems and the unification of information, mechanical and electrical interfaces, the weight and dimensions of the satellite platform could be reduced while the functionality of a large spacecraft (over 600 kg) would still be maintained. Therefore, the satellites on the platform should weigh 80–200 kg.

## 07

PROJECT
**ERA**

ROADMAP
**Aeronet**

APPROVED AMOUNT OF SUPPORT
**104** rub mln

EXTRABUDGETARY FUNDS
**45** rub mln

The objective of the **ERA** project is to create a cargo drone tiltrotor platform, which will be capable of transporting cargo of up to 80 kg over distances of up to 300 km at a speed of up to 180 km/h. The power supply scheme will be a hybrid of an internal combustion engine and a generator. Thanks to vertical take-off and landing, as well as stability to the wind, the cargo drone will be able to operate in difficult conditions, which is especially relevant for the oil and gas industry as well as logistics.

## 08

PROJECT
**SOVA**

ROADMAP
**Neuronet**

APPROVED AMOUNT OF SUPPORT
**306** rub mln

EXTRABUDGETARY FUNDS
**139** rub mln

**SOVA** is a software and hardware platform for creating voice and text smart assistants. Unlike other similar projects, SOVA is an Open Source platform that can be used by small businesses and independent developers.

## 09

PROJECT
**VIRRY Lifestyle**

ROADMAP
**Neuronet**

APPROVED AMOUNT OF SUPPORT
—

**VIRRY Lifestyle** — is a platform providing tools for long-term activation of a person's internal resources and psychoprophylaxis. The platform combines the use of immersive technologies, wildlife and interactive content created in collaboration with leading global psychologists. With the help of VR helmets, users will get immersed in realistic settings that will work to restore their well-being and internal resources. As part of the NTI, the project will receive support in overcoming regulatory barriers and adapting legislation on the use of psychoprophylaxis.

## 10

PROJECT
**A-Platform**

ROADMAP
**Energynet**

APPROVED AMOUNT OF SUPPORT
**265** rub mln

EXTRABUDGETARY FUNDS
**118** rub mln

**A-Platform** project aims to create a framework of services and applications for distributed energy management at various stages of the lifecycle. Industrial manufacturers, technology parks, autonomous settlements, smart cities and towns, and virtual power plants will be able to use the platform. As for its key principles, A-Platform will be multiplatform, scalable, and independent from the operating system and hardware architectures.

## 11

PROJECT
**Cablewalker**

ROADMAP
**Energynet**

APPROVED AMOUNT OF SUPPORT
**300** rub mln

EXTRABUDGETARY FUNDS
**214** rub mln

The objective of the **Cableworker project** is to create an export product that will be used to maintain and repair electrical networks based on an UAV system. Potential consumers include enterprises of backbone and distribution electric networks, as well as repair and engineering companies and industrial consumers with power supply facilities as their assets. The Cableworker complex will consist of an unmanned helicopter-type transport platform, diagnostic and technical maintenance modules, software, and an automated expert system for detecting violations. The system will allow to conduct detailed monitoring and maintenance of power lines automatically.

## 12

PROJECT
**HTSC**

ROADMAP
**Technet**

APPROVED AMOUNT OF SUPPORT
**243** rub mln

EXTRABUDGETARY FUNDS
**107** rub mln

The goal of this project is to build an integrated technological chain for the production of customized wire based on high-temperature superconductors, which is a key product for a range of markets including new energy, advanced electric propulsion systems, medicine, high-energy physics, and high-tech industries. The chain will be created with the help of advanced technologies for collecting and digitally analyzing big data, self-learning, artificial intelligence, and the industrial Internet of Things. As a result, the implementation of the project will reduce the time to market new customized products from 25 to two weeks and decrease the volume of defects by a factor of 2.5.

## 13

PROJECT
**"Russia is a Country of Seafarers of the XXI Century" project**

ROADMAP
**The Kruzhok Movement**

APPROVED AMOUNT OF SUPPORT
**231** rub mln

EXTRABUDGETARY FUNDS
**145** rub mln

**The «Russia is a Country of Seafarers of the XXI Century» project** is implemented under the umbrella of NTI Marinet market. It involves training and education for schoolchildren (aged 9-18) in the latest marine technologies and will be carried out at the Young Sailors' Club (named after sea captain Varukhin N.G.) in Veliky Novgorod. Additional educational programs and online courses will educate the students on the basics of modern and future navigation with new digital navigation technologies and unmanned navigation. There will be a navigation simulator installed at the Center, while Mr.Veliky Novgorod ship will be equipped with high-tech tools for practicing navigation skills in real settings.

## 14

PROJECT
**Engineering competitions in marine robotics**

ROADMAP
**The Kruzhok Movement**

APPROVED AMOUNT OF SUPPORT
**90** rub mln

**Engineering and marine robotics competitions** are implemented as a joint project of the NTI Kruzhok Movement and the Maritime State University named after admiral G.I. Nevelskoi. The objective of the project is to train a new generation of technological leaders of the NTI Marinet market and to equip schoolchildren and university students for Russian and international technological competitions. From 2020 going forward, annual competitions in underwater robotics will take place across the country. More than 1000 schoolchildren and university students and 100 teams will participate, and the best of them will go on to represent Russia in international competitions.

## 15

PROJECT
**AntionkoRAN-M**

ROADMAP
**Healthnet**

APPROVED AMOUNT OF SUPPORT
**312** rub mln

EXTRABUDGETARY FUNDS
**188** rub mln

The objective of the project is to develop and market the world's first non-viral gene therapy antitumor pharmaceutical for the treatment of cancer, which will make oncological therapy safer and more effective for patients. AntionkoRAN-M will be developed using the cancer gene therapy approach, in which the so-called killer genes and an immunostimulator gene are delivered to the tumor. The product of killer genes destroys cancer cells, while the protein of an immunostimulator gene activates the antitumor immune response resulting in the suppression of metastasis. The fact that this process is contained inside the tumor means that it is less toxic for healthy tissues and organs.

# NTI COMPETENCE CENTERS

## THREE DIRECTORS OF NTI COMPETENCE CENTERS TALK ABOUT HOW SCIENTISTS ARE CHANGING THE WORLD



What qualities should modern scientists possess and what superpowers do they dream of? Do they witness their technologies come to life and what challenges do they face? These and some of the other questions were answered by the directors of three NTI Competence Centers – Alexander Bukhanovsky (NTI Competence Center for Machine Learning and Cognitive Technologies at ITMO University), Dmitry Lakontsev, (NTI Competence Centre for Wireless Technologies and the Internet of Things at Skoltech) and Alexander Voloshin (NTI Competence Center for Technologies of Electric Power Transmission and Distributed Intelligent Power Systems at the Moscow Power Engineering Institute).

### FOR ME, BEING THE HEAD OF THE CENTER IS...

**Alexander Bukhanovsky**

... the same as being its chief designer, that is, to come up with strategic ideas for the Center's research projects and develop them so that the results form a single entity capable of radically changing our lives.

**Dmitry Lakontsev**

... first of all, an opportunity to launch projects that I have dreamed of for a long time. On the other hand, this job entails a lot of responsibility.

**Alexander Voloshin**

... about taking responsibility. First of all, the effectiveness of the Center affects the lives of all the 40 people on our team. Secondly, we face ambitious challenges. Being a director is, in a good way, a test that must be successfully passed.

### HOW WOULD YOU DESCRIBE YOUR TEAM?

**Alexander Bukhanovsky**

My team is a group of people whose key motivation is interest. Having said that, the motivation is so strong that it does not allow the mind to "get fat", so to speak, even when all other needs are satisfied. Only this type of people can advance long-term strategic projects.

**Dmitry Lakontsev**

True professionals. There aren't that many on the market, so I am proud that I was able to bring together so many highly qualified specialists and excite their curiosity in interesting and complex projects.

**Alexander Voloshin**

Young and very capable. Not only are they studying the technology of large Western companies such as Amazon or Google, they are developing their own tools, because the existing ones aren't enough.

## What are NTI Competence Centers?

**The National Technology Initiative (NTI) is an association of business representatives and expert communities that deals with developing promising technology markets and industries in Russia that could become the foundation of the global economy. Since 2015 RVC has been involved in the implementation of NTI.**

In 2018, with the support of the Ministry of Science and Higher Education of the Russian Federation, 14 NTI Competence Centers were launched on the basis of universities and scientific organizations. An NTI Competence Centre is a structural unit created on the basis of a university or a scientific organization that implements the integrated development of "end-to-end" NTI technologies jointly with the members of the consortium on the basis of a contract on the formation of a consortium.

These centers are tasked with transferring results of fundamental science to specific market products by organizing consortia with industrial partners, as well as training NTI "end-to-end" technology specialists in such spheres as big data, artificial intelligence, quantum technologies, new and portable energy sources, robotics and mechatronics components, wireless communication technologies, virtual and augmented reality technologies and others. The consortium participants determine the specific directions of the Centers, as well as a set of ongoing projects, taking into account the prospects for their commercialization. The main effectiveness indicators of NTI Competence Centers are demonstrated in the number of trained specialists, center's volume of income and the number of licensed technologies. RVC monitors and supports the activities of the Centers.

### THE MOST USEFUL AND AMAZING EMBODIMENT OF TECHNOLOGY THAT YOU ARE WORKING ON?

**Alexander Bukhanovsky**
The technology of digital personalities - personal assistants who independently develop and "mature" as they interact with their owner. They can carry out a different range of functions, starting from a household assistant to being an interface of professional decision support systems. Digital personality technically implements the cognitive operating system, which fundamentally changes the approach to the development and use of software and various services on the Internet, giving them a "human face". a digital personality can become anything to the owner: an avatar, a diligent minion or even a cute Pokemon.

**Dmitry Lakontsev**
A cell phone, that is now in possession of almost every human being on the planet, is the most amazing and most useful embodiment of the technology that I work on. The invention and implementation of wireless communications is a significant milestone in the technological development of mankind. It is no less important than, for example, a steam engine or an airplane.

**Alexander Voloshin**
We managed to do something that no one else in the world has been able to do - we taught artificial intelligence to develop digital protection systems and automatic control of energy facilities under the given requirements of reliability and economic efficiency. As of now it is generally accepted that only human intelligence is capable of this. In December 2019 we received necessary patents and several companies have already purchased from us licenses for this software. Now, together with companies within the industry, we are developing this technology. In addition, companies from other areas are also showing interest.

### WHAT ARE THE MAIN INTERIM RESULTS OF THE CENTER?

**Alexander Bukhanovsky**
Since the beginning of this year, we have developed and publicly launched a number of platforms, for example, for training intelligent digital objects based on big data, for supporting the ecosystem of digital personality, for generating and customizing models of complex objects.



**Dmitry Lakontsev**
The most important interim result is the creation of the Leading 5G Technology Research Center based at Skoltech. Under the model of the Central Committee of NTI, a small pool of enterprises that manufacture telecom equipment was allocated from a large consortium of companies. We convinced them that together we can create a technological platform for the production of domestic 5G base stations in the OpenRAN paradigm. We created a business plan, secured financing and took the project beyond the Center. We are very proud of this project.

**Alexander Voloshin**
The most important thing is that we've assembled a team. Three projects are currently being implemented and the fourth is about to start. We have fulfilled our obligations related to expenditures and the attraction of additional financing. We have ran all the necessary laboratory tests. We launched a new training and retraining programme for energy company personnel and a student training programme.

### WHAT'S YOUR MAIN CHALLENGE FOR 2020?

**Alexander Bukhanovsky**
The main challenge would be to carry out a systematic transition of our NTI Competence Center to a product model in the broad sense.

**Dmitry Lakontsev**
Make use of the opportunities at hand given the current pandemic. After all, it does have a number of upsides. Self-isolation and the need to work remotely advanced the digitalization of our lives. Psychologically people are becoming accustomed to digital solutions. This in turn makes our work easier.

**Alexander Voloshin**
The pandemic has taken a toll on our work on laboratory equipment and test benches. We do whatever can be done remotely. At the end of the year we planned to deliver the first newly-developed equipment to one of our customer's facilities. I would say that this would be the main challenge for 2020.

### TELL US ABOUT THE FEATURES OF YOUR MARKET.

**Alexander Bukhanovsky**
We have a wonderful market in terms of breadth. Everyone from oil workers to bankers need machine learning and cognitive technology. This provides numerous partnerships for the NTI Competence Center. But there is a flip side. Because our tasks are so diverse our projects are somewhat fragmented. There are many projects, but they aren't time consuming, and their cost is low. For example, in 2019, our employees completed 22 commercial projects for the development of various intelligent technologies, each and everyone of them with an alienable software system, transmitted to the customer with all the documentation. But the average lead time for such projects is 3 months, and the average cost is about 3 million rubles.

**Dmitry Lakontsev**
Our market is associated with advanced technologies. We have to constantly break down psychological barriers to implement innovative solutions, look for words and approaches so that employees of industrial players better understand new opportunities. Even if it is obvious that the company must undergo a digital transformation to be competitive in the market, it is very difficult to convince its management that certain changes need to be introduced.

**Alexander Voloshin**
We work with b2b and b2g customers. One of the main features is long-term

planning (one and a half years in advance). The market is very regulated: we can proceed to work on site if something didn't pass field tests. We work with critical infrastructure facilities, and reliability and security requirements of our designs (products) are crucial.

### HOW DO YOU THINK TECHNOLOGY WILL DEVELOP WITHIN THE NEXT 5 YEARS?

**Alexander Bukhanovsky**

Not only do I like to forecast, I do it based on predictive models. I perfectly understand that there is no truth to forecasts because of a probability interval. As for technologies that we work with, I can only say that digital technologies will make their advancements during the globalization era. For example, the development of traditional artificial intelligence technologies aimed at imitating basic cognitive functions (working with images, voice, language, etc.) is a thing of the past. The main challenge in all this would be an advent of a variety of intelligent systems in different areas of human life making their interaction with each other natural. Eventually sooner or later a new society will emerge, which will include objects of both artificial and natural human intelligence. The classical society will also become a complex system in which various critical and even revolutionary phenomena are possible.

**Dmitry Lakontsev**

Within the next five years large Russian cities and regional centers will gain access to fifth-generation communication networks (5G), domestic solutions will also be used to construct them. The current pandemic will give a powerful impetus to universal digitalization. Telemedicine will start to develop rapidly. 5G will open the door to telepresence. Cities will begin to function with much smaller populations, various high level automation systems will be filling in. There will be a fully unmanned, self-driving transportation system in place.

**Alexander Voloshin**

For the electric power industry five years is not a very long time. I would single out several areas in which technologies will develop. First, there will be finalized projects related to storage devices, renewable energy sources and retail electricity sales. Secondly, there will be technologies able to run in an automatic mode to predict accidents in large power systems. The Ministry of Energy is now pushing the owners of energy companies towards this. Thirdly, key decisions will be outlined pertaining to what is necessary to do in the era of digitalization. Ineffective technologies will be discarded.

### IF YOU COULD PICK A SUPER POWER, WHAT WOULD IT BE?

**Alexander Bukhanovsky**

What's the only difference between a good researcher and a bad one? a good researcher has the ability to chart a path to achieve the desired result. He needs to have scientific foresight, if you will. Without it, the research process turns into aimless wandering.

**Dmitry Lakontsev**

I work in innovation, in this sphere there is a very high level of uncertainty. So, therefore, I guess anyone in my place would like the ability see the future, at least the nearest future. This would allow me to make more informed decisions and take the shortest path to success. But here's what I think. If you can rely on the high-level of expertise of the team and trust your own intuition, then there simply wouldn't be any need in super powers!

**Alexander Voloshin**

Get enough sleep in one hour and quickly manage to do all the work so that there is time for my family. Usually, time flies so fast and I notice that I'm already 12 or 14 hours at work.



## NTI COMPETENCE CENTERS

1. NTI Center for Artificial Intelligence, Lomonosov Moscow State University
2. Center for Quantum Technologies, Lomonosov Moscow State University
3. Competence Center for New and Mobile Energy Sources, Institute of Problems of Chemical Physics of the Russian Academy of Sciences
4. NTI Center for New Production Technologies, Institute of Advanced Production Technologies, Peter the Great St. Petersburg Polytechnic University
5. Center for Technologies for Managing Properties of Bio-objects, Institute of Bioorganic Chemistry of the Russian Academy of Sciences
6. Big Data Storage and Analysis Technologies Center, Lomonosov Moscow State University
7. Components of Robotics and Mechatronics Technology Center, Innopolis University
8. Sensorica NTI MIET Center, MIET National Research University of Electronic Technology
9. Distributed Ledger Technologies Center, St. Petersburg State University
10. NTI Center for Quantum Communications, MISIS National University of Science and Technology
11. Center for Technologies for the Transport of Electricity and Smart Power Distribution Systems, MPEI National Research University
12. Competence Center for Wireless Communication Technologies and the IoT, SKOLKOVO Institute of Science and Technology
13. National Center for Cognitive Technologies, ITMO University, St. Petersburg
14. NTI Center for VR/AR and Neurotechnology, Far Eastern Federal University

# NTI COMPETENCE CENTERS IN 2019

The NTI Competence Centers operate as consortiums: universities and scientific organizations become platforms that connect scientists and businesses. The key objective of their collaboration is to develop projects with both scientific and commercial value. Each Center has industrial partners — these are companies acting as customers. This allows scientists to create projects and products, for which there's market demand, and thus to earn money. Since 2017, RVC has been conducting competitive selections. After selecting the sites for the Centers, RVC continues to assist with their activities by providing strategic planning recommendations, monitoring and analyzing performance.

# COMMERCIALIZATION OF SCIENTIFIC DEVELOPMENTS

We have created a development program for each Center, which is spread out over several years and includes targets for revenue and attracting private funding. The assumption is that financial support, which the Centers received from the state at the start, will allow them to achieve these indicators and develop into commercially successful structures

41

**PROJECTS**
were successfully completed by the Centers in 2019. Their portfolio includes approximately 200 research projects, of which more than 150 are currently being implemented

>3,9

**RUB BN**
the revenues of the NTI Competence Centers in 2019

>1,9

**RUB BN**
the cumulative amount of extrabudgetary funding of the Centers



# CONSORTIUMS AND COOPERATION WITH INDUSTRIAL PARTNERS

In 2019, the number of consortium members increased by 40%. Currently, more than half of them are commercial companies such as Sberbank, MTS, KUKA, Rosatom, Gazprom Neft and others. The number of customers of the NTI Competence Centers grew by 76% compared to 2018 and exceeded 190 organizations

470

**ORGANIZATIONS ARE MEMBERS OF THE COMPETENCE CENTERS' CONSORTIUMS**

The number of employees of the NTI Competence Centers has more than doubled in 2019. The Centers currently employ almost four thousand people

# EDUCATIONAL ACTIVITIES

Educational programs are developed via the collaboration of consortium members and range from master's programs to advanced professional education. Business and government agencies are directly involved in the process, thus students are able to gain knowledge and practical skills that they will be able to apply in the future

>10 000

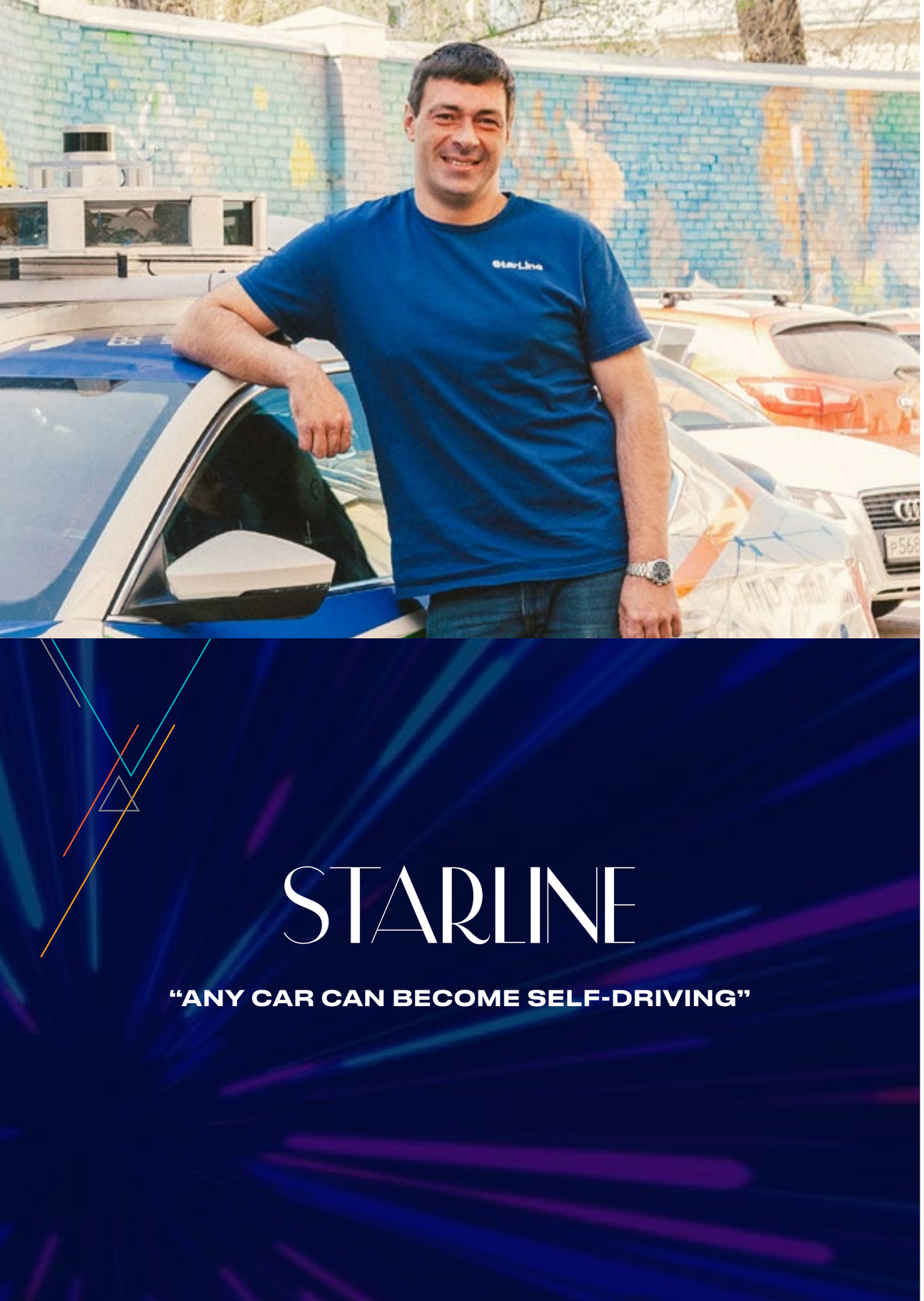
**SPECIALISTS**
took part in the Centers' educational programs on end-to-end technologies

34

**EDUCATIONAL PROGRAMS**
were developed by the Centers in 2019

80

**NEW ADVANCED**
professional education programs






In December 2019 during the final stage of the Up Great “Winter City” contest, Russian developers tested their unmanned vehicles at a training ground in winter conditions. A team from St. Petersburg showed the best result: the StarLine car drove 50 km in 4 hours with “penalty” minutes included. Boris Ivanov, Head of the “Smart Car” department at StarLine, spoke about his technological miracle and the future of the unmanned vehicle industry in Russia.

## THE TECHNOLOGY

**Modern self-driving cars are essentially data centers on wheels with a large number of powerful computers.** Our StarLine unmanned car is equipped with a set of sensors and several computers. As of now only one specific computer is installed in the vehicle. This computer monitors all other nodes and the overall operation of the car in case some of the nodes fail. The rest of the computers are equipped with powerful graphics cards.

**For our work we use ordinary, basic computers, specialized ones are not needed. It is simpler and cheaper this way.** Also this significantly speeds up the development process, because using ordinary computers allows us to run more tests quickly and inexpensively.

**Tens of millions of rubles have already been invested in the project, two million of which were spent to buy the car.** The most expensive components are the sensors.

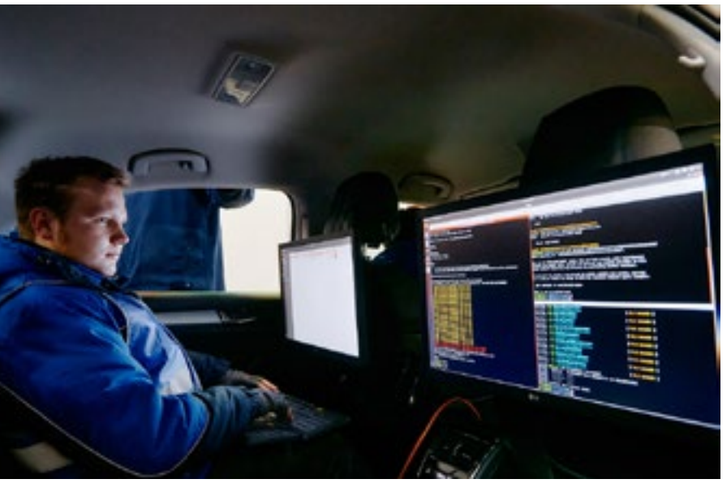
**The sensors we selected have different physical principles.** This ensures their stable operation in various weather conditions, like rain, snow or fog. Each sensor has its own strengths and weaknesses. That is why we apply the Sensor Fusion approach, which basically means that we use the strengths of one sensor to compensate for the shortcomings of another.

**Street lighting creates some additional challenges. The dynamic range of modern cameras is lagging behind the capabilities of the human eye.** To solve this issue, we use data fusion, i.e. data from several cameras with different exposure compensation parameters. Using appropriate software filters we have no problems with reflective surfaces such as puddles.

## "WINTER CITY" CONTEST

**At the end of 2019, our team showed a very good result in the Up Great “Winter City” contest.** The main task of the contest was to drive down the Russian winter road with safety level and speed of an ordinary driver, observing traffic rules in a dense urban area. More than 30 applications were sent from all over Russia and five teams participated in the final mass start. Our car was able to drive 50 km of the most difficult city route in 4 hours. This includes the extra “penalty” minutes that were added for traffic rules violations.

**Such contests expedite the development of technology.** First of all, you have to take into account the motivational factor for engineers and programmers and the competitive moment that comes with it. In our case the main contestants were not the other teams, but the technological barriers we faced. On the contrary, the teams we met became our partners and we continue to cooperate with them.



Modern self-driving cars are essentially data centers on wheels with a large number of powerful computers.


The sensors we selected have different physical principles. This ensures their stable operation in various weather conditions, like rain, snow or fog.

**We managed to create a community of professionals.** Thanks to this contest it actually brought the developers together.

**We believe it is important to join efforts.** For example, on March 12, we held a conference in St. Petersburg that brought together leading Russian developers of unmanned vehicles and automotive industry experts. The main topic of the meeting was based on studying the ways of creating a digital road model and V2X technologies. My colleagues and I tried to explain what a single standard of a digital road model should look like so that it can be applied to any Russian unmanned vehicle.

## NECESSARY INFRASTRUCTURE

**According to analysts at PwC, a complete unmanned transport infrastructure, which will be devoid of any human drivers, will appear in large cities by 2040.** Our assumption is that this will happen much earlier.

**Because self-driving vehicles are scarce in numbers, they can do without the infrastructure.** But the closer we get to the point where their use will be widespread, the more important the infrastructure will become.

**First of all, such infrastructure will be implemented for in-plant logistics and transportation of (quarry) machinery.** If we're talking about public roads, then this work is already underway.

**Right now it is important to develop common requirements for digital maps for unmanned vehicles. Such maps must be highly accurate.** Information about the situation on the roads should be constantly updated, so that autonomous vehicles receive the latest data on traffic jams, roads that are under construction and so on.

**There are projects on implementing unmanned vehicles in in-plant territories.** Our company is involved in such projects. First of all, we are talking about cargo and passenger transportation in closed territories. For such purposes StarLine unmanned technologies as a commercial product are already entering the market.

**By 2025 the market for unmanned vehicles will grow from $ 1.3 billion to $ 84 billion.** Sales of autonomous cars in absolute terms will reach 36 million units. Sales of cars that are equipped with autonomous driving systems will exceed 40% of the global market for new vehicles. Vigorous implementation of autonomous taxis and increased use of business mobility models in the transport system of large cities will enhance the development of unmanned systems and technologies.

## THE FUTURE OF STARLINE

**We can take almost any vehicle and turn it into a self-driving car.** Typically, a Prius is used for such unmanned car experiments due to the convenient location of its control (wheel). But the Prius is not officially exported to Russia. Those who use them for their experiments usually bring in used cars from abroad, often with a range of different problems. For our development needs, we chose a vehicle that is popular among Russian car owners and has a set of parameters that are acceptable to us. One of the reasons being that since it has electric power steering, we do not need to install additional actuators.

**The company is ready to begin testing its unmanned vehicle on public roads.** We prepared the car for certification, conducted the first inspection at the Test Center of FSUE NAMI (leading Russian scientific organization that deals with developing the automotive industry), designated the necessary tests for the car. Even though we're ready to move forward, the process had to be postponed due to the COVID-19 pandemic. After the situation comes back to normal, we will continue the certification process. We believe that this will take 1-2 weeks, depending on the workload of the Test Center. After that, we will begin testing the unmanned vehicle on the roads of St. Petersburg.



**BY 2025 THE MARKET FOR UNMANNED VEHICLES WILL GROW***

**$1,3 BILLION**

▼

**$84 BILLION**

*From The Report on the prospects of the unmanned vehicles market development made by RVC in cooperation with the consulting company Frost & Sullivan

**By 2025 the market for unmanned vehicles will grow from $ 1.3 billion to $ 84 billion. Sales of autonomous cars in absolute terms will reach 36 million units. Sales of cars that are equipped with autonomous driving systems will exceed 40% of the global market for new vehicles. Vigorous implementation of autonomous taxis and increased use of business mobility models in the transport system of large cities will enhance the development of unmanned systems and technologies.**

# UP GREAT TECHNOLOGY CONTESTS IN 2019

Technology contests have existed for several centuries. In Europe, the first such competitions were held at the beginning of the XVIII century. The participants had to perform tasks that hadn't been attempted before, such as creating an airplane that could fly from Europe to America. Technology contests started to flourish at the beginning of the XXI century.

The principles remained the same, but instead of airplanes the teams had to create unmanned vehicles and missiles. The United States has hosted a number of competitions over the years. These included the DARPA Grand Challenge — for the makers of drones, the Ansari X Prize — for space engineers, and the Netflix Challenge — for the developers of AI algorithms. Then, Russia also caught up with this trend. In 2017, RVC, the SKOLKOVO Foundation and the Agency for Strategic Initiatives launched the country's first technology competitions as part of the NTI. After reviewing the results of the first two series of contest, we launched new ones in 2019.

## WINTER CITY

**175 RUB MLN**

**PRIZE FUND**

In partnership:
with Yandex, NAMI, MosTransProject, and Vocord

Winter City is a contest in unmanned transport technologies. The global benchmark for the development of such technologies has been set at a fairly high level, but many unresolved problems still exist.

Developers have not yet been able to create an unmanned car that can function in winter — with poor visibility during snowfall or in the dark — and comply with all road traffic regulations. Before the launch of Winter City, it seemed that there were no developers in Russia attempting to solve this problem. However, over 30 applications were received, nine cars competed in the qualifying tests, and five teams participated in the final race at the NAMI testing site in the Moscow Region. Although the teams couldn't overcome the technological barrier, they managed to achieve unique results — for both Russia and the world. Moreover, they created a professional community of engineers and developers of unmanned transport in Russia, which continues to operate beyond the duration of the contest.



**03.07.18 — 10.12.18**
**SELECTION STAGE**

**26.02.19 — 05.03.19**
**QUALIFICATION STAGE**

**05.12.19 — 10.12.19**
**FINAL STAGE**

### Teams that made it into the finals

- BaseTracK
- StarLine
- Avto-RTK
- MADI
- NSTU

TECHNOLOGICAL BARRIER

To create and showcase a self-driving car that can move around the city in winter at different times of day and at the level of an average driver. At the testing site, the UAV needed to travel 50 km in the presence of other autonomous cars and simulators in under 3 hours. Penalty minutes were added for violations of road traffic rules.

BEST RESULT

StarLine team from St.Petersburg achieved the best result. Their vehicle completed the distance in 2 hours and 47 minutes, but violated road traffic rules a number of times, for example, by ignoring a red light. Rule compliance was being monitored by the judges and by automated control systems with high-precision cameras and traffic trackers. Thus, StarLine got 73 penalty minutes for violations.

### Hackathon Ice Vision

A satellite hackathon competition called Ice Vision was held as part of Winter City. The task was to develop software (based on CCTV cameras) for a self-driving car that would improve the quality of recognition of road signs in unfavourable weather conditions. 26 teams reached the finals, and these included MIPT, SFU, Skoltech, MSU, NSU, SPbPU, HSE, and Innopolis University, as well as teams from major foreign universities in the USA, China and South Korea. The first place and 1.5 million rubles were awarded to NtechLab team. The second place and 300 thousand rubles went to the team of Lomonosov Moscow State University and HSE. And the third place and 200 thousand rubles was won by a team from SibSU. A participant of the Winter City competition — the StarLine team — became a strategic partner and co-organizer of Ice Vision and gave out 100 thousand rubles as an additional prize for each team in the Top 10. The partners of the hackathon included MISIS, StarLine, Skoltech, NVidia and Sberbank.

# FIRST ELEMENT. AIR

60 RUB MLN

**PRIZE FUND**

"First element" is a contest in hydrogen fuel cells (HFC) technology.

HFCs convert hydrogen's chemical energy into electrical energy via a process of hydrogen oxidation with oxygen. Unlike batteries, they do not accumulate electrical energy. Instead, they draw it from hydrogen reserves, which can be quickly replenished. Thus, there is no need to wait for HFC power-generating systems to charge, as with traditional batteries. The "First Element. Air" contest finished in July 2019. Participants had to overcome the technological barrier by creating hydrogen fuel cell power systems for small drones. In terms of efficiency, the installations had to be comparable to internal combustion engines. Although the participants didn't manage to overcome the technological barrier, the result of two teams were close to the established threshold.

**03.07.18 — 25.12.18**
**SELECTION STAGE**

**20.02.19 — 20.03.19**
**QUALIFICATION STAGE**

**15.04.19 — 20.05.19**
**TESTING STAGE**

**10.07.19 —12.07.19**
**FINAL STAGE**

## Teams that made it into the finals

- Unmanned Helicopter Systems
- PolyTech
- NaukaSoft

TECHNOLOGICAL BARRIER

The teams had to overcome the unit's specific energy density of 700 W*h/kg

BEST RESULT

Three teams qualified for the final. **Unmanned Helicopter Systems and Polytech** showed best results by attaining energy density of 529.3 W*h/kg. Their installations remained in flight mode for 2.5 hours.



# READ//ABLE

200 RUB MLN

**PRIZE FUND**

In December 2019, RVC, ASI and the SKOLKOVO Foundation launched READ//ABLE — a new technology contest for the developers of AI algorithms in speech technologies.

The task was to create an AI product capable of identifying the meaning of a text and analyzing cause-and-effect relationships in a variety of contexts. The algorithm must also be able to pinpoint grammatical, speech, logical, factual, and ethical errors, explaining them in short comments — at the level of a human specialist. The competition will continue until the end of 2022, and the testing will be carried out until one of the teams overcomes the technological barrier. Text analysis competitions will be held in both Russian and English — each with a prize fund of 100 million rubles. The contest is open to foreign teams as well.

TECHNOLOGICAL BARRIER

To develop an AI system that can analyze the meaning of texts at a specialist level, identifying factual, logical and semantic errors.

**The algorithm will have 30 seconds to analyze an essay of up to 12,000 characters**

BEST RESULT

First tests are scheduled to take place in the fall of 2020




In 2019, an RVC innovation development platform named GenerationS was listed as one of the top five best state accelerators in the world, according to a UBI Global study. As assessed by UBI Global, GenerationS demonstrated exceptional achievement in value for startup graduates, value for the local ecosystem, and overall attractiveness as a program as a whole. Managing director at GenerationS Ekaterina Petrova explains why corporations need accelerators, how to convince a startup to come to Russia, and why a good team is important when it comes to innovation.

### WHAT SHOULD AN ACCELERATOR DO TO ENTER THE UBI GLOBAL RANKING?

— The assessment takes into account 21 key performance indicators. These indicators are divided into three groups: value for the innovation ecosystem, value for startups and the real value of the acceleration program.

The reason GenerationS got into the top 5 list of best public business accelerators in the world is because the company demonstrated superior performance in terms of value for the innovation ecosystem, achievements of startup graduates, as well as the attractiveness of acceleration programs for corporate partners.

### WHAT DOES THIS ACHIEVEMENT MEAN FOR GENERATIONS?

— As of today, this is the only ranking system with a comprehensive assessment methodology. We were well aware that being included in this list would allow us to objectively evaluate our results and understand which direction to take to develop in terms of both interaction with foreign ecosystems and with best practices of our international colleagues when it comes to strategy.

**>9**

**RUB BN**

cumulative volume of investment in the projects of GenerationS alumni, with 65% overseas investment

**SO FOR YOUR COMPANY, THE MAIN OBJECTIVE WAS NOT WINNING?**

— For us, it was a pleasant surprise. UBI Global's high ranking scores allowed GenerationS to assert itself in international markets. We implemented the Go Global program, which endeavoured to introduce large Russian corporations to foreign partners and innovation ecosystems. We are no longer perceived as an exclusively Russian accelerator. Thanks to our expertise, a pool of foreign partners, and interaction with the innovation ecosystem abroad, we have become an international platform capable of providing services on a par with large foreign players. Nonetheless, we're glad that our work was appreciated.

**HOW MANY STARTUP APPLICATIONS DID YOU RECEIVE IN 2019?**

— For our accelerators, we managed to collect more than 800 applications from startups based in Russia and abroad. Approximately 30% of those are international startups. In total, our partners selected more than 50 startups to further explore the possibility of jointly launching pilot projects. It's important to stress that these are "first priority" projects.

**WHY IS ALL OF THIS IMPORTANT?**

— We strive to ensure that as many projects as possible within this selection are of interest to our partners, because any accelerator's success is measured by the number of pilots implemented with corporations. Therefore, we try to conduct a meticulous selection process, present mature projects that meet all requirements of the partner, and guarantee that they are ready for implementation. When a partner gives the green light to at least 60% of the entire pool of startups, this means that the quality indicator is quite high. This implies that, during the initial selection process, our experts made exceptional project assessments.

**WHEN REFLECTING ON 2019, WHAT WAS YOUR FONDEST MEMORY? WHAT KIND OF DISCOVERIES DID YOU MAKE?**

— For GenerationS, the past year turned out to be very diverse. We launched partnerships with companies from completely different spheres and backgrounds: energy, transport, pharmaceutical industry and FMCG.

We also realized that companies that are just starting to work with startups need to have knowledge of the innovative ecosystem and all the processes within these ecosystems, both in Russia and globally.

**HOW CAN YOU HELP THEM?**

— We provide all the necessary information and give a detailed explanation as to why innovations should be implemented. We have a range of educational programs for company employees, both in Russia and abroad. For GenerationS, building a trusting relationship with partners is extremely important, even when the accelerator is completed. Oftentimes, interaction can continue on other issues.

**BY PARTNERS, ARE YOU REFERRING TO STARTUPS?**

— GenerationS has two key clients. The first client would be corporations and venture funds. The second clients are startups. One without the other simply cannot exist. It is important for us to clearly understand the needs of corporations and the possibilities of startups to make a perfect match. When a startup is promising, but still quite early-stage, the accelerator helps it grow and gain necessary skills and expertise. This, in turn, helps the startup to develop and become more appealing to corporate partners.

**>50**

**STARTUPS**

were selected from more than 800 Russian and international projects for further launch of pilot projects with corporations.

**600**

**PROJECTS**

were evaluated by 200 qualified independent industry professionals.

**>100**

**UNIVERSITIES**

In 2019, the number of GenerationS partners among specialized universities in Russia grew to more than 100 universities. Today, GenerationS is a partner of approximately 200 universities nationwide.



**Over 1,500 accelerators and incubators from 82 countries participated in the UBI Global World Rankings of Business Incubators and Accelerators 2019–2020. Approximately 400 entries managed to reach the finals.**

Each accelerator is an individually developed and comprehensive program that works with innovation, which usually goes beyond just scouting projects. Having a portfolio of companies from various industries helps GenerationS become a universal accelerator with high expertise and knowledge in various fields, which plays a very important role in the market.

**WHICH INDUSTRIES DID YOU GET TO KNOW BETTER THIS YEAR?**

— In the summer of 2019 we launched a joint accelerator with the Enel international energy company, which searched for innovative technologies for both traditional energy generation and renewable energy sources. It helped us to expand our expertise in the energy industry, as well as better understand what kind of technologies are currently in demand in our country.

**COULD YOU GIVE AN EXAMPLE?**

— Currently, there is a global trend towards decarbonization, which means that there's an increase in the capacities of renewable energy sources and the search for breakthrough solutions in this area. Russia is also not an exception in this regard. The government has set targets for "new renewable energy sources" until 2024. Digitization is also in focus, and Russia has embarked on a digital transformation of priority sectors of the economy. Last year, as part of our joint accelerators, we searched for solutions for our partners in this area.

**WHAT OTHER CUSTOMERS FROM 2019 WOULD YOU LIKE TO MENTION?**

— In 2019, we launched a joint accelerator with the State Transport Leasing Company (STLC). This has become one of our largest and most comprehensive projects. It includes several elements, the first being working with partner's employees. In order to launch pilot projects successfully they must have a precise set of tools. By means of an educational program, we developed this toolkit at the very beginning of the project. More than 20 employees became ambassadors for innovation in the company. Secondly, the essence of the accelerator for the company differs from the usual work on the market. Since STLC aims for the transport industry development, the task of the accelerator was to create a comprehensive platform for the transport industry to work with startups and technology commercialization. This would not only occur through a standard contract, but also through investment and joint ventures. Moreover, it became possible to form an ecosystem of industrial partners around the accelerator who carry out technical expertise and show interest in piloting projects. As a result, the accelerator evolved into a platform for the development of the transport industry. We are at the very beginning of its formation, but we are proud that this project is already attracting the interest of large companies around the world.

### DO YOU THINK CORPORATE ACCELERATORS ARE NECESSARY FOR BUSINESS?

— Absolutely. There are corporations that spent several years forming an innovative agenda. There are distinct KPIs and an understanding of what results should be achieved. Our work with such corporations is particularly well-coordinated, because there is a function that helps build the entire process of interaction within the accelerator.

The demand for innovation is gradually changing, companies put greater focus on the result the company will get in the end. Today, corporations (especially private ones) define key performance indicators before launching their programs.

Requirements for startups are also becoming more demanding. Now, it is necessary to prove the viability of the product, run a number of successful pilots, and have the ability to quickly scale-up.

### BUT NOT EVERYONE IS LIKE THAT...

— Yes. There is another category of corporations, which have an understanding of what startups are, but the process of interaction with them has not yet been defined. Such companies require a truly individual approach. But at the same time, they don't regard the accelerator as a PR tool. On the contrary, more and more companies are becoming aware that this is a significant and necessary element in the world of innovation. We see how many companies allocate separate budgets for working with innovations and form a special team for interacting with startups.

### WHAT ARE THE REQUIREMENTS FOR SUCH A TEAM?

— The team must have extremely in-depth knowledge of the innovation ecosystem and be able to competently build various processes and be focused on the result. Such a request from the market prompted GenerationS to develop a separate HR product for finding employees for corporations that will help shape an innovative vision and various processes within the company. In addition to a good team, you need a leader who will embody the idea and have a clear picture of how it can be implemented. a right leader is half of the journey to success.

### WHAT DIFFICULTIES DO YOU ENCOUNTER AS AN ACCELERATOR?

— Many corporations, knowledgeable of Russian technologies, turn to us mostly looking for foreign projects. However, it's not enough just to find international startups— they must be convinced to become a part of the accelerator. Given the fact that some foreign countries are still skeptical of Russia, it is necessary to work out an application with each international startup, highlight all the advantages of participating in the accelerator, give a detailed description of the opportunities available, and frankly talk about the bureaucracy in Russia that is yet to operate on a "comfortable" level. Our task as an accelerator is to change this perception of Russia. We strive to show the potential of the Russian innovation ecosystem as a whole and break down barriers. So, one of the excellent examples of concise and competent interaction with international projects was our joint accelerator with the Ilim Group launched in 2018. The company's focus was actually on foreign solutions, which prompted the company to select two international projects which are now being prepared for implementation. This positive example shows how to break down barriers of distrust.

### HOW DO YOU SCOUT FOR INTERNATIONAL STARTUPS?

— Any work with preliminary analysis at the request of a corporate partner to identify the priority geography for technological projects and specialized international partners.

**Today, GenerationS has over 350 international partners from 60 countries.**



**Today, GenerationS alumni operate not only in Russia, but also in the USA (17%), the CIS (35%), Europe (30%), the Middle East (5%), as well as in Asian countries (13%) - 42 countries in total. For example, ExoAtlet, which opened offices in South Korea, Japan, Luxembourg, the USA and China, as well as WantResult with 130 offices in Russia and the CIS.**

**4 STAGES OF INTERNATIONAL SCOUTING:**

**1.** preliminary analysis, which is implemented before accepting applications

**2.** reaching out to a network of international partners, including specialized structures of the innovation ecosystem

**3.** targeted manual search and application, if necessary, of ML / AI solutions

**4.** direct communication with foreign startups and assistance in filling out applications for participation in accelerator programs.

Scouting itself consists of two blocks: increasing the overall outreach and targeted projects.

The overall coverage is increased by newsletters sent out to partners' startups, posting information on social networks, and informing relevant institutes and research centers. The purpose is to inform as many partners as possible and attract startups that are interested in the program and in the Russian market. One of the GenerationS partners is the F6S platform, which has over 3.5 million startups. However, an increase in overall coverage does not always render good results. Many GenerationS acceleration programs involve working with science-based technologies; for example, in pharmaceuticals and BioTech, non-digital startups, and targeted technological projects for solving specific tasks.

### THE PURPOSE OF THE QUANTITATIVE SEARCH IS CLEAR. WHAT DO YOU DO TO IMPROVE ITS QUALITY?

— To improve the quality indicator at the scouting stage, we have developed our own special event called GENSTalks. We carry them out within the framework of each accelerator in Russia and abroad. These are pitch sessions conducted by a group of pre-selected startups that were picked during the scouting process, where experts (company representatives) have the opportunity to listen to the most interesting startup solutions, and foreign startups have a chance to get to know the company and ask questions about the program and the Russian market in general. We see an influx of high-quality foreign startups from those countries where such events were held. 20-30% of the total number of projects come from abroad. Sometimes, the number of foreign projects can reach up to 50-70%— it all depends on the needs of our corporate partners.

### GIVEN THE CURRENT SITUATION WITH THE PANDEMIC, DO YOU PLAN TO SUPPORT RUSSIAN STARTUPS?

— Of course. Finding new customers is quite difficult, because many corporations are more focused on getting into various government programs and looking to land on a list of priority businesses that can solve post-crisis problems. Some are also busy optimizing internal business processes. That is why the main thing that we're doing right now is drawing up a list of state programs where our startups could receive funding to support and further develop their business.



### WHICH INDUSTRIES FEEL MOST CONFIDENT AND SECURE IN CURRENT CONDITIONS?

— Medicine and pharmaceuticals. Also, quite a lot of requests come from companies in the energy sector. And of course, FinTech is now one of the most popular technologies, which is understandable because the format of working with clients has undergone changes given the current global situation. The chemical industry is trying to remain active in terms of technology search. The situation is more complicated with industrial companies that need to be physically present at production sites. Due to the crisis, large industrial players are forced to cut their expenses and focus on the primary tasks associated with business. Unfortunately, the search for new technologies has faded into the background, and we are seeing a slight decline in activity.

### TODAY THERE ARE A LOT OF ACCELERATORS ON THE RUSSIAN AND INTERNATIONAL MARKETS. BACK IN 2016 THE GUST PLATFORM SAID THAT THERE WERE 10,000 OF THEM. HOW DO YOU COMPETE WITH THEM?

— By having a differentiated product portfolio and an individual approach. Currently, we are striving to become a platform that will allow corporations and startups to interact as efficiently as possible and achieve high results in terms of joint projects, financial revenue, etc. We have already created a "quality standard" for acceleration programs that was approved by leading European and American associations. This standard was confirmed by the results of our partners over the past year in various fields, and we plan to further improve it. Now we are placing a large bet on the industry, we are working with innovative development programs of corporations and those that are developing on the basis of industry decrees of the president.

The experience accumulated over the past seven years is certainly useful and valuable in terms of contribution to the development of an innovative ecosystem in our country. We managed to create a commercial product within a public company, which contributes, among other things, to the financial indicators of RVC.

**>70**

**GENERATIONS STARTUPS**

were able to scale up their business abroad

**>30**

**GENERATIONS ALUMNI**

completed overseas acceleration programs

**In 2019, the number of foreign applications that were selected exceeded 20% of the total. Leading countries include Kazakhstan, Germany, Finland, Israel, Singapore, Armenia, Belarus, as well as Baltic countries. GenerationS international network of partners covers 60 countries.**

# GENERATIONS IN 2019

GenerationS implements comprehensive corporate development programs, including internal — to stimulate internal entrepreneurship; acceleration programs — for scouting and acceleration of external projects, and international — to educate employees on the methods of creating and managing innovations based on the experience of leading international corporations. In 2019, the line of corporate products was expanded to include online and face-to-face educational programs, innovative audit and strategic development services.

The infrastructure of the accelerator encompasses more than **16,000 startups** from **30 countries** as well as **400 corporate and ecosystem partners.**

# CORPORATE CUSTOMERS OF ACCELERATION PROGRAMS IN 2019:

## 1. THE STATE TRANSPORT LEASING COMPANY GTLK

340 applications from across the world have been submitted since the launch. Most of the projects are cross-industry, and their developments can be applied in the design, production and operation of various types of transport. Top 11 promising projects will continue to the next stage of industrial acceleration.

## 2. PEPSICO GLOBAL FMCG POWERHOUSE

Over 90 startups from Russia, Poland, Kazakhstan, Belarus and other countries applied to join the program. During an offline demo day, 19 startups presented their projects to PepsiCo experts, who have then selected 8 projects for acceleration.

## 3. FERRING PHARMACEUTICALS FROM SWITZERLAND

More than 70 startups from Russia, Ukraine, Estonia, Kazakhstan, Armenia, Uzbekistan and India were considered, and 8 teams qualified for the selection final. The winning team received 10,000 euros to develop its technology. The project offers unique environments for ovarian tissue vitrification that will allow to preserve fertility and perform menopausal hormone therapy in patients of various age groups. Thanks to the support of Ferring's top specialists, the team will be able to develop a commercial product.

## 4. ENEL INTERNATIONAL ENERGY COMPANY

Over 180 startups from Russia, Kazakhstan, Finland, the USA, Armenia, Singapore and other countries applied to join the program. 151 projects passed the initial assessment stage. Out of these, 29 were selected by Enel experts. 5 finalists will present their projects at Enel's head office in Rome.

**500+**
**COMPANIES**
from all over the world took part in the selection process

**>70**
**MILLION RUBLES**
GenerationS total revenue in 2019

**>50**
**STARTUPS**
out of more than 800 Russian and international projects were selected for further development with a possibility of launching joint pilot projects

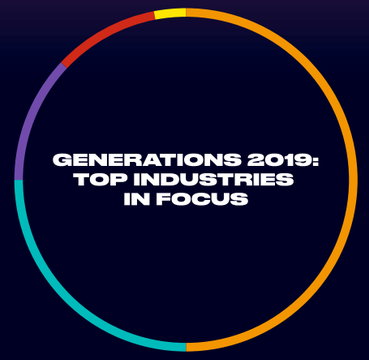
**30+**
**COMMERCIAL PILOT PROJECTS**
with large corporations were launched by the alumni of corporate programs of previous years in 2019

**600**
**PROJECTS**
were assessed by 200 qualified independent professionals from relevant industries

**100+**
**UNIVERSITIES**
the growth in the number of GenerationS partners among specialized Russian universities. The GenerationS partner base currently includes approximately 200 universities across the country

**60**
**COUNTRIES**
included in the international network of GenerationS partners in 2019

**20%**
**THE SHARE OF APPLICATIONS**
from foreign teams; the leading countries include Kazakhstan, Germany, Finland, Israel, Singapore, Armenia, Belarus, and the Baltic States




- transport ~50%
- energy sector ~25%
- FMCG / information technology ~12%
- medical sector ~10%
- other ~3%


- MVP/prototype stage 34%
- pilot production stage 22%
- launched mass production and sales 22%
- R&D stage 12%
- projects presented as ideas 7%
- projects scaling their production 3%

**>9 RUB BN**

**CUMULATIVE VOLUME OF INVESTMENT IN THE PROJECTS OF GENERATIONS ALUMNI, WITH 65% OVERSEAS INVESTMENT**

**30**
**GENERATIONS ALUMNI**
completed overseas acceleration programs

**42**
**COUNTRIES**
the geography of GenerationS alumni

**>70**
**GENERATIONS STARTUPS**
were able to scale up their business abroad

This year's #GENSTalks events abroad were held in Kazakhstan, Estonia and Germany

# DIGITAL ECONOMY

## FORGING THE FUTURE OF MEDICINE IN SAMARA



Samara State Medical University (SamSMU) received the status of a leading research center for digital economy in the field of "Virtual and Augmented Reality Technologies" along with a state grant. Director of the SamSMU Institute for Innovative Development Sergey Chaplygin and his deputy Vitaly Kuzmin talk about the new opportunities of the University, virtual reality training for doctors, its very own Technopark and non-medical inventions of the institute.

### SAMSMU AND THE STATUS OF LRC

Today, SamSMU is a technological valley, where people are conducting studies, treatments and practical science. We apply the best practices of classical Russian medical science and international practices. In particular, the Stanford University management model is applied, as well as its approaches in creating an innovative ecosystem. Small innovative enterprises were set up around our University, there is a startup center for screening and accelerating new ideas, besides that there is a system in place that deals with attracting venture financing and practical implementation in the largest enterprises of the Russian Federation and the CIS states.

SamSMU is developing new progressive methods and approaches of advanced medicine, which are embodied in popular software and hardware-software systems. Today Russian medical science is in dire need of innovative and ground-breaking solutions and approaches. Despite the fact that historically our clinical basis and the level of medical personnel training are good, we're looking to advance our technological base to catch up on the gap of 90s.

We've been working on virtual and augmented reality since 2013. We started to form the core of developers, the culture of production and cultivate a new generation of specialists from day one. In 2015 we conducted the first-ever surgery using augmented reality glasses. We managed to beat Microsoft, a leader in AR technology at the time, which conducted the same operation only a few years later.

### Background information about the LRC competition

In 2019 RVC announced a competition among leading research centers (LRC) and leading companies in the development of products, services and platform solutions based on end-to-end digital technologies. The winners of the LRC competition are seven educational and research organizations that will go on to develop digital technologies with commercial companies. The amount of approved grants for the implementation of each LRC programme activity ranges from 224 million rubles to 300 million rubles for a period of up to three years. Taking into account extrabudgetary funds the total amount of costs for projects is approximately 3 billion rubles.

The Institute began to develop and implement cutting edge technologies for treating diseases (illnesses) and training doctors.

SamSMU had everything at its disposal to participate and win the LRC competition. The new status and the state grant will allow us to expand markets to sell our technologies and products, as well as diversify our geography.

## THE PROJECTS THAT STARTED IT ALL

BIn 2014, having reorganized the Department of Innovative Technologies, SamSMU created an autonomous structure called the Institute for Innovative Development. Its primary focus is on IT medicine. The Institute began to develop and implement cutting edge technologies for treating diseases (illnesses) and training doctors.

The first projects dealt with training medical personnel. We began to make robotic simulators for our students so they could study special manipulations. However, the main drawback of these simulators was that they were expensive and not intended for mass use. In addition, they did not provide feedback and create the necessary conditions for students to immerse into the educational process.

We started to think about ways of optimizing the simulators. We did some research, looked at foreign practices and realized that it was necessary to go digital. So we refocused our team to work with VR&AR technology, developing the first prototypes of training simulators for performing a cricothyrotomy (where an incision made to establish a patent airway) and a larger training simulator for conducting open surgery. We were able to achieve a high degree of realism. We are especially proud of the multi-user mode, where surgeons and surgical assistants from around the world can conduct joint operations on the open surgery simulator.

### Virtual reality technologies of SamSMU in rehabilitation

**ReviVR: VR system for passive rehabilitation with tactile feedback.**

This is extensively used after patients experience strokes and brain injuries. The high efficiency of the rehabilitation course is maintained at the acute, early and late phases. About 3,000 patients in Russia and Kazakhstan underwent rehabilitation with ReviVR and managed to improve their physical activity.

**VR complex ReviMotion: video game rehabilitation system for children and adults.**

It is intended for rehabilitation of patients with movement impairments caused by lesions of the upper motor neuron, extrapyramidal disorders, cerebellar, frontal lobe and vestibular ataxia. ReviMotion is actively implemented in rehabilitation centers across Russia. In 2019 more than 4,000 patients underwent rehabilitation courses.



Soon afterwards products for patient rehabilitation were added to our educational programmes.

## VIRTUAL SURGICAL CLINIC

In 2015 we developed an augmented reality surgical navigation system. Eventually we created a product called Autoplan. This is the first surgical navigation system developed and registered in Russia, its unique design features a stereo camera. The complex is already used in the country's leading clinics, such as the Burdenko National Medical Research Center for Neurosurgery and the Sklifosovsky Clinical and Research Institute of Emergency Medicine in Moscow..

**By the end of 2019 more than 900 successful operations were carried out in Russia with the use of the Autoplan system. The complex received positive assessments based on the test results in Université Jean Monnet (France) and Heinrich Heine (Germany).**

We are continuing to enhance and develop the Autoplan surgical navigation system and we are coming up with related products such as a radiologist workstation.

As part of the LRC programme, we will develop an integration module with operational microscopes for Autoplan. This is necessary to improve the quality of neurosurgery. How will it work? The doctor runs a computed tomography scan, he constructs a virtual 3D model of the patient's brain and does preoperative planning. In the operating room, the neurosurgeon "lays" the three-dimensional model over the patient's brain, tracking the movements of the instruments and the boundaries of the tumor on the microscope screen. The new module will give the neurosurgeon the opportunity to quickly, efficiently and safely prepare for a complex surgery and reduce possible risks for the patient.

## LINKS BETWEEN SCIENCE AND BUSINESS COMMUNITIES

Within each product team, there is a product owner and a business analyst. These people contact customers and offer them the best solutions. We use the best project management practices by applying flexible approaches to (product) development.

SamSMU is a well-known brand in the medical market and we receive a large number of orders from our customers. In other industries such brands would face fierce competition.

We are vigorously gaining new niches and offering new products based on VR&AR. One of such in-demand designs for large enterprises is a software-hardware system that identifies deviant staff behavior. Other examples would be a software-hardware system that imitates different natural disasters and a software-hardware system that trains staff to operate complex technological equipment.

**Currently, 70% of commercial customers of the SamSMU Institute for Innovative Development are medical companies. 30% are within the industry and the education sector. It is estimated that in 2020–2021 the number of non-medical orders in the institute's portfolio will increase to 50% - 60%.**

## CENTER FOR ADVANCED STUDIES (CAS)

In 2014 we participated in the competition organized by the Russian Ministry of of Digital Development, Communications and Mass Media where the goal

**Sergey Chaplygin**
Director of the SamSMU Institute
for Innovative Development

**Vitaly Kuzmin**
Deputy of the Director of the SamSMU
Institute for Innovative Development

**70%**

**Currently, 70% of commercial customers of the SamSMU Institute for Innovative Development are medical companies.**

was to establish centers for advanced studies. SamSMU was the only medical university to win this competition. All of our IT development is concentrated in this center. CAS has become the foundation of LRC and our technological base. Now the center is focused on artificial intelligence technology, analysis and processing of big data. CAS is at the final stages of completing the most important project, which is a software platform for collecting and monitoring citizens medical data and their overall health. The product brings together patients' surveys, information about health from mobile devices and domestic appliances, and the results of in vitro and radiological studies. Currently, some platform modules are used in practical health care.

## TECHNOPARK

Ten years ago we tried to develop prototypes in factories and this turned out to be costly and time-consuming. Large manufacturing plants are simply not interested in working with just one sample. Having our own production was a reasonable solution and that is how the Technopark was launched in 2013. This facility allows us to put our theories into practice, conduct experimental and industrial research and develop turnkey solutions for a variety of problems, significantly reducing development time and cost of final products.

SamSMU is the only medical university in Russia that created a full-fledged small-scale production. It provides a wide range of services and operates on the full cycle principle: from generating ideas together with the customer to creating of a small-scale prototype. Today the Technopark manufactures up to 200 products per year. The Technopark has its own design, manufacturing and electronic components departments. Part of LRC programme is implemented at the Technopark.

### IMPLEMENTING END-TO-END VIRTUAL AND AUGMENTED REALITY TECHNOLOGIES AT THE SAMSMU IN 2019

**104**
**MILLION RUBLES**
were raised from sales of software-hardware systems for surgical navigation and patient rehabilitation

**41**
**MILLION RUBLES**
Is the cost of developed and implemented software products

**120**
**MILLION RUBLES**
were generated in revenue by SamSMU small innovative enterprises

**160**
**MILLION RUBLES**
were attracted as extrabudgetary funds for research and development projects of the University



# RVC AND THE DIGITAL ECONOMY OF THE RUSSIAN FEDERATION

In 2019, RVC implemented the provision of support measures as part of the "Digital Economy of the Russian Federation" national program. Competitive selections of leading research centers (LRC) and leading companies in the development of products, services and platform solutions based on end-to-end digital technologies have been successfully completed.

**11** organizations will receive grant support from RVC in the amount of 2.8 billion rubles

# WHAT IS THE DIFFERENCE BETWEEN LEADING COMPANIES AND LEADING RESEARCH CENTERS?

The winners of the LRC competitive selection included educational and research organizations, which will be developing digital technologies in collaboration with commercial companies acting as industrial partners of LRCs. Having approved LRCs technical briefs and activity programs, these companies will then be able to implement the resulting technologies.
The leading companies will develop and market new products based on end-to-end technologies with enhanced characteristics (compared to the alternatives that are available on the Russian market). As a result of project implementation, the revenue from the sale of new products should significantly exceed the amount of government support.
The competitive selection of LRCs and leading companies was initiated by the Ministry of Communications of the Russian Federation as part of the "Digital Technologies" Federal project of the "Digital Economy of the Russian Federation" national program.
Government support for leading research centers and companies is needed to ensure the digital transformation of priority sectors of the economy and the social sector. This is achieved by stimulating the development of end-to-end technologies, technological solutions and technology-based products. These technologies include AI, robotics and sensor components, quantum technologies, distributed registry systems, wireless communication technologies, new manufacturing technologies, as well as VR and AR technologies.

**82 APPLICATIONS RECEIVED FROM 19 CITIES IN RUSSIA**

# TOP 7 LCRS:

**1. Samara State Medical University (with Istok-Audio International JSC, NeuroTrend JSC, and Gazprom Gazoraspredelenie Samara LLC as industrial partners)**

LRC program «Platform VR & AR Technologies for Human Assessment and Development»

**2. SKOLKOVO Institute of Science and Technology (with industrial partners ELTEX LLC and Radio Gigabit LLC)**

LRC program «Development of a unified digital platform solution providing effective design and deployment of radio access networks based on a new generation (5G) open communication standard harmonized with the international standard».

**3. GlobalInformService JSC (with industrial partner «Concern Sozvezdie» JSC)**

LRC program «Research and Development of 5G/IMT-2020 Radio Access Technology»

**4. ITMO National Research University (with industrial partner Russian Railways JSC)**

LRC program «Digital platform hardware-software solution «Quantum Communication Platform of the Digital Economy»

**5. International Center for Quantum Optics and Quantum Technologies, LLC (with industrial partner RusAtom Automated Control Systems JSC)**

LRC program «Quantum Computing, Universal Quantum Computers, Ion-based Quantum Computers, Quantum Algorithms and Quantum Software»

**6. MIET National Research University of Electronic Technology (with industrial partner RusAtom Automated Control Systems JSC)**

LRC program «Trusted Sensor Systems»

**7. Innopolis University (with industrial partner Aeroflot PJSC)**

LRC program «Creating a Russian verified distributed registry system that meets domestic security requirements, including the creation of a specialized programming language for verifiable smart contracts, tools for their development, execution, and automatic audit (verification) for reliability and security, as well as interoperability mechanisms»



**224–300** MILLION RUBLES

FOR A PERIOD OF UP TO THREE YEARS — THE AMOUNT OF APPROVED GRANTS FOR THE IMPLEMENTATION OF EACH LCR PROGRAM

**3 RUB BN**

THE TOTAL COST OF THE PROJECTS, INCLUDING EXTRABUDGETARY FUNDS

# TOP 4 LEADING COMPANIES:

**1. Micran Research and Production Company**

a project to create domestic 5G modules for medium and large service areas

**2. Perm Scientific-Industrial Instrument Making Company**

a project to create technology and production of a miniature resonant wide-purpose optical gyroscope

**3. Fidesys LLC**

a project to raise the level of implementation of the functional parameters of the CAE Fidesys digital engineering analysis product line with the creation of specialized solutions and cloud services (Industry 4.0)

**4. Antiplagiat JSC**

a project in pan-linguistic analysis of large collections of texts

**129–250** MILLION RUBLES FOR A PERIOD OF UP TO THREE YEARS

THE AMOUNT OF APPROVED GRANTS FOR THE IMPLEMENTATION OF EACH PROJECT

**1,2 RUB BN**

THE TOTAL COST OF THE PROJECTS, INCLUDING EXTRABUDGETARY FUNDS

# RUKAMI

## THREE FINALISTS OF A TECHNICAL CREATIVITY COMPETITION TALK ABOUT INVENTIONS ORIGINATING IN TECHNOLOGICAL CLUBS



"Roboazbuka", customized prosthetic arm and a multifunctional CNC machine — it may sound unbelievable, but the oldest inventor of these is eighteen, and the youngest is only ten years old! All of them are finalists of “Rukami” — a competition of technical creativity, initiated by RVC. Three young makers told us about the “Rukami” festival, their projects and plans for the future.

### "I WANTED TO MAKE SOMETHING COOL"

**Makar Nuriev**

17-year-old, Tatarstan

**created a myoelectric upper limb prosthesis**

— I wanted to make something cool and, remembering the problems that people with disabilities are facing in Russia, I realized what it should be. I began researching relevant scientific articles and I also remembered my mother’s friend who lost his right arm.

So I decided to create a prosthesis, which would allow users to alter its design. This is the main benefit of my invention: each detail is individually selected for a particular person. Plus, its design is adaptive: you can choose from preset options or customize. There are also a number of software improvements: unlike contemporary processors from other companies, my invention uses a three-phase neural network instead of the usual three-stage one. The difference is that a three-phase neural network consists of further three neural networks — thus, it is stronger and more advanced. Such technology is not yet available on the market for prostheses.

I have created a prototype, but it is not in use yet — I am still working on it. Human arm is very complex — it is connected to the spinal cord via nerve endings, each of which sends unique signals. First, I have to collect the statistics of these neural signals, finding their similarities and differences. I can begin to study the data after I have collected information from approximately 100 test subjects. Then I can determine the differences and the similarities in data from different people’s arms — this is the final stage of development. So far I have tested the invention on people with both arms, with one exception: the only test subject without a right limb achieved similar results to the indicators of a person with both limbs, but the impulses to the prosthesis were weaker. This lead me to an understanding that the prototype needs an additional amplifier to strengthen the signal.

At the moment I have two options that would allow me to develop the project further. I submitted my resume for an internship at the “Motorica"

company, which would allow me to work with the required number of test subjects. Alternatively, I could work with state rehabilitation centers, but I will need government's support for that. I know how to introduce this  product onto the market, but this process requires a lot of time and effort.

I am currently studying in the 11th grade of a boarding school for gifted children with advanced study of chemistry in the village of Dubrovka in the Republic of Tatarstan. I'm working on a number of projects simultaneously — one of them is Hall's electromagnetic motor, which accelerates particles.

I can't say that have a clear vision of my future: I can see myself as both a successful businessman and an outstanding scientist. I hope that I won't have to choose between the two.

**Rukami is a non-profit project initiated by RVC and implemented by the NTI Project Support Fund in line with the roadmap for the development of NTI technological clubs (Kruzhok Movement).**

The goal of the project is to attract the attention of young people and the general public to technical creativity, making, and creating individual projects in technological clubs. Rukami festivals, at which students from Russian universities and high schools show their projects, are held in the regions, and then the finalists go on to present their inventions in Moscow.

**In 2019, The Rukami Tech and Creativity Festivals were held in 10 regions of the country and in Moscow. More than 60,000 guests attended.**



## "I RECEIVED VALUABLE ADVICE AT THE FESTIVAL"

— I'm a student at the children's technical creativity center  5, and I often use a laser CNC machine there. Unfortunately, there is often a queue to use it, and I can't always complete what I've planned for the day. Then, at my teacher's suggestion, I built my own unique machine and consequently presented it at the Rukami festival.

I've researched similar machines that are currently available on the market — they are expensive and take up too much space. My CNC machine is designed for milling, engraving and 3D printing, and it is competitive in terms of price and size. It took me about six months to build the first version. I received valuable advice at the Rukami festival. For example, with regards to the material of the casing, I was advised to replace plywood with a durable steel profile, which can also be used to store spare parts. Steel casing would also allow me to make the machine even smaller. I also received advice on which electronics to use.

I destroyed the first prototype, because I built it to understand the principles of constructing CNC machines. I will use this knowledge in the future to create a more advanced machine, taking into account the shortcomings of the previous version. The updated model will be collapsible and made of more durable materials.

In terms of education, I want to study design or engineering. I like the idea of working in shipbuilding.

**Daniil Merkushin**

18-year-old, Naberezhnye Chelny

**built a multifunctional CNC machine**


**In the capital, the event took place on the main square of VDNH on 31st August and 1st September. The theme of the festival was "Digital evolution: transformation that defines the future". More than 200 teams of university and high school students, which included technical enthusiasts from various parts of the country, presented their projects in 4 tracks: "Man", "Space", "Habitat" and "Fun".**

## "I WANT TO CREATE SOMETHING USEFUL"

— My younger brother Arseniy loves books and wanted to learn to read. I thought that I could help him study the alphabet by merging it with his other hobby — robots and mechanisms.

“Roboazbuka” is a set of seven robots with moving parts. My parents contributed their ideas as to what the parts might look like and helped me with the drawings. I used a 3D pen to make the robots. The set also includes cards, which show you how to put different letters together, or you can come up with various options yourself. My brother was very happy when he saw these robots. He started playing with them and could not stop. He has already learned the alphabet and is close to learning to read. He also makes other shapes, such as numbers or images of instruments, with these robots.

Thanks to their moving parts, the robots can change shape. "Roboazbuka" is helpful in learning the letters of the Russian or English alphabet, as well as numbers, colors, shapes and forms. "Roboazbuka" was tested in kindergartens and development centers, and it is now used in several of them, for example, in the city of Slobodskiy.

I became fascinated with robots in pre-school, after seeing the "City of Robots" exhibition. I wanted to learn more about how they work, so I joined the robotics club. Later, I started creating my own models. My parents are very supportive, and so is Maria Lvovna, the head of the club. She helped me with the “Roboazbuka" presentation and a number of other organizational issues.

**Georgy Chuchalov**

10-year-old, Kirov

**invented “Roboazbuka”**

I’m currently working on a new training kit, which might be 3D printed.

I want to become an engineer or an inventor in the future. I want to create something new and useful.

**The festival also housed a lecture hall for parents, where they could approach the leading industry experts to discuss extracurricular education and the benefits of gadgets, or talk about motivating children and bringing them up as future leaders.**



# HOW RVC IS DEVELOPING COMMUNITY AND EDUCATIONAL PROJECTS

Educational programs matter for RVC. It would be impossible to achieve our goals without first training the leaders of future startups, scientists, technology project managers and venture fund managers. We run our own educational programs and courses on technological entrepreneurship, while also supporting the NTI Kruzhok Movement and contributing to the organization of the NTI Contest and University 20.35. Furthermore, RVC supports community development by organizing industry events and awards, and developing Rukami — a large-scale project of technical creativity.

## NTI CONTEST

The NTI Kruzhok Movement Contest is an engineering competition for schoolchildren and students. It is held across 19 profiles, which are all related to technologies of the markets of the future and include unmanned transport, smart energy, small space technology, neurotechnology, etc. Such choice of profiles allows children and teenagers to go beyond the school curriculum by solving complex interdisciplinary problems. The format of the competition teaches them about teamwork. Winners and prize-winners can apply to study at the organizing universities without having to pass entry exams, or they are awarded extra points on admission. In 2019, a new project was unveiled: the NTI Contest.Junior is a track for students in grades 5-7. Prior to that, there were just two tracks: for students in grades 8-11 and for bachelor students.

### The results of NTI Contest.Junior

**22838**
APPLICATIONS FROM 84 REGIONS OF RUSSIA

**1200**
FINALISTS

**16**
CITIES HOSTED THE NTI CONTESTS

**221**
WINNERS

## 5 tracks

1. **«Technologies for people»**
2. **«Technologies for the virtual world»**
3. **«Technologies for space»**
4. **«Technologies for the environment»**
5. **«Technologies for the world of robots»**

In 2019, the NTI Lessons initiative was held for the second time. In this project, teachers are provided with free teaching materials for grades 7-11 in six subjects: "Man", "Environment", "Information", "Strategy", "Technology", and "Production". More than 1500 schools from 79 regions applied.

# TECHNOLOGICAL ENTREPRENEURSHIP COURSE FOR HIGHER EDUCATION INSTITUTIONS

In 2018, in partnership with MSU and ITMO University, RVC developed "Innovative Economics and Technological Entrepreneurship" training course to be taught as part of university education. The course is free and distributed under a free license. Universities only have to apply and wait for the selection results. The course trains students' practical skills; they learn how to create high-tech products and services, manage tasks in technology transfer and licensing, launch startups, carry out commercial R&D, hire teams and draw up action plans for bringing products to market. In 2019, we scaled the course and started to develop specialized versions for NTI markets.

**11 500**

**STUDENTS HAVE COMPLETED TRAINING**

**39**

**UNIVERSITIES LAUNCHED THE «INNOVATIVE ECONOMY AND TECHNOLOGICAL ENTREPRENEURSHIP» COURSE IN 2019**



For this specialized pilot course, we chose the Healthnet and Neuronet markets because of their development potential and business specifics (regulatory framework, product creation cycle, sales, etc.). The objective of the course is to create conditions, which would allow new projects in healthcare technologies to emerge in leading medical and other universities. The structure of the "Technological Entrepreneurship in Life Science" course has already been drawn up in collaboration with Sechenov University, and the universities are planning to test it in 2020.

# RUKAMI

In 2019, RVC launched Rukami — a large-scale project of technical creativity. This is a non-profit initiative aimed at attracting the attention of young people and the general public to technical creativity, making, and creating individual projects in technological clubs. And for the leaders of such clubs, we run educational and networking events, at which they learn how to attract and retain new audiences and foster sustainable communities.

**11**

**CITIES**

**11**

**FESTIVALS**

**>53 K**

**UNIQUE VISITORS VIEWED RUKAMIFEST.COM**

**>200**

**PROJECTS PRESENTED IN THE ALL-RUSSIAN PROJECT COMPETITION**

**>60 K**

**GUESTS**

**>2300**

**PEOPLE JOINED THE "HOW TO CREATE A CLUB" ONLINE COURSE**

The Rukami Tech and Creativity Festival is the main event of the entire project, and it was held in the regions and in Moscow in 2019. The participants had a chance to present their projects, or they could try their hand in creating amazing devices, installations and performances right on the spot. The headliners of the Rukami festival in Moscow, which was held at VDNH, included musicians, artists, entrepreneurs and other interesting guests.

# THE BASIC DEPARTMENT OF RVC AT MIPT

The Basic Department of RVC "Management of Technology Projects" has been running at MIPT since 2011. Only a year later, in 2012, the Department introduced its first master's degree programs for training future professionals. At the end of 2019, the Department was offering two master's programs: "Venture Investments and Technological Entrepreneurship" and "Project Management for AI technologies". The first program is aimed at preparing students for working in venture funds, technology companies and startups; and the second teaches how to work with machine learning in technology companies or join research laboratories.

# TECH IN MEDIA

Tech in Media is an all-Russian competition for journalists and media covering the subjects of science and technology. In 2019, the competition was dedicated to the NTI. Applications were accepted in six areas:

1. **Venture business**
coverage of the investment market, innovative projects and activities of the angel investors' community.

2. **Unmanned transport**
coverage of the market for unmanned vehicles, including quadrocopters, self-driving cars, and unmanned sea vessels.

3. **Technology enthusiast**
coverage of the activities of makers and technology enthusiasts.

4. **AI and machine learning**
covering the science of creating smart systems, such as machine learning, data management, healthcare, and human resource management

5. **Biotechnology and genetic engineering**
coverage of the main areas of development and innovative achievements of modern biotechnology and genetic engineering, which can significantly improve human health and quality of life (BIOCAD Special Track).

6. **Life Science**
coverage of achievements in neurobiology, molecular biology, and related fields (GE Healthcare Life Sciences special nomination).

**2,3**
**RUB MLN**
prize fund

**23**
**JOURNALISTS**
were named winners and awarded a share of the prize fund

**674**
**APPLICATIONS**
submitted by participants from 51 Russian regions and other countries

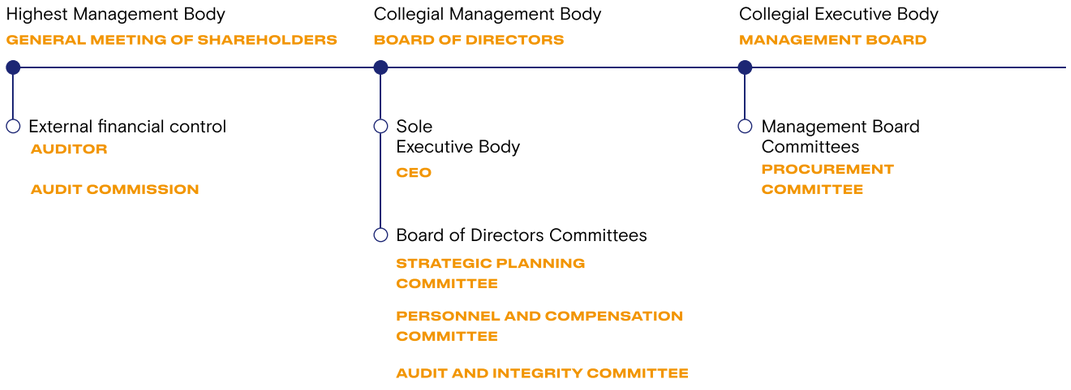


# CORPORATE GOVERNANCE

Russian Federation is the sole shareholder of RVC, and its rights are exercised by the Federal Property Management Agency (Rosimushchestvo). Each year, the representatives of the interests of the Russian Federation (state-appointed directors) are elected to the RVC Board of Directors. This ensures that the interests of the shareholder and the goals of the state development institute are met. The Board of Directors also includes representatives of other Russian state development institutions and members of both science and business communities, which creates a positive synergy effect for the development of innovation infrastructure and the venture capital industry in Russia.

RVC's corporate governance is based on the requirements of Russian legislation and Rosimushchestvo's recommendations, and it also follows the recommendations of the Bank of Russia's Corporate Governance Code.

# Corporate governance system




RVC's highest management body is the General Meeting of Shareholders. Its remit includes decisions on key issues, including approval of the Charter and major deals.

## Board of Directors

RVC's Board of Directors is a collegial management body that determines RVC's priority areas of activity and development strategies, sets the overall direction for RVC's operations (except for those issues that fall within the remit of the General Meeting of Shareholders) and supervises the work of the Management Board and of RVC's sole executive body.

Members of the Board of Directors are elected by the General Meeting of Shareholders for a term until the subsequent annual General Meeting of Shareholders.

The procedure for selecting candidates for the Board of Directors is determined by the sole shareholder, i.e., candidates are selected by Rosimushchestvo commission. The Board of Directors includes individuals representing the interests of the Russian Federation (state-appointed directors, civil servants) and independent directors.

Independent directors are elected to the Board of Directors in accordance with the procedure and criteria established by Decree No. 738 of the Government of the Russian Federation of 3 December, 2004, on the Management of Federally Owned Shares of Joint-Stock Companies and the Use of the Russian Federation's Special Right to Participate in the Management of Open Joint-Stock Companies ("Golden Share").

## Board of Directors Committees

For the purpose of preliminary analysis of materials and the preparation of recommendations on key issues, RVC's Board of Directors established the following committees:

— the Strategic Planning and Investment Committee
— the Personnel and Compensation Committee
— the Audit and Integrity Committee.

The Board of Directors Committees include the members of the Board of Directors as well as the representatives of other development institutions, federal ministries, businesses, innovation and venture capital markets. Such structure ensures that issues in all areas of RVC's activities are being worked out more effectively. The committees are headed by members of RVC's Board of Directors.

## Management Board of Directors

The Management Board is the executive body of RVC in charge of day-to-day operations and strategic management; it oversees the activities of subsidiaries and ensures the implementation of RVC's key strategic documents and decisions of the General Meeting of Shareholders and the Board of Directors. Management Board's actions are governed by the Charter and the Regulation on the Management Board of RVC. RVC's Management Board reports to the Board of Directors and the General Meeting of Shareholders.

## CEO

Alexander Povalko (elected by decision of an extraordinary General Meeting of Shareholders of 22 December, 2016, Order No. 1046-r of Rosimushchestvo; powers extended by the decision of the extraordinary General Meeting of Shareholders of January 28, 2020, Rosimushchestvo Order No. 27-r). RVC's CEO is elected by the General Meeting of Shareholders. The CEO's term of office is established by the General Meeting of Shareholders and does not exceed three years.

## Auditor

The accuracy of RVC's financial (accounting) statements is verified by an external independent auditor approved by the General Meeting of Shareholders based on the results of an open tender (conducted in accordance with legal requirements).

## Audit Commission

The Audit Commission controls RVC's financial and economic activities in order to improve efficiency and protect the interests of shareholders. The Commission is elected by RVC's General Meeting of Shareholders.

## General Meeting of Shareholders

100% stock of RVC belong to the Russian Federation as represented by Rosimushchestvo

In 2019, seven General Meetings of Shareholders were held (one annual and six extraordinary). In accordance with Federal Law No. 208-FZ on Joint-Stock Companies and RVC's Charter, the General Meeting of Shareholders decided on the following issues:

• Approval of the annual report and annual financial statements
• Election of the members of the Board of Directors, the Management Board, and the Audit Commission
• Approval of the Auditor of the Company's financial statements for 2019
• Approval of amendments to the Company's regulatory documents governing the activities of its management bodies
• Increase in the Company's authorized capital.

# 12 members

**OF THE BOARD OF DIRECTORS OF RVC, EFFECTIVE AS OF THE END OF 2019, WERE ELECTED AT THE ANNUAL GENERAL MEETING OF SHAREHOLDERS ON JUNE 28, 2019 (ORDER NO. 401-R OF ROSIMUSHCHESTVO ON DECISIONS OF THE ANNUAL GENERAL MEETING OF SHAREHOLDERS.**

These include:
**2 — independent directors**
**4 — civil servants**
**6 — state-appointed directors**

The Chairman of the Board of Directors is elected by the members of the Board of Directors by simple majority and can be re-elected at any time.

Members of the Board of Directors do not own shares in RVC.

# Key resolutions of 2019

1. Resolutions concerning the operations of RVC-backed funds, as well as the creation of new funds (in the form of investment partnerships).
2. Resolutions aimed at achieving the objectives related to government support of the NTI Centers located within higher education institutions and scientific organizations.
3. Resolutions to implement and finance projects in line with the implementation of roadmaps of the National Technology Initiative.
4. Resolutions aimed at achieving the objectives of the "Digital Economy" program.

# Board of Directors

The composition of RVC's Board of Directors since 28 June 2019 (elected in accordance with Rosimushchestvo Order No. 401-r of 28 June 2019):

1. **MAXIM AKIMOV**
   Deputy Prime Minister of the Russian Federation, Chairman of RVC's Board of Directors
2. **ALEXANDER AUZAN**
   Dean of the Faculty of Economics at Lomonosov Moscow State University, Doctor of Science (Economics), independent director
3. **ALEXANDER GALITSKY**
   Managing Partner at Almaz Capital Partners venture capital fund
4. **IGOR DROZDOV**
   Chairman of the Skolkovo Foundation's Management Board
5. **VASILY OSMAKOV**
   Deputy Minister of Industry and Trade of the Russian Federation
6. **DMITRY PESKOV**
   Special Representative of the President of the Russian Federation on Digital and Technological Development
7. **ALEXANDER POVALKO**
   CEO of RVC
8. **SERGEY POLYAKOV**
   CEO of the Foundation for Assistance to Small Innovative Enterprises



9. **OKSANA TARASENKO**
   Deputy Minister of Economic Development of the Russian Federation
10. **ILYA TOROSOV**
    Deputy Minister of Economic Development of the Russian Federation
11. **YURI UDALTSOV**
    Deputy Chairman of the Management Board, Rusnano MC LLC
12. **OLEG FOMICHEV**
    Director for Strategic Planning and Development, AO ComplexProm

The functions of the Chairman of RVC's Board of Directors were performed by Maxim Akimov, Deputy Prime Minister of the Russian Federation.

The composition of RVC's Board of Directors in the first half of 2019 (elected in accordance with Rosimushchestvo Order No. 651-r of 19 September 2018) consisted of nine people (until 1 March 2019). At extraordinary General Meetings of RVC Shareholders held on 1 March 2019 (Rosimushchestvo Order No. 126-r) and 25 April 2019 (Rosimushchestvo Order No. 246-r), Ilya Torosov, Deputy Minister of Economic Development of the Russian Federation, and Oksana Tarasenko, Deputy Minister of Economic Development of the Russian Federation, were also elected to the Board of Directors.

The current list of RVC's Board of Directors and their bios are available on the website: www.rvc.ru/about/governance/directors.

# Board of Directors Committees

## Strategic Planning and Investment Committee

The Strategic Planning and Investment Committee assists the Board of Directors in preparing resolutions on the Company's strategic goals and priority areas of operations, preparing RVC's development strategy and other strategy documents, as well as in consideration of investment issues, and prepares recommendations to RVC's Board of Directors in this regard.

## Strategic Planning Committee Members

The composition of the Committee by the end of 2019 (elected by resolutions of RVC's Board of Directors of 12 December 2019, minutes No. 18)

**Chairman of the Committee:**

1. **OLEG FOMICHEV**
   Director for Strategic Planning and Development, AO ComplexProm

**Members of the Committee:**

2. **ALEXANDER AUZAN**
Dean of the Faculty of Economics at Lomonosov Moscow State University, Doctor of Science (Economics), member of RVC's Board of Directors

3. **ALEXANDER GALITSKY**
Managing Partner at Almaz Capital Partners, member of RVC's Board of Directors

4. **KIRILL KAEM**
Senior Vice-President for Innovations, Skolkovo Foundation

5. **EVGENY KOVNIR**
CEO of Digital Economy

6. **ALEXANDER LUPACHEV**
Director of Russia Partners

7. **VLADIMIR MOSKVITIN**
Deputy Head of the Office of Deputy Prime Minister of the Russian Federation Maxim Akimov

8. **DMITRY PESKOV**
Special Representative of the President of the Russian Federation on Digital and Technological Development, member of RVC's Board of Directors

9. **ALEXANDER POVALKO**
General Director, Chairman of Management Board of RVC, member of RVC's Board of Directors

10. **OKSANA TARASENKO**
Deputy Minister of Economic Development of the Russian Federation, member of RVC's Board of Directors

11. **ILYA TOROSOV**
Deputy Minister of Economic Development of the Russian Federation, member of RVC's Board of Directors

12. **YURI UDALTSOV**
Deputy Chairman of the Management Board, Rusnano MC LLC, member of RVC's Board of Directors

13. **OLEG TEPLOV**
CEO of VEB Ventures

14. **VYACHESLAV SHULENIN**
Deputy Chairman of VEB.RF



## Activities of the Strategic Planning Committee in 2019

The RVC's Board of Directors' Strategic Planning Committee held 8 meetings in 2019. Six meetings were in-person, while two of them were organized as voting by correspondence.

**During 2019, the Committee considered the following issues:**

- RVC's Business Plan and budget for 2019 and for the 2020–2021 planning period;
- Updating the RVC Development Strategy for 2017–2030 and the RVC Long-Term Development Strategy;
- RVC's key performance indicators in 2019;
- Issues related to creation of venture funds with RVC capital contribution.

## Personnel and Compensation Committee

Personnel and Compensation Committee assists the Board of Directors with the development of systems for staff incentivization (including for members of the Management Board) and bylaws describing the bonus system, as well as recommendations for amending the system.

## Personnel and Compensation Committee Members

Composition of the Committee as of the end of 2019 (elected by resolutions of RVC's Board of Directors of 12 July 2019, minutes No. 10)

**Chairman of the Committee:**

1. **ALEXANDER AUZAN**
Dean of the Faculty of Economics at Lomonosov Moscow State University, Doctor of Science (Economics), professor (member of RVC's Board of Directors, independent director)

**Members of the Committee:**

2. **IGOR DROZDOV**
President of the Skolkovo Foundation Management Board (member of RVC's Board of Directors)

3. **ALEXANDER LUPACHEV**
Director of Russia Partners

4. **VLADIMIR MOSKVITIN**
Deputy Head of the Office of Deputy Prime Minister of the Russian Federation Maxim Akimov

5. **ANTON STOROZHENKO**
Partner at Spencer Stuart

In 2019, the RVC's Board of Directors' Personnel and Compensation Committee held no meetings.

## Audit and Integrity Committee

Audit and Integrity Committee assists the Board of Directors in the issues related to non-financial reporting assurance, RVC's key performance indicators' calculation verification, as well as other issues related to internal control systems, audit, risk management and ethics.

## Audit and Integrity Committee Members

Composition of the Committee as of the end of 2019 (elected by resolutions of RVC's Board of Directors of 12 July 2019, minutes No. 10)

**Chairman of the Committee:**

1. **YURI UDALTSOV**
Deputy Chairman of the Management Board, Rusnano MC LLC, member of RVC's Board of Directors

**Members of the Committee:**

2. **SERGEY BORISOV**
Chairman of the Board of Trustees of 'OPORA RUSSIA', All-Russian Non-Governmental Organization of Small and Medium Business

3. **VLADIMIR MOSKVITIN**
Deputy Head of the Office of Deputy Prime Minister of the Russian Federation Maxim Akimov

4. **SERGEY POLYAKOV**
CEO of the Foundation for Assistance to Small Innovative Enterprises, member of RVC's Board of Directors

## Activities of the Audit and Integrity Committee in 2019

The RVC's Board of Directors' Audit and Integrity Committee held 6 meetings in 2019. One meeting was in-person, while 5 of them were organized as voting by correspondence.

During 2019, the Committee considered the following issues:

- the results of the implementation of the Business Plan (key performance indicators and budget implementation) in 2018;
- documents regulating the RVC's key performance indicators' system;
- information on the functioning of the internal audit, internal control and risk analysis systems;
- the results of the Audit Commission's audit for 2018 and the information on planned measures to implement the Audit Commission's recommendations;
- bylaws governing the work of RVC's risk management systems.



# Management Board

The members of RVC's Management Board are elected from among RVC employees by resolution of the General Meeting of Shareholders on the basis of a recommendation from the Board of Directors. The Management Board must be made up of no fewer than five members. The term of office of members of the Management Board is determined by resolution of the General Meeting of Shareholders and may not exceed three years.

The function of the Chairman of the Management Board is performed by RVC's CEO.

The members of the Management Board as of the end of 2019 were elected by Rosimushchestvo Order No. 385-r of 30 June 2017, Order No. 727-r of 10 October 2017, Order No. 878-r of 20 November 2017, Order No. 651-r of 19 September 2018, and Order No. 301-r of 6 June 2019. The Management Board consists of eight members.

1. **ALEXANDER POVALKO**
CEO

2. **ANDRUSCHAK GRIGORY**
Deputy General Director — Director for Technology and Innovation Support Programs

3. **MIKHAIL ANTONOV**
Deputy General Director — Director for Innovative Infrastructure Development

4. **ALEXEY BASOV**
Deputy General Director — Investment Director

5. **KUMANINA EKATERINA**
Director for Strategic Communications

6. **ELENA MIKHEEVA**
Director of Risk Analysis and Internal Control Department

7. **ANNA ROMANENKO**
Deputy General Director — Executive Director

8. **MIKHAIL FEDOTOV**
Financial Advisor to the General Director

The current list of RVC's Management Board and their bios are available on the website: www.rvc.ru

# ANNEX

# CONTROL, AUDIT AND RISK MANAGEMENT

RVC's main control, audit and risk management bodies are the Board of Directors, the Audit and Integrity Committee of the Board of Directors, the Audit Commission, the CEO, the Risk Analysis and Internal Control Department and the Internal Audit Department. RVC's financial (accounting) statements are audited by an external independent auditor approved by the General Meeting of Shareholders based on the results of an open competitive selection process. RVC applies comprehensive efforts to develop its internal control, audit and risk management system in line with best corporate governance practices.

## Internal control and audit

The internal control and audit system is designed to ensure the achievement of RVC's strategic goals and objectives, the implementation of the Company's financial and business plans and the preservation and efficient use of its resources and capacity, as well as to ensure that RVC and its subsidiaries are in compliance with the requirements of Russian legislation and local regulations.

In the reporting period, the Company took measures to implement RVC's policies on internal audit and control, as well as to improve the organizational and legal framework for the functioning of the internal control and audit system, including:



- developed a methodology for organizing and conducting monitoring (evaluation) of the Company's internal control system
- carried out monthly reviews of employees' compliance with the requirements of RVC's bylaws and with the conditions of civil law contracts entered into by the Company when making payments, and informed the CEO about the results of these reviews
- developed measures to rectify the identified shortcomings, and consulted with employees on improving internal control of the Company's business processes
- regularly checked procurement documentation for non-compliance with the legislation of the Russian Federation and the Company's bylaws
- conducted an assessment of Company's bylaws, the operations of the Company's business divisions, as well as the availability, application, adequacy and effectiveness of control procedures

In 2019, the Internal Audit Department carried out 15 audits, including planned audits of the financial and business operations of RVC's subsidiaries and an assessment of the effectiveness of the Company's internal control and risk management system.

In accordance with RVC's Internal Audit Policy and the International Standards for the Professional Practice of Internal Auditing, RVC's Audit and Integrity Committee regularly reviewed internal audit plans and reports on the results of the internal audit activities within the Company. At the end of the year, changes were made to the RVC's Internal Audit Policy in order to clarify its phrasing and introduce amendments, which take into account the specifics of RVC's activities.

## Audit Commission

The members of the Audit Commission are elected by the General Meeting of Shareholders. The Commission consists of at least three people. Members of the Audit Commission cannot simultaneously be members of the Board of Directors or hold other positions within RVC's management bodies.

**The composition of the Audit Commission (elected by decision of the Extraordinary General Meeting of Shareholders of 20 November 2019):**

1. **NIKOLAY STARCHENKO**
member of the Management Board, Deputy Executive Director of the National Association of Corporate Directors, independent expert

2. **ALEXANDER ARIFOV**
First Deputy Chairman of the Board at JSC RUNA-BANK, independent expert

3. **VIKTOR BOVT**
Senior Audit Manager at VimpelCom, independent expert

4. **KONSTANTIN LUKOYANOV**
Partner in the law firm of Chernyshov, Lukoyanov and Partners (CLP Law Offices), independent expert

5. **DENIS MOLODYKH**
Assistant to the Head of the Federal Agency for State Property Management (Rosimushchestvo)

6. **VALERIA STEPANOVA**
Deputy Director of the Department of Strategic Development and Innovations at the Ministry of Economic Development of Russia

The functions of the Chairman of the Audit Commission are performed by Nikolay Starchenko (elected by Decision No. 2-2019 of the Audit Commission of 29 November 2019).

The RVC Audit Commission that operated in the first half of 2019 (from 29 June 2018 to 20 November 2019) consisted of five members.

**The tasks of the Audit Commission include:**

• Checking the accuracy of information contained in the Company's annual report and annual financial statements

• Auditing the Company's financial and economic activities, in particular, checking the procedures for maintaining accounting records and providing financial statements for compliance with the legislation of the Russian Federation, the Charter, internal and other documents

• Monitoring Company's compliance with the legislation and other regulatory legal acts governing its activities, the legality of operations performed by the Company, the status of the cash register and assets

• Controlling the creation and use of the Company's reserve and other special funds

• Checking the accuracy and promptness of accrual and payment of dividends on the Company's shares, interest on bonds, and income from other securities

• Controlling the implementation of previously issued recommendations of the Audit Commission based on the results of the audit of the Company's financial and economic activities

• Implementing other actions (measures) related to the audit of the Company's financial and economic activities

## Audit and Integrity Committee

In accordance with the Regulation on the Committees of RVC's Board of Directors, approved by the Board of Directors (minutes No. 18 of 12 December, 2019), the Audit and Integrity Committee was established for the preliminary consideration of the most important issues that, according to the Company's Charter, fall within the remit of the Board of Directors, including consideration of issues concerning the systems of internal control, audit, risk management, and ethics.

## External audit

In compliance with the applicable legal requirements, RVC conducts an annual mandatory audit of its financial (accounting) statements. The auditor is selected on a competitive basis in accordance with the requirements of Federal Law of the Russian Federation No. 307-FZ of December 30, 2008 on Auditing and in the manner prescribed by Federal Law No. 44-FZ of April 5, 2013 on the Contract System for the Procurement of Goods, Works and Services for State and Municipal needs.

**HRB Vneshaudit JSC was elected as RVC's auditor in 2019.**

## Fighting Corruption

RVC's Anti-Corruption Policy reflects a commitment to high ethical standards of business conduct, the Company's desire to improve its corporate culture and follow best practices in corporate governance, as well as concern for RVC's business reputation. RVC is included in the Consolidated Register of Participants in the Anti-Corruption Charter of Russian Business.

Every two years RVC completes the procedure for declaring its compliance with the provisions of the Anti-Corruption Charter of Russian Business and an assessment of measures to prevent and combat corruption.



The company, within the framework of its competence, is initiating the introduction of anti-corruption policies in its subsidiaries and affiliates that are analogous with RVC's anti-corruption policy, as well as making efforts to comply with the provisions of this document in joint companies and associations, as well as by contractors.

In an effort to prevent and combat corruption in 2019, the Company implemented its Anti-Corruption Action Plan, approved by RVC Order No. 02/16 dated January 19, 2016.

**The Company's main activities aimed at preventing corruption included the following:**

• Unifying the corporate Anti-Corruption Policy

• Improving interaction between business divisions

• Maintaining the operation of RVC's hotline

• Improving the procedure for conducting workplace inspections

• Updating the register of persons required to provide information on their interest in transactions concluded by RVC

• Ensuring the inclusion of anti-corruption conditions (reservations) in all contracts with counterparties (when approving draft contracts and when concluding contracts)

• Anti-corruption monitoring (analysis of RVC's statutory and operational activities)

• Analysis of reports and negative media publications about RVC's activities

In order to improve the organizational and legal framework for combating corruption, measures were taken in 2019 to improve the risk management, internal control and internal audit systems.

Activities aimed at the formation of common approaches to ensuring work on the prevention and enhancement of the effectiveness of the Company's anti-corruption efforts are carried out on an ongoing basis.

## Risk management

Part of RVC's corporate governance practice includes identifying and responding to risks. Risk management is a continuous, systematic process that affects all of RVC's operations.

RVC established and operates a risk management system based on legislative requirements, government standards and best practices in risk management.

**The following measures were taken during the reporting period in order to improve the risk management system:**

• The risk management section has been updated in terms of consolidating the approach to the qualitative characterization of risk appetite (in the RVC Development Strategy until 2030)

• The Company's management was informed about the current state of the risk management system

• RVC Risk Committee continued its activities, it held 15 meetings during which it carried out comprehensive assessments of risks to RVC and discussed measures aimed at minimizing those risks

• Company employees received training on the methodology for risk identification and assessment and for the development of risk management measures

• The functioning of the risk management and internal control systems was secured, as was their integration into the corporate management processes of NTI projects in order to implement NTI action plans (road maps)

**An integral element of risk management at RVC is providing methodological assistance for subsidiaries' risk management and internal control systems, as well as monitoring their performance.**

# INFORMATION TECHNOLOGY

In 2019, within the framework of its digital strategy for 2018-2021 “Digital RVC project”— RVC achieved the following results and milestones:

- creation of “Fund of funds” - the first release of an automated system for monitoring the investment portfolio of funds with the participation of RVC. The system is fully operational;
- the creation and implementation of “CRM” - the first release of the automated funnel management system for companies, projects and teams supported by RVC, including the following modules: “TechUp”, “National Champions”, “NTI. Infrastructure”, “NTI. Export”, “NTI. Spin-off”, “NTI. Technological breakthrough”, “NTI. Kruzhok movement”, “NTI. Up Great Technology Contests”;
- creation of the first release of the “GenerationS” automated corporate accelerator management (control) system, its launch is scheduled for 2020;
- creation and implementation of the first release of the “Corporate Portal” automated system that provides management of internal corporate content and personnel services;
- a number of tasks were completed within the framework of digitalization of management, business and tax accounting, corporate governance, procurement and contractual activities of RVC.

# DISCLOSURE

**As it is not a public company, RVC discloses information on a voluntary basis. The disclosure procedure is governed by RVC’s Regulation on Disclosure, which requires the publication of:**

**1.** Annual report

**2.** Annual accounting (financial) statements

**3.** RVC’s Charter and internal documents regulating the activities of RVC bodies

**5.** Decision on the issue (additional issue) of securities

**6.** Information on the acquisition of more than 20 (twenty) percent of the voting shares of any other public or non-public joint-stock company

**7.** Information about the corporate governance system

This information is disclosed on www.rvc.ru

In addition, RVC, in accordance with legal requirements, discloses information in the Unified Federal Register of Information about the Activities of Legal Entities.

# DIVIDENDS

**In accordance with decrees of the Government of the Russian Federation and the directives of the Federal Agency for State Property Management, RVC allocates 25% of its net profit at year end for the payout of dividends. In the absence of profit, dividends are not paid.**

A decision on profit allocation, including dividend payments for 2019, will be made at the Annual General Meeting of Shareholders in June 2020.



# PROCUREMENT

**704 229,02** rub thousand

**THE TOTAL VOLUME OF PURCHASES IN 2019**

**477 376,60** rub thousand

**THE VOLUME PURCHASED THROUGH COMPETITIVE PROCEDURES, WHICH AMOUNTED TO 68 % OF ALL PURCHASES**

**395 823,60** rub thousand

**THE SHARE OF PURCHASES FROM SMALL AND MEDIUM-SIZED BUSINESSES, WHICH AMOUNTED TO 65.05% OF ALL PURCHASES**

Information on the company’s procurement is available in the unified procurement information system www.zakupki.gov.ru, on the RVC website www.rvc.ru/about/purchase/, and also on the unified trading system’s electronic trading platform www.rts-tender.ru, in the case of purchases in electronic form.

# FINANCIAL RESULTS FOR 2019

**4,7** rub billion

**THE REVENUES FROM RVC'S CORE ACTIVITIES IN 2019**

**35,9** rub billion

**THE CUMULATIVE VOLUME OF RVC’S CAPITAL AND RESERVES AS OF DECEMBER 31, 2019**

In 2019, RVC did not take on any borrowings in the form of loans or credits. RVC has no overdue payables, including to budgets and extrabudgetary funds.

# PERFORMANCE OF RVC-BACKED FUNDS

## Subsidiary Funds

### RVC Seed Fund

| Indicator | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|
| Number of portfolio companies in the fund | 56 | 64 | 62 | 64 | 58 | 56 | 45 |
| Actual amount of RVC equity in the fund (RUB mln) | 1 980 | 1 980 | 1 980 | 1 980 | 1 980 | 1 980 | 1 980 |
| Amount of invested funds (RUB mln) | 790,00 | 902,36 | 1 045,95 | 1 223,48 | 1 170,46 | 1 168,58 | 1 045,36 |
| Approved investments (RUB mln) | 1 311,50 | 1 496,60 | 1 545,94 | 1 618,50 | 1 415,27 | 1 375,27 | 1 190,54 |
| Number of exit transactions from companies invested in previously | 5 | 10 | 12 | 13 | 13 | 15 | 10 |

### RVC Infrastructure Investments Fund (RVC InfraFund) *

| Indicator | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|
| Number of portfolio companies in the fund | 15 | 21 | 25 | 29 | 30 | 24 | 13 |
| Actual amount of RVC equity in the fund (RUB mln) | 1 099,00 | 1 099,00 | 1 099,00 | 1 099,00 | 1 099,00 | 2 599,00 | 2 599,00 |
| Amount of invested funds (RUB mln) | 212,00 | 297,00 | 435,00 | 496,00 | 417,38 | 361,47 | 285,92 |
| Approved investments (RUB mln) | 675,00 | 987,00 | 1 185,40 | 969,00 | 874,28 | 683,10 | 408,54 |
| Number of exit transactions from companies invested in previously | — | 2 | 5 | 6 | 7 | 14 | 8* |

* Taking into account the sale of a share of CJSC "LANOTEK-engineering"; As of December 31, 2019, the company is in the portfolio, there is an outstanding loan.



### RVC Biopharmaceutical Investments Fund

| Indicator | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|
| Number of portfolio companies in the fund | 8 | 13 | 15 | 18 | 20 | 17 | 11 |
| Actual amount of RVC equity in the fund (RUB mln) | 770,00 | 770,00 | 770,00 | 770,00 | 770,00 | 770,00 | 1 470,00 |
| Amount of invested funds (RUB mln) | 112,79 | 314,86 | 494,99 | 610,25 | 644,54 | 638,99 | 468,25 |
| Approved investments (RUB mln) | 769,11 | 978,11 | 724,29 | 743,7 | 1 053,68 | 1 024,31 | 599,36 |
| Number of exit transactions from companies invested in previously | — | — | — | — | 1 | 4 | 6* |

* Taking into account the sale of a share of "Akcentr" LLC; As of December 31, 2019, the company is in the portfolio, there is an outstanding loan.

### Venture fund for investments in civilian technologies from the military-industrial complex (RVC Civil Technologies)

| Indicator | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|
| Number of portfolio companies in the fund | — | 3 | 4 | 7 | 7 | 5 | 3 |
| Actual amount of RVC equity in the fund (RUB mln) | 350 | 350 | 350 | 350 | 350 | 350 | 350 |
| Amount of invested funds (RUB mln) | — | 63,70 | 88,00 | 150,005 | 127,91 | 127,90 | 86,50 |
| Approved investments (RUB mln) | 30,00 | 215,80 | 234,68 | 217,18 | 189,18 | 138,90 | 90,00 |
| Number of exit transactions from companies invested in previously | — | — | 1 | 1 | 1 | 3 | 2 |

# Funds in foreign jurisdictions

### Russian Venture Capital I LP

| Indicator | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|
| Number of portfolio companies in the fund | 3 | 3 | 3 | 2 | 2 | 2 | 2 |
| Actual amount of RVC equity in the fund (RUB mln) | 38,35 | 38,70 | 45,69 | 60,795 | 60,795 | 60,795 | 60,795 |
| Amount of invested funds (RUB mln) | 38 | 38,35 | 45,35 | 60,361 | 60,361 | 60,361 | 60,361 |
| Approved investments (RUB mln) | 38 | 38,5 | 45,35 | 60,361 | 60,361 | 60,361 | 60,361 |
| Number of exit transactions from companies invested in previously | — | — | — | 1 | 1 | 1 | 1 |

### RVC IVFRT LP

| Indicator | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|
| Number of portfolio companies in the fund | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Actual amount of RVC equity in the fund (RUB mln) | 12,56 | 13,84 | 13,84 | 13,84 | 13,84 | 13,84 | 13,84 |
| Amount of invested funds (RUB mln) | 23,90 | 28,45 | 32,20 | 32,70 | 32,70 | 32,70 | 32,70 |
| Approved investments (RUB mln) | 35,00 | 35,00 | 35,00 | 35,00 | 35,00 | 35,00 | 35,00 |
| Number of exit transactions from companies invested in previously | — | — | — | — | — | — | — |



# Closed-end venture funds

### Bioprocess Capital Ventures CE VF

| | |
|---|---|
| Year established | 2007 |
| Purpose of the fund | • Healthcare and technologies for life and health/living systems<br>• New materials and chemical compounds (fine chemistry ) |
| Management company | Bioprocess Capital Partners LLC |
| RVC's share | 49,00% |
| Actual size of the fund as of 31 December 2019 (RUB mln) | 3 000,000 |
| Actual amount of invested funds as of 31 December 2019 (RUB mln) | 3 000,000 |
| Actual amount of RVC's investment in the fund as of 31 December 2019 (RUB mln) | 1 470,000 |
| Number of project companies in the fund as of 31 December 2019 | 8 |
| Approved investments as of 31 December 2019 (RUB mln) | 3 223,14 |
| Amount of funds invested as of 31 December 2019 (RUB mln) | 3 218,01 |

### VTB — Venture Capital Fund CE VF

| | |
|---|---|
| Year established | 2007 |
| Purpose of the fund | • New materials and chemical compounds<br>• Information technology<br>• Network technologies and services<br>• Alternative energy<br>• Industrial equipment<br>• Agriculture, forestry and raw materials processing |
| Management company | VTB Capital Asset Management JSC |
| RVC's share | 49,00 % |
| Actual size of the fund as of 31 December 2019 (RUB mln) | 3 061,000 |
| Actual amount of invested funds as of 31 December 2019 (RUB mln) | 3 061,000 |
| Actual amount of RVC's investment in the fund as of 31 December 2019 (RUB mln) | 1 499,890 |
| Number of project companies in the fund as of 31 December 2019 | 5 |
| Approved investments as of 31 December 2019 (RUB mln) | 1 225,31 |
| Amount of funds invested as of 31 December 2019 (RUB mln) | 1 215,91 |

**Leader-Innovations CE VF**

| | |
|---|---|
| Year established | 2008 |
| Purpose of the fund | • Energy industry and energy conservation<br>• Alternative energy<br>• New materials and chemical compounds<br>• Network technologies and services |
| Management company | Leader CJSC |
| RVC's share | 49,00% |
| Actual size of the fund as of 31 December 2019 (RUB mln) | 1 380,406 |
| Actual amount of invested funds as of 31 December 2019 (RUB mln) | 1 380,406 |
| Actual amount of RVC's investment in the fund as of 31 December 2019 (RUB mln) | 676,399 |
| Number of project companies in the fund as of 31 December 2019 | 6 |
| Approved investments as of 31 December 2019 (RUB mln) | 1 120,34 |
| Amount of funds invested as of 31 December 2019 (RUB mln) | 883,81 |

**S-Group Ventures CE VF**

| | |
|---|---|
| Year established | 2008 |
| Purpose of the fund | • Information technology<br>• Alternative energy<br>• Energy industry and energy efficiency<br>• New materials and chemical compounds<br>• Healthcare and technologies for life and health/living systems<br>• Consumer market |
| Management company | S-Group Capital Management LLC |
| RVC's share | 49,00% |
| Actual size of the fund as of 31 December 2019 (RUB mln) | 1 160,645 |
| Actual amount of invested funds as of 31 December 2019 (RUB mln) | 1 160,645 |
| Actual amount of RVC's investment in the fund as of 31 December 2019 (RUB mln) | 568,719 |
| Number of project companies in the fund as of 31 December 2019 | 6 |
| Approved investments as of 31 December 2019 (RUB mln) | 1 445,65 |
| Amount of funds invested as of 31 December 2019 (RUB mln) | 1 443,93 |



# Funds established in the form of Investment Partnership Agreement (IPA)

| Fund name | Year established | Purpose of the fund | Management company |
|---|---|---|---|
| Softline Seed Fund IPA | 2013 | Russian companies that specialize in solutions in the field of cloud technologies, mobile applications, data security systems, digital marketing with Russia as their primary sales market | Softline Internet Projects LLC |
| High-Tech Seed Fund IPA | 2013 | Innovative companies in IT, biotechnology, new materials, energy efficiency | TONAP-Venture LLC |
| RusBio Ventures IPA | 2014 | Companies in the biomedical industry, including in biomedicine and biomedical services, bioinformatics, biotechnology, medicine and healthcare, pharmaceuticals | RusBio Ventures LLC |
| ACP Seed Fund IPA | 2014 | B2B software, hardware and software packages | ACP LLC |
| Venture Fund Accelerator IPA | 2014 | Innovative companies in the area of Hardware 2.0: wearable technology, IoT, medical technology | DI Group LLC |
| Life Sciences Seed Fund IPA | 2015 | Innovative companies in the field of pharmaceuticals, biotechnology, medical instrumentation, agrobiotechnologies | KSI Ventures LLC |
| Russian-Belarusian Venture Investment Fund IPA | 2016 | Special-purpose companies that have a product/ service based on innovative technology and that are carrying out the design, development and/or commercialization of the technology independently | RVC InfraFund LLC and Belifond |
| Skolkovo Venture Fund — IT I IPA | 2017 | Innovative IT companies | Skolkovo — Venture Investments LLC, Vzlyot LLC, IBS IT Services JSC |
| Skolkovo Venture Fund — Agrotechnological I IPA | 2017 | Innovative companies in the field of agricultural technologies, including digital and unmanned technologies for agribusiness, precision farming, alternative farms, bio-fertilizers and pesticides, innovative feed, storage and processing technologies | Skolkovo — Venture Investments LLC |
| Skolkovo Venture Fund – Industrial I IPA | 2017 | Innovative companies in the following areas: engineering software; engineering; energy efficiency; additive and hybrid technologies; control, management and warning systems; technologies and equipment for industrial and medical diagnostics; sensor studies; IoT; clean technologies; software and hardware solutions for infrastructure protection; big data; unmanned systems; navigation; mechanical engineering | Skolkovo – Venture Investments LLC |
| Tomsk State University Seed Fund IPA | 2017 | Any innovative companies carrying out activities in accordance with the list of priority areas and/or critical technologies of the Russian Federation | National Research Tomsk State University Federal State Autonomous Educational Institution of Higher Education (TSU RI) |
| Terra Fund II IPA | 2018 | Special-purpose, late-stage companies in the field of traditional energy technologies, smart grids, industrial IoT, robotics, artificial intelligence, machine learning | Terra.VC LCC |

| Fund name | Year established | Purpose of the fund | Management company |
|---|---|---|---|
| National Technology Initiative Venture Fund IPA | 2018 | Investments are made in companies: in order to implement NTI action plans (road maps) and/or if it is practicable under applicable law developing cross-cutting technologies related to the following key scientific and technical areas of the NT | KF Ventures LLC |
| Far East Fund for the Development and Implementation of High Technologies IPA | 2018 | Investments in growing Russian companies that are developing technologies, products and services that are of current interest or have a promising future | Far East High-Tech Fund LLC |
| Da Vinci Pre-IPO Tech Fund IPA | 2018 | Information technology, smart mobility, autonomous trucking systems, on-demand economy, financial technologies (fintech and blockchain), cross-industry B2B solutions based on IoT and big data technologies, products/ technologies related to artificial intelligence, AR/VR, cybersecurity with global scalability | Da Vinci Capital Management LLC |
| “New Industry Ventures” | 2019 | The focus is on investing in companies developing new materials, technologies, products and services for the oil and gas industry | Managing Partner of the Investment Partnership “New Industry” LLC |
| “Farmmed Innovations” IPA | 2019 | The partnership will invest in targeted medical and pharmaceutical companies mainly in the following areas:<br>a) Creation (Development) of new medicines and appliances to administer medicines;<br>b) Development of high-tech medical devices and their commercialization.<br>c) Software development (only if there’s a possibility to obtain a registration certificate or any other kind of authorization document in compliance with the law). | Unicorn Capital Partners LLC |
| Investment Partnership "Venture Fund to Support Advanced Educational Technologies in the Digital Economy" | 2019 | The partnership will invest in targeted companies with a focus on educational technologies, including but not limited to:<br>a) Creation of educational content<br>b) Technologies for ensuring the accessibility of educational programs for the general public<br>c)Technological platforms uniting participants in the education system:<br>•learning management system<br>•education platforms (uniting students and graduates, teachers, students and their parents, educational materials exchange platforms, etc.).<br>d) Technologies that enhance the education experience and the educational process through games, simulations, robotics and artificial intelligence<br>e) Technologies that allow combining and / or mix old and new learning models to create a more flexible, personalized approach to the student, which takes into account the goals of the program.<br>f) Technologies, tools for control and verification of knowledge; new technologies for confirming the level of obtained knowledge and qualifications.<br>g)Technologies and solutions that allow students to gain experience and become employed | RBF Ventures LLC |

## ABOUT REPORT

This Annual Report was prepared for the period from 1 January 2019 through 31 December 2019 using information available to the RVC. Financial indicators are based on financial statements audited in accordance with Russian Accounting Standards. Operating indicators are disclosed taking into account the following requirements:

- Bank of Russia Regulation No. 454-P of 30 December 2014 on the Disclosure of Information by Issuers of Equity Securities
- Corporate Governance Code (recommended for use by Letter No. 06-52/2463 of the Central Bank of the Russian Federation of 10 April 2014).

## DISCLAIMER

The present RVC Public Annual Report for 2019 was prepared using information available to the company at the time of its preparation. The report contains information on the results of the company’s activities in 2019 and forecast data, statements regarding the intentions, opinions or current expectations of the company regarding the results of its activities, financial position, liquidity, growth prospects, strategy and the development of the industry in which RVC operates.

Such forward-looking statements are characterized by risks and uncertainties, since they depend on circumstances that may change in the future. RVC does not give any direct or implied assurances or guarantees, nor does it bear any responsibility in the event of damages that may be incurred by individuals or legal entities as a result of using the forward-looking statements contained in this report, for any reason, directly or indirectly. These individuals should not fully rely on the forward-looking statements contained in this document, as they are not the only possible scenario that may occur.

With the exception of cases stipulated by the legislation of the Russian Federation, RVC does not undertake obligations to revise or confirm expectations and estimates or to publish updates and changes to the forward-looking statements presented in this report in connection with subsequent events or the receipt of new information..

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