Foresight in Russia: Implications for Policy Making

Alexander Sokolov sokolov@hse.ru

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Key challenges for S&T and innovation policies

• Development of human resources
• Creation of innovation friendly environment for business
• Bridging the gap between business, R&D and state
• Strategies for sectors of economy
• Increasing efficiency of budget R&D funding
• Innovation in the government
• Innovation in public sector, infrastructure
• Social innovation
• Stimulating innovation from the government
• Building regional innovation clusters
Policy instruments related to S&T and innovation

- Concept of long-term social and economic development of Russia
- Priority S&T areas, list of critical technologies
- Priorities for technology modernisation
- Strategies for sectors of economy
- Research programmes funded from Federal budget
- Technology platforms
- Innovation programmes for state-owned companies
- National research universities + innovation infrastructure
- Linking enterprises and universities
- State programmes for human resources development
- National research centres, centres of excellence
- Budget procurements
- Regional strategies of social and economic development, innovation priorities
Priorities for S&T and innovation

- **Mission-oriented:**
  Technology modernisation
  - Energy efficiency
  - Nuclear technologies
  - Space technologies
  - Medicine
  - Strategic information technologies

- **Functional:**
  Restructuring S&T system
  - Research universities
  - Innovation infrastructure at universities
  - National research centres
  - Centres of excellence

- **Thematic:** Critical technologies, S&T programmes
  - Information and telecommunication systems
  - Living systems
  - Industry of nanosystems
  - Transportation and aerospace systems
  - Rational use of nature
  - Energy efficiency and energy saving
Major stages of S&T Foresight in Russia

- S&T Foresight: 2030 – 2009-2010
- S&T Foresight: 2030 (new cycle) – 2011-2013
1st cycle – S&T Delphi: areas covered

Information and Telecommunication Systems
Industry of Nanosystems and Materials
Living Systems
Medicine and Health
Rational Use of Natural Resources
Transportation, Aviation and Space Systems
Power Engineering and Energy Saving
Manufacturing Systems
Safety and Security
Technologies for Society

- nuclear technologies
- hydrogen energy
- organic fuel and microsystems
- composites and ceramic materials
- membranes and catalysts
- biocompatible materials
Delphi 2025: informing policy making

Level of R&D

Support measures

The most important topics

Time of realisation

Leading country

Application areas

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R&D level vs importance of S&T areas

- Transportation & Aerospace
- Security
- Manufacturing
- Energy
- Rational Use of Nature
- Medicine & Health
- Living Systems
- Information & Communication
- Nanoindustry & Materials

Areas of concern for S&T policy

Experts share that consider R&D level in Russia corresponding world level
Importance index

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Selection of priorities on the basis of the Delphi survey

Priority application areas

Areas of R&D for public support

Priority application areas

Areas of R&D for public support
Expected effects

Minor potential effects

Few technologies have double effect

Internationally competitive technologies are related to aerospace and manufacturing

No technologies with triple effect

Medical technologies have high importance but are not competitive

Nanotechnologies mostly contribute to domestic markets

Competitiveness at global markets

Competitiveness at domestic markets

Resolving social problems

Medical technologies

Nanotechnologies

Few technologies

Internationally competitive technologies
Themes’ importance, R&D level and cumulative effect
(size of bubbles reflects the level of R&D)

- Stream distributed constants measuring system used in testing models in aerodynamic tunnels and in conditions of real flight
- Methods and devices for high-speed communication with efficient protection from natural and artificial noises based on nanotechnologies
- Test systems based on genomic and proteomic technologies for cancer, systematic, infectious and hereditary diseases diagnostics
- Crystalline and nanostructured metallic materials with advanced structural and functional properties for different modes of transport
- Offshore nuclear power units for energy and heating supply and fresh water provision for distant regions

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Identification of promising innovation clusters

Integration of bio-, nano and information technologies

Biosensors, biomedicine

Cell technologies, biocatalysis, biosynthesis
2nd cycle: from topics to technology areas

Foresight 2025

Delphi topics (900)

Thematic areas (56)

S&T areas (10)

Foresight 2030

S&T areas (6)

Thematic areas (25)

Technology clusters (250)

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Foresight 2030: detailed assessment of prospective technology areas

- Perspective areas for practical application of R&D results
- Reducing damage caused by socially important diseases
- Gap between future consumer needs and R&D capacities: state support required
- Broadband multimedia services
- Nuclear energy
  - Areas for stimulation market demand

Diagram:
- Energy
- Rational Use of Nature
- Transportation & Aerospace
- Nanoindustry & Materials
- Information & Communication
- Living Systems

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2nd cycle results: use for policy making

- Assessment of S&T impact as a means for better grounded long-term social and economic planning and budgeting
- Development of scenarios and policy measures to support innovation in particular sectors of the Russian economy
- Identification of large-scale promising innovation projects aimed at development of new products on the basis of “technology packages” (e.g. potential “marrying” of domestic and imported technologies)
- Identification of key areas of basic research
- Creating a background for selection of S&T priority areas and critical technologies
3rd cycle: application-driven S&T Foresight

Global trends and challenges of S&T development → Scenarios of long-term S&T development → Identification of points of effort's application

- External factors
- Alternatives

Roadmaps for priorities realisation → System of priorities

- Perspective market segments
- Innovative products and services
- New technological solutions
- R&D

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Major goals

- Identification of the most prospective for Russia in the long run areas of S&T and their implementation providing for competitive advantages
- Identification of areas for potential large scale innovation projects
- Assessment of future demand for key S&T related resources (basic and applied research, HRST and their skills et al)
- Integration with the formulation of national S&T and innovation policies (technology platforms, programmes of innovation development, government S&T programmes et al)
S&T Foresight: further activities

Development of a network of Foresight Centres at leading universities

Analysis of global S&T trends

Analysis of S&T trends in Russia

Innovation challenges

S&T and innovation capacities

Macroeconomic scenarios

Integration of models for forecasting major S&T, innovation and education indicators

Foresight of S&T areas

Innovation markets and demand for technologies

Expert panels (including business and foreign experts)

Major sectors of economy

Priorities for technology modernisation

Involvement of Basic Research

Dissemination and discussion of results

Integration to global value added chains

Areas to pursue global leadership

Future demand for skills

Involvement of businesses, technology platforms, development institutes, large companies

Roadmaps for sectors and product groups

Innovation strategies for sectors of economy

Policy recommendations

S&T Priorities

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Major components of S&T Foresight

- Macroeconomic trends
- S&T resources (R&D organisations, fixed assets, human resources)
- Roadmaps for sectors and S&T priority areas
- Global and national factors of long-term development
- Strategies for innovation development of sectors
- Policy recommendations for S&T and innovation
Key features of the ongoing activities

- Methodology: from sectoral structures – to markets
- Assessing future demand for skills
- Wider coverage of the sectors of the Russian economy
- Building a sustainable participants’ networks: expert panels, sectoral Foresight centres at leading universities
- Engagement of businesses: technology platforms, programmes of innovation development of state owned companies, business associations
- Closer interaction with everyday policy making in S&T and innovation: presentation of outputs
- Wide dissemination and discussion of results, building sustainable feedback

Moving from informing policies to designing them
Building sustainable expert networks

Foresight centres at universities

Expert panels for priority areas

Research centres, universities, companies

Foreign experts

Sectoral expert: technology platforms, state owned companies, government agencies, business associations

Federal universities
National research universities
Programmes for innovation infrastructure at universities
Joint university-company projects

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Addressing global and national factors of long-term development

Major factors of S&T development
- Demand for innovation
- Social, cultural and geopolitical factors
- Measures to increase Russia’s competitiveness in the long run

Global technology trends
- Scenarios for global shifts of technological modes
- Assessment of Russia’s potential for technology development
- Recommendations on priorities for basic production facilities

Comparative analysis of Foresight practices
- S&T trends
- Analysis of S&T Foresight methodologies
- Recommendations on development of Foresight methodologies

STEEPV
Society Technology Economy Environment Policy Values
Contribution to macroeconomic policies

- Mutual impact of S&T and socio-economic trends
- Complex forecast of major indicators of S&T, innovation and education
- Methodological issues
- Building a complex system of indicators, development of models
- Empirical analysis
- Assessment of key macroeconomic effects for S&T, innovation and education in RF
- Macroeconomic scenarios for the post-crisis period
- Scenario-based forecasts for short- and mid-term
- Assessment of macroeconomic and structural effects
- Scenario-based forecasts of S&N impact on socio-economic development
Assessing future demand for S&T resources

Foresight of basic research
- Research areas providing new S&T results and technological breakthroughs
- Assessment of Russia’s standing
- Centres of excellence
- Proposals for programmes of basic research

S&T potential
- R&D organisations
- Human resources
- R&D funding
- S&T fixed assets
- International cooperation

Integration of the results

S&T Foresight: 2030

Long-term demand for skills in the field of technological innovation
- List of key technological innovation
- Assessment of level of innovation skills
- Drivers for demand for skills
- Policy recommendations

S&T and innovation policy recommendations
- Analysis of best practices
- Analysis of new instruments for Russia
- Policy recommendations

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S&T Foresight

- Challenges for innovation development
- Global S&T trends
- S&T prospects for Russia

Assessment of S&T and innovation potential of Russia

- S&T Foresight
- Foresight of innovation markets
- Foresight for major sectors of economy
- Recommendations for technology modernisation

Integration into global value-added chains
- Identification of sectors of economy with a potential for global competitiveness

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Integration to policy design

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Anticipated outputs

• S&T
  – Scientific results
  – Breakthrough technologies
  – Innovation products and services
  – Assessment of Russia vis-à-vis world leaders

• Demand for technologies from innovation markets
  – Urgent demand for S&T for achieving development goals
  – New markets
  – risks, barriers, limitations
  – Russia’s competitive advantages

• Major sectors of economy
  – Scenarios
  – Strategic forks
  – Technological priorities
Issues for discussion

Engagement of experts:
- how to assure participation of business?
- number of experts vs their quality – a right balance?
- how to prove the quality of experts and their sufficiency?
- how to engage foreign experts?

How Foresight can help to opt between the support of “traditional” areas and emerging fields with potentially high economic and social return
Issues for discussion

How can regular monitoring and evaluation of Foresight contribute to the quality assurance?

How to find a balance between different types of priorities (macro-, mission-oriented, thematic et al)?

How to provide a stronger focus on policy agenda and a better ‘grounded’ approach (articulation of business demand, roadmapping for promising areas, evidence-based studies, integrated forecasting S&T, innovation and education indicators etc)

Is a broader set of instruments required (combination of qualitative and quantitative methods, weak signals and wild cards, horizon scanning et al)?
Issues for discussion

Implementation of Foresight outputs

National S&T Programme 2013-2020
- Thematic Priorities
- Results to be achieved
- A background for formulation of research projects to be funded
- Distribution of funding between priorities

Strategies for the sectors of economy

Strategies for social and economic development
Issues for discussion

Diminishing uncertainties
Managing risks

Informing policies
Designing policies
Priorities: mission oriented
Infrastructural
Thematic

Policies for regions
Corporations (private vs public)
Resource allocation

Early warning
Future demand
Future trends

Public interests vs corporate interests
Roadmaps as a policy instrument

- Prospective areas for Calls for proposals
- Tenders for technology development
  - Requirements to technologies
- Independent expertise
  - High-risk areas
  - Independent expertise
- Tenders for production
  - Requirements to products

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Optional strategies based on roadmaps

- **Technical requirements**
  - Import of technologies
  - Price vs quality
  - Technological chain

- **Markets**

- **PRODUCT**
  - R&D
  - Manufacturing
  - Product
  - Market

- **Technological chain**

- **Price vs quality**

- **Import of technologies**

- **Technical requirements**

- **Markets**

- **PRODUCT**

- **R&D**

- **Manufacturing**

- **Product**

- **Market**
Thank you!

sokolov@hse.ru