ERAWATCH Country Reports 2012: Serbia

Djuro Kutlaca

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This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). ERAWATCH is a joint initiative of the European Commission's Directorate General for Research and Innovation and Joint Research Centre.

The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context.

The first draft of this report was produced in December 2012 and was focused on developments taking place in the previous twelve months. In particular, it has benefitted from the comments and suggestions of Nicholas Harrap from JRC-IPTS.

The report is currently only published in electronic format and is available on the ERAWATCH website. Comments on this report are welcome and should be addressed to jrc-ipts-erawatch-helpdesk@ec.europa.eu.

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EXECUTIVE SUMMARY

Serbia is a candidate country for EU membership, and has a population of 7,186,862 (census 2011; excluding Kosovo), which compared to the estimated EU27 population of around 503.68 million inhabitants on January 1, 2012, presents 1.41% share of the total. In the year 2011, Serbia’s GDP per capita (€4290) reached 17.02% of the EU27 average. At the same time Serbia’s unemployment rate was 23%; more than twice the EU27 average of 9.7%. Real growth rate of GDP in 2011 was 1.6%. In 2011, Serbia's GERD as a percentage of GDP was 0.777% which was significantly lower in comparison to the EU27 average (2.03%). Comparing to other Eastern European Countries, Serbia significantly lags behind Slovenia (2.47%), Czech Republic (1.84%), Estonia (2.38%), and Hungary (1.21)%

The structure of the policy coordination mechanisms have remained unchanged during the last decade: the first level of research governance is the Serbian National Parliament, the highest legislative authority in the country, and the Committee for S&T Development reviews and proposes to the Parliament the laws regulating the area of science, technology and innovation. The Ministry of Education, Science and Technology Development of the Government of the Republic of Serbia (MESTD) governs the functioning and development of S&T in Serbia and is responsible for the fulfilment of the country’s obligations in this area. On the other hand, the main task of the National Council for S&T Development is to design and propose to the government a strategy for S&T development and to monitor its implementation.

Despite the economic crisis, the overall public R&D expenditure in Serbia has been increasing over the past years. The biggest jump was seen in 2011 when the budgetary allocations increased by 22% in comparison with 2010, following the government obligations which are the result of the additional financing for research infrastructure through financial agreements with the European Investment Bank and the Council of Europe Development Bank with a total value of €305m to be implemented in 2010-2015. About €100m has been invested in research infrastructure as part of this arrangement in the year 2011. Finally, innovation financing has been supported by the EU pre-accession funds with €8.4m.

The Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3) approach has not been implemented in creation of strategic policy documents in Serbia so far. The current approach to strategy and policy making process is traditionally based on expert opinion, without intersectoral dialogue, communication with wide public community for identification of bottom-up initiatives and priorities, scenario development, forecasting, and other future-oriented activities, which are commonly collected under a foresight exercise umbrella.

The key structural challenges faced by the national innovation system in Serbia are:

1. The absence of coordinated governance and funding of national innovation system in Serbia between main ministries and public funding sources as a consequence of the fact that the concept, purpose and functioning of innovation is not sufficiently developed and accepted in the economy and the society in Serbia.

2. Still present a linear model of governance of the R&D and innovation system in the country; this is the main obstacle for networking of R&D sector with the rest of economy and society. A crucial challenge for research governance in Serbia is the question how to increase R&D and Innovation activities in the Business Enterprise Sector (BES).

3. One of the significant problems in preserving and strengthening the scientific community is the ongoing drain of highly educated individuals from the country.

1 Sources: EUROSTAT and Statistical Office of the Republic of Serbia.
4. The attractiveness of R&D system in Serbia for private investments in R&D is insufficient because of the present structure and capacities of public R&D system. Restructuring of public R&D system and integration of BES into the national innovation system is primary task for the government. In addition, the legal framework is not in favour of private sector engagement in R&D and innovation activities.

5. Undeveloped infrastructure for innovative entrepreneurship and a lack of culture for technological entrepreneurship in the Higher Education Sector (HES) and public R&D laboratories and institutes (PRO – Public Research Organisations).

6. Several more challenges should be mentioned too: (a) Absence of evaluation culture and practice in R&D and innovation system in Serbia; (b) Insufficient knowledge about R&D and innovation capacities in BES; (c) Recognition of the need for financing of innovation activities with a much larger budget and significantly increased financing per innovation grant; (d) Lack of demand-side R&D and innovation policy tools and measures in Serbia.

The goals of current research policy which should support solutions with all structural challenges, are: (1) the current 55-45% ratio of financing basic as opposed to applied research must progress to 40-60% in favour of applied science in the next five years; (2) Focus by setting seven national R&D priorities in the field of science and technology, for the period 2010-2015; (3) Strengthening of the human resource base by preventing brain-drain, establishing effective projects with leading individuals in the Serbian scientific Diaspora and identification, development and support for talented young researchers; (4) Partnership within the R&D system through rationalisation of the R&D network and close cooperation between institutes and faculties; (5) Partnership with society through science promotion; (6) Partnership with industry through an innovation fund, a new legal framework for intellectual property, and incentives and support for innovation activities; (7) Partnership with other ministries through the participation of the scientific community in major infrastructural and other projects in Serbia; (8) Increasing and diversifying R&D expenditure: The goal is to reach 1% of GDP for science by 2015, not counting infrastructure investments. The Project of Infrastructural Investments, worth EUR 400 million started in January 2010 and will last until the end of 2015 (SSTDRS, 2010).

National priorities in the domain of S&T, defined in S&T Strategy are: (1) Biomedicine and human health; (2) New materials and nanosciences; (3) Environment protection and countering climate change; (4) Agriculture and food; (5) Energy and energy efficiency; (6) ICT; and (7) Improvement of decision making processes and affirmation of national identity.

The R&D and Innovation activities in Serbia in the period 2011-2014 are structured through the following major policy measures:


2. Policy measures for Innovation activities: (a) Programme for Supporting SMEs and Entrepreneurs to Strengthen Innovation Activities in 2011 (responsible institution is the National Agency for the Regional Development-NARD); (b) The MINI GRANTS and MATCHING GRANTS Programmes – Public call for the MINI GRANTS programme is launched in December 2011, Public call for the MATCHING GRANTS programme is about to be launched in spring 2012 (responsible institution is the Innovation Fund); (c) The Programme for co-financing of the Innovation projects – Public call for this programme is launched in December 2011 (responsible institution is the MES).
Major changes in the R&D and innovation policy mix are:

- The “IIR Programme” is a new programme for supporting the integration of basic, applied and development research as well as for fully utilising R&D resources of the country, emphasising commercialisation of R&D activities and results;

- The “SREF Programme” is a new programme for improving the material base of basic, applied and development research as well as for fully utilising R&D equipment and infrastructure in the country;

- The MINI GRANTS Programme launched by the Innovation Fund will award selected innovation projects with substantially larger amounts of money per grant in comparison with all past and on-going innovation projects, i.e. up to €80,000. Also, the MINI GRANTS Programme overcomes the legal obstacle that resulted from the rules defined in the innovation law. This implies, in particular, the obligation for companies to be registered in the MESTD innovation register in order to be eligible for the competition under public calls launched by the MESTD;

- The Programme for Supporting SMEs and Entrepreneurs to Strengthen Innovation Activities, launched in 2011 by the National Agency for the Regional Development, is more oriented to support non-technological innovation activities. The focus is on service and organisational innovations as well as efficient adoption of quality standards.

The creation of the National Strategy for science, education, research and innovation is a crucial step for developing a National Innovation System in Serbia. This strategy should address the structural challenges of the present R&D and innovation system in Serbia and propose solutions for major problems such as the absence of coordinated governance and funding of national innovation system in Serbia between the main ministries (MESTD - the Ministry of Education, Science and Technology Development, MFE - the Ministry of Finance and Economy) and public funding sources (NARD, Innovation Fund), networking of R&D sector with the rest of economy and society, and particularly mobilisation of R&D and innovation capacities in BES.

The development of integral innovation strategy and policy with an appropriate action plan which will stress demand-side as well as supply side R&D and innovation policy tools and measures is a direction for medium term evolution of the policy mix (for the 2012-2015 period). Another medium term activity should be the infrastructure development for innovative entrepreneurship and creation of the culture for technological entrepreneurship in HES and PROs.

The current policy mix should include the development of the evaluation standards as well as institutions responsible for evaluation in the area of science, technology and innovation in Serbia, in short term, i.e. in the very near future (target for 2012-2013).
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1 INTRODUCTION

Serbia is a candidate country for EU membership, and has population of 7,186,862 (census 2011\(^2\); excluding Kosovo; this is decrease of 311,139 citizens, or 4.15\% compared with census in 2002), which compared to the estimated EU27 population of around 503.68 million inhabitants on January 1, 2012, presents 1.41\%\(^3\) share of the total. In the year 2011, Serbia’s GDP per capita (€4290) reached 17.02\% of the EU27 average. At the same time Serbia’s unemployment rate was 23\%; more than twice higher than the EU27 average of 9.7\%. Real growth rate of GDP in 2011 was 1.6\%, in 2010 was 1.0\% and in 2009 -3.5\%. In 2011, Serbia’s GERD as a percentage of GDP was 0.777\% which was significantly lower in comparison to the EU27 average (2.03\%)\(^5\). In 2010 GERD was 0.792\%, or almost one fifth less than in 2009 (0.919\%), as direct consequence of economic crisis on GDP and overall economic performance in country. The main characteristics of these investments are change and instability i.e. in 2004 Serbia’s GERD as a percentage of GDP was 0.32\%, in 2006 it increased to 0.717\%, in 2007 decreased to 0.641\% and in 2008 increased to 0.732\%. Comparing to other Eastern European Countries, Serbia significantly lags behind Slovenia (2.47\%), Czech Republic (1.84\%), Estonia (2.38\%), and Hungary (1.21)\(^7\).

According to the data provided by the national statistical office, in 2011 the share of higher education sector expenditures for Research and Development (HERD) was 56.71\% of GERD (24.14\% in EU27), much higher than the BERD share (9.38\%) of GERD (62.07\% in EU27). Governmental expenditure for R&D was 33.77\% (12.81\% in EU27), whereas the private non-profit (PNP) sector amounted to 0.13\%, a negligible share of GERD in the same year (0.99\% in EU27).

Serbian budget allocations for science grew significantly, from the modest sum of €28m in 2001, to about €100m in 2008 and 2009 (data for the Ministry of Education, Science and Technological Development (MESTD) only). During that eight-year period, there was a substantial growth in salaries of researchers, and almost €30m were invested in capital equipment for scientific research work (SSTDRS, 2010). The Project of Infrastructural Investments, worth EUR 400 million started in January 2010 and will last until the end of 2015 (SSTDRS, 2010).

According to the data of the Republic Statistics Office, in 2011 Serbia had 13,609 researchers in total 11,615 of which were engaged in MESTD projects. The average age of the all employees in R&D sector is equal to the average age of the economically active population in country (44.1\%), but the average age of researchers in 2011 was 43.23 years, slightly under this average age\(^9\).

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\(^3\) This estimation is based on the calculation that Serbia becomes the 28th member of the EU. So in this scenario the total sum of the EU population will be the sum of Serbia’s population (census 2011) and the EU population (January 1, 2012 estimate).

\(^4\) Latest data provided by the Statistical Office of the Republic of Serbia for October 2012 showed that unemployment rate (the share of the unemployed in total active population), in the Republic of Serbia amounted to 22.4\%.

\(^5\) GERD for Serbia is calculated by the author of this report. Calculation is based on data provided by the Statistical Office of the Republic of Serbia within regular yearly statistical reports on S&T activities in Serbia, and using methodology proposed in Frascati Manual defined by the OECD.

\(^6\) R&D Indicators for Serbia are calculated by the author of this report. Calculations are based on data provided by the Statistical Office of the Republic of Serbia within regular yearly statistical reports on S&T activities in Serbia, and using methodology proposed in Frascati Manual defined by the OECD.

\(^7\) Sources: EUROSTAT and Statistical Office of the Republic of Serbia.


\(^9\) This fact should be considered as one among the first results of the implementation of the “Strategy of Scientific and Technological Development of the Republic of Serbia 2010-2015”, adopted by the Government of the
The Science Law, adopted by the Parliament in 2005, promoted excellence in R&D work; imposing publishing of scientific articles in ISI refereed scientific journals as a precondition for career advancement in the R&D sector. A direct empirical consequence of such regulation was a large increase in the number of publications in WoS\textsuperscript{10}. Thus, the figure of 1022 scientific papers published in 2000, grew to 3,614 in 2010. Following the Essential Science Indicators from Thomson Reuters, ScienceWatch.com produced a listing of the scientists, institutions, countries, and journals that achieved the highest percentage increase in total citations from the second bimonthly period of 2011 to the third bimonthly period of 2011 - i.e., from April 2011 to June 2011. Serbia's citation rise continued, as it achieved the highest percent citation increase in nine fields. Serbia has achieved Rising Star status in multiple fields: Agricultural Sciences, Biology & Biochemistry, Chemistry, Clinical Medicine, Computer Science, Engineering, Materials Science, Neuroscience & Behaviour, Pharmacology & Toxicology, and Physics.

The number of patents registered by R&D organizations in the period from 2003-2009 was just 54; while in the period 2003-200 over 3,400 technical solutions were implemented in the field of technological development in Serbia (SSTDRS, 2010; page 20). The relevant figures in the corporate sector were not remarkably better, with about 20 patents registered per year, while individuals registered more than 300 patents in the same period. In the year 2011 in total 229 patent applications were filled in the Intellectual Property Office out of which 180 were resident (151 patent applications filled by individuals, 21 by R&D organisations and 8 by companies) and 49 non-resident patent applications\textsuperscript{11}. In view of such results, Serbia was at the bottom of the list in Europe.

According to Innovation Union Scoreboard IUS2011, Serbia is one of the moderate innovators with a below average performance: Summary Innovation Index is 0.282 in 2011, slight decrease in comparison with 0.284 in 2010. Relative strengths are in Human resources (0.390), Open, excellent and attractive research systems (0.345), Finance and support (0.667) and Economic effects (0.376). Relative weaknesses are in Firm investments (0.230), Linkages & entrepreneurship (0.207), Intellectual assets (0.019) and Innovators (0.091).

Country profile for Serbia in IUS2011 is marked with the following findings: "High growth is observed for R&D expenditure in the public sector, Public-private co-publications, and Community trademarks. A strong decline is observed for Non-EU doctorate students. Growth performance in Finance and support and Intellectual assets is well above average" (IUS2011; page 57).

In the domain of knowledge demand in the Republic of Serbia, the main activities are generated by the “Strategy of S&T Development of the Republic of Serbia 2010-2015” (SSTDRS, 2010). The Serbian research system is centralised and governed by the Ministry of Education, Science and Technological Development (MESTD). The MESTD, according to the Law of the Ministries ("Official Gazette of the Republic of Serbia", 72/2012), has been established in July 26, 2012. The MESTD is the dominant and almost only public funding body in the country. Investments in research and innovation in Serbia from public sources are prioritised and budgeted in the framework of multi-annual plans to ensure stability and long term impact. Project financing based on open competition for R&D and innovation projects is decades-long practice in Serbia. Latest developments proved the government's long-term orientation toward competitive rather than institutional funding of R&D activities: “Strategy of Scientific and

\textsuperscript{10} Web of Science is an online academic citation index provided by Thomson Reuters. It contains three citation indexes subscribed since 1996, two section of the conference proceedings subscribed since 2001 and two sections of the journal citations report subscribed since 2006. Multidisciplinary content covers more than 12,000 journals with the highest impact worldwide, including Open Access journals and over 150,000 conference proceedings.

\textsuperscript{11} Intellectual Property Office of the Republic of Serbia and MESTD, combined data (SSTDRS, 2010).
Technological Development of the Republic of Serbia 2010-2015”, adopted by the Government of the Republic of Serbia on February 25, 2010, defined seven national priorities in the domain of science and technology and proposed institutional funding on a reasonable minimum level, only for minimum share of maintenance costs of a few government owned R&D organisations. The restructuring of the public R&D system together with harmonised efforts toward recognition and integration of the business R&D sector into the national innovation system is key objective of government strategy for S&T development of the Republic of Serbia until 2015.

Current research policy in Serbia is based on the above mentioned S&T Strategy. National priorities in the domain of science and technology, defined in S&T Strategy are: 1) Biomedicine and human health; 2) New materials and nanosciences; 3) Environmental protection and countering climate change; 4) Agriculture and food; 5) Energy and energy efficiency; 6) Information and communication technologies; and 7) Improvement of decision making processes and affirmation of national identity. Together with adoption of this strategy, a multi-annual plan for public financing of R&D activities was adopted too. Realisation of such plans is based on the MESTD annual budget which must be approved every year by the parliament. Following the “Strategy of Scientific and Technological Development of the Republic of Serbia 2010-2015”, a public call for funding of three programmes (Basic Research, Technological Development and Integrated and Interdisciplinary Research) was announced on Sunday, 23rd of May, 2010, supported by the “Act on the selection, evaluation and financing of research for the project cycle 2011 – 2014”, and the “Program for the research cycle 2011-2014” (MSTD-Act, 2010). Public funding of such investments in R&D and Innovation activities in the period 2011-2014 will be realized under the S&T strategy assumption that: “A realistic plan of growth of budget appropriations for science is an annual growth rate of 0.15% GDP. At such a pace, the budget appropriations by 2015, the closing of this Strategy framework shall reach 1.05%” (SSTDRS, 2010; page 62).

Main actors and institutions in research and innovation governance

The Serbian research system consists of three operational levels: 1) The Parliament and the National government level, represented by the Committee for S&T development; 2) The ministry level responsible for the design and implementation of science and research programmes on the national level; and 3) performers of R&D activities and intermediary organisations.

The first level of research governance is the Serbian National Parliament, the highest legislative authority in the country, and the Committee for S&T Development reviews and proposes to the Parliament the laws regulating the area of science, technology and innovation. The Ministry of Education, Science and Technological Development (MESTD) governs the functioning and development of S&T in Serbia and is responsible for fulfilment of the country’s obligations in this area. On the other hand, the main task of the National Council for S&T Development is to design and propose to the government a strategy for S&T development and to monitor its implementation. The Ministry of Finance and Economy (MFE) is an important institution for the support of innovation activities and creation of a national innovation system in Serbia as well. The National Agency for the Regional Development (NARD) and Innovation Fund (IF) of the Republic of Serbia are in limited extent also relevant innovation policy institutions in country concerning their independence in policy formulation, although their main activities are in funding of innovation activities (i.e. on the operational level); therefore both institutions are figured at the political and operational levels.

The operational level consists of intermediary and funding organisations. Research performers are private and public research organisations in government, higher education and the business enterprise sector. R&D organisations in the public sector form a block which comprises seven public universities with 78 faculties, the Serbian Academy of Sciences and Arts with its 10
scientific institutes, 28 other scientific institutes, a centre of scientific excellence, 30 research institutes, 65 innovative organisations, five business associations for support of innovation and 107 registered innovators\textsuperscript{12}. It also includes scientific and technical infrastructure that encompasses: the academic intranet, a gene bank, an accelerator, libraries of the institutes and faculties, the University Library and the National Library of Serbia, which boasts the KoBSON network that provides access to scientific and technological information worldwide. R&D organisations in the private sector include seven private universities with 45 faculties, research resources of foreign companies in Serbia and research and innovation resources of domestic firms. The efforts and results of small and medium-sized enterprises in the field of software engineering, new materials and biotechnology are particularly noteworthy.

Innovation performers are private and public companies, entrepreneurs and inventors.

The institutional role of regions in research governance

The Science Law as well as the Innovation Law in the Republic of Serbia defined MESTD as the main and the only governing institution in the country, responsible for R&D and Innovation activities. Research governance was transferred to the level of Autonomous Province of Vojvodina (APV) to a limited extent, as it was defined by the “Law on regulation of jurisdictions of the APV”, adopted by the Parliament of the Republic of Serbia on November 30, 2009: 1) creation of the Strategy for technological development of the APV, which must be harmonized with national S&T strategy; 2) (co)funding of establishment of high-tech installation, building of homes for young scientists, and international S&T cooperation; 3) (co)funding of R&D activities; 4) definition and funding of programmes important for APV in the area of S&T; 5) project financing for R&D projects important for APV; 6) financing of capital expenses and R&D infrastructure established by the APV; 7) establishment of the innovation fund in APV, based on local revenues; 8) establishment of local R&D centres and popularization of S&T activities in APV; 9) financing of Academy of Sciences and Arts of the APV. Some of these activities could be co-financed by the MESTD under the specific decision made by the Minister.

\textsuperscript{12} According to “Law on Innovation Activities” (Innovation Law. 2010), MESTD is obliged to monitor innovation activities in country and one instrument for realisation of this task is creation and up-dating of the "Register of organisations and individuals accredited for Innovation activities in Serbia". Actual data could be observed from the MESTD web site (only in Serbian language): http://www.mpn.gov.rs/nauka/page.php?page=261
Figure 1: Overview of Serbia’s research system governance structure

Legend:
**Political Level:**
- CSTD – Committee for S&T Development
- MES – Ministry of Education, Science and Technological Development
- NCSTD – National Council for S&T Development
- NARD – National Agency for the Regional Development

**Operational Level:**
- OIPR – Office for Intellectual Property Rights
- OS – Office for Standardization
- QCA – Quality Certification Agencies
- FA – Foreign Agencies for support of Technological Development
- IF – Innovation Fund
- STP – S&T Parks
- IC – Innovation Centres
- BTI – Business and Technological Incubators
- OMPM – Office for Measurements and Precious Metals
- CC – Chambers of Commerce
- HE-PuU – Higher Education, Public Universities
- PROs-SI – Public Research Organisations – Scientific Institutes
- PROs-RI – Public Research Organisations – Research Institutes
- RDI – R&D Infrastructures
- SASTA – Serbian Academy of Sciences and Arts
- MFE – Ministry of Finance and Economy
- SMEs – Small and Medium Sized Companies
- BEs – Big Enterprises
- CI – Corporate Institutes
- PrRO – Private Research Organisations
- CI – Corporate Institutes
- Inv – Inventors
- NARD – National Agency for the Regional Development
- NTFB – New Technology Based Firms
- SBs – SBs
- AB – Accreditation Board
- CSP – Committee for Scientific Promotion
- PRUs – Private Research Organisations – Scientific Institutes
- StR – Start-ups

Source: ERAWATCH Research Inventory
2 Recent developments of the research and innovation policy and system

2.1 National economic and political context

Description of the dynamics of the national economic and political context that may have impacted on the research and innovation system is based on reports released by the International Bank for Reconstruction and Development (IBRD, 2011), World Bank (WB, 2012) and International Monetary Fund (IMF, 2012).

Twelve years after the democratic changes in October 2000, Serbia’s transition remains incomplete. Forging a new identity has not been easy. A recent poll conducted by the World Bank and EBRD—A Life in Transition: After the Crisis—revealed that only about 30 percent of Serbians are satisfied with their lives, well below the average for other transition countries (42%) and the average for western Europe (72%); and the sentiment is little better with respect to expectations for the future—only 30 percent of Serbs believe the next generation will have a better life, which is again well below the average for all transition countries of 50 percent. Moreover, a large segment of the population is growing anxious for the rewards for their patience. Polls show growing frustration with the slow recovery and continued high unemployment, as well as growing fatigue with the reform process and the perceived “moving goalposts” of EU accession (WB, 2012; page 1; data and analysis of pools: The European Bank for Reconstruction and Development (EBRD): "Life in Transition", http://www.ebrd.com/downloads/research/surveys/LiTS2e_web.pdf).

Serbia is an open economy with unexploited export potential and a GDP per capita of approximately US$5,150 in 2010. Some 55 percent of total exports go to the EU-27 countries; the main sectors are: agriculture products, which make up about 20 percent of total exports (mostly grains, sugar, fruits and vegetables, confectionary products and beverages); iron, steel and metal products (20%); machinery and transport equipment (17%); and chemicals (9%). Serbia’s exports stalled in the aftermath of the 2008-2009 economic crisis but have shown signs of rebounding, and are now well above pre-crisis levels. Nevertheless, there is substantial room for improvement, as its exports as a share of GDP, currently at about 25 percent, could be 2-3 times larger. Using neighbouring Europe and Central Asia (ECA) economies for comparison, all have export shares of GDP in the range of 60-80 percent. (e.g. Czech Republic, Hungary, Slovakia, and Poland) (IBRD, 2011; pages 1-2).

The Serbian economy grew rapidly until 2008, fuelled in part by new export dynamism and largely by a significant boost in domestic demand, supported by significant economic reforms since 2000. GDP growth averaged 5 percent per year during 2001-2008, with exports growing at an average annual rate of around 30 percent, albeit from a low base (IBRD, 2011; page 2). Output rose in real terms by nearly 50 percent between 2000 and 2008, as the corporate sector started to post profits and the banking sector restructured. The supply response also reflected increases in productivity and output in recently privatized and de novo firms, as evidenced by the particularly rapid rates of output growth in those sectors which underwent extensive privatization (e.g., steel, cement, rubber, tobacco, dairy, sugar and banking) or attracted foreign investors. The crisis led to a drop in real GDP of 3.5 percent in 2009. Industrial output declined by about 20 percent between mid-2008 to mid-2009. Exports fell by nearly 30 percent over the same period, while imports declined even more sharply. The reduction in the trade deficit paired with strong unrecorded remittances resulted in a sharp correction in the external account, from 21.6 percent of GDP in 2008 to 7.1 percent in 2009. With decreased economic activity, and lower food and energy prices, inflation pressures also receded (to about 4 percent).
After a modest economic recovery in 2011, when real growth reached 1.6 percent, Serbia entered into recession again in 2012. Indicators from the first two quarters show a decline in investments and in exports. As a consequence of the crisis, employment has contracted rapidly, in both the formal and informal parts of the economy. Unemployment is still on the rise, reaching its peak of 25.5 percent in April 2012. The fiscal deficit in 2011 amounted to 4.8 percent of GDP, but will be significantly higher in 2012, closer to 7 percent of GDP.

The Serbian economy faces numerous challenges. The fiscal deficit has widened sharply in 2012 relative to the original budget and to last year’s level, and is unsustainably large. Public debt has also increased significantly. In addition, the external debt burden is high, inflation is volatile, and unemployment is elevated. Economic activity has significantly weakened amid a difficult global environment. GDP is expected to contract by about -2 percent in 2012, with a modest recovery expected next year. Inflation has risen sharply into double digits.

### 2.2 Funding trends

The main R&D funding indicators (GERD, BERD, GBAORD) and their evolution during the last three years in comparison with the corresponding EU 27 average are given in table below.

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<td>GDP growth rate</td>
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<td>1.0</td>
<td>1.6</td>
<td>2.0 (1)</td>
<td>n/a</td>
<td>1.5 - 0.3 (2012)</td>
</tr>
<tr>
<td>GERD as % of GDP</td>
<td>0.919</td>
<td>0.792</td>
<td>0.777</td>
<td>n/a</td>
<td>1.5 (2)</td>
<td>2.03</td>
</tr>
<tr>
<td>GERD (euro per capita)</td>
<td>35.53</td>
<td>29.67</td>
<td>32.49</td>
<td>n/a</td>
<td>n/a</td>
<td>510.5 (2011)</td>
</tr>
<tr>
<td>GBAORD (€ million)</td>
<td>166.96</td>
<td>131.78</td>
<td>153.60</td>
<td>n/a</td>
<td>n/a</td>
<td>91,277.1 (EU27 total 2011)</td>
</tr>
<tr>
<td>GBAORD as % of GDP</td>
<td>0.578</td>
<td>0.471</td>
<td>0.493</td>
<td>n/a</td>
<td>n/a</td>
<td>0.73</td>
</tr>
<tr>
<td>BERD (€ million)</td>
<td>38.02</td>
<td>25.80</td>
<td>22.72</td>
<td>n/a</td>
<td>n/a</td>
<td>159,975.937 (EU27)</td>
</tr>
<tr>
<td>BERD as % of GDP</td>
<td>0.132</td>
<td>0.092</td>
<td>0.073</td>
<td>n/a</td>
<td>n/a</td>
<td>5,925.03 (average)</td>
</tr>
<tr>
<td>R&amp;D funded by Business Enterprise Sector (% of GDP)</td>
<td>0.153</td>
<td>0.146</td>
<td>0.120</td>
<td>n/a</td>
<td>n/a</td>
<td>1.26 (4)</td>
</tr>
<tr>
<td>R&amp;D performed by HEIs (% of GERD)</td>
<td>54.78</td>
<td>51.70</td>
<td>56.71</td>
<td>n/a</td>
<td>n/a</td>
<td>24% (4)</td>
</tr>
<tr>
<td>R&amp;D performed by Government Sector (% of GERD)</td>
<td>30.87</td>
<td>36.62</td>
<td>33.77</td>
<td>n/a</td>
<td>n/a</td>
<td>12.7 (4)</td>
</tr>
<tr>
<td>R&amp;D performed by Business Enterprise sector (% of GERD)</td>
<td>14.32</td>
<td>11.63</td>
<td>9.38</td>
<td>n/a</td>
<td>n/a</td>
<td>62.4 (4)</td>
</tr>
<tr>
<td>Share of competitive vs</td>
<td>100% competitive</td>
<td>100% competitive</td>
<td>100% competitive</td>
<td>100% competitive</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Since the adoption of the national R&D strategy, covering the time period 2010-2015, several changes in budgetary commitments have been introduced (SSTDRS, 2010). A new grant programme for interdisciplinary and integral research has been introduced, taking up almost a third of national R&D financing addressed to realisation of the R&D and Innovation projects. The programme is meant to bring together large teams from different institutions in addressing Serbia’s R&D priorities. The remainder of project financing is split almost equally between basic and applied research. A small portion of the national RDI budget (about 2%) is spent on innovation projects.

Investments in R&D and innovation in Serbia from public sources are prioritised and budgeted in the framework of multi-annual plans to ensure predictability and long term impact. Project financing based on open competition for R&D and Innovation projects is decade’s long practice in Serbia. There is no institutional, or block funding for R&D activities in Serbia. Programmes for the support of R&D and innovation activities (co)financed by the MESTD, the Ministry of Economy and Regional Development (MFE) and the National Agency for the Regional Development (NARD) are not sector-specific.

The economic and financial crisis caused budgetary restrictions in the budget allocations for R&D and Innovation projects (co)financed by the MESTD in real terms: figure for 2011 remain almost the same as it was in 2010, but already contracted obligations for new selected and approved R&D projects (BR, TD, and IIR programmes) in 2011 were much higher than in 2010; therefore, the MESTD has prolonged public call for new innovation projects from 2011 to 2012.

Public funding of R&D and Innovation activities in the period 2011-2015 should be realized under the S&T strategy assumption that: “A realistic plan of growth of budget appropriations for science is an annual growth rate of 0.15% GDP. At such a pace, the budget appropriations by 2015, the closing of this Strategy framework shall reach 1.05%” (SSTDRS, 2010).

Investments in R&D and innovation in Serbia from public sources are prioritised and budgeted in the framework of multi-annual plans to ensure predictability and long term impact.

Despite the economic crisis, the overall public R&D expenditure in Serbia has been increasing over the past years. The biggest jump was seen in 2011 when the budgetary allocations increased by 22% in comparison with 2010, following the government obligations which are result of the additional financing for research infrastructure through financial agreements with the European Investment Bank and the Council of Europe Development Bank with a total value of €305m to be implemented in 2010-2015. About €100m has been invested in research infrastructure as part
of this arrangement in the year 2011. Finally, innovation financing has been supported by the EU pre-accession funds with €8.4m.

The goals of current research policy which should support solutions with all structural challenges, are: (1) the current 55-45% ratio of financing basic as opposed to applied research must progress to 40-60% in favour of applied science in the next five years; (2) Focus by setting seven national R&D priorities in the field of science and technology, for the period 2010-2015; (3) Strengthening of the human resource base by preventing brain-drain, establishing effective projects with leading individuals in the Serbian scientific Diaspora and identification, development and support for talented young researchers; (4) Partnership within the R&D system through rationalisation of the R&D network and close cooperation between institutes and faculties; (5) Partnership with society through science promotion; (6) Partnership with industry through an innovation fund, a new legal framework for intellectual property, and incentives and support for innovation activities; (7) Partnership with other ministries through the participation of the scientific community in major infrastructural and other projects in Serbia; (8) Increasing and diversifying R&D expenditure: The goal is to reach 1% of GDP for science by 2015, not counting infrastructure investments. The Project of Infrastructural Investments, worth EUR 400 million started in January 2010 and will last until the end of 2015 (SSTDRS, 2010).

Funding from abroad, particularly from the EU (via Framework, Structural Funds etc.), or from other international sources became an important source of R&D funding in Serbia since 2006. The share of funding from abroad increased from only 2.64% in 2006 to 7.18% in 2009 because of the increase of success in competition for FP7 and other EU funds. Figures for 2010 are consequence of global financial crisis which affect Serbian economy and R&D system as well.

There was no significant funding for innovation activities in Serbia from any source other than MESTD, MFE and NARD. A significant change in that sense happened in 2011: financial scheme for financing of the Innovation fund activities is under negotiation with the World Bank, the European Investment Bank, and the European Commission; preliminary negotiable is total sum of €75.5m for the period 2011-2014. Initial funding for the Innovation fund is provided by the "Innovation Serbia Project": The €8.4m project (Component 2: "Support Human Capital Development and Research) is funded by the EU pre-accession funds (IPA) allocated for Serbia in 2011, and implemented through the World Bank. The IPA project will provide funding for capacity building of the Innovation Fund and implementation of financial instruments supporting enterprise innovation (MINI GRANTS and MATCHING GRANTS Programmes) by the Innovation Fund. Public call for MINI GRANTS programme has been launched in December 5th, 2011. Public call for the MATCHING GRANTS programme is launched in spring 2012.

Programmes for the support of R&D and innovation activities (co)financed by the MESTD, the Ministry of Finance and Economy (MFE) and the National Agency for the Regional Development (NARD) are not sector-specific.

2.3 New policy measures

The R&D and Innovation activities in Serbia in the period 2011-2014 are structured through the following major policy measures:

1. Policy measures for R&D activities launched by the MESTD (responsible institution is the MESTD):
   - “Programme supporting Basic Research for the Research Cycle 2011-2014” ["BR Programme"]]. The “BR Programme” has been established by the Minister of Education, Science and Technological Development as an obligation defined within
Article 10, paragraphs 4, 27 and 105 of the Law on Scientific Research. The previous programme for support of basic research in Serbia has covered the period 2006-2010, ending by December 31st, 2011. The BR programme is a continuation of funding of basic research in Serbia for the next four years. The priority research fields are defined within the “Strategy of S&T Development of the Republic of Serbia 2010-2015” [SSTDRS]. Procedures for selection, evaluation and funding are defined within the “Act on Selection, Evaluation and Funding of Programme of Basic Research for the Research Cycle for the Time Period 2011 – 2014”;

- “Programme supporting Research in the Field of Technological Development for the Research Cycle 2011-2014” [“TD Programme”]. The “TD Programme” has been established by the Minister of Education, Science and Technological Development as an obligation defined within Article 10, paragraphs 4, 27 and 105 of the Law on Scientific Research. The previous programme for support of research in the field of Technological Development in Serbia has covered the period 2006-2010, ending by December 31st, 2011. The TD programme is a continuation of funding of basic research in Serbia for the next four years. The priority research fields are defined within the “Strategy of S&T Development of the Republic of Serbia 2010-2015” [SSTDRS]. Procedures for selection, evaluation and funding are defined within the “Act on Selection, Evaluation and Funding of TD Programme for the Research Cycle for the Time Period 2011 – 2014”;

- “Programme of Co-Funding of Integrated and Interdisciplinary Research for the Research Cycle 2011-2014” [“IIR Programme”]. The “IIR Programme” is a new programme for supporting the integration of basic, applied and development research as well as for fully utilising R&D resources of the country, emphasising commercialisation of R&D activities and results;

- “Programme of Providing and Maintaining Scientific Research Equipment and Scientific Research Facilities for the Research Cycle 2011-2014” [“SREF Programme”]. The “SREF Programme” is a new programme for improving the material base of basic, applied and development research as well as for fully utilising R&D equipment and infrastructure in the country.

2. Policy measures for Innovation activities:

- Programme for Supporting SMEs and Entrepreneurs to Strengthen Innovation Activities in 2011 (responsible institution is the National Agency for the Regional Development). This programme is more oriented to support non-technological innovation activities. The focus is on service and organisational innovations as well as efficient adoption of quality standards;

- The MINI GRANTS and MATCHING GRANTS Programs – Public call for the MINI GRANTS programme is launched in December 2011; Public call for the MATCHING GRANTS programme is launched in spring 2012 (responsible institution is the Innovation Fund). The Mini Grants Program provides unconditional grants up to €80,000 to innovative start-ups with a mandatory 15% of co-financing from the company. The Matching Grants Program is a conditional grant with a 5% royalty component, with project of up to €300,000 and a mandatory 30% co-financing from the company. Both programs have been developed with international advisors and according to World Bank international best practices;

- The Programme for co-financing of the Innovation projects – Public call for this programme is launched in December 2011 (responsible institution is the MESTD). This programme has been established by the MESTD as obligation defined by the Articles 36 of the Innovation Law (“Official Gazette of RS”, nos. 110/05 and
The total budget spent by the MESTD for innovation activities was €1.4m in 2009. The MESTD planned budget was nothing for innovation activities in 2011, therefore public call for innovation projects launched in December 2011 was an invitation for innovation projects which will be funded €1.79m from the budget allocated for the years 2012 and 2013.

The only tax incentive related to R&D and innovation activities in Serbia is addressed to organisations registered for R&D activities as non-profit organisations. These organisations are not obliged to pay taxes for R&D services they provide to clients under non-profit contracts.

### 2.4 Recent policy documents

The list of policy documents that are published in ERAWATCH represents the full range of important research and innovation policy documents regarding R&D and Innovation activities in Republic of Serbia created in the period 2010-2012. The inventory is consisting of the following documents:

2. Law on Scientific and Research Activities (Science Law, 2010), published on September 22, 2011;
3. Law on Innovation Activities (Innovation Law, 2010), published on September 22, 2011;

In addition, the Strategy of Development of Education in the Republic of Serbia by the year 2020 (SDERS) was recently completed by the Ministry of Education, Science and Technological Development (MESTD) and approved by the government in autumn 2012. Main parts of this strategy includes: (a) Strategy of development of the primary and secondary education; (b) Strategy of development of the high education; (c) Strategy of development of the “life long learning” system in the country; (d) Strategy of financing of education in the Republic of Serbia.

### 2.5 Research and innovation system changes

The structure of the policy coordination mechanisms remain unchanged last decade: the first level of research governance is the Serbian National Parliament, the highest legislative authority in the country, and the Committee for S&T Development reviews and proposes to the Parliament the laws regulating the area of science, technology and innovation. The MESTD governs the functioning and development of S&T in Serbia and is responsible for fulfilment of the country’s obligations in this area. On the other hand, the main task of the National Council for S&T Development is to design and propose to the government a strategy for S&T development and to monitor its implementation.

### 2.6 Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3)

The Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3) approach has not been implemented in creation of strategic policy documents in Serbia so far. The current approach in strategy and policy making process is traditionally based on expert opinion, without intersectoral dialogue, communication with wide public community for identification of bottom-up initiatives and priorities, scenario development, forecasting, and other future-oriented activities, which are commonly collected under the foresight exercise umbrella.
The recent “Strategy of S&T Development of the Republic of Serbia 2010-2015” was prepared using the established top-down approach with contributions from informal panels for selected S&T fields. Other inputs were a strategic document prepared by the National Council for Scientific and Technological Development, as well as numerous meetings and round tables with domestic and foreign scientists, businessmen, statesmen, members of the civil society and many others. Public debate on the strategy lasted from June 29th, 2009 until the end of November of 2009. Hundreds of comments were sent to the ministry by an online forum and e-mail from scientists, businessmen, foreign partners and science policy makers from all over the world. There is clearly expressed political will that the first foresight exercise in S&T in Serbia should be launched in very near future.

The main policy document in the area of S&T and Innovation is the “Strategy of S&T Development of the Republic of Serbia 2010-2015” (SSTDRS, 2010). "The Strategy is guided by two basic principles: focus and partner. Focus through defining a list of national research priorities in which we (i.e. R&D system in Serbia) can and must make significant progress. Partner through strengthening ties with institutions and companies to allow Serbia to validate its ideas in the global market”.

National priorities in the domain of S&T, defined in S&T Strategy are: (1) Biomedicine and human health; (2) New materials and nanosciences; (3) Environment protection and countering climate change; (4) Agriculture and food; (5) Energy and energy efficiency; (6) ICT; and (7) Improvement of decision making processes and affirmation of national identity.

Research governance was transferred to the level of Autonomous Province of Vojvodina (APV) to a limited extent, as it was defined by the “Law on regulation of jurisdictions of the APV”, adopted by the Parliament of the Republic of Serbia on November 30, 2009: 1) creation of the Strategy for technological development of the APV, which must be harmonized with national S&T strategy; 2) (co)funding of establishment of high-tech installation, building of homes for young scientists, and international S&T cooperation; 3) (co)funding of R&D activities; 4) definition and funding of programmes important for APV in the area of S&T; 5) project financing for R&D projects important for APV; 6) financing of capital expenses and R&D infrastructure established by the APV; 7) establishment of the innovation fund in APV, based on local revenues; 8) establishment of local R&D centres and popularization of S&T activities in APV; 9) financing of Academy of Sciences and Arts of the APV. Some of these activities could be co-financed by the MESTD under the specific decision made by the Minister.

2.7 Evaluations, consultations

Evaluations
One among the key challenges R&D and Innovation system in the Republic of Serbia is faced with is the creation of the evaluation standards and principles as well as instruments and mechanisms for implementation in monitoring and evaluation of innovation support measures. The accreditation procedure is obligatory for R&D, HE and registered innovation organisation: under the HE Law, for teaching competence: under the Science Law, for R&D competence; under the Innovation Law for innovation capacity. The permanent and transparent monitoring and evaluation practice in governance of innovation policy measures is urgently needed: there are no evaluation standards or institutions responsible for evaluation in the area of S&T and innovation in Serbia. Only ex-ante evaluations of innovation activities proposed under public calls for funding from the Ministry of Education, Science and Technology Development (MESTD) (former Ministry of Education and Science - MES), the Ministry of finance and economy (MFE) (former Ministry of economy and regional development - MoERD) and the National Agency for regional development (NARD) are regularly organised. Further monitoring of on-going activities, ex post and impact evaluation of innovation activities are organised as
sporadic initiatives within EU sponsored projects. It is necessary to organise national programme for evaluation of innovation activities which are (co)financed from the public sources, with development of evaluation standards, identification and training of evaluators, establishment of legal framework for such activities, etc. The MFE annually making reviews of SMEs and entrepreneurship and related programmes against the Strategy for the Development of Competitive and Innovative Enterprises (reports for 2008, 2009, 2010 and 2011 are available in Serbian).

The only ex-post and/or impact evaluation activity in the period 2012-2012 is recently (end of 2011) completed within the Improved SME Competitiveness and Innovation Project (ICIP), which is financed by the European Union and aims at improving the competitiveness of Serbian SMEs and increasing levels of innovation in SMEs. In total nine SME innovations and competitiveness support programmes have been evaluated that are implemented by the Government of Serbia and managed by the MFE, MESTD and NARD. The focus of the assessment was on the impact observed of nine programmes on the parties involved, specifically on the beneficiary enterprises and the innovation support organisations and consultants. Consequently, the methodology focused on effectiveness and efficiency of programmes, its management and capacities to operate the programmes, as well as on awareness of existing support measures; regarding the beneficiary enterprises, the methodology looked towards possible specialization of support measures profiles, on closing gaps in the innovation assistance process and meeting the needs of beneficiary enterprises.

### Consultations

Foresight as a methodological tool for consultations within R&D community as well as for consultations with all other interested stakeholders and communities in the economy and society is not implemented in Serbia yet. Orientation on foreign programmes and projects (EU, WB, OECD, etc.) for support of innovation activities in the Republic of Serbia should be, at least, acknowledged by the domestic governing institutions, but major the intervention in national innovation performance has to be harmonisation of overall and specific goals and activities of these projects with national priorities, needs and challenges. The optimal reaction to changes which are necessary in that direction is launching the first national S&T foresight exercise. The main outcomes and results of such foresight should be the identification of national innovation capacity and potentials, needs and challenges on the way toward creation of the national innovation system, selection of national priorities in R&D and Innovation, as well as creation of the first formal innovation policy document and establishment of the consultation and dialogue between RDI community and wider economy and society in Serbia.

### 2.8 Policy developments related to Council Country Specific Recommendations

Not applicable for the Republic of Serbia.

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3 Structural challenges facing the national system

According to Innovation Union Scoreboard (IUS2011)\textsuperscript{14}, Serbia is one of the moderate innovators with a below average performance: Summary Innovation Index is 0.282 in 2011, slight decrease in comparison with 0.284 in 2010. Relative strengths are in Human resources (0.390), Open, excellent and attractive research systems (0.345), Finance and support (0.667) and Economic effects (0.376). Relative weaknesses are in Firm investments (0.230), Linkages & entrepreneurship (0.207), Intellectual assets (0.019) and Innovators (0.091). High growth is observed for R&D expenditure in the public sector, Public-private co-publications, and Community trademarks. A strong decline is observed for Non-EU doctorate students. Growth performance in Finance and support and Intellectual assets is well above average.

Innovation Union indicators for Serbia are given in table below.

<table>
<thead>
<tr>
<th>Innovation Union Scoreboard Indicators - IUS 2011</th>
<th>Serbia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HUMAN RESOURCES</strong></td>
<td></td>
</tr>
<tr>
<td>New doctorate graduates (ISCED 6) per 1000 population aged 25-34</td>
<td>0.5</td>
</tr>
<tr>
<td>Percentage population aged 25-64 having completed tertiary education</td>
<td>20.5</td>
</tr>
<tr>
<td><strong>Open, excellent and attractive research systems</strong></td>
<td></td>
</tr>
<tr>
<td>International scientific co-publications per million population</td>
<td>N/A</td>
</tr>
<tr>
<td>Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Finance and support</strong></td>
<td></td>
</tr>
<tr>
<td>R&amp;D expenditure in the public sector as % of GDP</td>
<td>0.78</td>
</tr>
<tr>
<td><strong>FIRM ACTIVITIES</strong></td>
<td></td>
</tr>
<tr>
<td>R&amp;D expenditure in the business sector as % of GDP</td>
<td>0.13</td>
</tr>
<tr>
<td><strong>Linkages &amp; entrepreneurship</strong></td>
<td></td>
</tr>
<tr>
<td>Public-private co-publications per million population</td>
<td>4.2</td>
</tr>
<tr>
<td><strong>Intellectual assets</strong></td>
<td></td>
</tr>
<tr>
<td>PCT patents applications per billion GDP (in PPSC)</td>
<td>N/A</td>
</tr>
<tr>
<td>PCT patents applications in societal challenges per billion GDP (in PPSC) (climate change mitigation; health)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**OUTPUTS**

<table>
<thead>
<tr>
<th>Economic effects</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium and high-tech product exports as % total product exports</td>
<td>26.08</td>
</tr>
<tr>
<td>Knowledge-intensive services exports as % total service exports</td>
<td>45.20</td>
</tr>
<tr>
<td>License and patent revenues from abroad as % of GDP</td>
<td>0.10</td>
</tr>
</tbody>
</table>

The Serbian research system is centralised and governed by the Ministry of Education, Science and Technological Development (MESTD). Following the obligations defined by the Science Law (“Law on Scientific and Research Activities”, “Official Gazette of the Republic of Serbia", no. 110/2005, 50/2006 - corrections and 18/2010), a new national “Strategy of Scientific and Technological Development of the Republic of Serbia 2010-2015” (SSTDRS) was adopted by the Government of the Republic of Serbia on February 25, 2010, defining seven national priorities in the domain of science and technology. The main contribution of the new SSTDRS for support of innovation activities in the country is, in fact, the definition of key priorities of the MESTD in the area of S&T for the next five years and this is “the development of a national innovation system as an absolute prerequisite for establishment of a knowledge-based economy and society. The MESTD will work together with other competent state institutions and rely on the existing resources, in the direction of development, integration, and elaboration of a national innovation system as the only way of generating and marketing new technologies on the long run ” (SSTDRS, 2010; page 27).

The Ministry of Finance and Economy (MFE) is an important institution for the support of innovation activities as well as the creation of a national innovation system in Serbia. The "Strategy for the Development of Competitive and Innovative Enterprises" was adopted in 2008.

and implemented by the MFE; it is a strategic policy document for development of small and medium-sized enterprises and entrepreneurship, which defines key priorities and the way they will be implemented. The Strategy is based on five pillars, further developed in modules and measures, corresponding to the priorities in SME development and aimed to contribute to improving the performance of the entrepreneurs through all stages of start-up, growth and development of SMEs. The MFE activities are dedicated to the realisation of the strategic vision defined by the SDCIE: "The development of an Entrepreneurial Economy, based on knowledge and innovativeness, which creates strong, competitive and export oriented SME sector and sustainability contributes to an increase in living standards in the Republic of Serbia." (SDCISME, 2008)

The innovation landscape in Serbia could be succinctly described with the fact that no innovation policy in the country has been officially and formally approved by the central government or any ministry or parliament. Nevertheless, official attempts to create a national innovation policy have been registered twice since 2003 year: the very first effort was in 2003, with a working document prepared by the (then) Minister for S&T and Development (due to the change of the government, and new political party in power, this document remained as a draft, without official recognition); the second attempt was initiated by an EU funded project managed by the European Agency for Reconstruction in Serbia (“Support to Enterprise Development and Entrepreneurship – Serbia”, 2005-2006) in 2006, with the aim to build a “National Innovation Strategy for Serbia”, which failed too (the mentioned document remained a draft text, consequently the government stopped activities). The second attempt was also influenced by the legal obligation defined by the first Innovation Law adopted in Serbia in 2005 (Law on Innovation Activity, "Official Gazette of the RS", No. 110/2005; this law has been recently moderately changed: "Official Gazette of the RS", No.18/2010: "The ministry in charge of the scientific and research activity and technological development shall be responsible for establishing and implementation of the innovation policy" - Article 6).

Summarising, the key structural challenges faced by the national innovation system in Serbia can be grouped into the following issues:

1. Absence so far of a formal innovation policy in the country officially approved by the central government, any ministry or parliament.

   Creation of the first innovation policy in Serbia for more efficient and effective use of public budget and national innovation resources and capacities should be one major priority for governing institutions in country. Possible solution for this challenge is clearly defined responsibility and assigned task within national government, eventually in 2013.

2. Absence of coordinated governance and funding of national innovation system in Serbia between main ministries and public funding sources: The Ministry of Education, Science and Technological Development (MESTD), The Ministry of Economy and Regional Development (MFE), National Agency for the Regional Development (NARD), and recently (in March 2011) (re)established the Innovation fund.

   The concept, purpose and functioning of innovation is not sufficiently developed and accepted in the economy and the society in Serbia. Therefore, the development of the national innovation system in Serbia is currently in a phase of conceptualisation and far from being operational and functional. The absence of a formal innovation policy leads to a situation, in which the governance of innovation activities in Serbia is not structured, organised and budgeted between responsible ministries and agencies.

   Because of fact that NARD is organisationally subordinated by the MFE, funding and governance activities between these two institutions are fully synchronised. The main challenge in near future is establishment of the coordination between the MESTD, MFE and NARD. A possible solution could be mutual participation of representatives from both
ministries and NARD in policy related bodies (councils, committees, etc.) in order to harmonise both measures and finance addressed to same clients / users of public budget.

3. Another important challenge is still present linear model of governance of the R&D and innovation system in the country; this is the main obstacle for networking of R&D sector with the rest of economy and society, i.e. R&D sector and economy in Serbia are separate and mutually independent, without needs and aspiration for cooperation.

Existing instruments and mechanism are more oriented to preserve the situation rather than convert this into a networked, mutually dependent cooperation. This situation is particularly evident in the R&D sector with strong orientation of R&D community, enhanced by the Science law and criteria for advancement in research career based on articles published in scientific publications, rather than technology development and innovation.

The direct consequences of the obstacles shown above are the preservation of a role and structure of a R&D system that had been created in a time of a quasi-market economy. A crucial challenge for research governance in Serbia is the question of how to increase R&D and Innovation activities in the Business Enterprise Sector (BES). Official figures (Statistical Office of the Republic of Serbia: Bulletin on S&T activities in Serbia in 2011) showed that BERD share in GERD was only 9.38% in 2011, compared to 62.07% in EU. Although recent R&D and Innovation surveys support findings with a different situation in BES, i.e. investments in R&D and innovation in this sector are much higher than official statistics shows, further investigations to reveal the real situation in R&D and Innovation investments in BES in Serbia are needed.

The MES TD has implemented the “Law on innovative activities” and “Law on intellectual property rights (IPR)” in order to create a mechanism for more intensive linkage of science, research and innovation with the wider economy. The laws stipulate among other things: Strategic changes of the method of funding, partly oriented to the entities in the economic sector as the proponents of innovation projects; Regulation of IPR protection, under the joint projects between the corporate sector and R&D organisations; Formation of joint investment funds for financing the innovation projects. Through the future action plan under this strategy and in cooperation with the Ministry of Finance and Economy, taxation and budgetary incentives for investment into science and research shall be pursued. The proposals of the MESTD are as follows: The investment by corporations into projects involving science research organisations, which are co-financed by MESTD shall be free of corporate profit tax (recognised as a cost): Employment of young researchers registered in the projects of MESTD in the private sector enables the private sector to give salaries for two years free of contributions and taxes (payable by the employer); Should an enterprise choose to fund an employee’s doctoral studies MESTD would bear up to one half of the costs; Young researchers registered by the MESTD, who would incorporate their own enterprise, would be exempt from paying income and profit tax up to the age of 30. After that, they will be transitioned to standard progressive taxation within 5 years; MESTD would cover the costs of patent applications and other forms of protection of intellectual property for projects co-financed by MESTD (SSTDRS, 2010).

4. According to MESTD, one of the significant problems in preserving and strengthening the scientific community is the ongoing drain of highly educated individuals from the country. In the period 1990-2000, about 73,000 inhabitants left Serbia, and among them 17,000 had university degrees. This emigration trend continued after 2000, with some 50,000 people leaving, of which about 2,000 were university graduated (SSTDRS, 2010). The majority of the highly educated emigrants are from the area of engineering and technological studies and from the area of natural sciences. It is exactly for these reasons that a change has to be introduced in the Higher Education (HE) policies, including the introduction of initiatives.
aimed at keeping the best graduates and researchers in the country, along with the adoption of a long-term plan for the return of scientists from the Diaspora. MESTD just launched (in 2011) the project which will engage Serbian Diaspora in joint projects, to transfer their knowledge and skills for the benefit of Serbian society, as well as to motivate the scientists to return to Serbia.

5. The attractiveness of R&D system in Serbia for private investments in R&D is insufficient because of the present structure and capacities of public R&D system. Restructuring of public R&D system and integration of business enterprise R&D sector into national innovation system is the strategic orientation of government as articulated in a Strategy for S&T development of the Republic of Serbia until 2015. In addition, the legal framework is not favourable to private sector engagement in R&D and innovation activities because of the following:

- Legal barriers to companies to apply for public funds for R&D and innovation activities: according to Innovation law, there is formal obligation for companies to be registered in the MESTD innovation register in order to be eligible for competition under public calls for co-financing of the innovation grants. Direct consequence of this regulation is that less than 100 companies out of more than 100,000 companies in Serbia are registered in the MESTD innovation register, and only these companies could apply for innovation grants funded by the MESTD. Partly, this problem is resolved with funding from the Innovation fund which operates under the combination of national and international laws in order to comply between foreign donors request to be opened for all innovative companies in Serbia, and avoid national Innovation law which is highly restricted in that sense;

- Legal framework for risk and venture capital investments in R&D and innovation activities is not transparent enough and fully adapted to the “rules of game” in market economy: practically, there is no law which regulates venture capital and other risk investments.

6. Undeveloped infrastructure for innovative entrepreneurship and lack of culture for technological entrepreneurship in the Higher Education Sector (HES) and public R&D laboratories and institutes (PRO – Public Research Organisations) is another structural challenge in Serbian R&D and innovation landscape.

Crucial steps forward in order to create an environment to support technological entrepreneurship in Higher Education Sector (HES) and public R&D laboratories and institutes (PRO – Public Research Organisations) are the changes in HE Law and Innovation Law which stimulates and legally approves creation of university and PROs spin-offs. There are just few examples of spin-offs initiatives, such as within University of Novi Sad - Faculty of Technical Sciences and “Mihajlo Pupin” Institute in Belgrade. Only two Technology Transfer Offices are established within University of Novi Sad and University of Belgrade (in 2010) so far.

Overall assessment is that most of the private HE institutions are so-called “teaching” faculties/universities, with transmission of knowledge (teaching) as primary and only activity. Other two main missions: generation of new knowledge (research) and the ‘third mission’ (contribution to local or regional wealth and economic development) are mostly present in some of public HE institutions;

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"... the existing public research institutes have to be transformed, as ownership structure must be defined, their organizational form adjusted, method of funding and work flow suited to their mission, type and program of research and functions" (SSTDRS, 2010; page 55).
7. Lack of demand-side R&D and innovation policy tools and measures in Serbia is one of the key obstacles for development of the national innovation system. Key barriers in implementing demand-side policies in Serbia, besides absence of the innovation policy are: (1) (traditional) separation between R&D sector and business sector; (2) legal obstacles (the rules defined in the Innovation law in sense of obligation for companies to be registered in the MESTD innovation register); (3) lack of public awareness of the need for such policies. Still, there are no national guidelines issued in any fields of demand-side innovation policy, neither indicators defined to capture the impact of demand-side innovation policies, nor specific national studies conducted in the topic of demand-side innovation policy issues.

8. Absence of evaluation culture and practice in R&D and innovation system in Serbia: besides accreditation procedure (obligatory under the HE Law), for teaching competence, and under the Science Law, for R&D competence, there is no specific evaluation of teaching and R&D performance of HE institutions in Serbia. Other R&D and innovation organisations are obliged to pass regular, rather formal accreditation procedure which is legal obligation under the science and innovation laws. The introduction of permanent and transparent monitoring and evaluation practice in governance of innovation policy measures is urgently needed: there are no evaluation standards as well as institutions responsible for evaluation in the area of science, technology and innovation in Serbia. Only ex-ante evaluations of innovation activities proposed under public calls for funding from the MESTD, MFE and NARD are regularly organised. Further monitoring of on-going activities, ex-post and impact evaluation of innovation activities are organised as sporadic initiatives within EU sponsored projects.

9. Insufficient knowledge about R&D and innovation capacities in business sector: recognition of resources and capacities of business enterprise R&D sector and integration with public R&D organisations could strengthen overall R&D and innovation system in Serbia;

10. Recognition of the needs for financing of innovation activities with a much larger budget and significantly increased financing per innovation grant. Innovation activities in companies are co-financed from public sources up to several thousand Euros (the MFE and NARD public calls for financing innovation activities in companies for years 2009, 2010, 2011, 2012), which is not enough for significant innovations;

11. Lack of demand-side R&D and innovation policy tools and measures in Serbia: administration and good governance in harmonisation between supply and demand-side innovation policy tools and measures are needed. Possible solution is development of integral innovation strategy and policy with an appropriate action plan which will stress demand-side as well as supply side innovation policy tools and measures.
4 Assessment of the national innovation strategy

4.1 National research and innovation priorities

The main policy document addressing cooperation between universities, research and business is the “Strategy of S&T Development of the Republic of Serbia 2010-2015” (SSTDRS, 2010). "The Strategy is guided by two basic principles: focus and partner. Focus through defining a list of national research priorities in which we (i.e. R&D system in Serbia) can and must make significant progress. Partner through strengthening ties with institutions and companies to allow Serbia to validate its ideas in the global market”. The Strategy presents an action plan for realisation of such partnership (SSTDRS, 2010).

Links between education and science is one of the cornerstones for implementation of the Strategy. R&D institutes and faculties have to be integrated into one science-educational system. For the sake of integration of science institutes into the educational and scientific process at the university, the institutes should be allowed to become equitable members of the university, provided they meet the accreditation criteria for doctoral studies. In that way the Institutes would acquire the independent status or in cooperation with other university units, organise doctoral studies and become places where the doctoral dissertations could be prepared. Universities and their units (faculties, departments) could become founders of science institutes, science and research centres (with or without the status of legal person), defined in the Statutes of the University (SSTDRS, 2010).

The goals of current research policy are:

1. The current 55-45% ratio of financing basic as opposed to applied research must progress to 40-60% in favour of applied science in the next five years (SSTDRS, 2010, based on the MESTD internal unpublished data);

2. Focus on selected field of S&T by setting seven national R&D priorities in the field of science and technology, for the period 2010-2015;

3. Strengthening of the human resource base by preventing brain-drain, establishing effective projects with leading individuals in the Serbian scientific Diaspora and identification, development and support for talented young researchers;

4. Partnership within the R&D system through rationalisation of the R&D network and close cooperation between institutes and faculties;

5. Partnership with society through science promotion;

6. Partnership with industry through an innovation fund, a new legal framework for intellectual property, and incentives and support for innovation activities;

7. Partnership with other ministries through the participation of the scientific community in major infrastructural and other projects in Serbia;

8. Increasing and diversifying R&D expenditure: The goal is to reach 1% of GDP for science by 2015, not counting infrastructure investments; The Project of Infrastructural Investments, worth EUR 400 million started in January 2010 and will last until the end of 2015 (SSTDRS, 2010).

Investments in research and innovation in Serbia from public sources are prioritised and budgeted in the framework of multi-annual plans to ensure predictability and long term impact. Project financing based on open competition for R&D and Innovation projects is a decade long
practice in Serbia. Latest developments proved the Government's long-term orientation toward competitive rather than institutional funding of R&D activities.

National priorities in the domain of S&T, defined in Strategy are (SSTDRS, 2010): (1) Biomedicine and human health; (2) New materials and nanosciences; (3) Environment protection and countering climate change; (4) Agriculture and food; (5) Energy and energy efficiency; (6) ICT; and (7) Improvement of decision making processes and affirmation of national identity.

In addition to competitive financing of R&D and Innovation projects, MESTD announced a plan for other investments in R&D in Serbia in the period 2010-2015. The main sources of financing of the infrastructural projects which demonstrate and enable development of priority research fields in the next five years will be international financial institutions, and particularly the European Investment Bank, European Bank of Reconstruction and Development, the World Bank, Development Bank of the Council of Europe and various international donors, specifically EU pre-accession funds. The Project of infrastructural investments, worth €400m will start in January 2011 and last until the end of 2015. Projects selected for this investment were those conducive to the development of priority disciplines, likely to ensure successful development and identification of scientific talent, prevent brain drain, and finally, projects which will make up for almost twenty years of scarce investment into scientific infrastructure. Main projects within the “Serbian R&D infrastructure investment initiative” are (SSTDRS, 2010): (1) Serbian R&D infrastructure investment initiative comprises investments in upgrading existing capacities, for adaptation of existing buildings and laboratories and new capital equipment for research (app. €70m); (2) Development of Excellence centre and academic research centres (app. €60m); (3) Development of ICT infrastructure, for Campus for faculties of technical sciences of the University in Belgrade and Infrastructure for supercomputing initiative "Blue Danube" (app. €30m to €80m); (4) Creation of a knowledge-based economy through the construction of science parks in Belgrade, Novi Sad, Nis and Kragujevac (app. €30m); (5) Basic infrastructure projects, such as apartment buildings for researchers in Belgrade, Novi Sad, Nis and Kragujevac (app. €80m).

In addition to these initiatives, special programme for development of human capital in Serbia is defined (app. €33m) with four main investment activities (SSTDRS, 2010): (1) Human resources programme (programme for the return of Serbian researchers from the Diaspora). One of the projects is to have the researchers back for a period of time is to provide them with working conditions, means, necessary equipment and adequate accommodation. The networking of researchers in Serbia with their colleagues Serbian nationals in other countries. has also been planned, along with visits of the eminent Serbian researchers and incentives for foreign based researchers to establish their own enterprises in Serbia; (2) The "Petnica" research centre is a unique institution with a history of 26 years and about 14,000 young trainees, many of whom are proponents of R&D in Serbia today. In the next three years the works on additional capacities of "Petnica" should be completed for both accommodation and modern laboratories (app. €7.6m); (3) Mathematical high school campus; (4) New Science and innovation centre in Belgrade (for popularizing science among the youth and public at large): one of the core projects within the initiative to build a new scientific infrastructure is the Centre for promotion and popularization of science in Belgrade (about €20m).

The international S&T cooperation will be implemented in-line with the Strategy and identified priorities. In the FP7 the MESTD will pursue the policy of substantive promotion and imposition of topics of interest under the Strategy and its future implementation. For priority areas where the number of FP7 projects is small or the success low (health care, environment) special corrective action plans will be made.
A crucial step forward in order to create an environment which supports technological entrepreneurship in Higher Education Sector (HES) and PROs are changes in HE Law and Innovation Law which stimulates and legally approves creation of university and PROs spin-offs. Best practice case and recommended way of public-private knowledge transfer model is the (public) University of Novi Sad with almost 60 spin-off companies created within the last 5-6 years. The University of Novi Sad has established the first IPR Liaison Office within university, in cooperation with national IPR Office, as the first such office in R&D sector in Serbia. Agreement on the support of the IPR Office to the University of Belgrade and the foundation and work of the Technology Transfer Centre was signed in November 2010. The Centre is established by the decision of the University Council from October 26, 2010, in the purposes of identification, protection and commercialization of the results of research work of professors, researchers and students, and protection of IPR.

4.2 Evolution and analysis of the policy mixes

Following the taxonomy developed within the “Policy Mix” Project (Guy, K. et al 2009) 16, evolution and analysis of the policy mixes in Serbia will be based on existing policies in country which could be grouped into four groups:

A. Inputs: the impact of policy mixes on financial and human resource inputs; policies related to the knowledge inputs needed for the national innovation system to function properly;
B. Internal Flows - Input/Output Transformations: policies related to the knowledge production and internal flows of finance, human resources and knowledge;
C. Outputs: policies related to knowledge circulation, i.e. the transfer, diffusion and utilisation of knowledge outputs;
D. Matching Supply and Demand: policies related to the mechanisms in place to articulate the demand for knowledge, but it could also cover the articulation of supply side capabilities and the processes in place to ensure that both resource mobilisation and knowledge production are in line with expected demand. It could also cover the policies needed to stimulate the demand for R&D.

Key resources for the effective functioning of R&D and innovation system are: finance, human resources, knowledge. Key processes for the effective functioning of R&D and innovation system are: resource mobilisation, knowledge demand, knowledge production, and knowledge circulation.

Inputs: Policies related to knowledge inputs needed for the national innovation system in Serbia

The R&D and Innovation activities in Serbia in the period 2011-2014 are structured through the following major policy measures:

1. Policy measures for R&D activities launched by the Ministry of Education and Science (MES):
   a. “Programme supporting Basic Research for the Research Cycle 2011-2014” [“BR Programme”];
   b. “Programme supporting Research in the Field of Technological Development for the Research Cycle 2011-2014” [“TD Programme”];
   c. “Programme of Co-Funding of Integrated and Interdisciplinary Research for the Research Cycle 2011-2014” [“III Programme”];

2. Policy measures for Innovation activities:
   a. Programme for Supporting SMEs and Entrepreneurs to Strengthen Innovation Activities in 2011 (responsible institution is the National Agency for the Regional Development);
   b. The MINI GRANTS and MATCHING GRANTS Programs – Public call for the MINI GRANTS programme is launched in December 2011, Public call for the MATCHING GRANTS programme is about to be launched in spring 2012 (responsible institution is the Innovation Fund);
   c. The Programme for co-financing of the Innovation projects – Public call for this programme is launched in December 2011 (responsible institution is the MES).

Major changes in the R&D and innovation policy mix are:

- The “IIR Programme” is a new programme for supporting the integration of basic, applied and development research as well as for fully utilising R&D resources of the country, emphasising commercialisation of R&D activities and results;
- The “SREF Programme” is a new programme for improving the material base of basic, applied and development research as well as for fully utilising R&D equipment and infrastructure in the country;
- The MINI GRANTS Programme launched by the Innovation Fund will award selected innovation projects with substantially larger amounts of money per grant in comparison with all past and on-going innovation projects, i.e. up to €80,000. [Innovation projects granted by the Ministry of Finance and Economy (MFE) and the National Agency for the Regional Development (NARD) could be up to €10,000; the MESTD grant for the innovation project could be up to app. €30,000];
- The MINI GRANTS Programme overcomes the legal obstacle that resulted from the rules defined in the innovation law. This implies, in particular, the obligation for companies to be registered in the MESTD innovation register in order to be eligible for the competition under public calls launched by the MESTD. As this programme is administered by an agency independent from the MESTD, the applicant companies have no obligation for such a registration;
- The Programme for Supporting SMEs and Entrepreneurs to Strengthen Innovation Activities, launched in 2011 by the National Agency for the Regional Development, is more oriented to support non-technological innovation activities. The focus is on service and organisational innovations as well as efficient adoption of quality standards.

Fiscal Policies
The only tax incentive related to R&D and innovation activities in Serbia is addressed to organisations registered for R&D activities as non-profit organisations. These organisations are not obliged to pay taxes for R&D services they provide to clients under non-profit contracts.

Human Resource Policies
Two demographic factors sound major warnings for research governance in Serbia. According to the projection of the Republic Statistics Office (RSO), the population of Serbia will decrease by about 2% every five years; in other words, in 2022 Serbia will have 6.3% fewer inhabitants than in 2010. Additionally, the average age of the whole population is 41.4 (in 2002 was 40.25), classifying Serbia among the countries with an older populations. The average age of the researchers is 44.3 years, which is above the average age of the population as a whole, pointing to the need to take action to support and nurture young scientific researchers (SSTDRS, 2010).

MESTD has launched a special programme for the development of human capital in Serbia (app. €33m have been set aside for this task) with four main lines of investment in the period 2010-2015:

1. A human resources programme which will engage individuals in Serbian scientific Diaspora in joint projects and other initiatives, to transfer their knowledge and skills for the benefit of
Serbian society, as well as to motivate these scientists to return to Serbia. The programme includes the following activities: (a) Motivating Serbian Diaspora for scientific research – financial package will include relocation expenses, costs of lab equipment, and studentships/fellowships for the any accompanying team members, and appropriate funding; (b) Setting up of a Network of Serbian Scientific Diaspora; (c) Short-term visits of eminent Serbian scientists from Diaspora to Serbia (including training, lectures, etc., in Serbian research institutions); (d) Attracting scientists from the Diaspora to launch start-up companies will be encouraged by offering a set of special incentives, which could include tax breaks, reduction of levies and duties on their products, availability of business space at reduced rates, etc. Strategic areas to be supported through the project would include life sciences, information technology, new materials and structures.

2. The "Petnica" research centre is a unique institution with a history of 26 years and about 14,000 young trainees, many of whom are leaders of science research in Serbia today. In the next three years the work of providing additional capacities at "Petnica" should be completed with the opening of both new accommodation and modern laboratories (investment worth €7.6 million);

3. The “Mathematical” high school campus in Belgrade is a specialised secondary school which enrolls, using special selection criteria, the most talented young mathematicians and others interested in natural sciences from across Serbia. The MESTD plan calls for the building of a campus for accommodation during the school year but also for organising preparations for international scientific competitions and many other activities;

4. The new science and innovation centre in Belgrade for popularising science among young people and the public at large is one of the projects within the MESTD initiative to build a new national scientific infrastructure (investment worth €20m).

**Interaction between Knowledge Triangle Policies**

A crucial step forward in order to create an environment which supports technological entrepreneurship in Higher Education Sector (HES) and public R&D laboratories and institutes (PRO – Public Research Organisations) are changes in HE law and innovation law to help stimulate creation of university and PROs spin-offs. The best practice case and recommended example of public-private knowledge transfer model is the (public) University of Novi Sad with more than 60 spin-off companies created within last the 5-6 years. The University of Novi Sad has established the first Intellectual Property Liaison Office in a Serbian university, in cooperation with the national Intellectual Property Office (IPO). An agreement on the support for the Intellectual Property Office to the University of Belgrade and on the foundation and objectives of the Technology Transfer Centre was signed in November 2010. The centre was established in October 26, 2010.

The innovation law supports cooperation between PROs and SMEs. The recently adopted S&T strategy and the latest public call for new R&D projects for 2011-2014 also support (and provide funding for) cooperation between PROs and SMEs.

Creation of a knowledge-based economy through the construction of S&T parks in Belgrade, Novi Sad, Niš and Kragujevac (an app. 30 million EUR investment) is one of the key elements of R&D policy for the immediate future which promotes the diversification of sources of finance for scientific projects through better cooperation with business partners.

**Other Policies**

There are no other policies which have explicit actions, measures and incentives on R&D activities in Serbia. This fact supports the conclusion that the innovation system governance in Serbia is still based on a linear model. Nevertheless, there are a number of initiatives launched by the MESTD in 2010 in order to motivate other ministries to support R&D activities in their future investments responsibilities. Therefore, the MESTD will support in the near future, in
cooperation with other ministries, specific projects where most of the project cost will be funded out of the money for large infrastructural projects, except for specific R&D related activities and part of researchers’ salaries which would be funded by MESTD, such as: the R&D connected to the Corridor 10 infrastructure project of the Ministry for Infrastructure; Development of the academic network and Internet corridor with the Ministry of telecommunication and information society, and advancement of clusters and SMEs based on innovations with the Ministry of economy and regional development; Active participation in the national programme "Serbia against cancer" and the future program "Serbia against cardio vascular diseases" with the Ministry of health, infrastructural and development programs with the Ministry of defence and the interior, and continuation of the National program for energy efficiency with the Ministry of energy; There are also plans to support new capital, infrastructural and development programs in the forthcoming massive investments in energy generation, continuation of the National program of water management with the Ministry of agriculture - Waters directorate, and other infrastructural projects with the Ministry of agriculture, preparations of Serbia for post-Kyoto world.

The legal framework for the protection of intellectual property rights in Serbia is complete and fully in accordance with international recommendations and practice. The Republic of Serbia has become the member of the European Patent Organization (EPO) on October 1, 2010.
### 4.3 Assessment of the policy mix

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Policy measures/actions addressing the challenge 17</th>
<th>Assessment in terms of appropriateness, efficiency and effectiveness</th>
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<tbody>
<tr>
<td>The absence of coordinated governance and funding of national innovation system in Serbia between main ministries (MES, MFE) and public funding sources</td>
<td>Possible solution could be mutual participation of representatives from both ministries and NARD in policy related bodies (councils, committees, etc.) in order to harmonise both measures and finance addressed to same clients / users of public budget</td>
<td>The absence of a formal innovation policy leads to a situation, in which the governance of innovation activities in Serbia is not structured, organised and budgeted within responsible ministries</td>
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<td>The linear model of governance of the R&amp;D and innovation system in the country</td>
<td>The creation of the National Strategy for science, education, research and innovation is a crucial step for developing a National Innovation System</td>
<td>Still present linear model of governance of the R&amp;D and innovation system in the country is main obstacle for networking of R&amp;D sector with the rest of economy and society</td>
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<tr>
<td>The brain-drain - ongoing drain of highly educated individuals from the country</td>
<td>MESTD has launched in 2011 a special programme for the development of human capital in Serbia with four main lines of investment in the period 2010-2015</td>
<td>According to MESTD (SSTDRS, 2010), one of the significant problems in preserving and strengthening the scientific community is the ongoing drain of highly educated individuals from the country. MESTD just launched the project which will engage Serbian Diaspora in joint projects, to transfer their knowledge and skills for the benefit of Serbian society, as well as to motivate the scientists to return to Serbia</td>
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<tr>
<td>The present structure and capacities of public R&amp;D system</td>
<td>Restructuring of public R&amp;D system and integration of business enterprise R&amp;D sector into national innovation system is the strategic orientation of government as articulated in a &quot;Strategy of Scientific and Technological Development of the Republic of Serbia 2010-2015&quot; (SSTDRS, 2010)</td>
<td>New Innovation law is the legal framework for public – private partnership in R&amp;D and innovation, and “Strategy of Scientific and Technological Development of the Republic of Serbia 2010-2015” presents an action plan for realisation of such partnership</td>
</tr>
<tr>
<td>Undeveloped infrastructure for innovative entrepreneurship and lack of culture for technological entrepreneurship in HES and PROs</td>
<td>Crucial step forward in order to create environment which support technological entrepreneurship in Higher Education Sector (HES) and public R&amp;D laboratories and institutes (PRO – Public Research Organisations) are changes in HE Law and Innovation Law which stimulates and legally approves creation of university and PROs spin-offs.</td>
<td>The concept, purpose and functioning of innovation is not sufficiently developed and accepted in the economy and the society. Therefore, the development of the national innovation system in Serbia is currently in a phase of conceptualisation and far from being operational and functional. Certain number of mechanisms, grant schemes, incentives and programmes has launched since 2005, supporting public-private sectors knowledge transfer, transfer of technologies from R&amp;D to business sector, and realisation of innovation projects in business enterprise sector in Serbia.</td>
</tr>
<tr>
<td>Absence of evaluation culture and practice in R&amp;D and innovation system in Serbia</td>
<td>There are no evaluation standards as well as institutions responsible for evaluation in the area of science, technology and innovation in Serbia. Only ex-ante evaluations of innovation projects proposed under public calls for funding from the MES, MFE and NARD are regularly organised. Further monitoring of on-going activities, ex post</td>
<td>The very first assessment of innovation and competitiveness support programmes in Serbia is ongoing activity within “The Improved SME Competitiveness and Innovation Project” (ICIP) (CRIS No: 2010/234-669), financed by the EU with aims at improving the competitiveness of Serbian SMEs and increasing levels of innovation in SMEs. To support these aims ICIP has</td>
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</tbody>
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17 Changes in the legislation and other initiatives not necessarily related with funding are also included.
<table>
<thead>
<tr>
<th>Challenges</th>
<th>Policy measures/actions addressing the challenge</th>
<th>Assessment in terms of appropriateness, efficiency and effectiveness</th>
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<tr>
<td>and impact evaluation of innovation activities are organised as sporadic initiatives within EU sponsored projects. It is necessary to organise national programme for evaluation of innovation activities which are (co)financed from the public sources, with development of evaluation standards, identification and training of evaluators, establishment of legal framework for such activities, etc.</td>
<td>undertaken an in-depth analysis of innovation and competitiveness support programmes in Serbia to raise awareness for strong policy coordination among main stakeholders to further adapt the support tools in accordance with needs of enterprises and innovation service providers. In total, nine SME innovation and competitiveness support programmes have been evaluated that are implemented by the Government of Serbia and managed by the MFE, the MES, and the NARD. The results of this assessment have been released by the end of September 2011.</td>
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<tr>
<td>Insufficient knowledge about R&amp;D and innovation capacities in business sector</td>
<td>The Action plan for realisation of the &quot;Strategy of Scientific and Technological Development of the Republic of Serbia 2010-2015&quot; should consider investigations in revealing of real situation in R&amp;D and Innovation investments in BES in Serbia.</td>
<td>A crucial challenge for research governance in Serbia is the question how to increase R&amp;D and Innovation activities in Business Enterprise Sector (BES). Official figures showed that BERD share in the GERD was only 14.32% in 2009, compared to 62% in the EU. Unofficial R&amp;D and innovation surveys in 2010 support findings with a different situation in BES, i.e. investments in R&amp;D and Innovation in this sector are comparable to those by the MESTD. Further investigations in revealing of real situation in R&amp;D and Innovation investments in BES in Serbia are needed. Policy instruments for knowledge circulation promotion could have limited effects for knowledge circulation because of insufficient integration of business sector and public R&amp;D sector.</td>
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<td>Lack of demand-side R&amp;D and innovation policy tools and measures</td>
<td>Possible solution is development of integral innovation strategy and policy with appropriate action plan which will stress demand-side as well as supply side innovation policy tools and measures</td>
<td>Key barriers in implementing demand-side policies in Serbia, besides the absence of an innovation policy are: (1) (traditional) separation between R&amp;D sector and business sector; (2) legal obstacles (the rules defined in the Innovation law in sense of obligation for companies to be registered in the MESTD innovation register); (3) lack of public awareness of the need for such policies. Still, there are no national guidelines issued in any fields of demand-side innovation policy, neither indicators defined to capture the impact of demand-side innovation policies, nor specific national studies conducted in the topic of demand-side innovation policy issues.</td>
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5 National policy and the European perspective

The creation of the National Strategy for science, education, research and innovation is a crucial step for developing a National Innovation System. This strategy should address the structural challenges of the present R&D and innovation system in Serbia and propose solutions for major problems such as the absence of coordinated governance and funding of national innovation system in Serbia between the main ministries (MESTD, MFE) and public funding sources (NARD, Innovation Fund), networking of R&D sector with the rest of economy and society, and particularly mobilisation of R&D and innovation capacities in BES.

The development of integral innovation strategy and policy with appropriate action plan which will stress demand-side as well as supply side of R&D and innovation policy tools and measures is a direction for medium term evolvement of the policy mix (for the 2012-2015 period).

Another medium term activity should be the infrastructure development for innovative entrepreneurship and creation of the culture for technological entrepreneurship in HES and PROs.

The current policy mix should include the development of the evaluation standards as well as institutions responsible for evaluation in the area of S&T and innovation in Serbia, in short term, i.e. in a very near future (target for 2012-2013).

Table 1: Assessment of the national policies/measures supporting the strategic ERA objectives (derived from ERA 2020 Vision)

<table>
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<tr>
<th>ERA dimension</th>
<th>Main challenges at national level</th>
<th>Recent policy changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Labour Market for Researchers</td>
<td>Ensure an adequate supply of human resources for research and an open, attractive and competitive labour market for male and female researchers; Brain-drain and ageing of research population are critical issues for R&amp;D system</td>
<td>There is no special regulation for career breaks (i.e. parental leave) in the R&amp;D sector, and this is the same for all employees in the public sector. Restoration of the same position is guaranteed by the law, and a fixed-term contract must be extended due to maternity leave; MESTD recently (i.e. at the beginning of 2011) has launched a Programme which will engage Serbian scientific Diaspora in joint projects and other initiatives, as well as to motivate the scientists to return to Serbia. Recently launched public call (May 23rd, 2010) for funding of three programmes – Basic Research, Technological Development and Integrated and Interdisciplinary Research by the MESTD has explicitly promoted initiative for integration of foreign researchers into domestic R&amp;D teams;</td>
</tr>
<tr>
<td>2 Cross-border cooperation</td>
<td>Cross-border flows of knowledge are important particularly at the regional level; Serbia should make significant effort to attract international technology companies which would be ready to realize a part of their development programmes in the country.</td>
<td>Serbian science institutions took part as coordinators in 7 out of 11 projects funded under the FP7 regional call for tenders focusing on research infrastructural enhancement, &quot;Research Potential 3rd call&quot; (RegPot-3), as well as participating in the realization of 3 out of 4 remaining projects; Currently, bilateral cooperation programmes are being implemented in collaboration between Serbia and a number of countries which resulted in the co-financing of R&amp;D projects carried out by teams consisting of researchers from Serbia and from: Germany, Hungary, France, Slovakia, Slovenia, Croatia, Switzerland. In the 2011 a call for S&amp;T cooperation was launched with Spain, Portugal, Greece (new cycle), China and India, while a framework agreement was drawn up with several other countries (Austria, the Czech Republic, Portugal, Spain, Russia, USA).</td>
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<tr>
<td>ERA dimension</td>
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<td>World class research infrastructures</td>
<td>Obsolete R&amp;D infrastructure as a consequence of twenty years without investments in R&amp;D equipment and infrastructures; Lack of resources for everyday functioning leads to the situation where that equipment is not used with its full capacity, or at all in some cases</td>
<td>Serbian R&amp;D infrastructure investment initiative is part of new S&amp;T Strategy in Serbia. The Project of infrastructural investments, worth €400m started in January 2011 and it will last until the end of 2015</td>
</tr>
<tr>
<td>Research institutions</td>
<td>Creation and support of excellent research institutions engaged in effective public-private cooperation and partnerships, which will form the core of research and innovation 'clusters'; The Universities/ research institutions should be embedded in the social and economic life where they are based, while competing and cooperating across Europe and beyond; Integration of Serbian HE system into EU HE area;</td>
<td>In order to improve the quality and excellence of knowledge production, <strong>accreditation process</strong> for all organizations, institutions and companies intended to apply for government support for R&amp;D activities is obligatory under the Science and Innovation Law (2010). One of the major activities in the period 2010-2015, defined by the latest S&amp;T strategy, is the <strong>restructuring</strong> of the R&amp;D system. The Law on Higher Education (LHE), which fully implements the Bologna Declaration in Serbia, came into effect on 10 September 2005, opening the process of integration of Serbian HE system into EU HE area; Centres of excellence should act as disseminators of excellence in their surroundings and so contribute to the development of society and economy in Serbia. There are 2 centres of excellence to date: the Centre for Mathematical Research of Nonlinear Phenomena is a research unit at the Department of Mathematics and Informatics, Faculty of Science, University of Novi Sad, and the Centre for Solid State Physics and New Materials of the Institute of Physics Belgrade;</td>
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<td>Public-private partnerships</td>
<td>Commercialisation of R&amp;D results; Policy instruments for knowledge circulation promotion could have limited effects for knowledge circulation because of insufficient integration of business sector and public R&amp;D sector;</td>
<td>Crucial step forward in order to create environment which support technological entrepreneurship in Higher Education Sector (HES) and public R&amp;D laboratories and institutes (PRO – Public Research Organisations) are changes in HE Law and Innovation Law which stimulates and legally approves creation of university and PROs spin-offs; Innovation Law supports cooperation between PROs and small and medium sized (SME) companies. Recently adopted S&amp;T Strategy and latest public call for new R&amp;D projects for 2011-2014 period also support (in financial terms) cooperation between PROs and SMEs; It is a legally granted right and possibility that representatives from business sector could be elected in managing boards in public faculties and universities and PROs</td>
</tr>
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### International Cooperation

International scientific cooperation should be implemented in-line with the new S&T Strategy and its priorities; increase of Serbian FP participation provide an opportunity for knowledge circulation; there is very modest participation of R&D and innovative and corporate organizations in FP7.

On the basis of the Memorandum of Understanding signed by the Republic of Serbia regarding its Association with the EU FP7, Serbia obtained the status of Associated Country on June 13, 2007. That status provides an opportunity for Serbian researchers to participate in practically all priority areas, and to engage in project coordination, but also the possibility of influencing research policy through the involvement of Serbian experts in different programme committees of the FP7.

New S&T strategy (SSTDRS, 2010) promotes international multilateral and bilateral S&T cooperation.

#### Table 2: Assessment of the alignment of the national policies with the 5 ERA priorities, as identified by the ERA Communication July 2012

<table>
<thead>
<tr>
<th>ERA priority</th>
<th>Assessment in terms of appropriateness, efficiency and effectiveness</th>
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<tr>
<td>1 Effectiveness of national research systems</td>
<td>Investments in R&amp;D and innovation in Serbia from public sources are prioritised and budgeted in the framework of multi-annual plans. Project financing is based on open competition for R&amp;D and Innovation projects. There is no institutional, or block funding for R&amp;D activities in Serbia. Programmes for the support of R&amp;D and innovation activities (co)financed by the Ministry of Education, Science and Technological Development (MESTD), the Ministry of Finance and Economy (MFE) and the National Agency for the Regional Development (NARD) are not sector-specific. The goal of current research policy is to reach 1% of GDP for science by 2015, not counting infrastructure investments. The main policy document addressing cooperation between universities, research and business is the new “Strategy of S&amp;T Development of the Republic of Serbia 2010-2015” (SSTDRS, 2010). The Science law (Science Law, 2010) and the Innovation law (Innovation Law, 2010) with supporting by-laws and two other policy documents (“Act on the selection, evaluation and financing of research for the project cycle 2011 – 2014”, and the “Programme for the research cycle 2011-2014”, Act, 2010) are legal base for implementation of competitive funding through calls for proposals and institutional assessments as the main modes of allocating public funds to research and innovation in Serbia. Above mentioned legal documents and the SSTDRS are legal base for applicability of the core principles of international peer review as well.</td>
</tr>
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</table>
| 2 Optimal levels of transnational cooperation and competition | There is no specific national strategy in the Republic of Serbia for international S&T cooperation; the international S&T cooperation will be implemented in-line with the new S&T Strategy and identified priorities. The international multilateral and bilateral scientific cooperation will be implemented in-line with the new national “Strategy of Scientific and Technological Development of the Republic of Serbia 2010-2015” (SSTDRS, 2010) and identified priorities. On the basis of the Memorandum of Understanding signed by the Republic of Serbia regarding its Association with the EU FP7, Serbia obtained the status of Associated Country on June 13, 2007. That status provides an opportunity for Serbian researchers to participate in practically all priority areas, and to engage in project coordination, but also the possibility of influencing research policy through the involvement of Serbian experts in different programme committees of the FP7. Serbian science institutions took part as coordinators in 7 out of 11 projects funded under the FP7 regional call for tenders focusing on research infrastructural enhancement, "Research Potential 3rd call" (RegPot-3), as well as participating in the realization of 3 out of 4 remaining projects. Currently, bilateral cooperation programmes are being implemented in collaboration between Serbia and a number of countries which resulted in the co-financing of R&D projects carried out by teams consisting of researchers from Serbia and from: Germany, Hungary, France, Slovakia, Slovenia, Croatia, Switzerland. In the 2011-2013 a call for S&T cooperation was launched with number of countries (Spain, ...
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<th>ERA priority</th>
<th>Assessment in terms of appropriateness, efficiency and effectiveness</th>
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<tr>
<td>3</td>
<td>Portugal, Greece, China, India, Croatia, Switzerland, etc., while a framework agreement was drawn up with several other countries (Austria, the Czech Republic, Portugal, Spain, Russia, USA). “Serbian R&amp;D infrastructure investment initiative” is national R&amp;D infrastructure roadmap, prepared in communication with ESFRI, following country membership status in this EU R&amp;D infrastructure initiative.</td>
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<tr>
<td>4</td>
<td>Openness of labour markets for researchers There are no specific regulations to facilitate the integration of foreign researchers in the national research labour market, such as social security access, health insurance, compatibility of pension schemes in Serbia. Also, there are no tax incentives to facilitate the participation in supplementary pension schemes. Considering the researchers’ status, their contracts/fellowships are subject to social and health taxes as all other business contracts in Serbia. There are no specific regulations for EU citizens/ researchers to be distinguished from the rest of the world. MESTD launched in 2010 a public call for funding of R&amp;D programmes in the period 2011-2014 which was explicitly open to foreign researchers (Act, 2010): “A foreign researcher who within the last five years accomplished the results that met the minimal conditions for the management of projects can be engaged in the Ministry’s project. The foreign researcher engaged in the project of the Ministry is entitled to travel expenses and residence in Serbia in line with the respective act of the Ministry (Article 7)”; and “A project involving at least one foreign researcher is awarded one point additionally, and if involving 2 and more foreign researchers, it is awarded 2 points in the total sum of 50 points (Article 17)”. Integration of foreign researchers into domestic R&amp;D teams is very welcome and will be awarded in the selection procedure! Serbian EURAXESS services network is the portal which provides free and personalised assistance on the challenges faced by researchers and their families when relocating, as stated in The EURAXESS Services Commitment: for Serbian researchers planning to develop career in the heart of ERA, or researchers from EU, eager of doing research in Serbia.</td>
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<td>4</td>
<td>Gender equality and gender mainstreaming in research Overall, the gender structure of employment in R&amp;D sector is balanced, with 49.35% of women researchers in 2011, although women in business (31.52%) and high education sector (47.78%) are less present in comparison with gender structure of researchers in government laboratories and institutes (55.86%) (Statistical Office of the Republic of Serbia: yearly statistical bulletin on S&amp;T activities in Serbia, 2012). The Republic of Serbia is a signatory of a number of important and binding international documents, which guarantee the equality of men and women and prohibit gender-based discrimination, notably the Council of Europe’s Social Charter and the European Convention on Human Rights and the United Nations Convention on the Elimination of All Forms of Discrimination against Women (CEDAW). Domestic guarantees of gender equality are the Constitution of the Republic of Serbia and relevant laws and regulations: 1. Under Article 15 of the Constitution of the Republic of Serbia (adopted in 2006, November 08), the state shall guarantee equality between women and men and develop equal opportunities policies; 2. The Gender Equality Law (adopted in 2009; Official Gazette of the RS, No. 104/09) binds all public authorities to actively pursue equal opportunity policies, monitor the realisation of gender equality principles and supervise the exercise of international standards and constitutionally guaranteed rights within their remits. The Law addresses gender equality in employment, health care, family relations, education, culture, sports, political and public life and judicial protection; 3. The National Strategy for Improving the Position of Women and Promoting Gender Equality was adopted in February 13, 2009 (“Official Journal RS”, No. 15/09). The Strategy focuses on women’s participation in policy and decision-making; in the economy, education and health. Gender-sensitive statistics moves beyond simple disaggregation and presentation of existing data by sex, and recognises the need for monitoring the different problems and challenges faced by women and men in all walks of life. Women’s Government is a non-governmental, apolitical and non-profit organization with a mission to promote expert potential of women in Serbia. The organization was formally established in January 2007, as a result of a project «Voting for Women’s Government», which was implemented by the European Movement in Serbia and the daily newspaper «Blic» with OSCE support.</td>
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<tr>
<td>ERA priority</td>
<td>Assessment in terms of appropriateness, efficiency and effectiveness</td>
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| 5 Optimal circulation and transfer of scientific knowledge | Legal base for access and preservation of scientific information in the Republic of Serbia is the Science Law (Science Law, 2010). The Article 10 predefined 14 programmes of general interest to the Republic with Programmes 8, 11, 12 and 13 related to the Action MS45: Programme of development of information society; Programme for the procurement of scientific and professional literature from abroad and for access to electronic scientific and professional databases; Programme for publishing of scientific publications and holding of scientific conferences; Programme for encouraging of activities of scientific, scientific and professional societies, associations and other organisations, which are in function of the improvement of scientific research work, promotion and popularisation of science and technology and concern for the preservation of scientific and technological heritage.

The main policy document in this area is the “Strategy of S&T Development of the Republic of Serbia 2010-2015” (SSTDRS, 2010). Two among seven national priorities in the domain of S&T, defined in S&T Strategy are: ICT and Improvement of decision making processes and affirmation of national identity. The Strategy has proposed the building of special computing network, so called "NIONET", addressed to meet among the others and the demand for: Provision of supercomputing services to clients beyond science research and academic community (corporate sector, state administration etc.); and Warehousing of data and documents for permanent archiving (with the possibility of intelligent search) for the requirements of not only PROs but state administration, Government and public institutions, public and private enterprises and other clients. The Strategy has defined implementation instruments and one among them is the "Program of knowledge transfer, which should make possible the development and operation of centres for transfer of know-how and networking, organization of training courses for new technologies, incentives for feasibility studies of introduction in our industry (in cooperation with the Fund for research and technology, banks and the Fund for development)" (SSTDRS, 2010: page 66).

The major source of RTD information which offers wealth of information to researchers is KoBSON (www.kobson.nb.rs) i.e. consortia of libraries in Serbia which provides on-line retrieval of articles, journals and books, both domestic and foreign. Although this service is available to researchers in Serbia only since November 2001, it is improved year by year, and makes R&D work to be based on highly relevant and up-to-date S&T information from all world relevant journals and publishers and provides access to scientific and technological information worldwide. There is general assessment in R&D community in Serbia that Kobson is successful and crucial for R&D activities in country (Kosanović, B. (2008).

Major document which regulates forms of electronic identity for researchers giving them transnational access to digital research services is the "Strategy for development of an Information Society in Serbia up to 2020" (Official Gazette of the RS, No. 51/2010).

More specifically, chapter 3 regulates role of ICT’s in education, science and culture (page 12): "Up to year 2020 all institutions in the areas of education, science and culture should use broadband communications through optical fibers, and should be equipped for fast access to the Internet, available to students, professors, researchers etc." Further, the Strategy defines academic computer network, main services and computer nodes in Serbia. Major institutional framework for further development of this network is AMRES, as academic network in the Republic of Serbia (Official Gazette of the RS, No. 28/2010). Academic Network of Serbia (AMRES) is the national research and education network of Serbia, offering modern information-communication services and Internet connection to it’s users. It’s considered to be the most advanced network in country, with over 150 connected institutes and more than 150,000 active users. Using the informatics and Internet infrastructure, and computer network, AMRES provides the education and research organizations and other members with access and use of the Internet and information services in the country, as well as the connection with national and international networks of such type. AMRES is a member of the following international associations: TERENA (Trans European Research and Education Network Association); CEEUNET (Central and Eastern European Network Association); GÉANT2 (pan-European Research and Education Network) - observer.
References

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http://www.merr.gov.rs/files/628781a6309b3121a714093098c4a22/1Strategijamsp.doc (in Serbian language)

http://www.mpn.gov.rs/userfiles/Strategije/Strategija%20do%202020/Strategijarazvoja_obrazovanja_u_Srbiji_do_2020_godine.doc


## List of Abbreviations

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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>BERD</td>
<td>Business Expenditures for Research and Development</td>
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<td>BES</td>
<td>Business Enterprise Sector</td>
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<td>BR Programme</td>
<td>Programme supporting Basic Research for the Research Cycle 2011-2014</td>
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<td>CERN</td>
<td>European Organisation for Nuclear Research</td>
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<td>ERA</td>
<td>European Research Area</td>
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<td>COST</td>
<td>European Cooperation in Science and Technology</td>
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<td>ERA-NET</td>
<td>European Research Area Network</td>
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<td>ERP Fund</td>
<td>European Recovery Programme Fund</td>
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<td>ESA</td>
<td>European Space Agency</td>
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<td>ESFRI</td>
<td>European Strategy Forum on Research Infrastructures</td>
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<td>FP</td>
<td>European Framework Programme for Research and Technology Development</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<td>EU-27</td>
<td>European Union including 27 Member States</td>
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<td>FDI</td>
<td>Foreign Direct Investments</td>
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<td>FP</td>
<td>Framework Programme</td>
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<td>FP7</td>
<td>7th Framework Programme</td>
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<tr>
<td>GBAORD</td>
<td>Government Budget Appropriations or Outlays on R&amp;D</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GERD</td>
<td>Gross Domestic Expenditure on R&amp;D</td>
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<td>GOVERD</td>
<td>Government Intramural Expenditure on R&amp;D</td>
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<td>GUF</td>
<td>General University Funds</td>
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<td>HEI</td>
<td>Higher education institutions</td>
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<td>HERD</td>
<td>Higher Education Expenditure on R&amp;D</td>
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<tr>
<td>HES</td>
<td>Higher education sector</td>
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<tr>
<td>IIR Programme</td>
<td>Programme of Co-Funding of Integrated and Interdisciplinary Research for the Research Cycle 2011-2014</td>
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<td>IP</td>
<td>Intellectual Property</td>
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<td>IPR</td>
<td>Intellectual Property Rights</td>
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<tr>
<td>MFE</td>
<td>The Ministry of Finance and Economy</td>
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<td>NARD</td>
<td>National Agency for the Regional Development</td>
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<td>PRO</td>
<td>Public Research Organisations</td>
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<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<tr>
<td>R&amp;D</td>
<td>Research and development</td>
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<td>RI</td>
<td>Research Infrastructures</td>
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<td>RS</td>
<td>Republic of Serbia</td>
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<td>RSD</td>
<td>Republic of Serbia Dinars</td>
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<td>RTDI</td>
<td>Research Technological Development and Innovation</td>
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<tr>
<td>SF</td>
<td>Structural Funds</td>
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<td>SME</td>
<td>Small and Medium Sized Enterprise</td>
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<td>S&amp;T</td>
<td>Science and technology</td>
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SORs: Statistical Office of the Republic of Serbia
TD Programme: Programme supporting Research in the Field of Technological Development for the Research Cycle 2011-2014
VC: Venture Capital
Abstract
This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). The main objective of the ERAWATCH Annual Country Reports is to characterise and assess the performance of national research systems and related policies in a structured manner that is comparable across countries.

The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context. They further analyse and assess the ability of the policy mix in place to consistently and efficiently tackle these challenges. These reports were originally produced in December 2012, focusing on policy developments over the previous twelve months.

The reports were produced by independent experts under direct contract with IPTS. 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) and Directorate General for Research and Innovation with contributions from external experts.
As the Commission’s in-house science service, the Joint Research Centre’s mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.