SKOLKOVO

Innovation support and opportunities for cooperation

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Project Manager
Advanced industrial technology cluster
The mission, vision and target result of the Foundation by 2020 determine the key direction of development.

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<th>VISION</th>
<th>MISSION</th>
<th>TARGET RESULT</th>
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| Russia is a technological power, a leader in the field of scientific research and education. | Create an innovation ecosystem favorable to entrepreneurial and research activities in the following areas:  
- energy efficiency and energy saving;  
- nuclear technologies;  
- space technologies;  
- biomedical technologies;  
- computer technologies and software development. | Self-developing innovation ecosystem, facilitating the creation of jobs at new companies and attracting talented people. |
The project is now focused on self-development and unlocking of the ecosystem’s commercialization potential.

- **Creation and development of a critical mass of the key elements of the innovation ecosystem**
- **Further development of the innovation ecosystem’s key elements, including development and implementation of turnover mechanisms within elements as well as ensuring their integration and interaction**
- **Transition to self-development; unlocking the ecosystem’s commercialization potential**
### SKOLKOVO INNOVATION ECOSYSTEM AT A GLANCE

#### STARTUPS
- Number of startups: 1,802
- Total revenue: $3.0B
- Total investments: $600M+
- Jobs: 27,2K FTE
- Patents: >1,200

#### INDUSTRIAL COMPANIES
- Number of partners: 91
- Workforce: 6,300+
- R&D Centers in Skolkovo: 24

#### INVESTORS
- Number of deals: >150
- Investments: >$235M
- Share of Russia’s VC market: >40%

#### SKOLTECH
- Professors and lecturers: 85+
- Students: 600+
- Centers for Research, Education and Innovation: 10

#### Innovation city and physical infrastructure
- Technopark Skolkovo – the largest technology park in Europe has opened
- The residential areas have been put into operation, the first residents have received keys
- 2.6M sq. m. of total space, currently over 700,000 sq. m. are complete

#### Technopark service infrastructure
- 40 service providers in Skolkovo Technopark
- By January 1st, 2018 more than 300 startups have already reallocated or planning to move to Skolkovo Innovation center.
- Over 20 th. sq. m. of office and laboratory facilities in the Technopark Skolkovo complex of buildings

#### Skolkovo Intellectual Property Center
- Over 1,670 applications, including more than 300 international applications submitted through Skolkovo IP Center
- More than 120 transactions of Skolkovo startups with an estimated value of over $60M supported in 2014-2016
- The Skolkovo Foundation has the status of an Official Observer at the UN WIPO

#### Skolkovo Ventures Venture Investments
- Three venture funds launched in partnership with RVC:
  - High-tech
  - IT
  - Biotech
- More than $200M of assets under management
SKOLKOVO STARTUPS

Total number of Skolkovo startups
1,802

Over 40% of Skolkovo startups reported revenue in 2016
Every 22nd of them reported revenue of over $1.5M
Over 160 Skolkovo startups reported international sales
Every 5th startup submitted an application for IP registration, every 11th obtained a patent or license

Improving quality of Skolkovo startups

- Acceleration programs, including foreign accelerators
- Skolkovo mentorship panel development
- Cooperation with industrial partners, including development of demand for innovative technologies
- Research activity is monitored regularly, and 417 startups have lost their Skolkovo status for failure to comply with the requirements for resident startups
- Regular monitoring of procedures of startups receiving grants
- The technical and business expertise of the expert panel is updated and enhanced
SELECTION AND ASSESSMENT OF SKOLKOVO STARTUPS

Instruments to ensure quality and transparency of the process

- **random sampling** of independent experts
- **formalization of procedures**
- **publication of results** on the foundation website

**Skolkovo board of experts**

1. **Collegial character**
   Over 700 experts are included on the expert board, 30% of them are foreign specialists

2. **Competence**
   - 1 Nobel laureate
   - About 15 members of the Russian Academy of Science
   - Over 250 professors of leading Russian universities
   - Over 100 DScs and PhDs of foreign universities
   - Over 150 top managers and founders of companies

3. **Independence**
   Experts are not employed by the foundation, and their identity is not disclosed to applicants or to foundation employees working with applicants.

Average period of application review 33 days

Total number of applications reviewed Over 10,000

Total number of startups that obtained status Over 2,000

The process of becoming a Skolkovo startup

1. **Online application**
2. **Formal application review**
3. **External expert assessment**
4. **Documents review**
5. **Skolkovo startup status approval**
SKOLKOVO STARTUPS: SUPPORT MEASURES

FINANCIAL SUPPORT

1. Support of attraction of venture financing:
   • Venture Funds and Business Angels community development
   • Development of materials for professional investors
   • Facilitation of investments from professional investors

2. Grant financing:
   • Non-repayable financing
   • The foundation provides micro-grants (up to $20,000) for local tasks, mini-grants (up to $70,000) for the base-phase of the project and grants (up to $4M) for R&D, provided that the startup attracts co-financing of 25% to 75%, depending on the project stage and grant amount

3. Tax and customs benefits:
   • Insurance premiums - 14%
   • Profit tax – 0%
   • Exemption from VAT
   • Property tax – 0%
   • Reimbursement of customs payments

NON-FINANCIAL SUPPORT

4. Acceleration services:
   • Mentorship program
   • Support of commercialization
   • Marketing support
   • Acceleration programs in Russia and abroad

5. Intellectual property protection:
   • Patenting in Russia and abroad
   • Patent search and development of patent landscapes
   • Legal support in complex deals related to the registration, protection, use and transfer of IP rights

6. Access to office and laboratory infrastructure:
   • R&D infrastructure of Skoltech and shared resource centers
   • Lease of offices and co-working spaces

7. City services:
   • Lease of residential facilities
   • Medical services
   • Pre-school and school education
The share of private financing for the entire period is 65%:
- 2015 – 84%
- 2014 – 80%
- 2013 – 62%

The total number of grants approved in 2016 was 453 (37 grants and 416 mini- and microgrants)
In 2015 Skolkovo launched a new system of financing for the startups, microgrants, to finance the following activities:
1. IP Protection
2. Prototyping
3. Testing
4. Participation in exhibitions and conferences
There are 40 shared resource centers accredited across Russia.

In 2016-2017, **220+** research orders were carried out in the following areas:
- prototyping;
- metrological services;
- biomedical services;
- testing.

Examples of orders fulfilled by Technopark shared resource centers for Skolkovo startups:

The InCata laboratory developed an industrial design and manufactured prototypes of lidars for 3 different types of use (vehicles, service robots and UAVs).

The Karfidov Lab engineering center created an industrial design for a 3D graphite printing device called CarboPrint. Visualization and renders were used by the startup to attract investors and potential customers.

Development of design and manufacturing of a prototype of a machine with numerical program control based on ultrasound positioning technology.
SKOLKOVO MENTORSHIP PROGRAM

- The program was launched in July 2014
- Over 270 mentors and over 200 startups are taking part in the program, there are 100+ mentor and protégé pairs
- First success stories achieved

Skolkovo mentorship program: 3.5 steps to success

1. Fill out the application at mentor.sk.ru
2. Be approved by the Skolkovo expert board
3. Choose a startup like each other

Fill out the application at mentor.sk.ru

Choose a mentor

Critical mass of mentors and startups formed:

<table>
<thead>
<tr>
<th>Mentors</th>
<th>270</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startups</td>
<td>202</td>
</tr>
<tr>
<td>Pairs</td>
<td>105</td>
</tr>
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</table>

Key results of a survey of startups:

<table>
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<tr>
<th>Outcome</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Market vision was adjusted</td>
<td>68%</td>
</tr>
<tr>
<td>Clients were attracted</td>
<td>30%</td>
</tr>
<tr>
<td>Expertise was gained</td>
<td>20%</td>
</tr>
<tr>
<td>Investments were attracted</td>
<td>8%</td>
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</tbody>
</table>
The Skolkovo Foundation has observer status with the World Intellectual Property Organization (WIPO). A WIPO representative office operates at the Skolkovo Innovation Center.

The patent school is the first face-to-face course in Russia on patenting and IP protection. Over 600 students participated in the first event.

In 2014–2016, over 100 transactions of Skolkovo startups with a total value of $60M were supported by Skolkovo IP Center lawyers.
ATTRACTION OF INVESTMENT: SKOLKOVO INVESTMENT COMMUNITY

41% of Russia’s VC market is related to Skolkovo startups

> 150 venture deals were closed in 2012-2016

> $230M in investment from venture funds was attracted in 2012-2016

Investments in Skolkovo startups, $M

Skolkovo startups’ share of the Russian VC market, %

Volume of investment

Number of deals
SKOLKOVO VENTURES

Skolkovo Ventures is a full-scale investment management platform for raising capital, managing VC funds, founding and marketing new financial products for rapidly growing high-tech companies.

KEY AREAS OF DEVELOPMENT

Venture Funds Management (Buy-side)

- Three venture capital funds have been formed in the following areas: High-tech, IT, and Biotech for investments in Skolkovo and NTI projects
- The funds are co-managed by leading venture teams
- Over $100M under management
- Target stages of development: Round A and B, average size of investment – $15-30M

Attraction of investments to start-up companies (Sell-side)

- Providing services on a turn-key basis: from creation of an investment strategy and materials to marketing, support of negotiations and closing of the transaction.
- As of the end of 2016, the volume of investments attracted by Skolkovo companies accounted for 1/3 of the entire venture market of the Russian Federation. The investment service’s direct share accounts for 8% of the market.

Ecosystem support

- Mentoring of projects and development of investment materials
- Participation in the development of a legal and regulatory framework, promotion of new financial instruments
Role of industrial partners in the Skolkovo ecosystem – examples:

- 11 TOP-20 Russian corporations (Gazprom, Lukoil, Rosneft, RZD, Sberbank, AFK Systema, Rosseti, Tatneft, InterRAO, Transneft, Severstal, Rostech) have implemented innovations developed by Skolkovo companies.

- 5 TOP-10 global pharma companies (Pfizer, J&J, Sanofi, Medtronic, Roche) have invested in Skolkovo startup projects

- 3 Skoltech CREIs were created with the support of large industrial companies, including Rosatom, RSC Energiya, Gazpromneft, Rushydro, Rosseti, Tatneft, Russian Helicopters.

- Over 20 competitions for innovative projects were supported financially by industrial partners

Over 6,300 researchers will work in the R&D centers of Skolkovo’s industrial partners in 3 years.
INTERNATIONAL EXPOSURE OF SKOLKOVO

>25 international industrial partners
>200 startups participated in international events

More than 20 international conferences and exhibitions

More than 1000 international applications filed by startups in 2014-2017
Over 150 patents obtained abroad
Effective integration and partnership are essential for fostering innovation and creating valuable solutions. 

**Research:** 10 Centers of research, innovation and education (CREIs) have started their operations.

**Education:** 15 education programs; 4 innovation programs.

**Industry:** 15% of all Skoltech expenses are covered by external non-governmental sources.

**Biomedicine and biotechnology**

**Infectious diseases and functional genomics**

**Electrochemical energy storage**

**Energy Systems**

**Designing, manufacturing technologies and materials**

**Hydrocarbon recovery**

**Photonics and Quantum materials**

**Big data**

**Space**

**Advanced Studies**

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**Russian partners of CREIs**

**International partners of CREIs**
SKOLKOVO INNOVATION CITY

KEY BUILDINGS

1. MATRYOSHKA - COMPLETED
   - Area: 30,000 sq. m.

2. TECHNO PARK - COMPLETED
   - Area: 95,000 sq. m.

3. APARTMENTS 9 - 11 - COMPLETED
   - Area: 51,000 sq. m.

4. FAMILY CAMPUS
   - Area: 22,000 sq. m.

5. PROFESSORS' QUARTER
   - Area: 10,000 sq. m.

6. SKOLTECH
   - Area: 140,000 sq. m.

7. GALLERY
   - Area: 78,000 sq. m.

8. KEY PARTNERS' ZONE
   - Area: 126,000 sq. m.
SKOLKOVO INNOVATION CITY

OFFICES AND R&D CENTERS OF INDUSTRIAL PARTNERS

TECHNOPARK OFFICE CENTER
- 43,000 SQ. M.
- 2014-2015

RENOVA
- 27,000 SQ. M.
- 2016

MATRYOSHKA
- 30,000 SQ. M.
- 2016

SBERBANK DATA CENTER
- 37,000 SQ. M.
- 2018-2019

TMK
- 15,000 SQ. M.
- 2018

TATNEFT
- 10,000 SQ. M.
- 2017

BOEING
- 5,000 SQ. M.
- 2016

KEY PARTNERS (CISCO, IT-CLUSTER)
- 83,000 SQ. M.
- 2017

GALLERY
- 78,000 SQ. M.
- 2017

ТМК
- 15,000 SQ. M.
- 2018

RENOVA
- 27,000 SQ. M.
- 2016

2018-2019

2018

2017

2016
Key Performance Indicators of Portfolio Companies in 2017*

- Space Technology - 36
- Space Applications - 45
- Aviation - 41
- New Materials and components for aerospace - 31
- Telecom - 45

Startups breakdown by foresight

- Space Technology: 23%
- Space Applications: 18%
- Aviation: 21%
- New Materials and components for aerospace: 15%
- Telecom: 23%

Number of startups within the Space Technology & Telecom Foresight

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startups</td>
<td>106</td>
<td>120</td>
<td>168</td>
<td>170</td>
<td>195</td>
</tr>
</tbody>
</table>

Private Investments in portfolio companies, mln. Rub

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investments</td>
<td>126.8</td>
<td>186.2</td>
<td>549</td>
<td>586</td>
<td>620</td>
</tr>
</tbody>
</table>

Revenue of portfolio companies, mln. Rub.

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>1078.2</td>
<td>467.7</td>
<td>1150</td>
<td>1843</td>
<td>1950</td>
</tr>
</tbody>
</table>

* Expected indicators as of the end of 2017
Instruments for the Portfolio Formation

1. Active role of the Cluster’s experts in working groups of national Technology Initiative (AeroNet, AutoNet, MariNet Road Maps)

2. Participation in leading international industrial forums, conferences, and exhibitions

3. Organization of startup contests, pitch sessions, etc. with partners
In 2013 the agreements are signed between Skolkovo and Boeing Corp. regarding Boeing Research Center deployment and International Aviation Academy construction in Skolkovo.

- Boeing research center: 30 employees, estimated budget until 2015 — more than 500m rub.
- Joint project with Russian private investor on creation of Private flight academy – 1st education center in Russia for Boeing plane pilots with the use of newly developed flight simulator equipment.

In 2011 Airbus (EADS) spun-off Airbus Russian Technology Office in Skolkovo employing both European and Russian engineers.

- 12 employees., est. budget until 2015 — 400 mln rub.
- Designing the detonation combustion chamber for aircraft engines since 2012
- The project partners are:
  - MBDA (Matra BAE Dynamics Alenia)
  - Baranov Central Institute for Aviation Motor Building
  - Lavrentiev Hydrodynamics Institute of RAN Siberian Branch
- Two more Airbus spinoffs operate in Skolkovo:
  - Telum – development and commercialization of a self-organization technology for small LTE (Long Term Evolution) cells – investment 10 mln rub.
  - Datadvance - development of design process automation, predictive modeling and multidisciplinary design optimization software – investment 22 mln rub.

In 2011 the agreements are signed between Skolkovo and Siemens AG regarding Siemens Research Center placement in Skolkovo.

- Overall investment of Skolkovo and Siemens into the project (high frequency solid state generator) up to the moment accounted 130 mln. RUR.
- 15 research engineers engaged

In 2015 the agreements are signed between Skolkovo and FANUC regarding Engineering Center construction in Skolkovo.

- Overall investment into the center presumed 850 mln. RUR. in construction, deployment and operations until 2020
- 55 engineers, 5000 sq.m. with expansion option up to 10 000 sq.m. until 2030
- Construction in progress.
SUCCESS STORIES: SPACE TECHNOLOGIES

DAURIA AEROSPACE: DEVELOPMENT OF NEXT-GEN SMALL SATELLITES

- Product: Satellites, small satellite platforms and subsystems
- Three satellites built and launched
  - DX-1 AIS satellite
  - Two Perseus AIS satellites were sold on-orbit (contract value between $4.35 and 6 Million.)
- Investment attracted – over $20M
- Spacecraft under construction
  - Two MKA-N medium resolution EO-satellites for Roscosmos – to be launched in July 2017
  - One Auriga high-resolution satellite – testbed for future EO constellation.
  - Contract on GEO-based satellite with Indian telecom operator

SPUTNIX: INTEGRATED SOLUTIONS FOR SMALL SPACECRAFT

- Product: Full stack of small satellite technologies and products, Education kits, Test equipment
- First private Russian satellite built and launched
- Profit vehicle: equipment for education and small satellite testing for schools and universities
- Doubled its revenue in 2017 in comparison with 2016 - 150 mln. Rub. (and started international sales in Myanmar, Kazakhstan, and active negotiations in Iran, France, and Belorussia).

AVANT-SPACE: NEXT GENERATION ELECTRIC PROPULSION FOR SMALL SPACECRAFT

- Product: Low power consumption propulsion system for small satellites.
- The thruster can be used for phasing, orbit raising, station-keeping and deorbiting.
- Experimental development of thruster is carried out – first results obtained
SUCCESS STORIES: ECB & MICROELECTRONICS

MEGARAD: POWER MANAGEMENT INTEGRATED CIRCUITS FOR SMALL SATELLITES
- Product: A family of radiation hardened power management integrated circuits for small satellite electrical power system, from solar cells to payload electronics
- Radiation hardening by design realized on cheap commercial technologies leads to the best combination of performance, radiation hardness, and cost.
- First serial pieces of hardware developed and manufactured

THERCON-LHP: HIGHLY EFFICIENT LOOP HEAT PIPES (LHP) FOR AEROSPACE APPLICATIONS
- Product: LHP - highly efficient passive heat-transfer devices, operating on a closed evaporation-condensation cycle and using capillary pressure for pumping the working fluid
- Applicable in:
  - Avionics
  - Aircraft sensors
  - Aircraft servers
- Joint project with Thales Avionics

DIGITAL SOLUTIONS: ASIC AND ELECTRONIC ENGINEERING DESIGN CENTER
- Product: various ECB for aerospace industry
- Main focus - the development and creation of algorithms for digital radio, image processing, radar, as well as designing of various devices based on the FPGA and digital signal processors
- Contracts with leading aerospace companies of Russia
**SUCCESS STORIES: SPACE APPLICATIONS**

**IMAGEAIRY: PLATFORM FOR GEOSPATIAL DATA TREATMENT**
- Web-based platform for geospatial data access and API for building analytic products on top of the EO data
- Markets: precision agriculture, urban planning
- Innovation: to robotize selection, processing, and access to Earth Remoting Sensing data based on AI / Big Data algorithms
- 01/2017. Investment Fund Larnabel Enterprises, VP Capital, Vast Ventures, and GVA Capital invested $16.65 mln in Astro Digital Co. - Imageary Co. is Russian branch of the company

**WAYRAY: AUGMENTED REALITY FOR CARS**
- Product: the first True Augmented Reality car navigation system that applies aeronautical principles to land navigation
- 02/2017. WayRay raised $18 mln investments from a group of investors leaded by Alibaba Group
- Showcase at CES 2018

**AEROSTATE: AIR QUALITY FORECASTS**
- Product: Worldwide verifiable air quality forecasts at city-block resolution. Distributed through API.
- Company provides rigorous accuracy assessment of our forecasts 24/7
- High prediction accuracy
- Global coverage of the system with high resolution (1 km² per pixel).
- Currently forecasts supplied in several cities around the globe – US, UK, Russia, Spain, more is coming
SUCCESS STORIES: AVIATION & UAV

AEROB: UNMANNED AIRCRAFT SYSTEMS / PLATFORMS

- Product: Automated control systems for UAVs, UAV platform
  - Aerob 4D, 4 DFL platforms
  - Wide variety of payloads for surveillance: optical, radar, laser scanning
- Partnered with Russian Helicopters (one of the major helicopter manufacturers) on the innovative convertiplane UAVs development and won several significant R&D contracts.
- Multiple units sold to Emercom, Government services
- Joint venture with Indian UAV manufacturer: foreign market entrance

SCAN: DEVELOPMENT OF UAV PLATFORMS, UAV-BASED PRODUCTS AND SERVICES

- Product:
  - Professional aerial imaging systems,
  - Agisoft PhotoScan - stand-alone photogrammetric software solution
  - GIS Sputnik — multidimensional spatial data visualization system. Orthophotos and digital elevation models created with Agisoft PhotoScan Professional can be imported into Sputnik GIS for further analysis using wide range of tools: length, height and volume measurements, cross sections generation and kriging interpolation.
- > $10M revenue
- Global sales and operations

KURSIR: UNIFIED GROUND-BASED EQUIPMENT OF LANDING SYSTEMS, NAVIGATION AND AIR TRAFFIC CONTROL FOR AIRFIELDS

- Product: modern high tech equipment that guarantees safe navigation and landing
- Product has been developed, tested and implemented. Current R&D: use the UAV for inspections
- All necessary licenses obtained
- Manifested interest from Chinese airports and Finnish contractors
AnisoprintTM is 3D additive technology providing insertion of the continuous reinforcing yarn into the plastic in the course of printing. It allows 3D printing of the components of the material which:

- is 20 times stronger than the conventional plastic,
- 1.5 times stronger than aluminium,
- is comparable by strength with titanium alloys,
- and with all this, weighs 4 times less!

QSpace Technologies: Optical Satellite Communications and Quantum Cryptography

- Optical data transmission – significant increase in bandwidth
- Absolute confidentiality by design
- Won Airbus BizLab corporate accelerator contest
- Satellite segment in development

3D Bioprinting Solutions: Magnetic Space Bioprinting

- Main goal of the project – use of space environment for 3D-printing of human tissues and organs
- Scaffold-free 3D printing technique using tissue spheroids, which are capable of fusing on their own
- Functional thyroid gland for mouse was printed
- Preparation for bioprinting experiment on ISS is underway. Joint work with IMBP, RSC “Energia”, Roscosmos
Skolkovo Foundation is the unique and most efficient knowledge based ecosystem in Russia. To be a partner of Skolkovo Foundation is a great opportunity for getting access to breaking through technologies, dialog with governmental institutions and market access.*

- Point of entry to Russian aerospace market
- Convenient place for technology collaboration:
  - tax exemptions, venture capital, grants etc.
- Strong connections with aerospace major players
- Access to cutting edge technologies
- Industrial infrastructure access
- Softlanding program for foreign startups and partners
- Infrastructure projects to participate

* Disclaimer. Market access can not be guaranteed due to nonprofit statement of Skolkovo Foundation