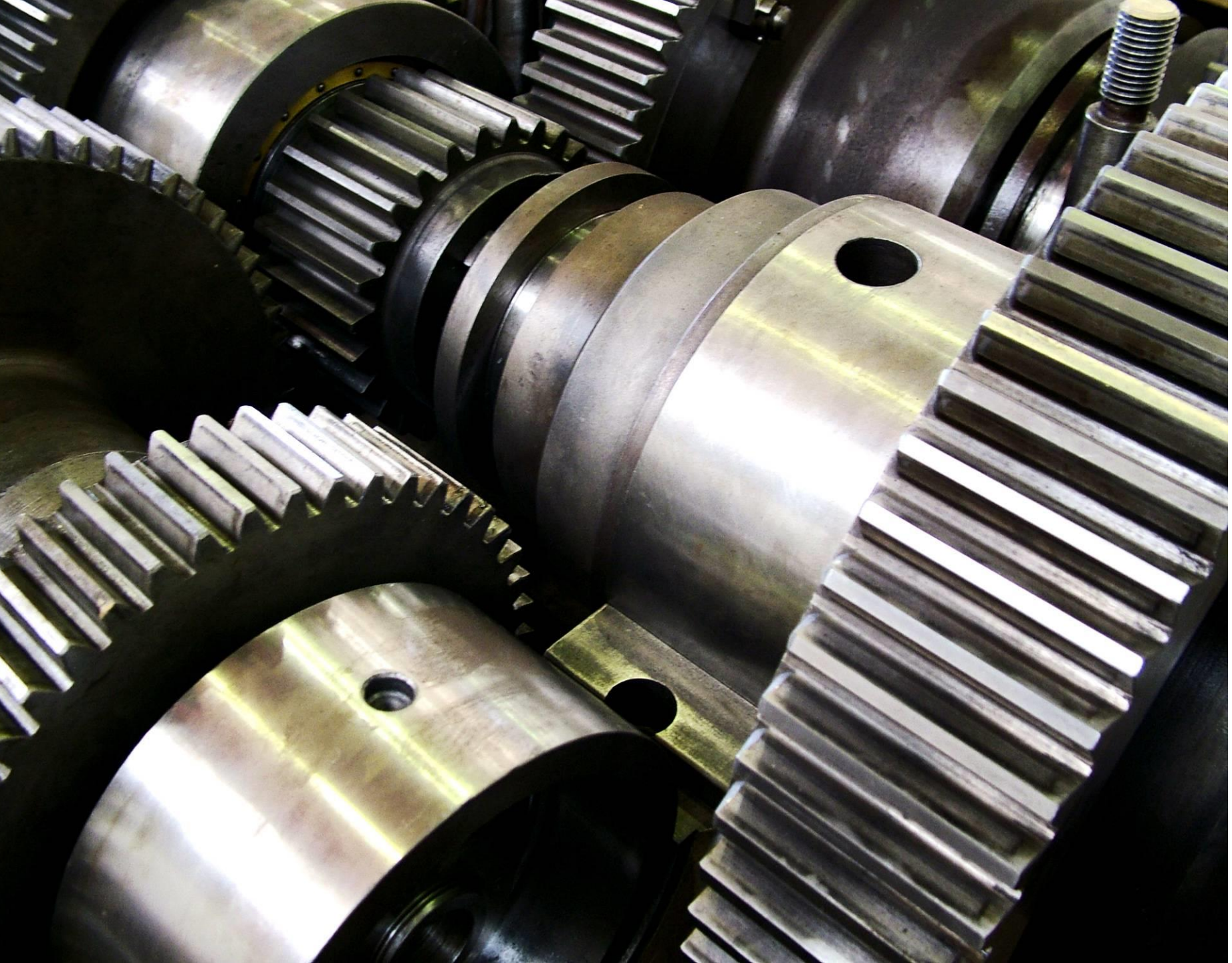


THE REALITY OF RUSSIAN INDUSTRY

Alexey Ponomarev

Vice-President,
Strategy & Industry

September 22, 2015

Skoltech
Skolkovo Institute of Science and Technology

CONTENTS

Institutional Structure

→ **Integrated branches, state owned property**
State Corporations:

- Rusatom
- Federal Space Agency
- Rostec

→ **State owned integrated branch structures**

- resource industries (Rosneft, Gazprom, Rosgeo, etc)
- infrastructure (Transneft, Russian Railways, ect.)
- other fields (United Aircraft Corporation, United Shipbuilding Corporation, Almaz-Antey, etc.)

→ **Non-governmental financial-industrial groups and larger companies**

- metallurgy (Evraz, Severstal, Bazel, etc)
- machine building (Systema, Rosselmash, Power Machines, etc.)
- others

→ **Offices of transnational corporations**

→ **Other private companies**

→ **Small business**

Position on Internal Market. Illustration: import vs. manufacturing, 2014

	Импорт		Импорт в постоянных ценах в 2014 г., 2007 = 100	Физический объем производства в 2014 г., 2007 = 100
	млрд. долл.	% совокупного импорта России		
Текстильное и швейное производство	12,3	4,3	156,3	89,0
Производство кожи, изделий из кожи производство обуви	4,7	1,6	108,1	115,1
Химическое производство за исключением производства фармацевтической продукции	23,7	8,3	125,0	129,7*
Производство фармацевтической продукции	12,8	4,5	155,4	120,3
Производство резиновых и пластмассовых изделий	9,4	3,3	134,8	191,0
Производство готовых металлических изделий	9,0	3,1	131,0	129,0
Производство машин и оборудования	45,4	15,9	120,1	79,8
Производство офисного оборудования и вычислительной техники	6,2	2,2	210,0	68,5
Производство электрических машин и электрооборудования	12,2	4,3	166,3	69,2
Производство электронных компонентов, оборудования для радио, телевидения и связи	18,9	6,6	109,6	138,2
Производство медицинских изделий; средств измерений, контроля, управления и испытаний; оптических приборов, фото- и кинооборудования; часов	8,4	2,9	175,5	95,1
Производство автомобилей, прицепов и полуприцепов	33,4	11,7	81,8	103,1
Строительство и ремонт судов	1,6	0,5	147,3	57,2*

*Данные за 2013 г.

Источники: Росстат, ФТС России, расчеты ИНП РАН

Position on Internal Market. Illustration: the structure of apparent consumption, 2014

	Отечественная продукция	Импорт из ЕС и США	Импорт из Китая	Импорт из других стран
Текстильное и швейное производство	38,8	10,9	25,4	24,9
Производство кожи, изделий из кожи производство обуви	21,4	16,4	45,8	16,4
Химическое производство за исключением производства фармацевтической продукции	55,5	30,0	5,2	9,3
Производство фармацевтической продукции	35,3	51,4	0,4	12,9
Производство резиновых и пластмассовых изделий	66,6	14,9	7,0	11,5
Производство готовых металлических изделий	70,2	15,2	7,7	6,9
Производство машин и оборудования	43,2	34,4	9,4	13,0
Производство офисного оборудования и вычислительной техники*	26,8	15,3	45,2	12,7
Производство электрических машин и электрооборудования	56,1	21,6	11,5	10,8
Производство электронных компонентов, оборудования для радио, телевидения и связи	30,5	20,4	31,8	17,3
Производство медицинских изделий; средств измерений, контроля, управления и испытаний; оптических приборов, фото- и кинооборудования; часов	62,1	22,5	4,5	10,9
Производство автомобилей, прицепов и полуприцепов	57,0	24,0	3,8	15,2
Строительство и ремонт судов	86,7	4,9	1,6	6,8

*Данные за 2013 г.

Источники: Росстат, ФТС России, расчеты ИНП РАН

Position on Internal Market.
Illustration: the structure of imports to Russia, by country, 2014

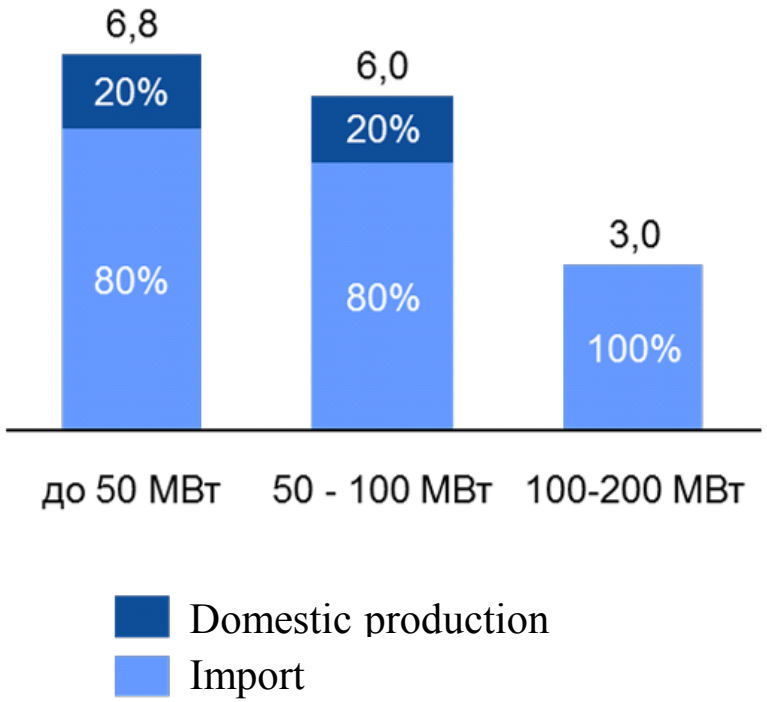
	ЕС и США	Китай	Япония	Белоруссия	Украина	Другие страны
Текстильное и швейное производство	17,7	41,0	0,2	5,0	1,0	35,1
Производство кожи, изделий из кожи и производство обуви	20,3	56,8	0,0	2,3	0,8	19,8
Химическое производство за исключением фармацевтического производства	67,3	11,7	1,6	2,9	1,7	14,8
Фармацевтическое производство	79,8	0,7	0,4	0,8	0,4	17,9
Производство резиновых и пластмассовых изделий	44,3	20,8	7,1	7,5	2,2	18,0
Производство готовых металлических изделий	50,6	25,8	1,3	3,8	5,5	13,0
Производство машин и оборудования	60,4	16,6	4,3	3,0	2,5	13,3
Производство офисного оборудования и вычислительной техники	17,1	60,4	0,4	0,7	0,0	21,5
Производство электрических машин и электрооборудования	49,3	26,1	2,7	3,2	4,0	14,7
Производство электронных компонентов, оборудования для радио, телевидения и связи	29,9	46,5	1,7	1,1	1,1	19,7
Производство медицинских изделий; средств измерений, контроля, управления и испытаний; оптических приборов, фото- и кинооборудования; часов	60,4	12,1	5,4	2,6	0,9	18,5
Производство автомобилей, прицепов и полуприцепов	54,9	8,6	17,8	2,2	0,4	16,2
Производство судов	36,1	11,8	7,0	0,0	14,1	31,0

Источники: ФТС России, расчеты ИНП РАН

Position on Internal Market. Illustration: the dynamics of industrial sectors in Russia

Источник: ЦМАКП

Position on Internal Market.
Illustration: power-plant machinery; gas turbines, 2014



Competitiveness of Russian Industry: changes during 2008-2014

- Changing of the Index of Import Competitiveness / Dec 2013 – Dec 2014 / ~75% in key machine manufacturing branches
- Import substitution : overcapacity (2009 -2014) vs. new investments. The deterioration of business conditions - as a source of competitive overcapacity
- Example: the increase of capacities during 2008 - 2013:

- Production of building materials more than 20% (loaded for about 60%),
- Wood processing industry, chemical industry, machine building 17-18% (loaded for about 50-70%)

- Renovation of productive capacities of «live sectors» 10-30% (leaders: plant protection chemicals, cement, plastics)
- Car industry as a leader of the "import substitution". Model of the development.

Main Tools

Prioritization tools

- Formal priorities («Priority directions of development of science, technology and engineering» and «Critical technologies»)
- Priorities of the State Council on modernization
- …….
- Searching for international cooperation priorities

Implementation tools

- Federal target and state Programs
- Development strategies of sectors of the economy
- Infrastructure projects
- Development Programs of state companies
- New mechanisms for the National Technological Initiatives.

For example: «Priority directions of development of science, technology and engineering in the Russian Federation» (2011)

1. Terrorism Security and Countering
2. Nanosystems
3. Information and communication technologies
4. Life Sciences
5. Military sciences
6. Environmental management
7. Transport and Space Systems
8. Energy efficiency, energy conservation, nuclear power.

Main Programs in Industry

Main industrial programs:

Federal Space Program

Rosatom development program

Federal target programs of the Ministry of industry and trade:

Aviation

Shipbuilding;

Pharmaceutical industry and medical equipment

Other programs of the Ministry of industry and trade:

Microelectronics

Proceedings

In development:

Advanced manufacturing technologies

Photonics

Key programs of State companies:

Hard-to-recover reserves and the Arctic program

Modernization of the power systems

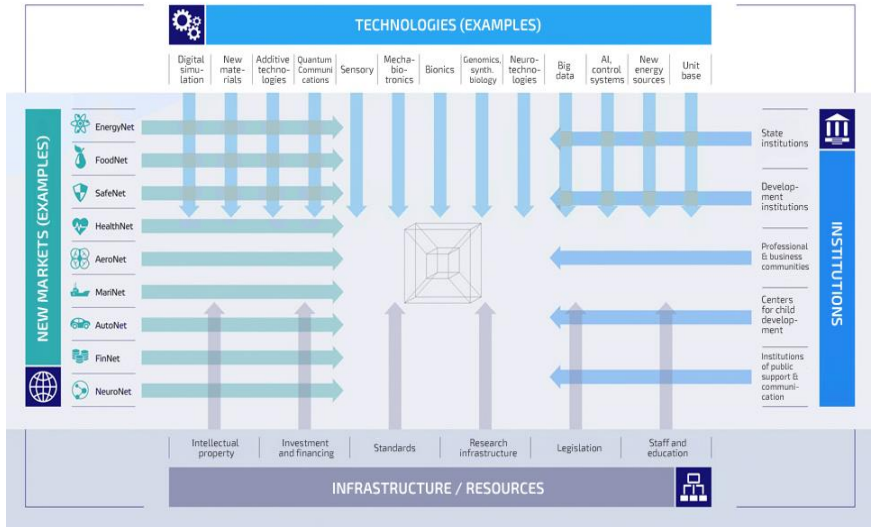
Biomedical directions:

Nanotechnology as an emerging priority

Agricultural complex and food industry

National Technology Initiative. Matrix. Directions

NTI Matrix



«Markets» group

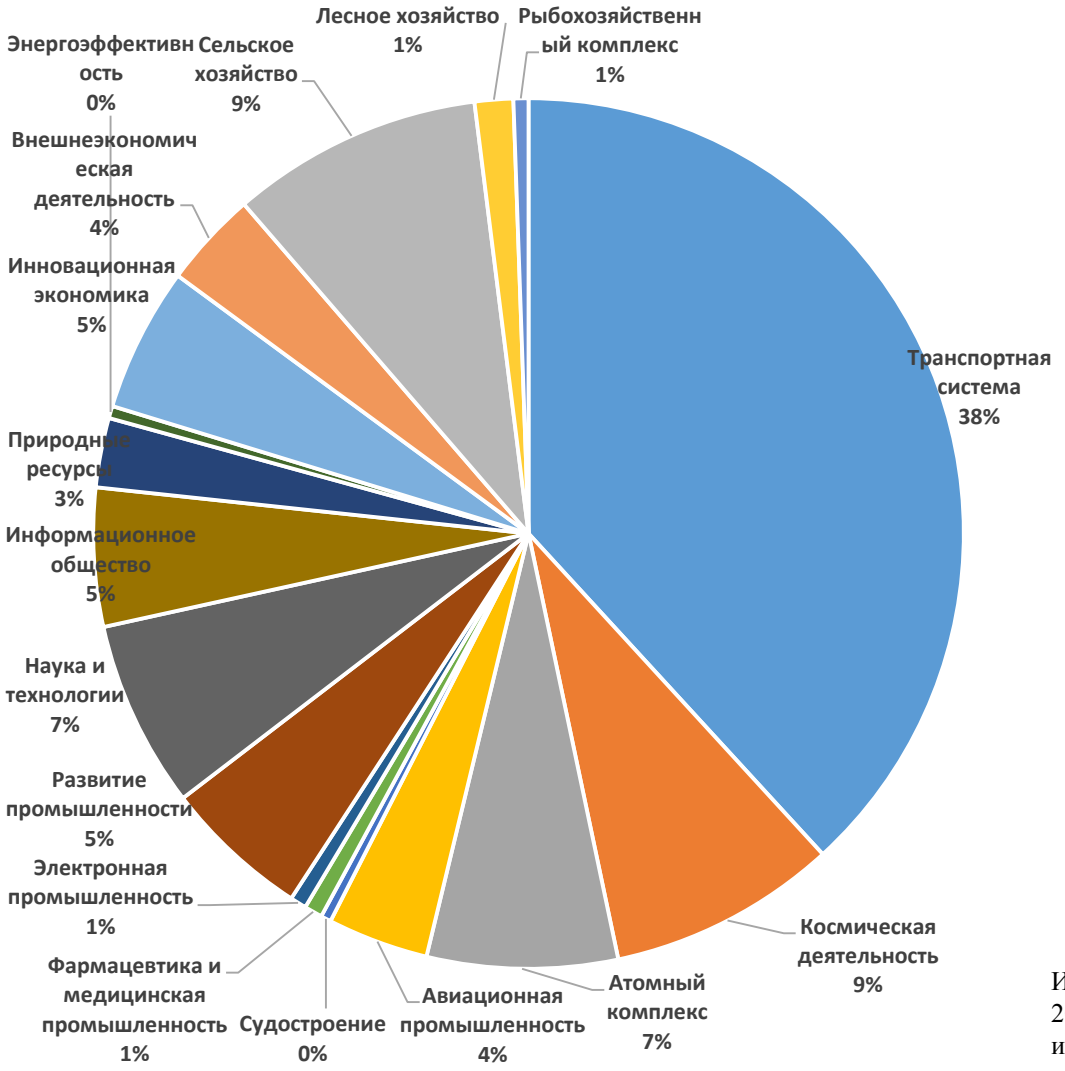
- EnergyNet distributed power from personal power to smart grid and smart city)
- FoodNet (system of personal production and food and water delivery)
- SafeNet (new personal security systems)
- HealthNet (personal medicine)
- AeroNet (distributed systems of unmanned aerial vehicles)
- MariNet (distributed systems of unmanned maritime transport)
- AutoNet (distributed network of unmanned management of road vehicles)
- FinNet (decentralized financial systems and currencies)
- NeuroNet (distributed artificial elements of consciousness and mentality)

«Technologies» group

- Digital design and simulation
- New materials
- Additive technologies
- Quantum Communications
- Sensory
- Mechabiotronics
- Bionics
- Genomics and synthetic biology
- Neurotechnologies
- BigData
- Artificial intelligence and control systems
- New sources of energy
- Unit base (including processors)

The state support of the industry in Russia

The structure of the planned expenditures of the federal budget of Russia for the state program of the "Innovative development and modernization of the economy" in 2015 (a total of - 2.2 trillion. Rub.)



Источник: Федеральный бюджет на 2015 и плановые 2016 и 2017 г. (с изменениями от 20 апреля 2015 г.)

Russian in a global context

Technological multistructural entity

- Technological structure of fixed assets
- Return on investments and long-term planning horizons
- The investment climate

Russia in the context of global technological development

- Research and development expenses
- The structure of the industry and the motivation of technological renovation

International cooperation

- Core competencies
- Money and expertise in international projects

The structure of the research and development sector. The main trends

- Companies, Academy, branch institutes, universities
- Government and Business

Advanced Manufacturing Technology - a new type of demand at the present stage of development of the Russian industry

- Technological support of industries
  - Introduction of new technologies
  - The development of branch technologies;
  - Engineering
- Create the means of production: the establishment of production technologies and equipment for industry (former "machine tool industry")
- Integration of software and hardware

The production technology and equipment: import and own production

- The share of imports - more than 90% + features of the structure of imports
- Own production - about 15 bln. Rubles (large producers: Stankoprom, KASKOL)
- 1990 vs.2015: 73 thousand units vs. 2 thousand units.
- Base - the traditional casting and machining technology
- The first deliveries of the new generation additive technology equipment
- Expansion of the use of composite materials
- Manufacture of electronic components and products on the basis of 73% of its imports. "Assembly model"

Technological Development Incentive Programs

- Stimulation of technological innovation: the market and the "crutches"
- Industrial investment in the conditions of expensive money
- Areas of state support. Rules of the game. WTO.
- Tools incentives (funds, budget subsidies, standards, procurement, research and development, educational programs)

The crisis in 2014: Challenges and Opportunities

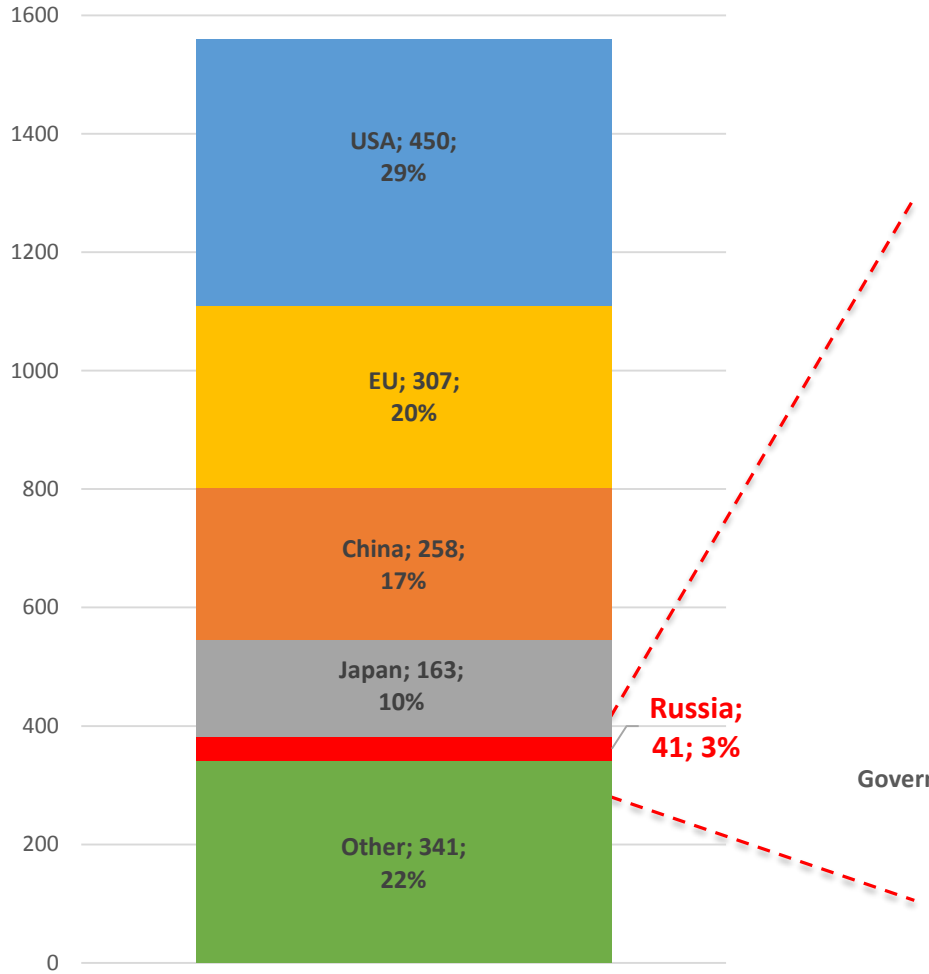
- The problem of demand: large infrastructure projects such as the major source of demand for Russian industrial products. Uncertainties and constraints.
- The production chain: dependence on imports of intermediate bounds as a limiter for exchange advantages (construction, agro, mining and processing, mechanical engineering)
- The role of international companies. Localization.
- The natural growth of demand and offer support mechanisms. Approaches focusing on the development of new production technologies.

Structure

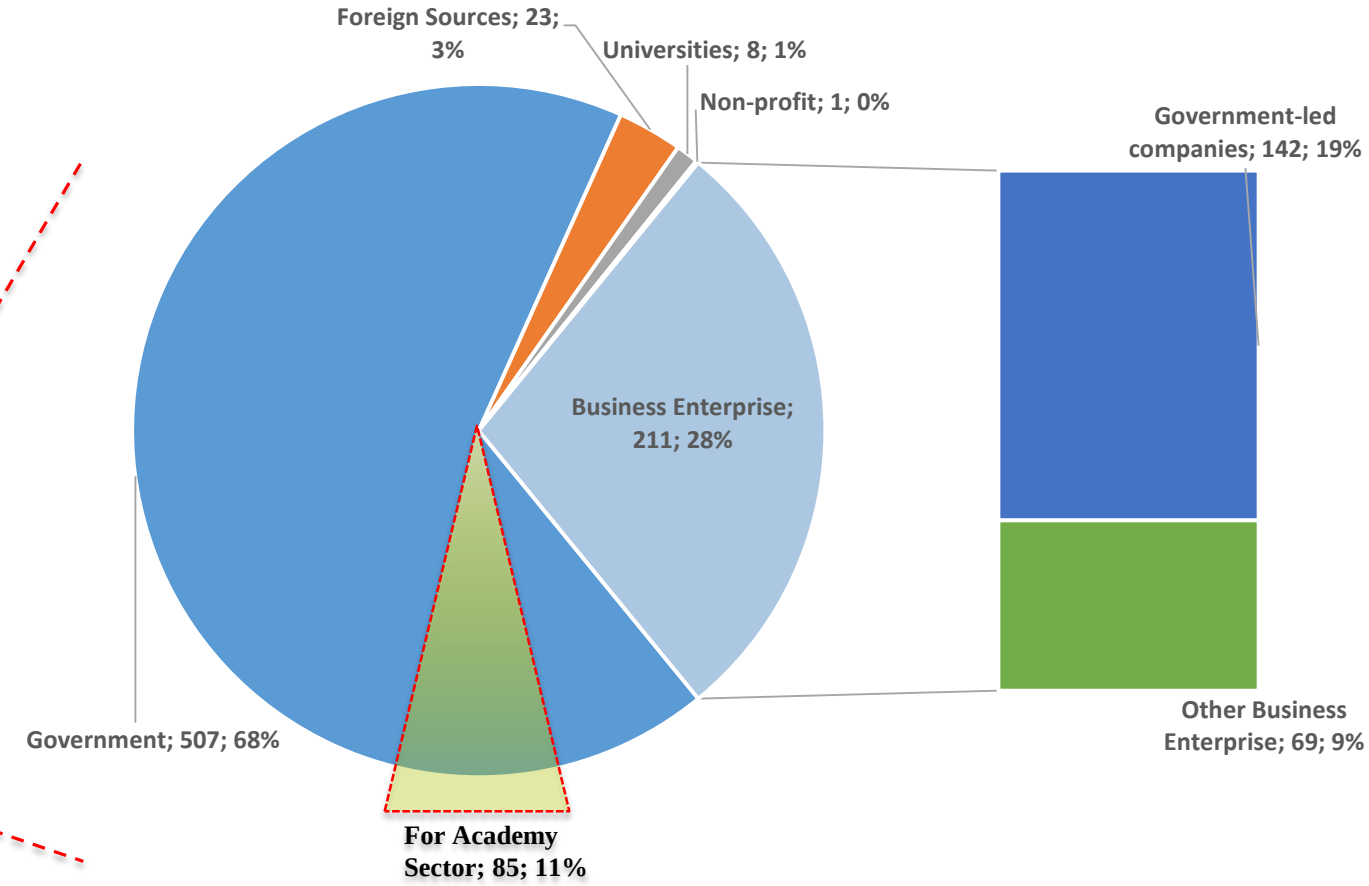
- The traditional structure of the of R&D (Soviet Union tradition): The Academy - Industrial research institutes - Industrial design offices (scientific production associations) (Russia, China)
- International practice: development of R&D centers at Universities.
- Corporate R&D Centers: traditional practices of big companies. State-owned companies and private business.
- The practice of small and medium enterprises (SMEs) and their interaction with big companies. National characteristics.

Example: domestic expenditure on research and development

World R&D Expenditures Structure (bln $ PPP; %)



Russian R&D, Source of Funds (bln Rub; %) **Total = 750 bln Rub**



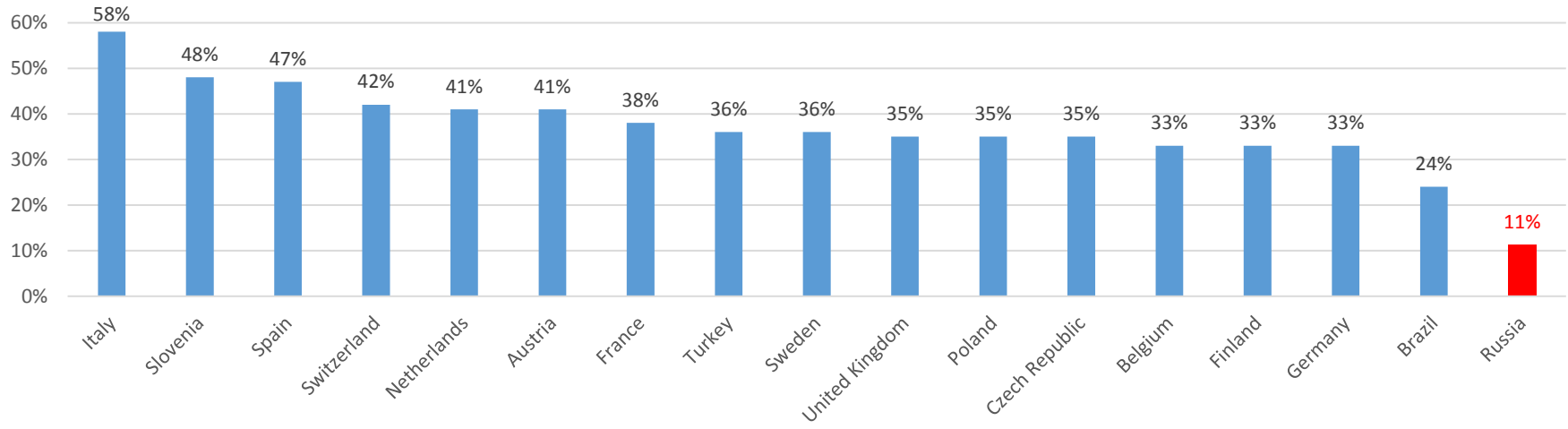
Источник: Battelle, 2014 Global Funding Forecast, World Bank, Индикаторы науки 2015, Росстат.

Practices and trends in the organization of industrial R&D departments

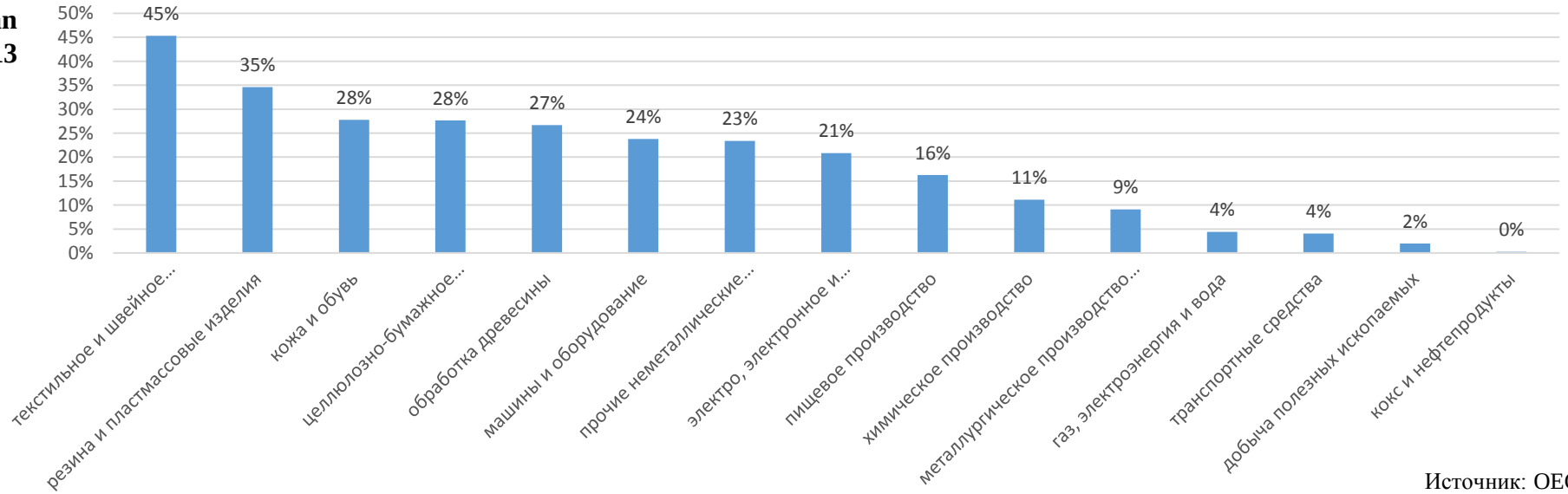
- Worldwide traditions in new sectors: ICT, Pharmaceuticals
- Create new engineering centers in the “basic industries“
- Association of developers and technologists
- Following the trends of "project management“
- The value and the deficit super-qualified professionals
- New private engineering centers and engineering companies
- Large-scale restructuring of the integrated companies

Position of SME in Russian Industry

SME share (Turnover) in manufacturing (%), 2012



SME share (Turnover) in Russian industry (%), 2013



Источник: OECD, Росстат

Features of interaction of SMEs and big companies. Contradictions and opportunities

- The practice of attracting SMEs by the big companies. Features of the public sector. The tender procedures. Restrictions profitability.
- Stimulation of outsourcing. The practice of “Open innovations". SMEs in the Program of Innovative development of state companies.
- SMEs - “Showroom of models" as a consequence of multiculturalism.
- "Gazelles". The dynamics of growth. The internal organization. The variety and creativity. Prospects.
- Integration into the world market. Issues and Challenges.

Incentive mechanisms

- Medium companies – new-established “Industrial Support Fund”. Federal target programs. Regional mechanisms. Examples.
- Association and other professional structures. National Technology Initiative. Interaction with the public sector and federal authorities
- The role of leaders. Business models. Work in the medium companies

Small technology (innovative) business

- Changing of technology generations: opportunities, challenges and prospects.
- Industrial preferences.
- Access to markets. Local, national, global.
- Big companies as partners. The dangers and opportunities.
- Support Systems. "Technoparks", "clusters, ect. Support Foundations for small business innovation.
- Partnership with «Bortnik Foundation».
- Clusters of Skolkovo Foundation as important and natural advantages for Skoltech.
- Internal features: profile professor, CEI.
- Skotech – a tool of interaction with industry in all advanced sectors.

General requirements. Expectations from Skoltech

- «Exclusiveness» of graduates
- Open-mindedness and understanding of world level of technologies. Flexibility and perceptivity.
- Value of deep understanding of a problem: focused specialization and high professional mobility.
- Work «in the interphase», interdisciplinary.
- System of business contacts and opportunity to be quick about problem solution.
- Confidence in professional characteristics and ability to work in specific team – in general as the result of joint work and internships during studying.

Illustration: Manufacturing Technologies

→ Gap in competences in manufacturing companies. Lack of work experience. Problems of Russian engineering education.

→ Engineering support of the following sectors:

- Assignment of tasks from developer and manufacturer;
- Work in engineering companies and subdivisions of big companies;
- Participation in designing («constructor – technologist»);
- Development of new sector-wide technologies;
- Implementation during production.

→ Development «production of manufacturing equipment» sector:

- Development of new technologies;
- Transfer of new technologies;
- Designing of new manufacturing equipment (software, equipment)

→ Small business, start – up

- open-mindedness for choosing the activity area;
- high specialization for achieving the leadership

Focus of attention on sectorial courses

- Development of technological expertise with understanding of global and national context
- General elements of field economics
- Motives for business behavior of enterprises, working in the field of research and technologies
- Organization of work in the field of research and innovations on different types of enterprises
- Development of cooperation in the manufacturing fields, definition of activity areas for job search after graduation from Skoltech

The expectations of employers.

Skoltech graduates:

- Special, "elite", inflated expectations of employers;
- Distrust and skepticism as to all new.

Main expectations of employers in hiring:

- Master as a built-in problems of persons:
  - possess working experience in this company

  or
  - has the experience and competence in solving problems that are important for the company, working on the problems in advance and with visible success.
- Competence, complementary to the usual elite graduates of Russian universities
- Adaptability to work and life in the company not worse than their colleagues from other universities
- Initiative, creativity, broad thinking and professional knowledge without national and linguistic boundaries

Career prospects.

R & D departments:

- “elite" forces for exploration works
- development under the requirements of the market
- implementation of technologies

Project management as an important step in the industrial career in modern companies.

Stir in the traditional hierarchy of “design bureau” and engineering centers.

Possible additional education: economics, management.

"Continuing Education": changing majors and fields. Feel the perspective!
Self-education and professional circle of friends: going beyond the routine.

Opportunities in Skoltech

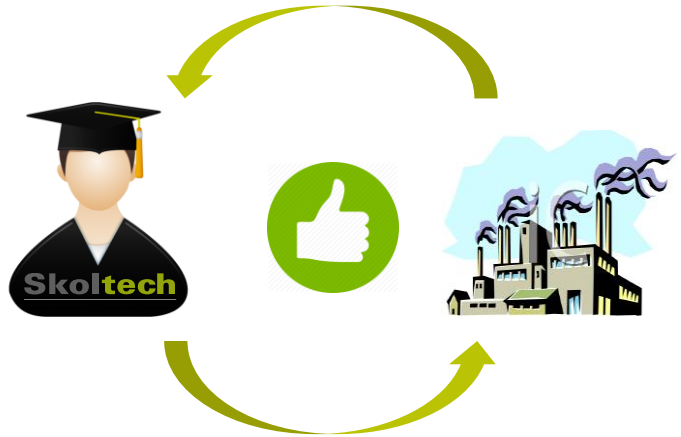
Skoltech:

- joint supervision of the student by the company representative and Skoltech professors for research and other project work of students from the first year of Master Program
- individual internships in companies
- team project oriented internships with supervision of professors (Industrial Immersion)

Companies:

- large companies with R&D entities (public and private, international companies)
- medium-sized companies with sustainable development, new markets and new technologies
- small innovative companies, start-ups. Within the innovation center "Skolkovo"

Proper start-ups as a result of the first experience (internship in companies)



Student Fairs for Industry starting September 23, each Wednesday, at Skoltech

WELCOME !!!