



# ERAWATCH COUNTRY REPORTS 2012: Russian Federation

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ERAWATCH Network – Centre for Social Innovation,  
ZSI

Manfred Spiesberger

## Acknowledgements and further information:

This analytical country report is one of a series of annual ERAWATCH reports which cover the EU Member States, Countries Associated to the EU Seventh Research Framework Programme (FP7) and, since 2011, selected third countries (ERAWATCH International).

ERAWATCH is a joint initiative of the European Commission's Directorate General for Research and Innovation and Joint Research Centre - Institute for Prospective Technological Studies (JRC-IPTS). The reports are produced, under contract, by the ERAWATCH Network.

The analytical framework and the structure of the reports have been developed by the Institute for Prospective Technological Studies of the Joint Research Centre (JRC-IPTS) with contributions from Directorate General for Research and Innovation and the ERAWATCH Network.

The report is only published in electronic format and is available on the ERAWATCH website (<http://erawatch.jrc.ec.europa.eu/>). Comments on this report are welcome and should be addressed to [jrc-ipts-erawatch-helpdesk@ec.europa.eu](mailto:jrc-ipts-erawatch-helpdesk@ec.europa.eu).

The opinions expressed are those of the authors only and should not be considered as representative of the European Commission's official position.

## Executive Summary

Russia is the largest country in the world in terms of area, and spans over nine time zones. It has a population of 142.7m (UNESCO-UIS, 2012), which is concentrated in the European part of the country making it the largest European country. In 2012, its GDP amounted to €1,568b; it is an upper middle-income country with a GDP of €10,925 per capita (World Bank, 2013)<sup>1</sup>. Its economy depends largely on primary goods production (oil, gas, mining and metallurgy). It is counted within the group of economically fast developing BRIC countries.

Over the period 2007-2011, Russia invested slightly above 1% of GDP in R&D (GERD). In 2010, GERD amounted to 1.11% of GDP (down from 1.24% in 2009). In absolute figures GERD amounted to €15b (RUB610b) in 2011, up by nearly €2b as compared to 2010<sup>2</sup>. The government finances most of GERD (67.1% in 2011), whereas the business enterprise sector financed only 27.7% of GERD in 2011, showing a slightly increasing trend. Most of GERD is performed in the business enterprise sector (BERD), a sector which is marked by big R&D intensive companies in state ownership. BERD has been slightly decreasing from 64.3% of GERD in 2006 to 61.0% in 2011, while R&D performance in the higher education sector (HERD) has been increasing from 6.3% to 9.0% over the same period (EUROSTAT, 2013). The economic crisis resulted in a short, but significant dip in R&D funding in the years 2009-2010. With economic growth back at a rate of around 4% in 2010-2012 (OECD, 2013), also funding for R&D entered again a growth path.

The EU and Associated countries to the EU's Framework Programme for RTD (FP) are Russia's main international cooperation partners in R&D. The multilateral cooperation with the EU is legally based on the EU-Russia S&T agreement, which is due for renewal in 2014. Russia has the highest participation rate in the EU Framework Programmes in terms of the funding it receives and of participants in funded projects, of all so-called "Third Countries" (non-EU and non-associated countries to the FP). In addition, around fifteen bilateral S&T agreements and related bilateral R&D and innovation funding programmes underpin the cooperation with the EU. The cooperation will be further underpinned through the EU-Russia Year of Science in 2014.

Russia has an important scientific tradition with major successes in fields such as physics, space, aeronautics, and nuclear energy. It can rely on a well-educated labour force and a significant amount of R&D personnel.

Stimulating private investment into R&D and innovation is a major challenge for Russian policy makers. The structure of the economy with a focus on big companies and a large share of state ownership, as well as the framework conditions (e.g. legal system, corruption) are not very conducive to private investment. Several stimulation measures have been introduced in recent years: co-funding by businesses is a requirement in some of the activities under the main competitive R&D funding

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<sup>1</sup> World Bank provides data in US \$, which have been converted to € with an average exchange rate of 1€ = \$1.2848 as provided by the European Central Bank for the year 2012.

<sup>2</sup> An exchange rate of €1 = RUB40 has been applied throughout this report for conversions, where no official figures were available.

instruments - the Federal Targeted Programmes (FTPs). Tax incentives and special economic zones for technology development have been established. Venture funds and technology parks have been added to the portfolio of measures. In 2010-2012, Technology Platforms were selected, Innovative Territorial Clusters were supported and a new funding tool for collaborative projects between business and higher education institutions (the HEI-business programme) was established.

The interactions and exchanges within the knowledge triangle education, research and innovation are not yet well established in Russia. The majority of research activities are traditionally performed in research institutes, and are more weakly established in universities and business enterprises. The measures mentioned above are targeting not only private R&D investment, but also an improved interaction in the knowledge triangle. Specific support tools for enhancing research within universities were introduced since 2009. These include programmes for selecting and supporting National Research Universities, for enhancing the capacities and internationalising a group of 15 leading universities, and for attracting leading scientists (mainly from abroad) to Russian universities and research institutes. Innovation infrastructure at universities was enhanced, and a law (FZ-217), introduced in 2009, made spin offs from higher education institutions (HEIs) and private research organisation (PROs) possible and regulated the transfer of Intellectual Property Rights in this case.

The following table provides a brief overview of Strengths (S) and Weaknesses (W) within the knowledge triangle:

### Knowledge Triangle

	Recent policy changes	Assessment of strengths and weaknesses
Research policy	Strengthening research at universities, reform of Russian Academy of Sciences initiated	S: opening up to international cooperation, new funding tools introduced e.g. attracting foreign scientists and Russian scientific diaspora, focus on cooperation with the EU W: HERD rather low in international comparison, domination of government sector
Innovation policy	Innovative Territorial Clusters introduced	S: commitment of policy makers to modernisation and innovation stimulation W: selective activities, without targeting the broader framework (e.g. legal framework); lack of evaluation of measures; weak R&D and innovation funding by business enterprise sector
Education policy	Selecting an elite group of universities and enhancing it with specific funding tools; revised law on education approved	S: upgrading of equipment and curricula, Russia joined the Bologna process and the transformation to two cycle system is ongoing W: adjustment of the university sector to declining number of students is necessary
Other policies	Law on spin-offs issued in 2009	S: support tools for small innovative companies provided by FASIE, venture funds through RVK and funding through Rusnano available, framework conditions for spin-offs improved W: industry structure marked by a lack of SMEs

In the period 2012-13, additional significant measures were taken to strengthen the research and innovation system: a monitoring process of the HEI sector was

launched, which will lead to a concentration of resources on the leading institutions and to a reduction in the number of HEIs overall. A reform of the Russian Academy of Sciences was initiated in summer 2013. New Federal Targeted Programmes, the major competitive funding tools for research and innovation, were approved for the period 2014-2020. A revised law on education will enter into force in September 2013.

The main challenges for Russia's R&D system are strengthening research and innovation activities in the business sector, and enhancing the linkages in the knowledge triangle education, research and business. In the past few years, several new support measures have been devised to address specifically these issues. Measures such as special economic zones, technology platforms and innovative territorial clusters are targeted at linking research and business. Funding programmes for strengthening research in the university sector (e.g. National Research Universities' programme), for linking universities and business, and for attracting highly qualified researchers to the universities were launched.

### Assessment of the national policies/measures

	Objectives	Main national policy changes over the last year	Assessment of strengths and weaknesses
1	Labour market for researchers	<ul style="list-style-type: none"> <li>- Funding programme launched in 2010 to attract leading scientists (especially from abroad) to Russian universities</li> <li>- Simplified procedures for hiring foreign highly qualified specialists introduced</li> </ul>	S: high levels of tertiary education attainment W: Overall limited attractiveness of working conditions for researchers: low basic salaries, good RIs only at leading institutions
2	Research infrastructures	<ul style="list-style-type: none"> <li>- Participation in international infrastructures (e.g. JINR-Dubna, CERN, X-FEL)</li> <li>- Plans for "Megascience" projects for national infrastructures</li> </ul>	S: participation in international R&D infrastructure projects (especially in Germany); financial means for investing in big infrastructures in Russia available after a long time W: large infrastructures in Russia outdated; variety of infrastructure investments under discussion
3	Strengthening research institutions	<ul style="list-style-type: none"> <li>- Stimulation measures for strengthening research at universities introduced</li> <li>- monitoring and streamlining of the HEI sector started</li> <li>- Academy of Sciences reform initiated</li> <li>- Significant increase of GERD in absolute figures</li> </ul>	S: several new funding tools for university research and related knowledge transfer introduced: attracting leading scientists, HEI-business programme, Federal Universities, National Research Universities W: HERD increasing, but still low in international comparison; sector of the Academy of Sciences slowly moving forward in a reform process
4	Knowledge transfer	<ul style="list-style-type: none"> <li>- Technology Platforms (TPs) selected in a competition in spring 2011</li> </ul>	S: stimulation tools implemented: FASIE, TPs, Rusnano, Russian Venture Company W: impact of stimulation measures not sufficiently verified; limited level of business co-funding in the major R&D funding programmes, the FTPs
5	International R&D cooperation with EU member states	<ul style="list-style-type: none"> <li>- Inward mobility programmes introduced (attracting leading scientists)</li> </ul>	S: Russia is traditionally the strongest third country performer in FPs; dense network of bilateral RTDI cooperation with

		<ul style="list-style-type: none"> <li>- Participation in ERA-NET projects, especially the regional ERA.Net RUS for Russia</li> <li>- Repeated proposals of Russia to mutually lift visa procedures with the EU</li> </ul>	<p>EU Member States and Associated countries to FP7 (through RFFI, RAN, FASIE, etc.);</p> <p>great international interest in programme for attracting leading scientists (mainly from abroad) to Russian universities and research institutions</p> <p>W: bureaucratic hurdles (customs, taxation, etc.) for international R&amp;D cooperation, however hiring of foreign staff in Russia has been made easier</p>
6	International R&D cooperation with non-EU countries	<ul style="list-style-type: none"> <li>- Inward mobility programmes introduced (attracting leading scientists)</li> </ul>	<p>S: cooperation with major international R&amp;D players (USA, CN, JP, etc.); cooperation network with other Former Soviet Union countries</p> <p>W: limited inward mobility to Russia, however hiring of foreign staff in Russia has been made easier; bureaucratic hurdles (customs, taxation, etc.) for international R&amp;D cooperation</p>

## TABLE OF CONTENTS

1	INTRODUCTION .....	9
2	PERFORMANCE OF THE NATIONAL RESEARCH AND INNOVATION SYSTEM AND ASSESSMENT OF RECENT POLICY CHANGES .....	10
2.1	MAIN POLICY OBJECTIVES / PRIORITIES, SOCIAL AND GLOBAL CHALLENGES .....	10
2.2	STRUCTURE OF THE NATIONAL RESEARCH AND INNOVATION SYSTEM AND ITS GOVERNANCE .....	11
2.2.1	Main actors and institutions in research governance .....	11
2.2.2	The institutional role of regions in research governance .....	13
2.3	RESOURCE MOBILISATION .....	14
2.3.1	Financial resource provision for research activities (national and regional mechanisms) .....	14
2.3.2	Providing qualified human resources .....	17
2.3.3	Evolution towards the national R&D&I targets.....	18
2.4	KNOWLEDGE DEMAND .....	20
2.5	KNOWLEDGE PRODUCTION .....	21
2.5.1	Quality and excellence of knowledge production .....	21
2.5.2	Policy aiming at improving the quality and excellence of knowledge production .....	22
2.6	KNOWLEDGE CIRCULATION.....	23
2.6.1	Knowledge circulation between the universities, PROs and business sectors .....	23
2.7	OVERALL ASSESSMENT .....	24
3	NATIONAL POLICIES FOR R&D&I .....	25
3.1	LABOUR MARKET FOR RESEARCHERS .....	25
3.1.1	Stocks of researchers.....	25
3.1.2	Providing attractive employment and working conditions .....	25
3.1.3	Open recruitment and portability of grants .....	26
3.1.4	Enhancing the training, skills and experience of researchers.....	28
3.2	RESEARCH INFRASTRUCTURES.....	28
3.3	STRENGTHENING RESEARCH INSTITUTIONS.....	29
3.3.1	Quality of National Higher Education System .....	29
3.3.2	Academic autonomy.....	32
3.3.3	Academic funding.....	33
3.4	KNOWLEDGE TRANSFER.....	33
3.4.1	Intellectual Property (IP) Policies.....	33

3.4.2	Other policy measures aiming to promote public-private knowledge transfer .....	34
3.5	ASSESSMENT .....	36
4	INTERNATIONAL R&D&I COOPERATION .....	38
4.1	MAIN FEATURES OF INTERNATIONAL COOPERATION POLICY.....	38
4.2	NATIONAL PARTICIPATION IN INTERGOVERNMENTAL ORGANISATIONS AND SCHEMES .....	38
4.3	COOPERATION WITH THE EU .....	39
4.3.1	Participation in EU Framework Programmes .....	39
4.3.2	Bi- and multilateral agreements with EU countries.....	43
4.4	COOPERATION WITH NON EU COUNTRIES OR REGIONS.....	45
4.4.1	Main Countries.....	45
4.4.2	Main instruments.....	46
4.5	OPENING UP OF NATIONAL R&D PROGRAMMES.....	47
4.6	RESEARCHER MOBILITY .....	47
4.6.1	Mobility schemes for researchers from abroad .....	47
4.6.2	Mobility schemes for national researchers.....	48
5	CONCLUSIONS.....	49
6	REFERENCES.....	50
7	LIST OF ABBREVIATIONS.....	52

## 1 INTRODUCTION

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The main objective of the ERAWATCH International Analytical Country Reports 2012 is to characterise and assess the evolution of the national policy mixes of the 21 countries with which the EU has a Science and Technology Agreement. The reports focus on initiatives comparable to the ERA blocks (labour market for researchers; research infrastructures; strengthening research institutions; knowledge transfer; international cooperation). They include an analysis of national R&D investment targets, the efficiency and effectiveness of national policies and investments in R&D, the articulation between research, education and innovation as well as implementation and governance issues. Particular emphasis is given to international research cooperation in each country.

## 2 PERFORMANCE OF THE NATIONAL RESEARCH AND INNOVATION SYSTEM AND ASSESSMENT OF RECENT POLICY CHANGES

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### 2.1 MAIN POLICY OBJECTIVES / PRIORITIES, SOCIAL AND GLOBAL CHALLENGES

Some research fields, where Russia has strong scientific potential, or where it wants to push its capacities, are more relevant for intersectoral and international S&T cooperation than other fields. These fields concern for example cooperation on research in physics, energy (including nuclear fission and fusion), aeronautics, space and nanotechnologies.

An important grand challenge, where Russia is cooperating internationally concerns energy: on the one hand it is a major energy resource provider for EU countries and on the other hand it cooperates on future energy technologies with the EU, e.g. on the international nuclear fusion project ITER. Regarding the societal challenge in the area of health the focus has been put on innovation and applications in industry, and a specific thematic funding programme has been established with the Federal Targeted Programme Development of the Pharmaceutical and Medical Industry for the years 2011-2020. Climate action and marine research are important challenges for Russia due to a possible ice-free arctic and raw materials and resources extraction in this region.

Another important field for Russia is nanotechnology, where it has put high priority on research, technology development and innovation. Support and stimulation activities have been getting off the ground in the last few years. The Russian state corporation for the support of nanotechnologies - Rusnano – has, after a slow start, begun funding innovative projects and annually organises an important international nanotechnology forum in Moscow.

The selection of Russian Technology Platforms, which stimulate the intersectoral cooperation among business, research institutes, universities and governmental organisations, confirms the thematic priority setting. Of the 27 TPs selected for support in spring 2011, 11 deals with energy related topics (nuclear energy, oil and gas, alternative energies, etc.), five TPs deal with nanotechnologies and new materials, whereby four of these TPs are coordinated or co-coordinated by Rusnano. Other fields with more than one TP are space and ICTs (Governmental Commission, 2011).

## 2.2 STRUCTURE OF THE NATIONAL RESEARCH AND INNOVATION SYSTEM AND ITS GOVERNANCE

Russia is the largest country in the world in terms of area, and spans over nine time zones. It has a population of 142.7m (UNESCO-UIS, 2012),<sup>3</sup> which is concentrated in the European part of the country and making it the largest European country. In 2010, Russia invested a share of 1.11% of GDP in R&D (GERD, down from 1.24% in 2009). In 2011, GERD amounted in absolute figures to €15b (RUB610b), up by nearly €2b as compared to 2010 (EUROSTAT, 2013).

The EU and Associated countries to the EU's Framework Programme for RTD are Russia's main international cooperation partners in R&D. Russia has the highest participation rate in the EU Framework Programmes in terms of funding it receives, of all so-called "Third Countries" (non-EU and non-associated countries to the FP). In addition, around fifteen bilateral S&T agreements and related bilateral R&D and innovation funding programmes underpin its cooperation with the EU. As a consequence and with the aim of strengthening cooperation, in 2008, Russia expressed its interest in becoming an associated country to the EU's FP7. In February 2011, Commissioner Geoghegan-Quinn met with then Russian Minister for Education and Science, Andrei Fursenko, and confirmed that the EU would not open negotiations on Russia's association to FP7 (under the new general EU-Russia Agreement), stating that the timing for this was no longer meaningful. Instead, it was agreed to build a new 'strategic partnership' between the EU and Russia for S&T.

Apart from cooperation with the EU, international RTDI cooperation is well established with major international R&D players (USA, CN, JP, etc.). A special focus is placed on cooperation with other Former Soviet Union countries, with which Russia is linked through joint funding programmes or cooperation among Academies of Sciences.

### 2.2.1 Main actors and institutions in research governance

The main player in Russian S&T policymaking, strategy and implementation is the [Ministry of Education and Science](#) (in Russian: Minobrnauki or MON). Several other ministries have responsibilities for R&D and respective budgets: e.g. [Ministry for Economic Development](#), Ministry of Industry and Trade, Ministry of Energy, Ministry of Information Technologies and Communication, and Ministry of Defence.

Research policy is coordinated at the governmental level by the Governmental Commission for Economic Development and Integration. Research related advisory bodies to the President are the Council for Science and Education and the Council for Modernisation of the Economy and Innovative Development of Russia. Within the Russian Parliament two committees take care of research policy: in the lower house, the State Duma, the Committee on Science and High Technologies; and in the upper house, the Federal Council, the Committee on Science, Education, Culture and Information Policy. Both committees propose and scrutinise legislation relevant to R&D.

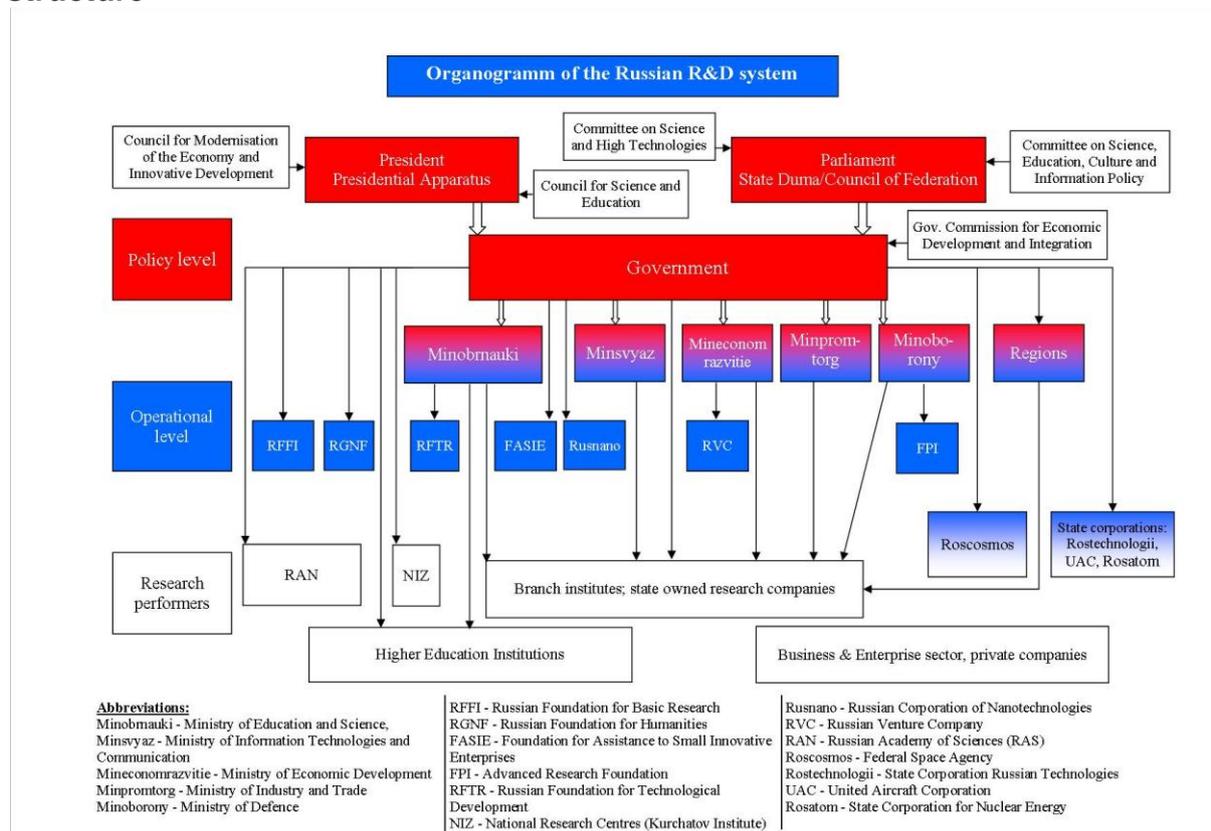
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<sup>3</sup> Russia's population has been declining since it became an independent state in 1991.

For policy implementation several funding bodies are in place besides the Ministry of Education and Science and the other relevant ministries. For basic research support, the [Russian Foundation for Basic Research](#) (RFFI) and the [Russian Foundation for Humanities](#) (RGNF) have been established. A new agency for basic research in defence and dual use research, the Advanced Research Foundation, will be operational as of autumn 2013. For the innovation side, the [Foundation for Assistance to Small Innovative Enterprises](#) (FASIE), the Russian Foundation for Technological Development (RFTR), the [State Corporation for Nanotechnologies](#) – Rusnano, and the Russian Venture Company are available. More recently, in 2011, the Skolkovo foundation has been added to the portfolio of innovation support instruments. It has been developing a broad spectre of activities, mainly for establishing a high tech centre on the outskirts of Moscow, but also for allocating R&D grants.

Some important research institutions have a mixed set of tasks, including research performance and policy implementation. This concerns for example the [Federal Space Agency](#) which is a major actor in both the definition and the supervision of Space-related research and at the same time is responsible for implementing the [Federal Targeted \(funding\) Programme for the space sector](#).

**Figure 1: Overview of the Russian Federation’s research system governance structure**



Source: ERAWATCH Country Fiche – Russian Federation

## 2.2.2 The institutional role of regions in research governance

R&D policy is shaped and implemented predominantly at the federal level, by the government and the responsible ministries, in particular the Ministry of Education and Science. The regions have limited tasks and resources available for R&D, but their relevance - especially in innovation related support - is increasing.

The Russian Federation is a federal state, structured into so-called *Subjects of the Federation*; these are 46 regions (oblast'), 21 republics, 4 autonomous districts (okrug), 9 territories (kray), 2 federal cities (Moscow, St. Petersburg) and 1 autonomous region (avtonomnaya oblast'). Federal subjects are regrouped for governance purposes into eight Federal Districts, led by representatives of the president. In this analytical country report, the term 'region(s)' is used generally referring to all Subjects of the Federation.

R&D capacities are concentrated in certain Russian regions and especially in and around big cities. Moscow and the Moscow region have the highest concentration of R&D capacities followed by St. Petersburg, the second largest city in Russia. Then follow a range of important regional centres, such as Rostov-on-Don in the south, Kazan, Nizhny Novgorod and Saratov in the Volga Federal District, several big cities in Siberia: Irkutsk, Krasnoyarsk, Novosibirsk, Tomsk, and in the Urals: Yekaterinburg.

Several regions have developed their own regional S&T programmes, which target the respective regional R&D capacities and which are focused on the innovation and industrial component of R&D. Regional venture funds, technology parks, and innovation incubators are being established and regional co-funding of RFFI and FASIE funding programmes is being provided.

### Main research performer groups

Research is performed in Russia de-facto mainly in public institutions, particularly in the academy sector (the Russian Academy of Sciences and the various other academies, e.g. for agriculture and medicine), in research institutes (linked to ministries or other public bodies), and in state owned enterprises. Paradoxically, the share of GERD performed in the business enterprise sector is relatively high and reached 61.0% in 2011. This can be explained by the fact that several public research institutes are organised as companies and also by the important role played by publicly owned companies in research performance, such as the State Corporation for Atomic Energy (Rosatom) - both of these categories are accounted in R&D statistics to the business enterprise sector.

In 2011, Public Research Organisations (PROs) performed a share of 29.8% of GERD. This sector includes some important organisations such as the [Russian Academy of Sciences](#) (RAN), which is still a major player in Russia's research system and receives a substantial block grant from the state. The Federal Space Agency (Roscosmos) is another huge public R&D player. Traditionally universities have cared first and foremost for education, but in recent years, research has been gaining importance in these institutions. This development has been stimulated and promoted by the government's research policy. GERD performed by HEIs amounted to 9% in the

reference year 2011 (up from 6.3% in 2007; EUROSTAT, 2013). The private non-profit sector is still insignificant in Russia in research performance (and research funding).

## 2.3 RESOURCE MOBILISATION

### 2.3.1 Financial resource provision for research activities (national and regional mechanisms)

The main strategic document for the S&T sector is the [Strategy for the Development of Science and Innovation in the Russian Federation up to the year 2015](#), which was prepared by the Ministry of Education and Science and approved in early 2006.

Specific targets for R&D intensity measured in Gross Domestic Expenditure on Research and Development (GERD) as a percentage of GDP have been set in the strategy. It foresaw an increase in R&D spending to 2% of GDP by 2010 and to 2.5% of GDP by 2015. Russia is currently spending slightly more than 1% of GDP on R&D and is herewith quite far away from its targets - in 2010, R&D intensity was 1.11% of GDP. Meanwhile a more realistic target of 1.77% to be reached by 2015 was set in a decree by President Putin in May 2012 (Decree No. 599, 2012). In absolute figures funding inflows into R&D have substantially increased over the last years, and GERD reached €15b (RUB610b) in 2011 (up from €11b in 2009).

A target has also been set for R&D funding from national non-governmental sources, where especially the business and enterprise sector is meant to contribute. According to the strategy document, this indicator should increase from around 40% in 2004 to 60% of national R&D funding by 2010 and 70% by 2015. EUROSTAT figures show, however, that business-enterprise funding of GERD has been decreasing most of the last years and increased only slightly in 2011 to reach 27.7% of GERD (up from 25.5% in 2010). It should also be noted that the state controls several R&D intensive businesses and that R&D funding by private companies is rather limited. Both the R&D intensity (GERD) and the non-governmental R&D funding targets seem rather difficult to reach for Russia.

The international economic crisis has had strong effects on the Russian economy. After several years of remarkable economic growth of around 7% annually up to the year 2008, the GDP declined by nearly 8% in 2009. Since 2010, there was again economic growth, and as a result the GDP expanded by around 4% in the years 2010-2012 (OECD, 2013). While during the most pressing years of the economic crisis in 2009-10 the budgets of several funding programmes (e.g. [Federal Targeted Programme R&D in Priority Fields of the S&T Complex of Russia 2007-13](#)) and research funds (e.g. RFFI) were cut, the situation has changed since then. In May 2012, President Putin issued a decree (Decree No. 599, 2012) that announced significant budget increases for the research foundations for the coming years. Overall the budget of the research and innovation foundations should increase up to €625m (RUB25b) by 2018 from around RUB10b (€250m) in 2011. For the years 2012-2013 the budget of RFFI was actually increased by €50m (RUB2b) to reach €200m (RUB8b) overall annually.

What concerns distribution of funding, in the Soviet system, R&D funds was allocated generally as block funds based on planning decisions. Since Russia's independence in 1991 this funding mode has gradually been changing and competitive and project based R&D funding schemes have been established. In 2005, around 25% of the civil governmental R&D funding was allocated competitively. The share of competitive funding is constantly increasing, while the share of block grant funding against reporting requirements is decreasing. In the year 2011, the OECD (2011b) estimated competitive funding at approximately 30%. Government aimed at increasing it to 50% of civil governmental R&D funding by 2010 and stipulated that it should be further increased up to 70% (OECD 2008). These are ambitious goals. It should be noted that in the last five years indeed many new competitive funding programmes were introduced (e.g. federal targeted programmes). In addition significant shares of traditional block funding to main research organisations (e.g. Russian Academy of Sciences) are meanwhile distributed in a competitive funding mode. However, effective competition in some sectors is still rather limited.

Research funding is allocated either directly from the state budget to research performing organisations, channelled through the ministries mentioned above or distributed via several agencies. The portfolio of funding instruments has been further diversified over the past five years, with a special focus on support tools for innovation and for universities. Competitive R&D funding allocation is handled by several research and innovation funds and ministries, in particular the Ministry of Education and Science (MON).

A legal framework for most of the Russian funding instruments is provided by the [State Programme Development of Science and Technology for the period 2013-2020](#). The programme was approved in December 2012 and has a planned budget of €40b (RUB 1600b). Its budget has been subdivided into six categories: fundamental research (the biggest share with around 50% of the budget), applied R&D, institutional development of the S&T sector, R&D infrastructures, international cooperation, and programme implementation.

One of the main implementation instruments under the state programme is the Federal Targeted Programmes (FTPs) for R&D support. These FTPs are managed by MON:

FTP	Total Budget €	Total Budget RUB	From federal budget €	From federal budget RUB
FTP <a href="#">R&amp;D in Priority Fields of the S&amp;T Complex of Russia (2007-2013)</a>	€4.31b	RUB172.39b	€2.78b	RUB111.33b
FTP <a href="#">R&amp;D in Priority Fields of the S&amp;T Complex of Russia (2014-2020)</a>	€5.98b	RUB239.03b	€5.06b	RUB202.24b
FTP <a href="#">Scientific and Scientific-Pedagogical Personnel of Innovative Russia for the years 2009-2013</a>	€2.26b	RUB90.45b	€2.01b	RUB80.39b
FTP <a href="#">Scientific and Scientific-Pedagogical Personnel of Innovative Russia for the years 2014-2020</a>	€5.03b	RUB201.02b	€3.84b	RUB153.48b

The follow-up programmes for the period 2014-2020 were approved in May 2013 and the budgets increased significantly. The main share of the programmes' budgets is financed from the Russian federal budget, and the rest is planned to come from non-budgetary sources<sup>4</sup>. In the previous programming period the planned shares for non-budgetary financing could not be fully achieved.

MON is also responsible for recent funding tools for the university sector. An amount of RUB90b (€2.25b) was invested over the period 2010-2012 in addition to the usual budget allocations for universities through the following programmes:

- Federal Universities programme
- National Research Universities programme
- Attracting leading scientists to Russian Universities
- Programme for stimulating business-university cooperation.

Besides the Ministry, three main funding organisations had already been set up in the early 1990s: the Russian Foundation for Basic Research (RFFI) and the Russian Foundation for Humanities (RGNF) distribute grants for basic research in the sciences, social sciences and humanities. For applied research and innovation related funding, the Foundation for Assistance to Small Innovative Enterprises (FASIE) takes care of support for small innovative enterprises and start-ups. The Russian Foundation for Technological Development (RFTR) provides zero-interest loans to companies for innovative projects.

More recently additional funding bodies have been introduced, in particular for innovation activities. The Russian Venture Company (RVK) was set up in 2006 and operates as a fund of funds for establishing a network of national and regional venture funds. The State Corporation for Nanotechnologies (Rusnano) was established in 2007 and supports commercialisation of nanotechnology. The Skolkovo Foundation, which has been developing a high tech centre at the outskirts of Moscow since 2010, has also started grant giving activities. Finally, the new Advanced Research Foundation (FPI) for support of basic research for defence and dual use technologies will be operational as of autumn 2013.<sup>5</sup>

Federal Targeted Programmes and innovation related funding are implemented in a collaborative funding mode, requiring to different extents co-funding from private sources. This approach still has some limitations in Russia, as co-funding cannot always be attracted to the extent that it has been planned in certain programmes.

Tax incentives, such as tax breaks on R&D grants, favourable depreciation periods, etc. have been introduced in Russia in the last years, but their role and effects are not yet well studied. It seems that especially companies do not yet take these incentives up well due to lack of trust in the applicability of the regulations.<sup>6</sup>

In terms of allocation of resources to thematic priorities, Russia has singled out the fields of energy, nuclear technologies, space, medical, and information technologies in 2009. In addition to these fields, security and military technologies, nanosystems,

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<sup>4</sup> With non-budgetary sources it is meant co-funding mainly from business, but also from regional or other sources, which are not directly related to the federal budget.

<sup>5</sup> Another new agency, preliminarily named Russian Science Foundation, is currently in the planning phase and a related draft law has been submitted to the State Duma (the lower house of Parliament) in July 2013.

<sup>6</sup> See regarding tax policy: Simachev, 2011.

life sciences, environment, and transport were identified in 2011 (see chapter 2.4 Knowledge Demand below). Compared to the grand societal challenges defined by the EU for its new Horizon 2020 research and innovation programme, in particular the fields energy, environment, health, security and transport overlap with Russian priorities. These are relevant also in Russia's current R&D and innovation funding model. Specific funding programmes were established for some of these priorities. For example:

- Federal Targeted Programme New Generation Nuclear Energy Technologies for the years 2010-2015 and with a perspective up to the year 2020, planned budget for the whole period (from public sources) €2.8b (RUB110.2b)
- Federal Targeted Programme Development of Pharmaceutical and Medical Industry of the Russian Federation for the period until 2020 and a longer term perspective, planned budget for the years 2011-2020 (from public sources) €3.1b (RUB122.6b).

### 2.3.2 Providing qualified human resources

Traditionally science and education are highly valued in Russia. As a country that has achieved major successes in space, nuclear research, and other fields, it has a rich research tradition and has produced a range of Nobel laureates, especially in physics. At the point of its independence in 1991, Russia had inherited a huge R&D sector with a significant related labour force. As a result of the transformation processes to a market economy and due to serious cuts in funding, the R&D sector experienced an important downsizing. The R&D personnel shrank by more than 50% since 1991 reaching 736,540 people by 2010 (EUROSTAT, 2013). The R&D personnel per 10,000 employed reached 126 in 2009, which was slightly lower than the value for Germany on this indicator, but higher than Spain or the UK (Higher School of Economics, 2011).<sup>7</sup>

Tertiary education levels of the population are quite high. OECD data (2011a) indicate that more than 50% of the population in the age range of 25-64 years has attained tertiary education. This is higher when compared to all OECD countries. In comparison to other countries Russia educates higher share of students in the sciences, although this trend has experienced certain changes with growing number of students in social sciences, particularly in economics.

Low salaries, limited career perspectives and outdated equipment distract young talents from embarking on a scientific career and lead them to the business sector for better paid job opportunities. The situation regarding salaries has improved significantly over the past five to ten years, where economic growth has allowed increasing financial inflows into the R&D sector.

In spite of a broad reservoir of educated personnel, qualifications do not always meet the requirements of the labour market and research. In June 2011, the President Medvedev held a discussion with scientists, who were selected in a competition to establish research labs at Russian universities in the programme: *attracting leading scientists*. The scientists mainly came from abroad, with a majority being emigrated Russian scientists. They complained that they can barely find enough sufficiently

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<sup>7</sup> More detailed data on Human Resources in Science and Technology (HRST) are not available for Russia.

qualified personnel for their labs and that an improvement of the education system needs to be tackled. Shortly after taking over his duties in May 2012, the Minister of Education and Science, Dmitry Livanov, introduced an annual monitoring of the public higher education institutions, which was expanded in 2013 to cover also the private HEIs. The efficiency of the HEIs will be increased and a streamlining process is envisaged, which will lead to the merger, reorganisation or closure of 20% of HEIs. Complementary to this streamlining a competition for additional funds for the strongest HEIs was implemented in 2013 (see chapter 3.3.1 Quality of the National Higher Education System). These measures contribute to concentrating efforts and financial resources on the strongest HEIs.

On-the-job training in companies, lifelong learning, creativity, communication skills and critical thinking are all elements that need to be significantly enhanced in Russia to ensure that the labour force can meet the requirements of an innovation oriented economy that will no longer rely as strongly as currently on primary goods' production.

### 2.3.3 Evolution towards the national R&D&I targets

According to EUROSTAT, the business enterprise expenditure on R&D (BERD) in Russia amounted to 0.67% of the GDP in 2010 and was herewith significantly lower than the EU-27 average, which was 1.24% in the same year. In the preceding years 2006-2009, BERD had been around 0.7% of GDP.

Data for BERD as a share of Gross Domestic Expenditure on R&D (GERD) indicate that business enterprises perform 60.5% of GERD, which is only a single percentage point below the EU-27 level (data for 2010, EUROSTAT, 2013).

But these data need to be considered with some caution. Notably public ownership in the business enterprise sector has to be taken into account. In Russia a range of fully or partly state owned research institutes are organised as companies and are calculated therefore to the business enterprise sector. Furthermore, big state owned companies represent a major share of research-intensive Russian companies. It is quite difficult to discern the R&D funding coming from privately owned companies, although it seems quite limited. Overall “the extent of *state control* in the Russian economy remains extensive as a result of a high degree of state ownership and control over economic activity” (Conway et al, 2009). The influence of the state and the role of state owned companies have even further increased over the last few years, especially during the financial crisis of 2009-2010. Plans to privatise state companies, e.g. in the transport sector (Aeroflot, Sovkomflot) and in the financial and oil sectors, were announced in 2011 by the Minister of Finance Kudrin, but have not yet come far. It was planned that the state should reduce its role in the economy in the course of 3-5 years, and that Russia should become a more attractive place for private investment.

Leveraging R&D investment from companies is a strategic target. The main tool here is the co-funding requirement in applied research funding programmes, especially the Federal Targeted Programmes managed by the ministries. This mechanism is not yet working properly and business investment cannot be raised to the extent that it was planned in strategic and programme documents.

A recent strategy is to incite big state-owned companies and state corporations (Gazprom, Russian Railways, Rosatom, etc.) to develop innovation programmes and to outline herewith their support for innovation activities. With this top-down approach the government tries to generate more business enterprise investment into R&D.

The framework conditions for innovative start-up businesses and the business environment in general remains difficult. On the World Bank indicator '*ease of doing business*' Russia took the 112<sup>th</sup> place of 185 countries in 2012 (World Bank, 2013). In particular overregulation and bureaucratic procedures, as well as high levels of corruption restrain business and innovation activities. Regulations on Intellectual Property Rights have been improved, but still hinder national and international businesses from investing in Russian R&D and innovation. These problems may also lead to an underestimation of innovative capacities, as successful firms may not wish to declare their true innovation performance to avoid controls by the authorities. Support to innovative start-up companies is offered through the well-established and relatively renowned funding tools of the Foundation for Assistance to Small Innovative Enterprises (FASIE; e.g. through its START programme). For more serious investment, venture funds have been established since 2006 through the Russian Venture Company (RVK). For business ventures and implementation of research results in nanotechnologies, the state-owned company Rusnano acts as a kind of investment fund. It has been available since 2007.

Public Procurement is very important, but a rather ambiguous tool in Russia. Innovation activities are mostly driven by government policy and public procurement of goods is highly relevant in major publicly dominated industry sectors, such as energy, aeronautics, defence and space. Public procurement is also the main implementation procedure for the most important competitive R&D and innovation funding tools, the Federal Targeted Programmes. These programmes launch their calls for projects according to the Russian public procurement law (FZ-94). But the rules of the law are not well adapted to the needs of R&D and innovation funding. The law has been modified more than 20 times over the last few years, and is therefore rather complicated to apply and serves as an example of overregulation. Some of the most pressing problems are:

- Among the selection criteria for projects, the price of a good or service has an overly important role. This leads to price dumping and to the selection of less qualified proposers over scientifically better-qualified teams.
- Project budgets are very rigid. Financial means foreseen for a certain year have to be spent in the same year and cannot be transferred to the next one.
- The purchase of scientific material and equipment has to be tendered. Normally the cheapest offer has to be selected. Therefore scientists end up buying inferior material than would be necessary for their research.

Discussions on the appropriateness of the law for R&D and innovation funding have been ongoing for years. Some improvements have been made, but a satisfying solution could not yet be achieved. However, for the upcoming programming period 2014-2020 it was announced that the major FTPs will be mainly implemented through grant funding and state contracts under the new Federal Contract System. These changes will facilitate research and innovation support significantly.

## 2.4 KNOWLEDGE DEMAND

Government or the government sector drives knowledge demand above all. Major R&D intensive sectors of the economy - aeronautics, space, defence, and nuclear energy - are dominated by state owned companies. The picture is a bit more diversified in the overall main economic sectors - oil, gas, and metallurgy - where relevant private players are active alongside state owned companies. An encouraging exception in knowledge demand is the ICT sector, where several private R&D intensive companies have become internationally renowned service providers (e.g. Yandex, Kaspersky Labs, etc.).

Thematic priorities for modernisation were defined in 2009. Prime Minister Medvedev (who at the time was still the President) suggested focusing on five thematic areas for the modernisation of Russia's economy:

- Energy efficiency and energy saving, including alternative fuels;
- Nuclear technologies;
- Space technologies, especially related to telecommunication (GLONASS – Global Navigation Satellite System);
- Medical technologies;
- Information technologies, including supercomputers.

Priority areas for S&T development were adopted by then President Medvedev in July 2011. They complement the priority areas for modernisation and are the following:

- Security and counter-terrorism;
- nanosystems;
- Information and telecommunications systems;
- Life sciences;
- Advanced weapons, military and special technology;
- Environmental management;
- Transport and space systems;
- Energy efficiency, energy saving, nuclear power

These priorities come into focus for governmental knowledge demand and are also relevant for the project to establish a top international innovation centre in Skolkovo, near Moscow, which was pushed by the Prime Minister. Another more recent initiative concerns a top-down stimulation of innovation activities within big state-owned companies and state corporations (e.g. Rosatom, Russian Railways, etc). Under the guidance of the Ministry of Economic Development, 47 state owned companies have developed specific innovation plans to stimulate knowledge demand.

Knowledge demand is also driven through public R&D and innovation funding programmes. The main funding programme, the FTP R&D in Priority Fields, solicits in a first step of a call specific topics from potential proposers. The responsible FTP bodies then specify the topic of a call. The development of this FTP indicates that knowledge demand from companies has some weaknesses: the various funding lines in the FTP require different shares of co-funding from non-budgetary sources (in particular from companies). In the funding line with the highest required co-funding

share of more than 50%, business did not show sufficient interest. As a result, this funding line was cancelled.

The Technology Platforms (TP), which were selected in spring 2011, also provide thematic input for calls in FTPs. These TPs are coordinated mostly by big R&D intensive state-owned companies and state corporations (e.g. Rosatom) or governmental R&D funding bodies (e.g. Rusnano) and cover the usual thematic fields: energy, nanotechnologies, space, etc. It is a question for the future about how far private businesses will collaborate on TPs, how far TPs will reach beyond the usual topical fields, and whether they will not be another support tool focusing on the big state-owned R&D players. In contrast to the European TPs – which are industry-led and bottom up – the Russian TPs are more policy-driven and top-down.

## 2.5 KNOWLEDGE PRODUCTION

### 2.5.1 Quality and excellence of knowledge production

In terms of input into the R&D and innovation system, Russia invests substantial amounts into knowledge production. In 2010, GERD as share of GDP reached 1.11% which was equivalent to €13b. Despite a significant decrease in the last 20 years, it can still rely on a considerable number of R&D personnel (more than 730,000 in head count in 2010). In addition, a quite a high share of more than 50% of the population has received tertiary education. The situation with research infrastructure has improved considerably in the last few years. Significantly more funding has flown into R&D and innovation and this has allowed upgrading and bringing equipment up-to-date at leading institutes and research organisations, such as the National Research Centre (NRC) Kurchatov Institute.

Analysis of the R&D and innovation system usually finds out that input does not match with output and that the latter is limited and stagnating.<sup>8</sup> This concerns publications, citations and patents for research. Russia produces roughly 27,000 articles per year in journals referenced in the Web of Science (2008). It has herewith a share of 2.6% of world production. Despite some fluctuation, output of scientific articles has remained at this level since 1981, whereas other competitors (e.g. Brazil and China) have significantly increased their shares (Adams and King, 2010). Triadic patent families are similarly stagnating for Russia, as compared to China or other countries (Gokhberg and Agamirzyan, 2011).

Training of human resources is not up to the requirements of research and the knowledge intensive labour market. In particular, the transfer of new knowledge into innovations and application in the business sphere is weak.

Several institutes, which were previously subordinated to ministries or agencies (so-called branch institutes) and which are still linked somehow to governmental bodies, continue working with very limited output. Also, within the main public research organisation, the Russian Academy of Sciences, the picture is ambiguous. Research institutes or groups, which are well equipped, successful in competitive funding

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<sup>8</sup> See for example OECD Reviews of Innovation Policy: Russian Federation 2011 (OECD, 2011b), or the strategy of the Ministry of Economic Development (2011): Innovative Russia 2020.

acquisition, and internationally well connected, exist together with decaying institutes, which survive on traditional block grant funding and produce little output.

### 2.5.2 Policy aiming at improving the quality and excellence of knowledge production

The government authorities are to some extent aware of the limitations of the R&D and innovation system. Russian and international studies have been commissioned and strategic documents have been prepared, which reveal the weaknesses. For example the recent *"Innovative Russia 2020"* strategy, which was approved by the government at the end of 2011, points explicitly to the weaknesses in knowledge transfer to business.

The availability of statistical indicators has improved a lot for Russia and many major indicators for the R&D and innovation system can now be found in OECD or EUROSTAT databases. International benchmarking is herewith facilitated and it is therefore already widely used.

The evaluation of research institutions and funding programmes is becoming more important and embedded in policy making. In 2009, a general regulation was issued by the government "On the evaluation of the efficiency of scientific organisations performing civil R&D" (Decree No 312), which obliges public research organisations to provide reporting on a defined set of indicators. Accountability of research organisations has been enhanced and several funding schemes now include obligatory evaluations. The Russian Academy of Sciences (RAN) is obliged to provide annual reporting and measurement of indicators against its large block grant from the federal budget. However, a systematic evaluation is not yet fully established; discussions are ongoing among scientists, about how to best evaluate and which indicators to use.

New reforms were initiated by the new Minister of Education and Science, Dmitry Livanov, who took office in May 2012. An annual monitoring of the public and private higher education institutions has been brought on the way, and in spring 2013 it resulted in the announcement of closures and reorganisations of certain public HEIs. An evaluation of the Russian Academy of Sciences was undertaken, and in July 2013 a long overdue reform was launched: the plans foresee that Academy autonomy will be curtailed significantly. Its institutes will be transferred to a state agency and managed in the future by it. Several other measures are under consideration, but the whole reform package will be approved only in autumn 2013.

Approximately 50% of civil R&D funding in Russia is provided through competitive funding programmes. Project proposals to the research foundations (RFFI, etc) and funding programmes are usually evaluated following national evaluation procedures. Recently introduced funding programmes, especially for the HEI sector are accompanied by a monitoring of their implementation. For example, in the *National Research Universities* programme the funded universities have to provide figures on such indicators as the number of articles produced per year, the number of foreign students, etc. (Ministry of Education and Science, 2009). Some evaluation procedures, for example, in Federal Targeted Programmes, have some flaws and competition is sometimes limited.

International experts have so far been involved in project evaluations for the *Leading Scientists* programme of the Ministry of Education and Science, which was launched in 2010. Furthermore, international evaluation has been used for few funding lines of the research foundations RFFI and FASIE, and in the framework of international research cooperation programmes (e.g. participation in ERA-NETs, bilateral funding programmes). It is however the policy of the Ministry to increase international evaluations. The numerous Russian researchers working abroad will especially be more intensively consulted for evaluations.

## 2.6 KNOWLEDGE CIRCULATION

### 2.6.1 Knowledge circulation between the universities, PROs and business sectors

Knowledge circulation between the universities, PROs and business sectors is weak. The sectors operate in a rather separated mode, while interaction and circulation between them is limited. However, several initiatives have been taken to stimulate knowledge circulation.

As a result of a competition in 2005, four Special Economic Zones, (SEZ) for Technology and Development were established in St. Petersburg, Tomsk, Zelenograd and Dubna (the latter two situated in the surroundings of Moscow). All four zones have been created around important public scientific centres, to which private companies would be attracted with the incentive of tax breaks. The presidential innovation flagship project *Skolkovo Innovation Centre* (near Moscow) shall provide an environment for interaction among higher education, research organisations and business, which comes with tax breaks and modern infrastructure.

In 2010, the Ministry of Education and Science launched a new funding programme for stimulating business-university cooperation. The budget of the programme was €475m (RUB19b). Two calls were implemented in 2010 and overall 112 projects received financial support. A single project could receive public support of maximum €2.5m (RUB100m) per year, and the project could last up to three years. The business partner in the project needed to provide co-funding of the project with at least the same amount as the public support. More recent measures are Technology Platforms and Innovative Territorial Clusters, which were supported in 2011 and 2012 respectively by the Ministry of Economic Development.

While there is even a proliferation of different measures for stimulating knowledge circulation, and in general for innovation activities, proper evaluations of the effects of the measures have yet not been undertaken. Gokhberg/Agamirzyan (2011) mentions that SEZs and technology parks have not yet met the expectations. For some of the more recent measures (Skolkovo, HEI-business programme) it is too early to provide assessments.

## 2.7 OVERALL ASSESSMENT

In terms of resource mobilisation the situation in Russia has significantly improved over the last few years up to the current year 2013 and more funds have become available for R&D and innovation. GERD has, in absolute figures, constantly increased in national currency and has reached €15b (RUB610b) in 2011. This has allowed introducing specific measures to strengthen knowledge demand and knowledge circulation, e.g. through Technology Platforms, through stimulation of cooperation between HEI and business, etc. The opportunities offered by these new stimulation measures will have to mature and their efficiency needs to be verified at a later stage. First effects are already visible; for example, the share of research performed in the HEI sector is increasing steadily and reached 9.0% of GERD in 2011 (up from 6.3% in 2007). The situation is marked, however, by a strong focus on government driven measures, while business enterprise R&D and innovation funding has been decreasing. A stronger focus on the efficiency of research institutions and a certain streamlining of this sector will have to be considered, and the ageing of the R&D personnel will have to be addressed.

## 3 National policies for R&D&I

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### 3.1 LABOUR MARKET FOR RESEARCHERS

#### 3.1.1 Stocks of researchers

There were 368,915 researchers counted in 2010 in Russia, which is less than half of the researcher stock in 1991 (EUROSTAT, 2013). This heavy decline illustrates the strong downsizing of R&D capacities and the migration trends of researchers, both internally in Russia to other sectors of the economy (e.g. to business) and externally as brain drain abroad. It is estimated that around 30,000-35,000 researchers emigrated abroad during this period.<sup>9</sup> The financial crisis led to acceleration in the decline of the number of researchers: while from 2006-2007, an increase of nearly 4,000 researchers to 392,849 took place against the usual trend, in 2008, the number of researchers declined sharply by around 17,000 to reach 375,804. Since then the decline continues again, however at a lower pace.

Postdoctoral researchers in Russia include *Candidates of Science* (equivalent to PhD) and at a higher level *Doctors of Science* (equivalent for example to habilitation in Germany). In 2010, the number of Candidates among researchers was 78,325 and the number of Doctors was 26,789. While the overall number of researchers has been declining steadily, the number of Candidates and Doctors of Science has been increasing over the last few years. Concerning postgraduate studies, in 2010, there were 157,437 students (*Aspiranty*) enrolled in the postgraduate study programme, the *Aspirantura*, to become a Candidate of Science. In this same year 33,763 students graduated (CSRS, 2012). The trends at the postgraduate level are encouraging. The number of postgraduate students is increasing steadily, as well as the number of new entrants. In 2010, the number of new entrants was nearly 10,000 higher than in 2005 and reached 54,558. This shows that research is becoming more attractive for the young generation. Still, the age structure remains a specific problem of the R&D personnel and researcher stocks. Because of the strong migration trends, the age bracket 30-49 is thinned out, whereas the age bracket 50-70 and over constitutes more than 50% of researchers (CSRS, 2012).

#### 3.1.2 Providing attractive employment and working conditions

For many years it has not been very tempting to embark on or follow-up a research career in Russia. The important and valued scientific tradition (with several Russian Nobel laureates), which makes research attractive, has to be seen against the difficulties of the R&D and innovation system. A research career option in the last 20 years either showed true commitment to research, or it was triggered by a lack of alternatives. Otherwise many talented students and researchers have moved on to better paid jobs in business or abroad.

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<sup>9</sup> See “Round table: Emigration abroad and brain circulation in the scientific-technological sphere of Russia” (in Russian), published at [www.strf.ru](http://www.strf.ru), last accessed 2 September 2011.

However, the situation has been improving over the recent years. Salaries of researchers have been increasing significantly. Nevertheless basic salaries of researchers still remain low, especially when considering regional disparities in price levels. In Moscow and St. Petersburg, where most of the R&D capacities are situated, price levels are usually higher than in the rest of the country. The average monthly salary of the R&D personnel amounted to €710 (RUB28, 388) in 2011; it has increased significantly from €482 (RUB19, 263) in 2008 (HSE, 2010b and 2013).

Researchers are employed by their organisation, e.g. the Academy of Sciences or universities, and are paid according to the internal salary regulations. Additional non-financial benefits, such as cheap housing, offer incentives for researchers to enter or stay in science. But it is with competitive grants from the research foundations (RFFI, RGNF, FASIE), funding from competitive FTPs and other ministerial programmes, and with international projects that the leading researchers can improve their salaries. Another alternative is to follow-up a second job or additional paid activities besides the regular research employment.

Some other working conditions, such as ageing of the mentoring and supervisory staff for young researchers and limited career perspectives (e.g. because of the favouring of male colleagues over female for the top positions) are also not very conducive to embarking on a scientific career. Equipment in many institutions is outdated, although increased research funding over the last years has helped improve the situation and the leading research groups now have up-to-date equipment at their disposal. There are however no modern big infrastructures available and researchers have to move abroad to work on such infrastructures.

As in many countries, career breaks are not advantageous for professional advancement. Women therefore usually take short maternity leave. They also do this because of the need to earn a salary. Birth rates are in general rather low in Russia. Parental leave is regulated in chapter 41 of the Russian labour code (197-FZ). The duration of the leave is specified in the code and the right to return to the same position after the leave is guaranteed. The father of a child is also entitled to take parental leave.

More of a problem is the de-facto domination of male colleagues in leading positions. For example there is only one woman among the 56 members of the Presidium of the Russian Academy of Sciences, its top governing body.<sup>10</sup> The presidium was newly elected in 2013. In the previous presidium there was even not a single female member.

### 3.1.3 Open recruitment and portability of grants

In general, there is not many foreign staff working in Russian research institutions. The approach to employment of foreign specialists has up to 2010 been restrictive and regulated through quotas. Migration regulation is confusing. At a hearing of the Federation Council, it was stated that 846 legal acts regulate migration, whereby many are contradictory.<sup>11</sup> The attractiveness of moving to a Russian research

<sup>10</sup> See <http://www.ras.ru/presidium/headquarters/presidiummembers.aspx>, last accessed on 12/08/2013.

<sup>11</sup>See the article "A migration codex shall be established for the R[ussian] F[ederation]" on [http://www.strf.ru/material.aspx?CatalogId=221&d\\_no=35218](http://www.strf.ru/material.aspx?CatalogId=221&d_no=35218) (in Russian), last accessed on 20.08.2012.

institution is limited by the framework conditions for research: harsh living conditions, quality and availability of housing, language barriers, low salaries, and outdated infrastructure.

However, attitudes in Russia are changing and in the last several years the country has become more open to international cooperation. This also extends now to recruitment. Some research institutions, especially universities (e.g. Higher School of Economics) are trying to attract foreign staff on their own initiatives. The Ministry of Education and Science stimulates scientists from abroad, including from the Russian scientific diaspora, to establish labs in Russia through the support programme ‘*Attracting leading scientists*’, which was introduced in 2010. Three calls in this programme were implemented. Meanwhile a fourth call was launched in 2013. The programme follows an elite approach, and does not yet aim at a broader internationalisation of research institutions. Around 40 scientists are selected for support in each call. In the call in 2010, for example, 40 scientists were selected to establish research labs at universities. Only five of the selected scientists were permanent Russian residents (MON, 2011a). Whereas the first two calls were directed at universities, in the 2012 call the programme was opened also to non-university public research institutions. Importantly for the sustainability of the measure, a call for prolongation of grants selected in 2010 was implemented and 24 projects were prolonged for another two years period.<sup>12</sup> Recruitment of foreign specialists is also essential for the success of Russia’s innovation flagship project, the Skolkovo innovation centre.

The more open attitude has also brought about some changes in regulations. Registration rules for foreign specialists have been relaxed. Highly qualified foreign specialists are defined by income. Since 2010, if they earn at least €50,000 (RUB2m) per year. They only need a confirmation of their status from their employer to get a work permit for three years.<sup>13</sup>

The recognition of qualifications is improving due to Russia’s adhesion to the Bologna process and adoption of European rules. The recognition of foreign diplomas will be further simplified for attracting highly qualified specialists and for enhancing academic mobility. A modification of the law on recognition of diplomas was adopted in December 2011, and has led to recognition of diplomas issued by “*leading institutions*” without specific recognition procedures in Russia. The list of leading institutions was adopted in May 2012, and an update has been published by the Ministry of Education and Science in September 2013 and includes 201 institutions from 23 countries.<sup>14</sup>

Research positions are to a certain extent published at the websites of research institutions, but usually only in Russian.

The portability of grants depends on the funding agencies, which provide the R&D or innovation support. The R&D foundations RFFI and RGNF as well as few ministerial programmes provide grants, which are usually linked to the individual researcher and which are therefore portable. The innovation foundation FASIE and the major

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<sup>12</sup> See for information on the programme <http://минобрнауки.рф/проекты/ведущие-вузы/учёные>

<sup>13</sup> See

[http://www.economy.gov.ru/minec/activity/sections/investmentpolicy/doc20100810\\_01](http://www.economy.gov.ru/minec/activity/sections/investmentpolicy/doc20100810_01)

<sup>14</sup> See for the list of institutions: <http://минобрнауки.рф/новости/3648>

funding tools Federal Targeted Programmes (of ministries) provide financial support through state contracts. These are linked to the research institution and are therefore not portable. Most competitive R&D and innovation funding is allocated through FTPs and related state contracts.

### 3.1.4 Enhancing the training, skills and experience of researchers

The postgraduate training is with the so-called *Aspirantura* quite formalised. Since Russia joined the Bologna process, the system is in the process of a transformation to comply with European standards. A credit system has already been introduced as a consequence. There are some examples of joint international postgraduate schools, e.g. the Postgraduate Training Network in Biotechnology of Neurosciences (BioN), a project supported by the EU's TEMPUS programme.<sup>15</sup> Through several international joint master programmes and through intensive exchanges in the ERASMUS Mundus programme, many students move to EU countries and use English in their studies. The same holds true for researchers, where many moves abroad for research stays and some stay on for longer periods of employment. For exchanges with the USA, various tools such as the Fulbright Program in Russia or the programmes of the Civilian Research and Development Fund (CRDF) Global are available.

Curricula modernisation at universities is supported by the various programmes introduced by the Ministry of Education and Science for enhancing the university sector: innovative universities programme, national research universities, etc.

## 3.2 RESEARCH INFRASTRUCTURES

Russia has a wide a range of major research infrastructures, in particular in physics. As a leading scientific power in nuclear energy, military technologies and in aeronautics and space research, respective research infrastructures have been built. A significant number of scientific infrastructures are situated at institutes of the Academy of Sciences. Some universities, for example Moscow State University, and organisations subordinated to federal agencies (e.g. Roscosmos) and state corporations (e.g. Rosatom), possess similarly unique facilities.

Some of the main installations are situated at the Kurchatov Institute in Moscow (synchrotron centre, beam technology), at the Joint Institute for Nuclear Research in Dubna (Moscow region – neutron reactor, beam technology), at the St. Petersburg Institute of Nuclear Physics in Gatchina (Leningrad region – high flux beam reactor), at institutions for space research, such as in Korolev (Moscow region) and Baikonur (located in Kazakhstan and rented by Russia).

New space related infrastructure is under construction with the cosmodrome "Vostochny" and Russia's earth observation system GLONASS. An important programme for upgrading infrastructures in Russia was the [\*Federal Targeted Programme Development of the nanoindustry infrastructure in Russia for 2008-2011\*](#).

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<sup>15</sup> See <http://neurobiotech.ru/>

Besides this programme, substantial funding for major scientific infrastructure projects is currently under discussion. In 2011, under the heading *Megascience*, six projects, mainly in the field of physics, were preliminarily shortlisted for support over the coming years.

- The tokamak IGNITOR project at Troitsk, near Moscow, will be implemented with international partners, especially from Italy, in a 50-50% cost-sharing arrangement;
- The NICA collider project at the Joint Institute for Nuclear Research in Dubna, for which an international 50-50% co-funding arrangement is also in preparation;<sup>16</sup>
- The neutron research reactor PIK in Gatchina near St. Petersburg;
- The synchrotron facility ISSI-4 at the Kurchatov Institute in Moscow;
- An ultra-high intensity laser complex in Nizhny Novgorod;
- The collider “Super Si-tau fabrika” (Super C-tau factory) at the Institute of Nuclear Physics in Novosibirsk.

The project costs range from €125m to €1b (RUB5b to RUB40.3b) and overall an amount of €3.3b (RUB133b) would have to be invested over a period of up to 10 years. Some of the projects have already been in preparation for a while, e.g. construction of the PIK reactor in St. Petersburg had already started some 20 years ago, but works had to be stopped because of the serious cuts in research funding after Russia’s independence in 1991. With a significantly improved funding situation for research, this project has been taken up again and construction of the infrastructure will be finished.

There are some ongoing discussions, whether or not all the projects are still up-to-date and if they are all necessary for Russia given its strong investment in international physics related research facilities abroad (especially in Germany). There is a certain danger of duplication of efforts at international and Russian level, whereas a concentration of resources on fewer projects and a greater diversification might yield more significant results.

### 3.3 STRENGTHENING RESEARCH INSTITUTIONS

#### 3.3.1 Quality of National Higher Education System

In Russia Higher Education Institutions (HEI) are differentiated into three types:

- Institutes
- Academies
- Universities

Institutes and academies are usually thematically focussed on a certain speciality (e.g. Mining Academy), while universities normally have a broader approach (classical universities, technical universities or economic universities). In July 2013, there were 2,716 HEIs searchable at the Russian Federal Education portal (including branches of universities), the majority of which were state institutions (1,736 HEI).<sup>17</sup>

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<sup>16</sup> A letter of intent to participate in the project was signed by Belarus, Bulgaria, Germany, Kazakhstan and Ukraine in August 2013. See: <http://en.ria.ru/science/20130808/182656321/5-States-Agree-to-Help-Russia-Build-Heavy-Ion-Collider.html>

<sup>17</sup> See <http://www.edu.ru/>

There are two Russian universities in the top 500 of the Academic Ranking of World Universities (2013): Moscow State University at 79<sup>th</sup> place (up by one place as compared to 2012) and St. Petersburg State University, which is ranked in the span of 301-400 places (up from the span 401-500<sup>th</sup> place in 2012).<sup>18</sup> There are different national rankings of universities established (e.g. by media), which are accessible at the federal education web-portal. These help potential students when choosing an appropriate higher education institution.

Russian universities have traditionally mostly cared for education, while research was concentrated in institutes of the Academies of Sciences and branch institutes of ministries. The share of GERD performed by the Higher Education sector (HERD) is therefore rather low as compared to EU countries, but it has been steadily increasing over the past years. HERD as a share of GERD climbed from 6.1% in 2006 to 9.0% in 2011. In comparison, the average for the EU-27 reached 24.2% in 2010. Against this general picture, some of the main universities (Moscow State University, etc.) have always been performing research. Staff has been involved both in university teaching and research at institutes.

The Ministry of Education and Science tries to differentiate the university sector and single out an elite group of universities. To this group belong:

- Universities subordinated to the government: *Moscow State University* and *St. Petersburg State University*;
- A group of eight *Federal Universities*;<sup>19</sup>
- A network of 29 *National Research Universities*.<sup>20</sup>

Federal Universities are established on the basis of already existing universities. National Research University is a status, which an existing university receives as a result of a competition. With improved and targeted funding, the research component at universities will be strengthened and the innovative capacities enhanced. It is intended that linkages with business will be fostered, curricula will be improved and human resources will be better qualified.<sup>21</sup>

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<sup>18</sup> See <http://www.shanghairanking.com/ARWU2013.html>

<sup>19</sup> The Federal Universities are: Southern federal university in Rostov-on-Don, Siberian federal university in Krasnoyarsk, Northern federal university in Arkhangelsk, Privolzhsky federal university in Kazan, Ural federal university in Yekaterinburg, Far Eastern federal university in Vladivostok, North-Eastern federal university in Yakutsk, Baltic federal university in Kaliningrad.

<sup>20</sup> The National Research Universities are National research nuclear university (established on the basis of Moscow Engineering-Physics Institute), National research technological university (established on the basis of the State technological university "Moscow institute of steel and alloys", State university - Higher school of economics in Moscow, Kazan state technical university of A.N.Tupolev, Moscow aviation institution (state technical university), Moscow state technical university of N.E.Bauman, Moscow institute of physics and technology (state university), Nizhni Novgorod state university of N.I.Lobachevsky, Novosibirsk state university, Perm state technical university, Samara state aerospace university of academic S.P.Korolev, Saint-Petersburg state mining institute of G.V.Plekhanov (technical university), Saint-Petersburg state university of information technologies, mechanics and optics, Tomsk polytechnic university, Belgorod state university, Irkutsk state technical university, Kazan state technological university, Mordovian state university of N.P.Ogarev, Moscow state institute of electronic technology, Moscow state university of civil engineering (MGSU), Moscow power engineering institute (technical university), Perm state university, Russian state medical university of the federal agency of public health and social development in Moscow, Russian state university of oil and gas of I.M.Gubkin in Moscow, Saint-Petersburg state polytechnic university, Saratov state university of N.G.Chernyshevsky, Tomsk state university, Institution of the Russian Academy of sciences - Saint-Petersburg academic university - Scientific-educational centre of nanotechnologies of the RAS, South Ural state university in Chelyabinsk.

<sup>21</sup> See for research related reforms of the university sector Dezhina, 2011.

Another support measure to enhance the international standing and competitiveness of the leading universities was launched in May 2013. Budget amounting to €225m (RUB9b) will be invested in this programme for attracting foreign professors, for supporting international mobility of students and teaching staff, and for developing joint study programmes with foreign partners. At the end of July 2013, the results of this call were published and 15 universities selected for support.<sup>22</sup> The target indicator of the measure is to bring five Russian universities in the top 100 of international university rankings by 2020 (from currently one – Moscow State University).

It is an important policy initiative to focus more funds on a group of strong universities and to enhance their capacities. The broad field of public and private organisations offering higher education will undergo a significant transformation and streamlining process over the coming years, whereby weaker HEIs will have to shut down. This will be triggered by the ageing trends in Russia, which lead to fewer students entering HEIs. Estimates of the Ministry of Education and Science project a reduction of more than 40% in student figures from 7.4m in 2009 to 4.2m in 2013 (MON, 2011b). The ministry introduced an annual monitoring of the public and private higher education institutions in 2012.<sup>23</sup> As a result of the first monitoring, 30 public HEIs and 260 branches of public HEIs will be reorganised or closed (for 2013 alone it is planned to close 111 HEI branch organisations).<sup>24</sup>

The most prestigious and best universities are public; the broad and diversified field of private HEIs includes few well renowned institutions, such as the New Economic School in Moscow.

Access to universities is possible through the Unified State Exam (EGE in Russian) at the end of secondary education. Universities may require additional entry exams. Tertiary education levels of the population are quite high for Russia. More than 50% of the population in the age range of 25-64 years attains tertiary education, which is higher as compared to all OECD countries (OECD, 2011a). Half of the tertiary educated population attains only the shorter and usually more practical oriented tertiary type 5B education level (according to ISCED) and the other half attains the higher levels (ISCED 5A and 6). Although Russia does not lead in the latter case of the more advanced levels, the indicator is still rather high and it is part of a high-ranking group of countries.

Russia's participation in the Bologna process is an important basis for promoting researcher mobility. In October 2007, a law (Federal Law 232-FZ) entered into force introducing the two-cycle system with bachelor and master degrees, but not yet concerning the PhD level. Universities should introduce the two-cycle system over a

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<sup>22</sup> See <http://минобрнауки.рф/пресс-центр/3500>; the 15 universities are: Far Eastern federal university, Kazan (Privolzhsky) federal university, Moscow institute of physics and technology (state university), National technological research university MISiS, Tomsk national research state university, Tomsk national research polytechnic university, National research university higher school of economics, National research nuclear university (MIFI), Nizhni Novgorod state university of N.I.Lobachevsky, Samara state aerospace university of academician S.P.Korolev (national research university), St. Petersburg state polytechnic university, St. Petersburg state electrotechnic university LETI of V.I.Ulyanov (Lenin), St. Petersburg national research university of information technologies, mechanics and optics, Ural federal university of the first president of Russia, B.N.Jelzin.

<sup>23</sup> See: <http://минобрнауки.рф/документы/2521>

<sup>24</sup> See <http://минобрнауки.рф>; indicators used for the monitoring include qualification of students, research activity (acquisition of research funds), financial management (acquisition of additional funds), share of foreign students, infrastructure situation.

transition period, which is currently (in 2013) ongoing and most students still study according to the traditional five year scheme. Until now Russia has made the most progress in adapting to the Bologna principles in adopting comparable higher education degrees, introducing a credit system and in the provisions of learning quality.

In 2008, the number of foreign students at Russian universities was 1.3%, which is lower than in most EU countries (HSE, 2010a). The highest share of foreign students originates from countries of the Former Soviet Union.

### 3.3.2 Academic autonomy

The Russian Higher Education system comes from a rather rigid origin in the former communist system, where central control and guidance through the ministries were the rule. This has been liberalised and a certain degree of autonomy introduced in the system with the law on education of 1992. This allowed the formation of private universities, which have proliferated. Presently the number of public and private universities is rather high. Taking into account demographics with a steady decline of the younger population and of potential students there is more offer than demand for studies. Moreover, the educational standards are not up to the necessary quality level at certain institutions. The law on education has been completely revised and has undergone an open consultation. It will enter into force in September 2013. The law will simplify and make the regulation of education more coherent, because in addition to the basic law on education different authorities have issued many other legal acts. Moreover, the law has been adapted to the new realities of the institutional structure (Federal Universities, etc.). The academic autonomy has been specified now in a dedicated article.

HEIs are in Russia accredited by the Federal Service for Supervision of Education and Science (Rosobrnadzor), which also takes care of quality control of educational activities and of the curricula. Private universities are relatively autonomous; given that they are accredited by Rosobrnadzor and given that they can generate income through tuition fees for running their institution. The autonomy of public universities depends on their capacity to generate income besides the federal budget. Additional means through tuition fees, acquisition of research projects or additional funding from ministerial programmes (e.g. National Research University programme) give room to define new research fields and for hiring research personnel.

At individual level, university personnel usually have huge teaching loads and often second or third jobs to prop up their salaries. This limits their capacities to perform research, and in this sense their academic autonomy is restricted by availability of time for research.

The governance structure of HEIs differs slightly from institution to institution. HEIs are headed by the rector and the vice rectors. The government appoints the rectors of the Federal Universities, and the rectors of the two universities directly linked to the government – Moscow and St. Petersburg State Universities – are appointed by the Russian President. Other rectors in public universities are elected by the representative body of the university personnel, which is the conference of the university personnel. A scientific council takes care of the scientific and educational

agenda of a university. Several universities have established advisory councils or boards of trustees, where the participation of business representatives is still the exception (see for an exception e.g. St. Petersburg State University).

### 3.3.3 Academic funding

Spending on tertiary education from public and private sources reached 1.4% of GDP in 2008 (UNESCO-UIS, 2012). Public block funding for universities is allocated only to public universities and makes up the main share of their funding. It is based on the number of students they educate and on some other indicators, e.g. the regional economic and geographical situation. Scientific performance criteria are of only limited relevance for block funding, but they are gaining in importance. Tuition fees are another important source of university income. Public HEIs have to educate a certain quota of students without payment of tuition fees, and their costs are covered through funding from the federal and regional budgets. In addition to this minimum quota, they are free to accept additional students on the basis of tuition fees. Since 2005 there are more students on tuition basis than on free publicly funded basis. The relation of public block funding (from federal, regional and municipal sources) versus income generated through tuition fees and from competitive sources differs largely between HEIs.

The budget of the major public universities, Moscow State University and St. Petersburg State University, is directly included as a specific funding line in the federal budget. Private universities are funded by donors, tuition fees and generate income from competitive funding.

Funding for university research comes usually from competitive funding sources. These include projects supported under Federal Targeted Programmes and by the Russian competitive research and innovation foundations (RFFI, RGNF, and FASIE). Other competitive sources are grants for *leading scientific schools* and contract research. In the last years several specific programmes for strengthening university research have been introduced (e.g. National Research Universities or Attracting Leading Scientists), through which additional funds for research were made available. Own university funds, generated for example through tuition fees, may also be used for supporting research. Universities are relatively free to set their research priorities, but depend on thematic priority setting of competitive funding programmes.

## 3.4 KNOWLEDGE TRANSFER

### 3.4.1 Intellectual Property (IP) Policies

Intellectual Property Policies are a long-standing problem of the Russian innovation system. IPR rules have long been contradictory and restrictive about ownership of IPR. The possible usage of IPR has not been clearly regulated. According to the legislation, the Intellectual Property generated within public research organisations or publicly funded research projects mostly remain in the hands of the governmental bodies.

In 2009, a law (217-FZ) regulating spin-offs and Intellectual Property Rights (IPR) came into force. It was pushed by the then President Medvedev and allows universities and research institutions to establish companies together with other partners (e.g. businesses) for the commercialisation of generated innovations. Universities and PROs have an exclusive right on intellectual property generated at their institution, but they can transfer IPR through a licensing agreement and against a shareholding to a spin-off company. This law will be amended in 2013. The modification will allow researchers to take over and use the IPR, in case that the organisation does not use it within a certain period of time. This should provide an incentive for researchers for implementing their results and should stimulate innovation activities in general.

Knowledge Transfer Offices have been established in the course of the economic transformation process at the major research and higher education institutions. Some of them (around 70) coordinate their activities under the roof of the Russian Technology Transfer Network (RTTN).<sup>25</sup>

### **3.4.2 Other policy measures aiming to promote public-private knowledge transfer**

Russian framework conditions are not yet very conducive for public-private knowledge transfer and innovation activities in general. The Russian Ministry of Economic Development admitted in a draft of its Innovation Strategy 2020 (2011) that the quality of tax and customs regulation and its application have a “repressive” character regarding innovative business. However, some encouraging policy measures have been taken over in the last years.

#### **Spin-offs**

Spin-offs from research institutions have been stimulated specifically since 2009, when the above-mentioned law 217-FZ on spin-offs was introduced (see chapter 3.4.1 on Intellectual Property Policies). Preliminary data indicate that 943 spin-offs were created from universities by June 2011, but only 30 by research institutes (including 21 from the biggest Russian research institution, the Academy of Sciences (Gutierrez/Correa, 2012)). The rather solid figure for the university sector seems to be triggered firstly by a backlog of spin-offs, which made use of the new opportunities, and secondly by a certain need to provide figures, as spin-off creation is a priority of the Russian top leadership and an indicator for university performance. The comparably low figure for the research institutes may be explained by more bureaucratic procedures which have to be circumvented at the Academy and at institutes linked to ministries. The law is still a short lived measure, and the data will have to be observed over a longer period of time, especially for survival rates and development paths of spin-offs.

Spin-offs can turn to the innovation fund FASIE for start-up funding. Furthermore, a broad infrastructure of around 80 technology parks has been established in Russia. However, the efficiency of the technology parks is doubted by analysts (Gokhberg/Agamirzyan, 2011). The public support programme for technology parks

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<sup>25</sup> See: <http://www.rttm.ru/?&lang=eng>

will be continued up to 2014, but a co-funding from regional or municipal budgets will be required.

### **Inter-sectoral mobility**

Researcher mobility between the education, research and business sector is rather low. The government tries to encourage interactions between the sectors through new support tools, such as Technology Platforms and the funding tool for HEI-business projects (see for more details on these tools in chapters above, e.g. 2.6 Knowledge Circulation). Technology Platforms have received funding for starting up their activities. To complement them, the Russian Foundation for Technology Development (RFTR) was reactivated in 2011 and provides zero interest loans to projects on a competitive basis, which emerge from the TPs.<sup>26</sup>

The new Skolkovo High Tech Centre mixes different elements of the knowledge triangle and also serves as a platform for intersectoral mobility. It combines a higher education institution, research institutes with national and international staff, R&D labs of national and international companies, and stimulation tools for applied research and innovation activities (e.g. consulting on technology transfer, grant giving).

The measures are quite new and have to be observed for its effects over a longer period of time.

### **Promoting research institutions - SME interactions**

Since 1994, interactions between research institutions and small innovative companies have been stimulated by the Foundation for Assistance to Small Innovative Enterprises (FASIE). Several funding tools have been developed by FASIE for specific aims: its UMNİK programme is designed for young scientists, or its main programme, START, provides support for market oriented R&D and establishing of start-up companies. The FTPs are other major tools, where in several funding lines cooperation between research organisations and business is required.

### **Involvement of private sector in the governance bodies of HEIs and PROs**

Few universities have already established advisory councils or boards of trustees, where business representatives participate. Examples are the St. Petersburg State University or the St. Petersburg State Mining University. The board of trustees of the latter one, which is a key educational institution for the oil and gas and the metallurgy sectors, is composed only of business representatives (Gazprom, Alrosa, Surgutneftegas, Total, etc.). Boards of PROs usually do not include private sector representatives. But this depends on the PRO and its structure. The Federal Space Agency, which can be counted to the category of PROs, includes in its structure a broad range of companies, which are interlinked with research units and the central unit.

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<sup>26</sup> Until summer 2012, the RFTR has supported 10 projects related to the TPs. See <http://www.rftr.ru/> and <http://rftr.ru/src/Projects.pdf>

Four different types of special economic zones (SEZs) have been established since 2005 under the guidance of the Ministry of Economic Development:<sup>27</sup>

- Technology Innovative SEZ
- Industrial Production SEZ
- Port SEZ
- Tourism and Recreational SEZ

In the context of this report, the most relevant SEZ is the one for technology development (see also chapter 2.6.1 Knowledge circulation between the universities, PROs and business sectors). The zones offer preferential tax and social security regimes for their residents (companies that establish themselves there). In addition, the Skolkovo High Tech Centre is defined as a special zone with tax and other preferences for its residents.

The most recent initiative of the Ministry of Economic Development (mineconomomrazvityia) concerns Innovative Territorial Clusters. These clusters promote cooperation among companies, research and higher education institutions. They also encourage the development of SMEs. A competition was held in spring 2012 and 25 pilot clusters were selected. Out of this group 13 clusters will receive financial support of up to €125m (RUB5b) starting from 2013 and for a period of five years.<sup>28</sup>

### 3.5 ASSESSMENT

Russia has a relatively well-educated labour force at hand, with more than 50% tertiary educated in the age bracket of 25-64 years. However the quality of the education is not always guaranteed, and the curricula and infrastructure are in several cases outdated. Specific stimulation measures (e.g. National Research Universities, etc.) for improving the higher education sector and for enhancing its research capacities have been taken by the Ministry of Education and Science. The Minister, Dmitry Livanov, appointed in May 2012, who was previously rector of one of Moscow's main technical universities, has stated on several occasions that education and research need to be more strongly interlinked in the frame of universities. Important reforms for the HEI and PRO sectors have been brought on the way in 2012-13. An annual monitoring of public and private universities has already led to a stronger focus on results and quality of the universities, to concentrating of resources on leading universities and to a streamlining process of the HEI sector. A long overdue reform of the Russian Academy of Sciences was finally initiated in July 2013; respective reform laws are being discussed in the Parliament and should be approved in autumn 2013. The effects of the measures are not clear yet, but the focus should be on concentrating resources on the well-performing institutes, and on increasing the efficiency and output of the academy institutes.

In knowledge transfer Russia has used the opportunity of economic growth to provide funds for and to introduce new innovation stimulation tools. Meanwhile a broad portfolio of measures is available (e.g. RVK, Rusnano, Technology Platforms,

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<sup>27</sup> See

<http://www.economy.gov.ru/wps/wcm/connect/economylib4/en/home/activity/sections/specialeconomicareas/main/index>

<sup>28</sup> See <http://www.economy.gov.ru/minec/activity/sections/innovations/politic/>

Skolkovo Foundation, Innovative Territorial Clusters, etc.), which have been designed to cover the whole innovation chain from applied research, start-up funding, close to market and product introduction support. It will be important to monitor the impact of these measures, and how far they will lead to new innovative products and to the emergence of new innovative private business players. Sustainability, in the sense of implementing well working measures over a longer period of time, and regular assessments should be ensured.

## 4 International R&D&I Cooperation

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### 4.1 MAIN FEATURES OF INTERNATIONAL COOPERATION POLICY

Recent policy and programming documents such as the State Programme Development of Science and Technology and the Innovation Strategy 2020 include general goals of international R&D and innovation cooperation. Russia aims for better integration into international research networks, to internationalise research and to strengthen excellence of research in the country. Enhancing the innovation performance and competitiveness of the Russian economy has become particularly relevant, and international cooperation should also contribute to it. It needs also be taken into consideration that many emigrated Russian researchers are working in main international cooperation partner countries. This scientific diaspora cooperates with the colleagues in their former home country, and policy has started to promote links and to use programmes for cooperation with them.

The Ministry of Education and Science shapes international S&T cooperation policy in first place. Other players, such as the Ministry of Foreign Affairs, are also relevant for the definition of priority regions and for concluding international agreements.

Russia has put an important focus on RTDI cooperation with the EU. This policy focus is triggered by the long-standing cooperation among researchers and the importance of the EU as an economic partner. Other important partners are the USA and countries in the Asia-Pacific region such as China, Japan, and South Korea.

Another priority group of countries are the independent states of the Former Soviet Union (in the Russian diction the “near neighbourhood”). International S&T cooperation is an important tool for keeping the scientific contacts up among the researchers and as a policy for cooperation with these countries.

Russia cooperates on several global challenges with international partners. For example, in the field of energy Russia is a partner in the framework of the international ITER project on nuclear fusion. In the space field it cooperates with ESA, NASA and other international partners on joint space missions. What concerns climate change, Russia is in particular interested on joint research on the impacts on the arctic region.

### 4.2 NATIONAL PARTICIPATION IN INTERGOVERNMENTAL ORGANISATIONS AND SCHEMES

A multilateral S&T cooperation forum is the International Science and Technology Center (ISTC) situated in Moscow. Russia and its main research partners - the EU, Japan and the USA - founded it in 1992 as an international organisation. Through the ISTC substantial support to the Russian R&D sector has been provided with the aim of conversion from military to civilian research. The relevance of the ISTC has been declining over recent years. Until 2007, slightly more than €20 million were invested annually through the ISTC in the Russian S&T sector by the EU. But the EU contributions to the ISTC were slashed to reach around €5 million in the year 2009

(Spiesberger, 2008). Since then it has been further reduced. In summer 2010, the Russian President Medvedev signed a decree on the withdrawal of Russia from the ISTC.<sup>29</sup> Consequently the ISTC activities will be winded down in Russia by 2015 and in the future the main ISTC office will be located in Kazakhstan.

Until 2010, R&D cooperation between the EU countries, associated countries to the FP6 and Russia was supported through the European INTAS programme (International Association for the cooperation with scientists of the Former Soviet Union). INTAS supported small-scale multilateral research projects, grants for young scientists, summer schools, and innovation and conference grants. INTAS was discontinued in 2010 and the organisation winded down.

Russia has a certain tradition of cooperating with international partners on research infrastructures. Contacts between Russian scientists and CERN date back to 1964. The first formal agreement was concluded in 1967. Currently Russia has a special observer status in CERN and it is considering upgrading to an associated member status. Russia participates in its major R&D programmes, for example, in the Large Hadron Collider. Russia is also a member of the international ITER consortium for building a fusion reactor.

International cooperation on research infrastructures is particularly strong with Germany. Russia has pledged an important contribution of around €300m for the European XFEL project, an X-ray Free-Electron Laser facility which is under construction in Hamburg. The XFEL convention was signed in November 2009; Russia has with approximately 23% the second biggest share in the project after Germany.<sup>30</sup> Russia is also involved in other major research infrastructures based in Germany, such as the international FAIR (Facility for Antiproton and Ion Research) at GSI in Darmstadt and the synchrotron source BESSY in Berlin.

Russia hosts an international research infrastructure with the Joint Institute for Nuclear Resaerch (JINR) in Dubna near Moscow. In this framework it cooperates mainly with countries of the Former Soviet Union and from Central and Eastern Europe.

## 4.3 COOPERATION WITH THE EU

### 4.3.1 Participation in EU Framework Programmes

Russia participates traditionally in the EU's Framework Programme for RTD and other EU multilateral S&T cooperation tools (e.g. EUREKA, ERA-NETs, until 2010 INTAS). In the analysis of cooperation in the EU Framework Programme for Research and Technological Development (FP), it can be observed that Russia consistently has one of the highest participations of all "Third Countries" (countries not being EU Member States or Associated Countries to the FP) in the past FP's and the current FP7.

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<sup>29</sup> Decree No. 534-rp of the President of the RF, 2010.

<sup>30</sup> See <http://www.xfel.eu/news/2009/20091130>

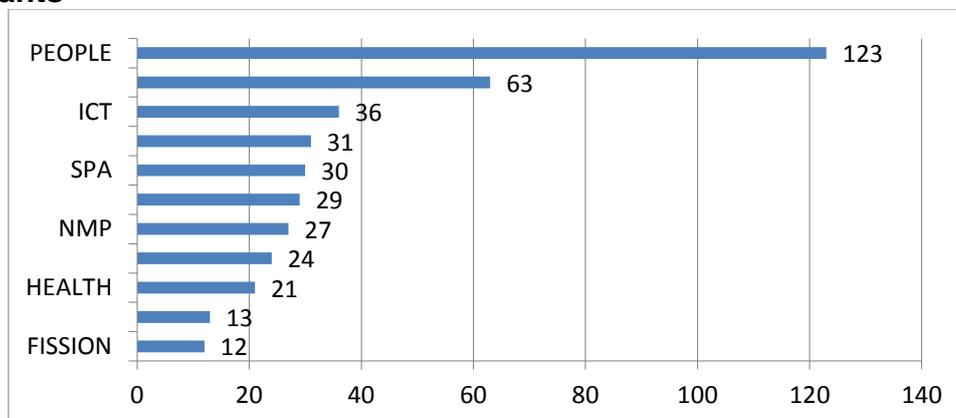
According to data from the European Commission, in the period between 2002 and 2006, Russian teams have been involved in 309 projects funded in the different FP6 sub-programmes (including EURATOM). In these projects more than 450 Russian research organisations have participated and received an EC contribution of around €50 million (without INTAS). Most projects with Russian participation were funded in the following scientific fields of FP6 in order of importance (citing here only the top three priorities):

- Sustainable development, global change and ecosystems;
- Nanotechnologies and nanosciences;
- Information society technologies (IST).

In the FP7 Russia is still the strongest “Third Country” performer in terms of funding it receives through the FP projects and in the number of participants in the funded projects. It is therefore ahead of other third countries such as the USA, or the other BRICS. The status in May 2013 was that 695 Russian research organisations have been involved in 436 funded projects (see Figure 2 and the detailed Tables 1 and 2 for the data on Russian participation in the FP7).<sup>31</sup> Most projects with Russian participation have been funded in the FP7 sub-programmes People (123 projects), Transport (TPT – 63 projects), and ICT (36 projects). Then follow: Environment (ENV – 31 projects), Space (SPA – 30 projects), Knowledge-Based Bio Economy (KBBE – 29 projects), Nanotechnology, Materials and New Processes (NMP – 27 projects), Infrastructure (INFRA – 24 projects), Health (21 projects), Energy (13 projects) and Fission (12 projects). All other FP7 sub-programmes (e.g. SME, etc.) have 10 or less projects with Russian participation. These data depend of course on the size (in terms of available budget) of the respective FP7 sub-programmes and on the level of competition of a certain sub-programme.

The success rates of Russian participants per FP7 sub-programme show that results were the highest in nuclear fission (48.15%) and in infrastructure (47.71%). The lowest success rate (1.56%) was achieved in the European Research Council (ERC), where only one applicant out of 64 applicants received funding. The total cost of the projects selected for funding with Russian participation amounts to €4b. Russian organisations have received more than €60 million in EU funding in these projects.

**Figure 2: Number of funded projects in FP7 sub-programmes with Russian participants**



Source: European Commission, 2013.

<sup>31</sup> Data provided by the European Commission in May 2013.

**Table 1: Russian Federation participations in FP7**

Proposal SP Description2	Proposal Program	All submitted		Mainlisted			Success Rate: applicants in mainlisted proposal / applicants in all submitted proposals - applicants from Russian Federation
		Number of Proposals	Number of Applicants	Number of Proposals	Number of Applicants	Proposal Total Cost	
Not_Available	N/A	2	2				
SP1-Cooperation	ENERGY	78	141	13	25	82.768.334	17,73%
SP1-Cooperation	ENV	162	290	31	51	225.391.450	17,59%
SP1-Cooperation	HEALTH	132	204	21	41	170.437.969	20,10%
SP1-Cooperation	ICT	358	432	36	46	125.936.978	10,65%
SP1-Cooperation	KBBE	152	240	29	46	115.617.572	19,17%
SP1-Cooperation	NMP	142	229	27	37	189.764.194	16,16%
SP1-Cooperation	SEC	33	39	1	1	4.888.070	2,56%
SP1-Cooperation	SP1-JTI	16	18	1	1	5.298.240	5,56%
SP1-Cooperation	SPA	109	160	30	53	232.121.071	33,13%
SP1-Cooperation	SSH	172	207	9	10	38.213.434	4,83%
SP1-Cooperation	TPT	192	318	63	114	825.819.952	35,85%
SP2-Ideas	ERC	49	64	1	1	2.448.377	1,56%
SP3-People	PEOPLE	471	575	123	162	1.149.144	28,17%
SP4-Capacities	INCO	38	104	10	36	1.464.360.630	34,62%
SP4-Capacities	INFRA	70	109	24	52	440.217.464	47,71%
SP4-Capacities	REGIONS	2	2				
SP4-Capacities	SiS	21	22	3	3	6.918.842	13,64%
SP4-Capacities	SME	52	60	2	3	3.709.375	5,00%
SP5-Euratom	Fission	21	27	12	13	87.253.017	48,15%
	<b>Sum:</b>	<b>2.272</b>	<b>3.243</b>	<b>436</b>	<b>695</b>	<b>4.022.314.113</b>	<b>21,43%</b>

**Table 2: Russian Federation Contract type of the FP7 projects with country's participator**

Proposal Sub Funding Description	Number of Proposals	Number of Proposals
Collaborative project for specific cooperation actions dedicated to international cooperation partner countries (SICA)	143	37
Collaborative project (generic)	176	34
Collaborative Project targeted to a special group (such as SMEs)	42	5
Combined Collaborative Project and Coordination and Support Action	3	1
Coordinating action	102	35
ERANETplus	1	1
ERC Advanced Grant	30	1
Industry-Academia Partnerships and Pathways (IAPP)	28	2
Initial Training Networks (ITN)	108	8
Integrating Activities / e-Infrastructures	49	18
International Incoming Fellowships (IIF)	132	22
International Outgoing Fellowships (IOF)	31	1
International Research Staff Exchange Scheme (IRSES)	170	89
Joint Technology Initiatives - Collaborative Project (FCH)	10	1
Large-scale integrating project	250	50
Network of Excellence	3	3
Research for SMEs	47	2
Small or medium-scale focused research project	539	80
Small or medium-scale focused research project INFSO (STREP)	251	12
Supporting action	121	34
	36	
<b>Sum:</b>	<b>2.272</b>	<b>436</b>

For the upcoming EU RTD funding programme - the Horizon 2020 (2014-2020)-, the status of Russia will change. Similarly to the research teams from other emerging economies (e.g. China) Russian participants in Horizon 2020 projects will not receive funding from the EU automatically. The effects of this change should be considered. A possible measure for ensuring continued participation of Russian researchers in Horizon 2020 could be to establish a Russian funding mechanism for these participants.

Russian scientists and teams participate in projects of the European initiatives such as COST and EUREKA. COST supports networking among researchers of its member states. Researchers from other international partners may, however, also participate in COST actions. By May 2013, Russian researchers had been involved in 47 running

COST actions. Russia is herewith in fourth place in participation rates among non-member countries of COST (after Australia, the USA, and New Zealand).<sup>32</sup>

Russia is a member of EUREKA since 1993. But the participation of Russian organisations in comparison to the duration of its involvement is rather low. This may reflect the limited innovative capacities available in the country. But this trend could be also due to the lack of financing for EUREKA and that responsibility for the programme has been changing several times among Russian ministries. In 2011, the responsibility for EUREKA in Russia was moved to the Skolkovo Foundation, and there are some signs of more intensive funding activities, such as a joint Israel-Russia call for EUREKA projects in 2012. Russian participation has been fairly stable over the past 10 years, with an average of around five project participations per year. Russia is not yet member of EUROSTARS, the EUREKA funding tool co-funded by EUREKA member states and the European Union.

Russia continues to participate actively in ERA-NET projects. In addition to ERA-NETs mentioned in last year's ERAWATCH report, Russia has joined meanwhile the following projects:

- ERA.Net RUS Plus – a follow-up project to the ERA.Net RUS has been selected for funding in the FP7 and will start in November 2013. The project will run over a period of five years until 2018. It will implement another call for S&T and innovation projects, which will involve more than 20 funding organisations from EU MS/AC and Russia and which will have a preliminary call budget of approximately €20m. In spring 2013 thematic priorities for the S&T call were selected. This selection was done in the frame of a foresight exercise, which has been implemented in the forerunner project ERA.Net RUS.
- *EraSME* - <http://www.era-sme.net/era-sme/> is an ERA-NET for stimulation of SME cooperation in innovative projects. EU funding has stopped, but the EraSME continues at a smaller scale. The Russian FASIE participates in this ERA-NET since February 2013.
- *SUMFOREST* – an ERA-NET to start in the second half of 2013 in the area of wood. A call with participation of the Russian Forest Technology Platform is planned.

#### 4.3.2 Bi- and multilateral agreements with EU countries

On the bilateral level, Russia has concluded Science and Technology agreements with a broad range of EU Member States. According to the Ministry of Education and Science,<sup>33</sup> the Russian Federation has active agreements in place with thirteen EU countries (Bulgaria, Czech Republic, Finland, France, Germany, Hungary, Italy, Poland, Romania, Slovakia, Slovenia, Spain, and United Kingdom). Another agreement was signed with Croatia in May 2011. Agreements with Austria, the Netherlands, were previously active, but are still in the process of renewal. Agreements have been established similarly on the level of research funding bodies, between the Russian Foundation of Basic Research (RFFI), the Foundation for Assistance to Small Innovative Enterprises (FASIE), the Russian Foundation for Humanities (RGNF) and European counterparts. Among research organisations, the

<sup>32</sup> COST (2013) COST Overview July 2013: [http://www.cost.eu/download/COST\\_Overview\\_July2013.pdf](http://www.cost.eu/download/COST_Overview_July2013.pdf), last accessed on 10 October 2013.

<sup>33</sup> See <http://mon.gov.ru/work/mez/dok/>

Russian Academy of Sciences (RAN) has a dense network of cooperation agreements with academies in EU Member States and countries associated to FP7 in place.

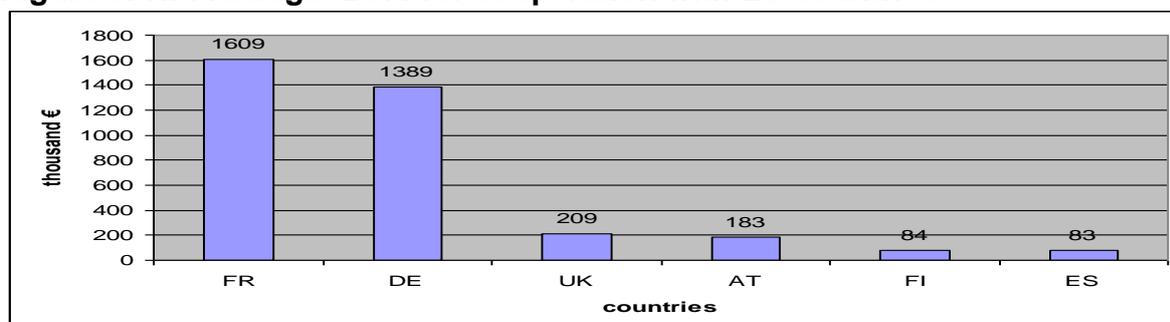
Not all of these agreements have resulted in substantial cooperation. But comprehensive cooperation with Russia has been developed between some of the biggest EU countries such as France, Italy and especially Germany, which ranges from mobility schemes, funding of joint research projects, co-funding of research infrastructure to joint laboratories. Also other EU countries such as Austria, Finland and Greece have substantial ongoing cooperation on bilateral level with Russia and have established joint mobility and research funding schemes.<sup>34</sup>

Russia's most important partner country in S&T cooperation, not only among the EU countries but overall, is Germany. Bilateral RTDI cooperation dates back to an agreement between Germany and the USSR in 1987, which was renewed in 2009. In 2005 the countries agreed on a Strategic Partnership in Education, Research and Innovation. A variety of funding organisations cooperate on joint programmes; this includes Fraunhofer, the Helmholtz Association, the German Research Foundation, the Federal Ministry for Education and Science and its International Bureau, and the Max Planck Society on the German side. On the Russian side the Ministry of Education and Science, RFFI, RGNF, FASIE, RAN and others are involved. From the financial point of view, Russia invests substantial means in the cooperation, especially for the participation in research infrastructure situated in Germany (e.g. it committed €300m for the FAIR facility).

The second most important partner among the EU countries is France. France signed an Intergovernmental Agreement on Scientific and Technological Cooperation with the USSR on the 30<sup>th</sup> of June 1966 and with the Russian Federation on the 28<sup>th</sup> of July 1992. Many joint programmes are funded by the French National Center for Scientific Research (CNRS) with counterparts such as RFFI and RAN in Russia.

In 2011, the Russian Foundation for Basic Research invested in the cooperation with EU countries the following amounts: in cooperation with France were invested €1.6m (mainly CNRS) and with Germany (DFG and Helmholtz) €1.4m; then follow relatively smaller scale joint funding activities with UK (Royal Society) and Austria (Austrian Science Fund) with around €200,000 invested by RFFI in 2011; the third group of funding partners is Finland and Spain with slightly more than €80,000 invested in cooperation with each of them.

**Figure 3: RFFI budget 2011 for cooperation with EU countries**



<sup>34</sup> A detailed overview of bilateral cooperation between Russia and its most important partners among EU Member States and countries associated to the FP7 was prepared in the frame of the FP7 funded BILAT-RUS project: [http://www.bilat-rus.eu/media/D\\_2.2\\_Good\\_practice\\_instruments.pdf](http://www.bilat-rus.eu/media/D_2.2_Good_practice_instruments.pdf)

Source: Russian Foundation for Basic Research, 2012.

In addition other funding instruments need to be taken into account, e.g. bilateral cooperation programmes in applied research and innovation, which the Russian FASIE has established with funding partners in Finland, France and Germany. Surveys among funding organisations<sup>35</sup> have revealed that mainly basic research is supported in this R&D and innovation funding cooperation. However, applied research and innovation are gaining in importance.

## 4.4 COOPERATION WITH NON EU COUNTRIES OR REGIONS

### 4.4.1 Main Countries

The main non-EU partner countries of Russia in S&T cooperation can be classified as follows. Firstly, the USA is the most important non-EU partner country. Cooperation dates back to the times of the Cold War, when arms control was an important issue. Today the scientific excellence, the know-how in innovation and the many Russian researchers working in the USA provide incentives for the cooperation. Cooperation traditionally takes place in the frame of several forums. Within the International Science and Technology Center (ISTC), in the frame of bilateral cooperation programmes funded and co-funded by the Civilian Research and Development Fund (CRDF Global), the National Science Foundation (NSF) and the National Institutes of Health (NIH). For example the RFFI has launched joint calls with NSF on materials and chemistry, and with NIH on health issues such as HIV. Other partners are the US National Academies of Sciences and the US ministries. Furthermore, several private American Foundations have been active in research support in Russia, e.g. the Carnegie Foundation, McArthur Foundation, the Open Society Institute, etc., but most of them have either stopped or reduced their activities. Several US organisations are now involved in Russian innovation support tools, e.g. in Skolkovo.

Secondly, a group of cooperation partners is formed by countries of the Former Soviet Union. The basis for the cooperation with these countries is the regional proximity, and the close ties and common research interests established in the past in the Soviet Union. Cooperation programmes are in place with Armenia, Belarus, Moldova, and Ukraine. They are mostly bottom-up and cover therefore research fields, which were traditionally strong in the Soviet Union: physics, chemistry, etc. Discussions are also ongoing to establish a research fund in the frame of the Eurasian Union, which shall emerge out of the customs union between Russia, Belarus and Kazakhstan.

Thirdly, another group of cooperation partners includes countries of the Asian region, such as China, India, Japan, Mongolia, South Korea, Taiwan, and Vietnam. This group has become more important over recent years and its relevance might increase further, as Russia is trying to diversify its economy regionally more towards Asia. Cooperation programmes are in place for basic research and the thematic orientation is determined also mostly bottoming-up.

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<sup>35</sup> See Kougiou et al, 2010.

#### 4.4.2 Main instruments

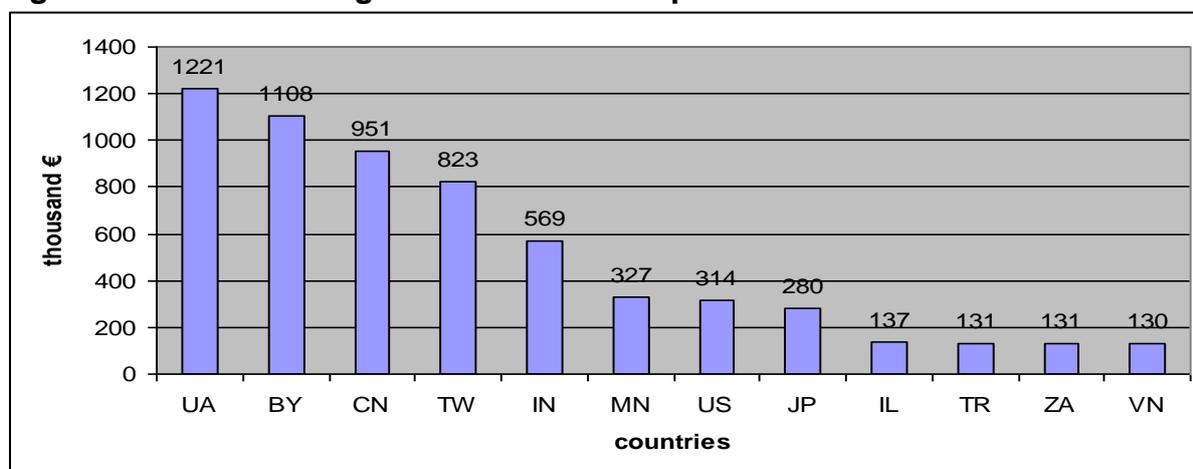
The main instrument for cooperation with non-EU countries are joint funding programmes between the Russian Foundation for Basic Research (RFFI) and counterparts in the partner countries, and between the Russian Academy of Sciences and its counterparts. Usually joint research or mobility projects are funded in the framework of these programmes.

RFFI launches calls for joint research projects with foreign partners annually or in longer-term intervals. Projects are evaluated both by RFFI experts and by the foreign funding partner. The projects are selected then for funding through comparing the evaluation results.

The Russian Academy of Sciences and the foreign partner academies collect proposals for mobility projects within their organisation. They agree then the projects to be supported in the frame of a joint commission. These projects are fixed then in a protocol, which is valid for one or more years.

The annual budget dedicated to international cooperation in basic research through the Russian Foundation for Basic Research illustrates the country priorities. It does not, however, grasp the full range of cooperation with the non-EU countries. For example, the US cooperation is relevant for innovation in particular and therefore not so strongly represented in the RFFI budget.

**Figure 4: RFFI budget 2011 for cooperation with non-EU countries**



Source: Russian Foundation for Basic Research, 2012.

Data indicate that most funds were invested in cooperation with the neighbouring countries Ukraine and Belarus with more than €1m each in 2011. The next are major partners in Asia with slightly below €1m of funding for cooperation with China and Taiwan. India with a budget of €569,000 and Mongolia with €327,000 follow. Only then are the USA and Japan with around €300,000.

## 4.5 OPENING UP OF NATIONAL R&D PROGRAMMES

Russian national funding programmes are in principle open to participants from the EU Member States. This openness is based on reciprocity between the EU and Russia, as Russian entities may also participate in the FP7. Openness of Russian programmes concerns above all the main public competitive funding instrument, the Federal Targeted Programme R&D in Priority Fields of the S&T Complex of Russia (2007-2013). Several other Federal Targeted Programmes are confidential and not accessible, as they are targeted at support of defence related research. An EU supported project, which has facilitated access to Russian funding programmes, is ACCESSRU.<sup>36</sup>

Towards other countries Russian programmes are not open on such general basis of reciprocity as with the EU. In the FTP R&D in priority fields and the FTP R&D personnel specific funding lines are used for cooperation with international partners.

Besides these schemes there are particularly cooperation links in the applied research and innovation fields. The Russian innovation support tools Rusnano, RVK and the Skolkovo High Tech Centre are open to international cooperation and involve several international partners.

## 4.6 RESEARCHER MOBILITY

### 4.6.1 Mobility schemes for researchers from abroad

There are several Russian schemes in place, which support researcher mobility to Russia. At the level of R&D and innovation funding organisations, all three major Russian Foundations, RFFI, RGNF and FASIE have established bilateral funding programmes with partner organisations in EU Member States and Associated countries to the FP7, in the frame of which mobility of researchers is supported. Dedicated mobility schemes have been established by research organisations, especially between Academies of Sciences. The Russian Academy of Sciences, for example, has exchange programmes with several partner academies in the EU (e.g. Austria, Hungary, Poland, etc.).<sup>37</sup>

Two programmes introduced by the Ministry of Education in 2009 and 2010 and Science have been designed for enhancing mobility.

- The first funding activity targets Russian scientists established abroad (*scientific diaspora*) to work with research groups in Russia. Two calls for this support scheme were launched in 2009 and 2010 in the frame of the Federal Targeted Programme Scientific and Scientific-Pedagogical Personnel of Innovative Russia for the years 2009-2013. 110 projects were supported in the first call and 125 projects in the second call.
- With the second support scheme Russia tries to attract leading scientists from Russia and especially from abroad (irrespective of whether they belong to the Russian scientific diaspora) to establish research groups at Russian universities and public research organisations. Leading scientists selected for support have to

<sup>36</sup> See <http://www.access4.eu/russia/index.php>

<sup>37</sup> Funding schemes of funding and research organisations (type 1 and 2) are searchable at a database prepared within the ERA.Net RUS project. See <http://www.eranet-rus.eu/en/167.php>

spend at least four months per year in Russia. This scheme comes with solid funding of approximately €3.5 million per project for a period of usually two to four years. In the first call 40 scientists were selected for support of their projects, whereby half of the scientists were foreign nationals and only five selected scientists were permanent Russian residents. Most scientists from abroad were from the USA (ten - with four having double Russian and US nationality) followed by researchers from Germany (seven) (MON, 2011a). Importantly, foreign experts were also involved in the evaluation of proposals, which underlines the opening up tendencies of Russia in R&D and innovation. Two more calls were implemented in this scheme in 2011-2012 and a fourth launched in 2013 (see also chapter 3.1.3 Open recruitment and portability of grants).

A scheme introduced in 2013 for enhancing the capacities of an elite group of 15 universities includes means for attracting foreign professors to Russia (see chapter 3.3.1 Quality of the National Higher Education System).

#### **4.6.2 Mobility schemes for national researchers**

Mobility of researchers mainly flows from Russia to abroad with far less researchers moving to Russia. Mobility flows from Russia were for some time and are still to some extent driven by the need for international cooperation, which allowed access to modern infrastructure and equipment.

The Russian research and innovation foundations (RFFI, RGNF, FASIE) have established bilateral cooperation programmes with a broad variety of countries. They usually support research and innovation projects, which include means for mobility. RFFI also manages a small-dedicated mobility programme for Russian researchers. The Russian Academy of Sciences has established a large network of exchange programmes with partner Academies in the EU, in Former Soviet Union countries and many other parts of the world.

The new scheme mentioned in the previous chapter for enhancing the capacities of an elite group of 15 universities includes means for mobility of Russian students and university staff (see chapter 3.3.1 Quality of the National Higher Education System).

## 5 CONCLUSIONS

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Measures to stimulate interactions within the knowledge triangle were designed by policy makers and introduced with the aim that they will all create environments for cooperation among education, research and business organisations. These measures concern Technology Platforms, the innovation flagship project Skolkovo, Innovative Territorial Clusters, and several other initiatives. Since 2009, specific support tools for enhancing research within universities were introduced, for example, the programme attracting leading scientists to Russian universities. Innovation support at universities (such as Technology Transfer Offices and technology parks) has been enhanced and spin offs from HEIs and PROs facilitated. The RFTR has been revived and has started supporting innovative projects emerging from Technology Platforms. With the new Minister of Education and Science Dmitry Livanov a continuation and acceleration of this policy to strengthen research at universities and innovation activities can be observed. In the field of the public research organisations a reform of the Russian Academy of Sciences has been initiated. The detailed measures are not finally decided yet, but the aim is a stronger focus on efficiency and results of the single RAN institutes.

The Russian innovation system has entered in the last period another phase of important reforms. The new Minister of Education and Science Dmitry Livanov has put his priorities on the universities and the academies of sciences. He quickly initiated measures to concentrate resources on leading universities and to enhance their research performance. Concrete targets have been set: the number of Russian universities in international rankings should increase from two currently to five over the coming years. The second major strand of reforms is the Russian Academy of Sciences. The detailed measures are not finally decided yet. It is however already obvious that its autonomy and role have been significantly reduced in favour of the government. A focus will be put on efficiency and results of the single RAN institutes. Strengthening innovation continues to be important, but is not in the immediate focus of policy.

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## 7 List of Abbreviations

BERD	Business Expenditures for Research and Development
CERN	European Organisation for Nuclear Research
CIS	Commonwealth of Independent States
COST	European Cooperation in Science and Technology
CRDF	US Civilian Research and Development Fund
ERA	European Research Area
ERA-NET	European Research Area Network
ERDF	European regional development fund
ERP Fund	European Recovery Programme Fund
ESA	European Space Agency
ESFRI	European Strategy Forum on Research Infrastructures
EU	European Union
EU-27	European Union including 27 Member States
FASIE	Foundation for Assistance to Small Innovative Enterprises
FDI	Foreign Direct Investments
FP	European Framework Programme for Research and Technology Development
FP	Framework Programme
FP7	7th Framework Programme
FTP	Federal Targeted Programme
GBAORD	Government Budget Appropriations or Outlays on R&D
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on R&D
GOVERD	Government Intramural Expenditure on R&D
GUF	General University Funds
HEI	Higher education institutions
HERD	Higher Education Expenditure on R&D
HES	Higher education sector
ICT	Information and Communication Technologies
INCO	International Cooperation
IncoNet CA/SC	S&T International Cooperation Network for Central Asian and South Caucasus Countries
IncoNet EECA	S&T International Cooperation Network for Eastern European and Central Asian Countries
INFRA	Infrastructures
INTAS	International Association for the Promotion of Co-operation with Scientists from the New Independent States (NIS) of the Former Soviet Union

IP	Intellectual Property
IRSES	International Research Staff Exchange Scheme
MON	Ministry of Education and Science
NATO	North Atlantic Treaty Organisation
OECD	Organisation for Economic Co-operation and Development
PRO	Public Research Organisations
R&D	Research and development
RAN	Russian Academy of Sciences (RAS)
RFFI	Russian Foundation for Basic Research (RFBR)
RGNF	Russian Foundation for Humanities (RFH)
RI	Research Infrastructures
RTDI	Research Technological Development and Innovation
RVK	Russian Venture Company
S&T	Science and technology
SF	Structural Funds
SME	Small and Medium Sized Enterprise
TP	Technology Platform
UIS	UNESCO Institute of Statistics
UNESCO	United Nations Educational, Scientific and Cultural Organization
VC	Venture Capital