Deliverable D1.1

The Russian S&T system

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WP1: Preparing the analytical ground for coordinating EU MS/AC S&T and innovation programmes towards Russia or with Russian programme owners

Task 1.1: Analysing the Russian S&T system

- Stock taking and analysis of existing information with emphasis on analytical data and studies.
- Preparing an analytical report including an overview of the structure of S&T in Russia (public and private sector), Russian strengths and national priorities in S&T; leading S&T institutions by scientific disciplines, present state of international cooperation with emphasis on EU MS/AC.

Partners involved: CNRS, Archimedes, KIAE, HSE, ICISTE, ZSI
D1.1: Structure (1)

Introduction (CNRS)

1  S&T strategy and governance
   1.1 National priorities in S&T (CNRS)
   1.2 Legal basis for S&T policy (CNRS) (HSE)
   1.3 Governmental and other S&T decision-making bodies (ICISTE) (HSE)

2  S&T landscape
   2.1 Scientific Excellence in Russia (HSE)
   2.2 Research and Innovation Infrastructures (KIAE)
   2.3 Human potential (HSE)
   2.4 Geographical distribution & regional research potential (ICISTE)
   2.5 Distribution between education and research (ICISTE)
   2.6 Organisation of public and private sector (Archimedes)
   2.7 Effects and Efficiency of reforms in the S&T sector (HSE)
   2.8 Output indicators: number of publications and patents (HSE)
D1.1: Structure (2)

3 Main actors implementing S&T policy and performing R&D
   3.1 Actors at the federal level implementing S&T policy (ICISTE) (KIAE)
   3.2 Main actors at the regional level (ICISTE)
   3.3 S&T funding agencies (All partners)
   3.4 State corporations (CNRS) (KIAE) (INBI)
   3.5 Research performers (HSE) (CNRS) (KIAE) (INBI)

4. International cooperation
   4.1 S&T cooperation agreements (Archimedes)
   4.2 International programmes and initiatives (Archimedes)
   4.3 Indicators (HSE)

Conclusions (CNRS)

Bibliography

ANNEXES
Gross Domestic Expenditure on R&D (GERD)

- 2008: RUB 431.07 billion (€ 11.8 billion), 1.03% of GDP
- A decline compared to previous years (2007: 1.12% of GDP)
- R&D funding by source, 2007
  - government: 62.6%
  - business 29.4%
  - funds from abroad: 7.2%
  - other: 0.7%
- Thematic priorities, 2007: transport, aviation, space, ICT

Sources: EUROSTAT Database, 2010
S&T Indicators in the RF: 2009, State University – Higher School of Economics
GERD as percentage of GDP, 2007

Israel: 4.65
Germany: 2.53
Austria: 2.51
France: 2.11
Russia: 1.12
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S&T funding trends (1)

- R&D in Russia is *de facto* overwhelmingly publicly funded

- Recent legislative changes aimed at facilitated R&D and innovation: tax exemptions, creation of innovative companies by universities and research organizations to commercialize their R&D, large public companies are obliged to put up innovation strategies, etc.
S&T funding trends (2)

- 2005: 25% of civil governmental R&D funding allocated competitively and increasing: 50% of civil governmental R&D funding in current years and a planned further increase up to 70%
- 2009: R&D budget cuts up to 30% due to crisis
- Tenders encouraging international participation
- Changes to the Law #94 on tenders
Russian S&T Funding System: SWOT Analysis

**Strengths (internal factors)**
- Move to competitive S&T funding (ftp, RFBR, FASIE)
- Strengthening of evaluation and accountability
- Relative high S&T investment in comparison to competitors
- Funding of basic research
- Improvements in innovation funding

**Weaknesses (internal factors)**
- Intransparencies of S&T funding (e.g. defence R&D budget)
- Low/negligible private S&T funding (weak innovative company sector)
- Legal limitations: state order system
- Domination of state sector in S&T funding
- Slow reform of institutional sector

**Opportunities (external factors)**
- National politics favouring S&T investment (economic policy)
- International interest in S&T cooperation with RU
- FP7 association

**Threats (external factors)**
- Policy factors: political conflicts with EU, NATO, etc.
- Current economic crisis: repercussions on S&T funding
- Declining S&T investment from abroad

Source: HSE, ZSI
Scientific Excellence
- Articles of the Russian Authors in the World Scientific Journals (Web of Science)

- Number of articles and % of the world total for different fields:
  - Clinical medicine: 27,7% (2008), 35,2% (2002)
  - Chemistry: 22,3% (2008), 12,3% (2002)
  - Physics: 8,1% (2008), 9,5% (2002)
  - Engineering/technology: 4,8% (2008), 2,9% (2002)
  - Biology: 6,1% (2008), 8,2% (2002)
  - Science of materials: 7,3% (2008), 4,7% (2002)
  - Earth sciences: 3,2% (2008), 4,5% (2002)
  - Mathematics: 12,0% (2008)
  - Space sciences: 4,0% (2008)
  - Other: 2,5% (2008), 1,2% (2002)

- State University - Higher School of Economics
Scientific Excellence - Patent Activity

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- Patent applications by resident applicants, %
- Patent applications by non-resident applicants, %
- Patent applications, total

- Inventiveness ratio - resident patent applications in Russia per 10000 population
- Autosufficiency ratio - resident/total patent applications in Russia
- Dependency ratio - non-resident/resident patent applications in Russia

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State University - Higher School of Economics

Scientific Excellence - R&D Personnel

Head-count

Distribution by occupation

- Total, thousand
- Total in FTE, thousand
- Researchers
- Technicians
- Supporting stuff
- Others
Scientific Excellence
- R&D Personnel motivation and quality

Average monthly salary of R&D personnel as a per cent of that:

- in the national economy (= 100%)
- in industry (= 100%)

Distribution by qualification

Distribution by age

Average monthly salary of R&D personnel as a per cent of that:

- in the national economy (= 100%)
- in industry (= 100%)

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S&T institutions
- Organisations performing R&D

By type, %

By sector of performance, %

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### Higher education institutions performing R&D: 45% (2004 – 38%)

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<th>Year</th>
<th>Teaching staff total, thousands</th>
<th>Teaching staff performing R&amp;D, %</th>
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#### S&T institutions

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<tr>
<th>Institution</th>
<th>R&amp;D expenditure, %</th>
<th>Non-budgetary R&amp;D funding per 1 ruble of the budgetary R&amp;D funding</th>
<th>New technologies created, %</th>
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S&T Policies
- Challenges

**Production and domestic markets:**
- Conservation of traditional structure
- Lack of competitive mechanisms
- Low share of high-tech sectors

**National innovation system:**
- Institutional misbalance
- Gap between science and higher education
- Underdeveloped cooperation between S&T and real sector
- Low capacity compared to funding

**Administration mechanisms:**
- Increasing expenditure on S&T
- Inconsequent S&T policies (including strategy levels)
- Low motivation for S&T and innovation
- Inefficient corporate management
S&T Policies
- Main Challenge: Loss of Competitive Positions

Federal budget appropriations on civil science and technology (at constant prices), 1998 = 100%
Gross domestic expenditure on R&D (at constant prices), 1998 = 100%
Articles of Russian authors in international scientific journals (Web of Science)
Russia's % in the world total articles in international scientific journals (Web of Science)
S&T Policies - Reforms in S&T

Improving quality and increasing supply from the S&T sector:
- Government R&D sector reform
- Resources allocation:
  - priorities
  - centers of excellence
- Support to networks

Human capital development:
- Education sector reform
- Providing efficient contract
- Attraction and retention of young scientists
- Recovery of motivation for scientists / teachers

Stimulation of demand for technologies and innovation in the economy:
- Promotion of market competition
- Support to innovators
- Innovation in the public sector
- Innovation infrastructure
**Priority setting**

- 8 priority areas and 34 critical technologies
- Meeting the global agenda, ensuring national competitiveness and promotion to innovation in key areas

**Support to front-end R&D**

- Specialised Federal Target-Oriented programmes
- Specialised programmes of state science academies and state scientific funds
S&T Policies
- Adjusting the Institutional System

Restructuring government R&D institutions
- Creating S&T centres in view to ensure S&T support to high-technology sectors

Evaluation of R&D units’ performance
- Weighting resources (human capital, tangible and intangible assets, financial sustainability, etc) and outputs; selecting groups of “leaders”, “middle-runners” and “outsiders” for comprehensive targeted policies
- Research universities
S&T Policies
- Developing the S&T Support Framework

Improving legislation for IPR and technology commercialisation
- The Government Resolution “On Government Control Over the Results of Civil-Purpose R&D” (2005)

- Encouraging the public-private partnership
  - The Russian Venture Company and sector-specific state corporations (2006-2008)

- Tax incentives for R&D and innovation
  - Changes to the Tax Code (2008), including new procedures for VAT and profit tax calculation
  - Simplified taxation mechanisms

- Developing the innovation infrastructure

- International S&T cooperation
D1.1 conclusions: main features of the Russian S&T system

Scientific excellence

- Russia ranks among leaders for absolute figures of S&T human potential (4th place after China, Japan and the USA) and scientific publications. But for important comparative indicators such as citations or patents, Russia is obviously not at the forefront.

- the Russian R&D personnel has stabilised and financial inflows into S&T have significantly improved over the last years

- Russia disposes still of scientific excellence in basic research fields such as physics, chemistry, etc. and in certain applied research areas such as nuclear or space research.
Main features of the Russian S&T system (2)

*Governance system and policy framework*

- The Russian S&T system is still policy-driven at the national level. The **Ministry of Education and Science** (MES Russia) works out the federal strategy for the S&T development.

- At the implementation level, two main agencies are in charge of supporting R&D by means of Federal Targeted Programmes, which are the new tools designed for funding R&D in a competitive way:
  - the **Federal Agency for Science and Innovation (FASI)**,
  - the **Federal Agency for Education**

- FASI implements especially the main competitive funding programme for S&T, the “**Federal Targeted Programme R&D in Priority Fields of the S&T Complex of Russia 2007-2012**”.
Main features of the Russian S&T system (3)

*Higher Education and Research*

- Russia has a particular division between organisations that conduct research and education. Research was historically performed at research institutes of the **Russian Academy of Sciences** (RAS), and **higher education at universities**.

- The new **“Federal law on integration of science and education”** (2007) aims at boosting S&T and innovation activities in Higher Education Institutions and establishing close links with research institutions. One of the recent achievements here is the new statute of **National Research Universities** assigned to leading Universities on a competitive basis.
Main features of the Russian S&T system (4)

*Research expenditures*

- Domination of the government-owned budget-funded institutions in the Russian S&T sector remains the main distinction from the science systems of EU Member States and other major industrial countries: 62% of the Gross Domestic Expenditure on R&D was financed by the Government in 2006 (34% in the EU).

- Three bodies control most of the civilian State R&D budget: the Russian Academy of Sciences, which is still the major actor, the Federal Space Agency (Roscosmos), and the Federal Agency for Science and Innovation (Rosnauka).
Main features of the Russian S&T system (5)

Innovation policy

The National System of Innovation (NSI) suffers from the heritage of the Soviet Union and the social, political and economic transition of the 90s. According to the MES itself, the main NSI weaknesses are:

- **Insufficient coordination** between public and private sectors in funding R&D.
- **Low level of implementation** of adopted measures aimed at promoting innovation activity in the enterprise sector
- **Low level of inter-ministerial coordination of innovation activity**
- **Low level of support for small innovative enterprises**, lack of large innovative companies, lack of promotion of innovative entrepreneurship

- The effect of the practical measures provided by the Government on reorganisation of national S&T during the last 15 years are still too limited. Changes of the situation will strongly depend on measures for improving the overall business environment, the economic stability, and the respect of law.
Main features of the Russian S&T system (6)

**International cooperation.**

According to its national strategy for the development of science and innovation, Russia is willing to create **favourable conditions** for international S&T co-operation.

- Russia had the **highest participation in FP6** (2002-2007) of all Third Countries. Entities from the Russian Federation participate in all thematic and sub-programmes of FP7, including coordinated calls in several thematic priorities. Russia has signalled its **interest in an associate status to the FP7**.

- Data for **international co-publications** exhibit a significant trend of bottom-up bi- and multi-lateral cooperation, especially in fundamental research. The **Russian Foundation for Basic Research** is the major player which provides support for international cooperation on a joint and competitive basis.
Main features of the Russian S&T system (7)

- Overall the Russian S&T sector shows an **ambiguous picture**: important reforms have been achieved in R&D funding. Competitive funding programmes have been introduced. Innovation support has been given a priority. But large parts of the S&T sector function still in an old Soviet mode, where funding is spread without or only limited competition and accountability.

- Although some obstacles regarding internal regulations remain to be tackled, **Russia has the research potential, the resources, the instruments, and eventually the willingness to make a new step to strengthen S&T cooperation with EU member states for a mutual benefit.**
Thanks to all contributors to the report

Thank you for your attention