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JRC 96561

EUR 27323 EN

ISBN 978-92-79-49231-0 (PDF)

ISSN 1831-9424 (online)

doi:10.2791/634274

Luxembourg: Publications Office of the European Union, 2015

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Abstract

The report offers an analysis of the R&I system in Bulgaria for 2014, including relevant policies and funding, with particular focus on topics critical for two EU policies: the European Research Area and the Innovation Union. The report was prepared according to a set of guidelines for collecting and analysing a range of materials, including policy documents, statistics, evaluation reports, websites etc. The report identifies the structural challenges of the Bulgarian research and innovation system and assesses the match between the national priorities and those challenges, highlighting the latest policy developments, their dynamics and impact in the overall national context.

## **Acknowledgments**

The report draft has benefited from comments and suggestions of Yanita Zherkova from the Ministry of Science and Higher Education and of Milena Slavcheva from JRC-IPTS. The contributions and comments from DG RTD and JRC-IPTS are also gratefully acknowledged.

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## Executive summary

The Republic of Bulgaria is a member state of the European Union since 2007. Its economic development has been affected by the currency board arrangement since 1997 and most recently by the global financial crisis and the decline in foreign and domestic markets. This report was prepared according to set guidelines for collecting and analysing a range of materials, including policy documents, statistics, evaluation reports, websites, etc. The quantitative and qualitative data is, whenever possible, comparable across all EU Member State reports.

The gross domestic product (GDP) for Bulgaria is €39940m for 2013, or €5500 per inhabitant. In 2013 its GDP per capita in purchasing power standard is at 45% of the EU-28 average (Eurostat, Dec. 2014). For 2011 the economic activity, measured as GDP growth increased to 1.8%, but this positive trend was followed by a decline to 0.9% in 2013 (See Table 3). Although this growth is well above the EU average of 0.1% (for EU28 in 2013), the country remains among the three member states that exhibit innovation performance less than 50% of the EU average (EC Report, 2014c). The share of government budget appropriations or outlays on research and development as % of total government expenditure for 2013 is 0.66%, which is twice lower than EU28 (1.41%). At the same time, the ratio of research and development (R&D) performed by the business sector (as percentage of gross domestic expenditure on R&D - GERD), increases from 30% in 2009, to 61% in 2013, which is close to the EU28 average of 64% (Eurostat, Dec. 2014).

The innovation system in Bulgaria is operating below its potential, whether measured by the system's inputs (investment), outputs, or by the contribution of innovation to economic growth. The low ranking of Bulgaria in the Global Competitiveness Report 2013-2014 ([WEF, 2013](#)) (score for innovation - 105 from the total of 148 countries) and in the European Innovation Scoreboard ([EC Report, 2014c](#)) (in the last group of modest innovators) highlights the challenges the country is facing in terms of creating a radical turn-around momentum in its economic development model. A review of the National Research and Innovation System (NRIS) reveals that although many of the reforms have been started, there is still a lack of strategic co-alignment and underperformance of all different parts of the system, such as higher (tertiary) education, scientific research institutions, and enterprise innovation. The structure of NRIS spread across the jurisdiction of the Ministry of Education and Science (MES), the Ministry of Economy (ME), and other sectoral ministries. It includes public research institutes under the Bulgarian Academy of Science (BAS), the Agrarian Academy (AA), public and private higher education institutions (HEIs), and other private research performers. The main funding institutions are the National Innovation Fund (NIF) - for private sector innovation, and the National Science Fund (NSF) - for public sector scientific research.

The country's newly approved strategic documents (outlined in Table 1) highlight the variety of policy frameworks and strategic platforms approved since 2013. Critical analysis of the strategic documents reveals serious internal disproportions within the education system, discrepancy between the labour market demand and the supply of qualified professionals, insufficient entrepreneurial education across university degrees and professions, weak provision of doctoral training and mobility of researchers, lack of substantial partnering across the public and the private sector, and insufficient

coordination across different policy initiatives, institutions, or governing agencies, responsible for the design and implementation of the reforms.

The overview of the budgets of MES and ME for the last reporting years reveals a lack of acceleration, stability and predictability of funding (Tables 2a - 2d). The decrease in the proportion of both government sector expenditure by source and by sector of performance indicates for serious problems in the public sector and difficulties to respond to the challenges outlined in Horizon 2020 (Figure 4).

The National Reform Programmes (NRP) for 2013 and 2014 develop action plans to address the specific research, development and innovation (RDI) national targets for Bulgaria in Europe 2020: a gradual increase of R&D spending up to 1.5% of GDP, a decrease in the rate of school dropouts to 11%, and an increase of the number of people with a higher education degree in the age group 30-34 up to 36% ([CM, 2011a](#)). Many of the measures envisaged in the strategic action plans refer to processes such as: modernisation, strengthening and encouragement, which carry limited vision for the drivers at organisational and entrepreneurial level. NRP 2014 envisages also increased financing for applied science research, incentives to entrepreneurial firms with high value added activities to hire additional labour, encouraging investment for improvement of the scientific infrastructure, and improving the mechanisms for evaluation of scientific outputs ([CM, 2014a](#)).

The relative proportion of R&D funding by source for 2013 (Figure 4a), is 48% from abroad, followed by 32% from government and 20% from business enterprises, which demonstrate marginally improved absorption of EU funds through various mechanisms. The increase of R&D expenditure by business enterprise to 0.4% of GDP for 2013 is attributed mainly to sectors such as 'services of the economy' (Eurostat, Dec. 2014).

Bulgaria's relative technological advantages are revealed in: construction technologies; new production technologies; environment; food, agriculture and fisheries; energy; and ICT, while world-class scientific outputs are detected in energy, transportation and space technologies. Scientific publications in health, biotechnology, ICT, nano-materials, and environmental research are acknowledged as having a significant potential for impact ([CM, 2014j](#)) There is no information on the contribution from the balanced project vs. institutional allocation of public funding in terms of strengthening the present strategic advantages and what is the complementarity between national and European programme funding, as the current R&I monitoring and evaluation system is relatively weak. There are also no details about the regional concentration and impact of R&I funding and its integration with business clusters, research infrastructure, educational and research establishments, or other strategic facilities, which are targeted for smart specialisation.

The assessment of the progress that Bulgaria is making towards realisation of ERA highlights on one hand a misalignment between relative scientific strengths and technological advantages, and the underdevelopment of university – industry collaborative relationships, and on the other – visible participation in COST and ERA-NET research initiatives, in the European Research Infrastructure, as well as participation in Eureka, Eurostars and EU framework programmes (ISSS, 2014).

Regarding the already undertaken reforms, analysis reveals rigidity of HEIs to respond to legislative changes; lack of unity between education/training and scientific research, as well as misalignment with the labour market; lack of practical experience for graduates and adequate career guidance. The activities supporting knowledge transfer and open innovation at university level are still at initial stages of development and there is very little cooperation between academia and industry. As a result of these weaknesses, it is now widely acknowledged that the low contribution of innovations to the value added (26% for BG while 45% for EU28 – Eurostat, 2010) is a serious challenge for economic development ([CM, 2014d](#), p.61). The main risk for the country, identified in the Strategy for the Development of Higher Education in Republic of Bulgaria ([SDHE](#)), is the chronic accumulation of crisis situations in key societal spheres, which are in organic interaction with science and education - poverty alleviation, social inclusion, demographic decline, tax collection, sound and transparent judicial system ([EC COM, 2014d](#); [EC COM, 2014a](#)).

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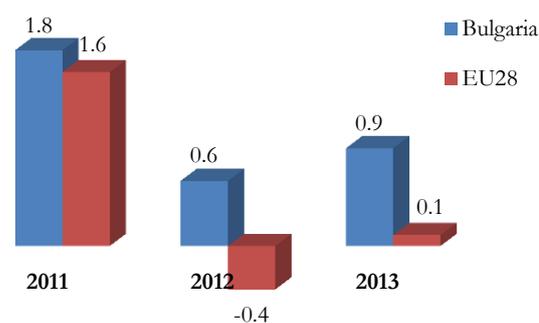
# 1. Overview of the R&I system

## 1.1 Short paragraph positioning your country in the European RDI landscape

The Republic of Bulgaria is one of the medium size member states of the EU with a population of 7.2m, or 1.45% of the EU-28 population (Eurostat, Dec. 2014). The Gross Domestic Product (GDP) at market prices for Bulgaria is €39940m for 2013, or €5500 per inhabitant. For 2011 the economic activity, measured as GDP growth increased to 1.8%, but this positive trend was followed by a decline of the GDP growth to 0.6% in 2012, followed by a marginal recovery to 0.9% in 2013 (See Fig. 1 and Table 3). Although this growth is well above the EU average of 0.1% (for EU28 in 2013), the country remains in the group of modest innovators, or among the three member states that exhibit innovation performance less than 50% of the EU average (EC Report, 2014c).

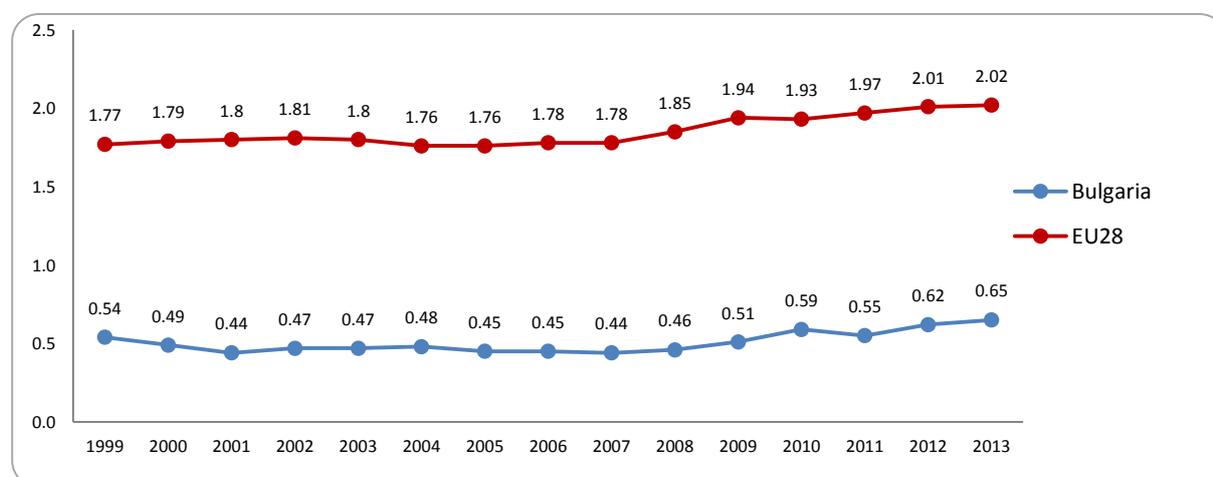
In 2013 the GDP per capita in purchasing power standard is at 45% of the EU-28 average (Eurostat, Dec. 2014) which is the same figure as for 2012 and indicates a stagnation in the reform process. The small size of the market for innovative products in Bulgaria, along with the lack of well-defined national R&I policy and the fragmentation of the system, have led to unsatisfactory performance of the country in the EU RDI landscape (EC Report, 2014c). The turnover from innovations as percentage of the total turnover in 2010 is 7.6%, while the EU27 figure is 13.4% (Table 3.).

**Figure 1. GDP Growth Rate, 2011-2013**



Source: Eurostat, Dec 2014

**Figure 2. Gross Domestic Expenditure on R&D (GERD) from 1999 to 2013 (percentage of GDP)**



Source: Eurostat, Dec. 2014

The gross domestic expenditure on R&D as percentage of GDP (or the R&D intensity) in Bulgaria remains consistently low. Although the current level of 0.65% (2013) is three times lower than the EU28 average of 2.02% (2013), there is a positive trend in the right direction (Figure 2, Table 3). This marginal positive trend, however, does not demonstrate strong enough acceleration towards achieving Bulgaria's target of 1.5% by 2020, which represents a challenge for the country.

## **1.2. Main features of the R&D&I system**

The National Research and Innovation System (NRIS) in Bulgaria is characterized by a significant underfunding, fragmentation and an overall decline with a lack of a coherent national strategy for its integration. All reports and strategic documents acknowledge the long-term underfunding of the research system, which for 2013 is 0.65% of GDP (Figure 2). This is three times lower than the average EU-28 and nearly half of it comes from abroad (Figure 4a).

At present there are three distinctive components of the system with little interaction between them and a lack of overarching policy frameworks that can facilitate their integration. The *higher (or tertiary) education system* is decentralised and comprises of autonomous public and private HEIs, governed by the Higher Education Act ([NA, 2014c](#)) and the National Agency for Evaluation and Accreditation (NEAA). All public HEIs receive public funding from the Ministry of Education and Science (MES). The *scientific research system* is also publicly funded and partially decentralised under the autonomous BAS, the AA under the Ministry of Agriculture and Food (MAF), and research institutes under the subordination of different sectoral ministries. The third component of *private sector R&D performers* is entirely decentralised where firms access public funding mainly through the Ministry of the Economy (ME), the National Innovation Fund (NIF) and EU operational programmes.

At present MES implements nine [legislative acts](#), all of which constitute the governance of different segments of the science and education system (public primary education, secondary professional and vocational education, life-long learning and professional training and qualifications, higher education and scientific research establishments). Among the regulatory roles of MES is to maintain the List of the Professions ([MES, 2014a](#)), as well as other lists and registers for educational establishments, licenced education activities, academic staff, doctoral students, and others ([MES](#)). The newly approved science and education [strategies](#) by MES project a continuation of the fragmentation of the system, whereby each element of the education system is governed by a separate legislative act and associated with a separate strategic document, outlining focused but narrowly defined aims.

The HEIs are financed by allocated budgets per number of accepted students and a block research grant (see Table 2a). Scientific research by public universities is funded by MES as a proportion of their overall educational budget and in accordance with the Higher Education Act ([NA, 2014c](#)), where the present university research budgets are below the statutory requirements ([MES, 2014c](#)). A recently adopted Law for the Student and Doctoral Students Loans ([NA, 2013b](#)) stipulates new forms of centralised financial support for students that combine self-financing with state grants.

Although the governance framework for the scientific research organisations is decentralised and specific to each ministerial arrangement, the activities of all research establishments are regulated by the Law for Promotion of Scientific Research ([NA, 2013e](#)). BAS in addition is governed by the updated Law for the Bulgarian Academy of Sciences ([NA, 2013a](#)), protecting its autonomy, while the Law for the Agrarian Academy from 2008 is still under revision ([AA](#)). The public research institutes of BAS receive their budget as approved by the Parliament, where MES is an intermediary without supervisory power.

Regarding the competitive funding of scientific research, MES supervises the National Science Fund (NSF), which is governed by the Rules for NSF ([MES, 2014b](#)), stipulating an open competition for bidding among all eligible research performers.

The private sector research performers and public/private funding, coordinated by ME, represent the third element of the Bulgarian NRIS. The main instrument for disbursements of public funding for R&D in the private sector since 2006 is the National Innovation Fund (NIF), governed by its Rules and under the supervision of the Bulgarian Small and Medium Enterprises Promotion Agency ([BSMEPA](#)) and ME. The EU funding platforms hosted by ME - Eureka, Eurostars, Operational Programme (OP) 'Development of the Competitiveness of the Bulgarian Economy' 2007-2013 ([OPC](#)), and the new OP 'Innovation and Competitiveness' 2014-2020 ([OPIC](#)) - involve a form of public-private co-financing, which acts as accelerators for increasing the proportion of business enterprise expenditure for R&D in the economy.

A serious challenge for the country's NRIS is to establish an integrated platform for complementary financing and implementation of the National Roadmap for Research Infrastructure ([CM, 2014b](#)), the National Research and Development Strategy ([CM, 2014d](#)) and the Innovation Strategy for Smart Specialisation 2014-2020 ([CM, 2014j](#)). The implementation and integration across these three strategic instruments are expected to co-align public and private science and innovation activities and to create a new momentum for growth and enhanced competitiveness of the Bulgarian economy. The recently adopted Strategy for the Development of Higher Education (SDHE) in Republic of Bulgaria and the newly approved OP 'Science and Education for Smart Growth' 2014-2020 ([OPSESG](#)) (hosted by MES) and [OPIC](#) (hosted by ME) will have to address the challenges of fragmentation and to facilitate the co-alignment across the three elements of the NRIS.

### ***1.3. Structure of the national research and innovation system and its governance***

The highest policy-making institutions within the Bulgarian NRIS are the National Assembly (or The Parliament) ([NA](#)) and the Council of Ministers ([CM](#)). The Parliament approves the state budget and the allocation of funds for research and innovation and has a number of Standing Committees ([SC](#)) that have impact on the legal framework for innovation. The specialised SCs that contribute to the Science and Innovation policy framework are: Education and Science, Investment Planning, Economic Policy and Tourism, as well as those in specific policy areas such as Transport, Information Technologies and Communications, Regional Policy and Local Self-Government, or the Committee on European Affairs and Oversight of the European Funds (Diagram 1).

The CM operates with two roles - as a policy-making authority and as executive governing body for supervision and control of the policy implementation. CM has ten consultative bodies (CB) that discuss and approve various aspects of the legal and strategic framework for innovation. These are: Council for Development<sup>1</sup>, National Council for Innovation<sup>2</sup>, National Council for Science and Innovation<sup>3</sup>(constituted in 2013 to replace the National Council for Scientific Research), National Council for Loans to Students and Doctoral Applicants<sup>4</sup>, Council for the Protection of Intellectual Property Rights<sup>5</sup>, Consultative Council for Promotion of Small and Medium Size Enterprises<sup>6</sup>, as well as Coordination Council for Implementation and Monitoring of the National Plan for Fulfilment of the European Youth Guarantee 2014-2020<sup>7</sup>, Council for Coordination and Management of the EU structural funds<sup>8</sup>, and Council for European Affairs<sup>9</sup> (Diagram 1). The narrow specialisation of these consultative bodies and the division between MES and ME innovation policy efforts contribute further to the fragmentation of the strategic effort to incentivize and mobilise the science and innovation potential on a national scale (Diagram 1).

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<sup>1</sup> Portal Advisory Councils. 20 Dec. 2014 <[http://www.saveti.government.bg/web/cc\\_401/1](http://www.saveti.government.bg/web/cc_401/1)>

<sup>2</sup> Portal Advisory Councils. 20 Dec. 2014 <[http://www.saveti.government.bg/web/cc\\_48/1](http://www.saveti.government.bg/web/cc_48/1)>

<sup>3</sup> Portal Advisory Councils. 20 Dec. 2014 <[http://www.saveti.government.bg/web/cc\\_54/](http://www.saveti.government.bg/web/cc_54/)>

<sup>4</sup> Portal Advisory Councils. 20 Dec. 2014 <[http://www.saveti.government.bg/web/cc\\_402/1](http://www.saveti.government.bg/web/cc_402/1)>

<sup>5</sup> Portal Advisory Councils. 20 Dec. 2014 <[http://www.saveti.government.bg/web/cc\\_25/1](http://www.saveti.government.bg/web/cc_25/1)>

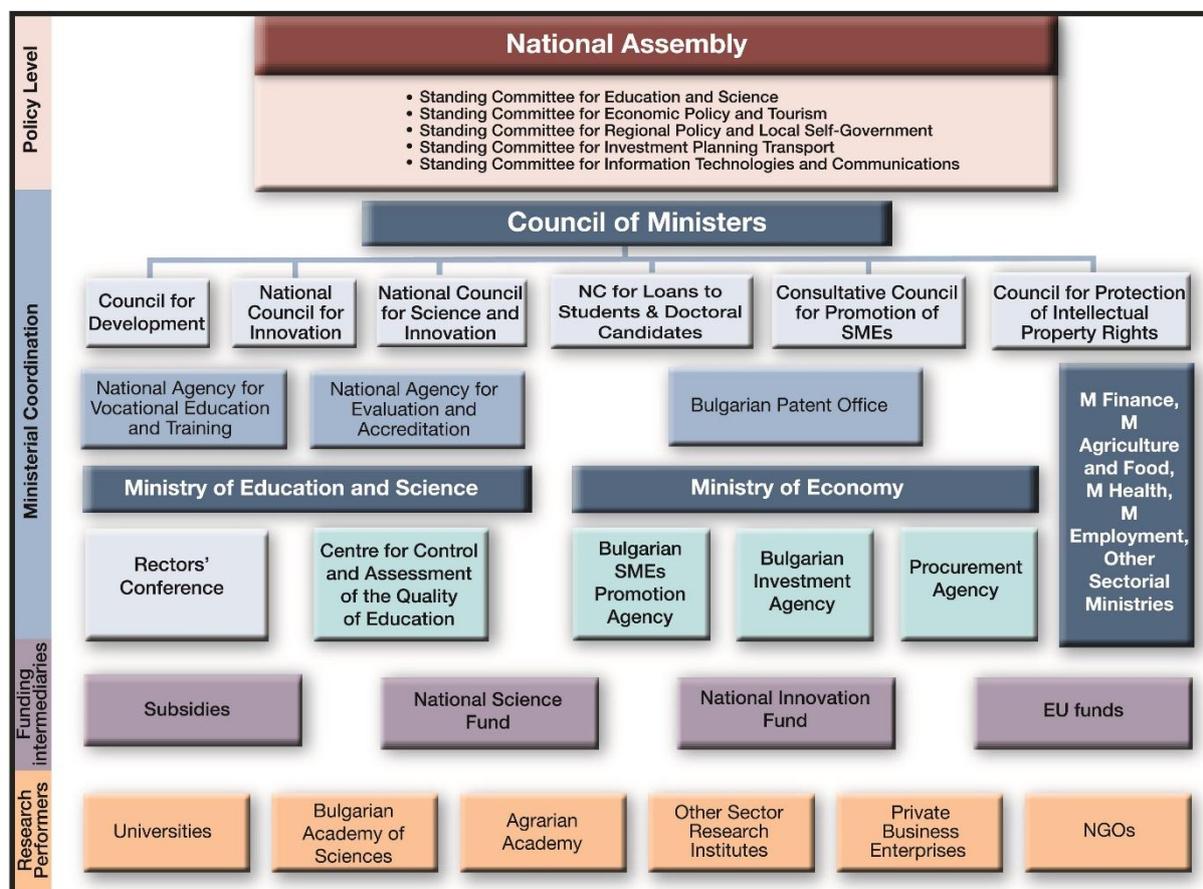
<sup>6</sup> Portal Advisory Councils. 20 Dec. 2014 <[http://www.saveti.government.bg/web/cc\\_50/1](http://www.saveti.government.bg/web/cc_50/1)>

<sup>7</sup> Portal Advisory Councils. 20 Dec. 2014 <[http://www.saveti.government.bg/web/cc\\_90/1](http://www.saveti.government.bg/web/cc_90/1)>

<sup>8</sup> Portal Advisory Councils. 20 Dec. 2014 <[http://www.saveti.government.bg/web/cc\\_204/1](http://www.saveti.government.bg/web/cc_204/1)>

<sup>9</sup> Portal Advisory Councils. 20 Dec. 2014 <[http://www.saveti.government.bg/web/cc\\_33/1](http://www.saveti.government.bg/web/cc_33/1)> MES Also dealt with part of the structural funds – programmes dedicated to Young Doctors and PhD candidates

**Diagram 1. Institutional structure of the Bulgarian national research and innovation system**



A number of independent governing and executive agencies are established directly under the supervision of the CM. These are: National Agency for Evaluation and Accreditation ([NEAA](#)), National Agency for Vocational Education and Training ([NAVET](#)) and Patent Office of Republic of Bulgarian ([PO](#)). At the ministerial level, the two leading Ministries that shape strategically the NRIS are: the Ministry of Education and Science ([MES](#)), and the Ministry of Economy ([ME](#)). Agencies that are subordinated to MES and ME are Bulgarian SME Promotion Agency ([BSMEPA](#)), Centre for Control and Assessment of the Quality of Education ([CCAQSE](#)), as well as Bulgarian Investment Agency and Procurement Agency. Rectors' Conference ([RECTORS](#)) is constituted as an independent, consultative and self-financing institution under MES.

At present [MES](#) and [NEAA](#) supervise 37 public and 14 private HEIs, which include 30 universities, 14 specialised higher schools and 7 independent colleges. MES holds the main responsibility for competitive programme allocation of resources to scientific research performers. These include the allocation of resources under the NSF, where 1280 contracts have been signed with research establishments between 2008-2012 and the resources from the European Social Fund (ESF) for young Doctors and PhD candidates. Although among the eligible research performers for NSF programme funding are all universities, HEIs and research establishments, the HEIs remain primarily teaching institutions.

Under NSF there are no sectoral research calls for example in the fields of health care, agriculture or environment ([CM, 2014d](#)) and many of the sectoral research establishments rely entirely on their sectoral budgets disbursed from the relevant ministry. Among the public sector research performers are: 47 scientific research institutes under the Bulgarian Academy of Sciences ([BAS](#)), 26 research institutes and experimental laboratories under the Agrarian Academy ([AA](#)), funded by the Ministry of Agriculture and Food ([MAF](#)), the [Military Academy](#), funded by the Ministry of Defence, as well as the National Centre of Public Health and Analyses ([NCPHA](#)), and some remaining specialised research institutes which are publicly funded and governed by sectoral ministries ([CM, 2014d](#)). Although it is mandatory that NSF report statistics, at present there are no details about the distribution of funds across the spectrum of research performers – i.e. universities, scientific institutes, or NGOs, or the success rate of bids within and across these categories.

ME hold the main responsibilities for the disbursement of EU structural funds to the business sector and for competitive programme funding through the National Innovation Fund ([NIF](#)). NIF also does not report at present systematically details about the size and the composition of the private sector research community, or the number and the type of its beneficiaries, i.e. multinationals, SMEs, high tech firms, NGOs, or public sector actors that contribute to commercial research and innovation activities. Currently there is no established dialogue between the two funding bodies - NSF and NIF - to ensure complementarity and synergy.

The following section outlines the main legislative and policy changes in the area of science and innovation for the period 2010-2014.

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#### **Main changes in 2014**

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- *Europa 2020: National Reform Programme 2014 update ([CM, 2014a](#))*
- *National Roadmap for Research Infrastructure ([CM, 2014b](#))*
- *Rules for the National Science Fund ([MES, 2014b](#))*
- *Rules for Management of the National Innovation Fund ([ME, 2014d](#))*
- *National Strategy for the Promotion of Small and Medium Size Enterprises 2014-2020 ([CM, 2014c](#))*
- *National Research Development Strategy 2020 ([CM, 2014d](#))*
- *National Strategy for Life-long Learning 2014-2020 ([CM, 2014f](#))*
- *Strategy for the Development of Higher Education ([CM, 2014h](#))*
- *Innovation Strategy for Smart Specialisation ([CM, 2014j](#))*
- *Integrated Information System of the National Agency for Vocational Education and Training (implemented and tested over the period 2012-2014)([link](#))*

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#### **Main Changes in 2013**

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- *Law for Promotion of Scientific Research ([NA, 2013e](#))*
- *Actualisation of the Law for School Education – towards introducing additional evaluation criteria for assessment of quality and accessibility (under discussion) ([NA, 2014a](#)).*
- *Actualisation of the Law for Student and Doctoral Students Loans ([NA, 2013b](#)) - introduced a new credit system with state guarantee for students and doctoral candidates.*
- *Actualisation of the Law for Development of the Academic Staff ([NA, 2013c](#)) – establishing a framework for career development and progression.*
- *Programme Statehood, Development and Justice. Economic and Social Priorities of the Government ([CM, 2013b](#))*

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## Main changes in 2012

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- *National Development Programme: Bulgaria 2020* ([CM, 2012a](#))
- *BAS Annual Report 2012* ([BAS, 2012](#)) – reporting on the activities in each of its institutes, bi-lateral projects and publications, participation in FP7, submitted and approved projects for COST, CIP and EU structural funds for the period 2007-2012.
- *Adoption of the National Qualification Framework* – introducing nine qualification levels across all stages of the education system ([CM, 2012b](#))
- *Law for Public-Private Partnership* ([NA, 2012](#))
- *Proposal for a new Law on Innovation* ([CM, 2012c](#)) which reinstates the National Innovation Fund, the activities of the National Council on Innovations, and will revise the tax incentives for research and public procurement (under discussion).
- *Decision by the CM №121 from 25.06.2012 for the differentiation of educational subsidies to HEIs according to complex performance evaluation and the needs of the labour market* ([CM, 2012d](#)).

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## Main changes in 2011

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- *National Reform Programme 2011-2015* ([CM, 2011a](#)) – sets the national R&D spending aim of 1.5% of GDP by 2020.
- *National Research Development Strategy 2020* ([NA, 2011c](#)) – setting up the new targets for Bulgaria according to Europe 2020; introducing a new mechanism for more efficient financing of R&D and justifying five priority areas for the development of scientific research in Bulgaria.
- *Introduced differentiated financing for the tertiary education establishments.*
- *Changes to the Law for the Bulgarian Academy of Sciences* ([NA, 2013a](#)) – changing the governing structure, establishing a Board of Trustees to allow public influence to its research agenda, and introducing the obligation to submit to the Parliament Annual Reports with detailed research outputs.

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## Main Changes in 2010

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- *Bulgaria becomes a full member of the European Programme Eureka, and the Bulgarian small and medium enterprises promotion agency* ([BSMEPA](#)) is authorised to manage the participation of Bulgarian firms.
  - *National Roadmap for Research Infrastructure* ([CM, 2010](#)) – introducing a set of priorities for investment in science based on evaluation of scientific capabilities.
  - *Launch of the Ranking System for Higher Education Institutions in the Republic of Bulgaria* ([link](#)) by the Ministry of Education and Science. A Consortium of Open Society Institute, MBMD Social Research Agency, and Sirma Group Holding (OSI-MBMD-S) under a project financed by the OP 'Human Resources Development' (2007-2013) and co-financed by the European Social Fund, developed the methodology for rating of the higher education in Bulgaria and implemented it for MES ([MES, 2011](#)). The methodology includes indicators for evaluation of scientific outputs and other performance criteria.
  - *Government declares support for export oriented and high technology industries (as a response to Europe 2020 strategy).*
-

## **2. Recent Developments in Research and Innovation Policy and Systems**

### ***2.1 National economic and political context***

The Bulgarian economy experienced a slowdown in 2012, mainly due to the lower external demand and the corresponding real decline of Bulgarian exports. The increase in export of goods and services to 7.2% was associated with accelerated economic recovery for 2013 ([NSI, 2014](#)). The economy, however, continues to exhibit low productivity of labour (43.5% of EC27 = 100 – 2011), low proportion of high-tech firms, low level of company spending on R&D, low level of FDI in technology intensive sectors and in technology transfer activities, low firm-level technology absorption and low value-added activities in the economy, low level of staff training and aging labour force, very low quality of life in terms of income and health, and very low interaction between education-research-innovation<sup>10</sup> ([CM, 2014j](#), p.68). The household spending is contracted and the economy continues to operate below its potential.

In addition, due to the small and further contracting internal market (15% contraction for 2013), the economic growth of Bulgaria is strongly dependent on the exports ([MF, 2014](#)). Although Bulgarian exports are diverse and include manufacturing good, services, agriculture products and metals, further analysis reveals that Bulgaria's competitive advantage is in relatively low value-added products ([ME, 2014b](#)). The internationalisation of Bulgarian firms is very low and the impact of foreign direct investment (FDI) is limited, which is an impediment to accelerated growth ([MF, 2014](#)). The low productivity of labour is due also to the high-energy consumption and to the limited investment in the manufacturing sector ([CM, 2014j](#)).

In addition, the economic performance of Bulgarian firms is affected by the relatively low quality of management and entrepreneurial education, by the weak antimonopoly policy and high extent of market dominance, combined with weak tax incentives for investment, and low level of university-industry collaboration in R&D ([WEF, 2013](#)). In spite of these impediments to growth, the level of FDI in 2013 amounted to 2.7% of GDP, registering a 2.1% increase (year-on-year), which is a measure of the attractiveness of the economic situation. This trend is expected to stabilise but there are no expectations for growth ([CM, 2014a](#)).

The government has already reached its fiscal targets and has achieved financial stability and fiscal consolidation, which is expected to improve the business climate. The structure of the economy also shows some strength in terms of high contribution of exports in manufacturing goods to GDP. This factor, however, is tempered by the very high levels of costs to export and time to export ([EC Europe 2020, 2014a](#)). The main impediments to growth remain access to financing (both availability and affordability of financial service), policy instability and government instability, inefficient government bureaucracy and corruption ([WEF, 2013](#)). The instability of the political environment in 2013 and 2014 was associated with elections and two caretaker governments (one for 77 days, and the other

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<sup>10</sup> Bulgaria is ranked in 117 place in the Global Competitiveness Index (GCI) 2013-2014 in pillar "University-industry collaboration in R&D" ([WEF, 2013](#)).

for 93 days). This has delayed a number of institutional and legislative reforms and overall has played a negative role on institutional performance, including the Parliament (NA) and The Council of Ministers (CM). The challenges that the country is facing, outlined in the EC recommendations, make it clear that the reform package should aim at a radical transformation, rather than moderate adaptation. Although the government is an active participant in all European initiatives and broadly complies with EU recommendations, the reform package is incomplete and still has not produced distinctive results with impact on the economy and the NRIS.

After the last elections in October 2014, the new Parliament includes representatives from eight political parties, and a wide diversity of opinions among stakeholders. This political environment affects the top political level of the R&I system - the Parliament and the CM, characterised by a significant number of separate Parliamentary Committees and Councils to oversee different aspects and policies for development of science and innovation in the public and in the private sector. The fragmentation of the R&I system in Bulgaria is exemplified also by the ineffective inter-ministerial coordination between MES and ME.

## ***2.2 National R&I strategies and policies***

The political situation in Bulgaria still does not allow for predictable, long term planning in R&I policies and budgets. The reporting period is characterised by intense strategizing and strategic planning at all levels. The new strategic documents (Table 1.), however, represent different stakeholders, address specific challenges, and highlight the fragmentation of the policy framework and the need for an enhanced coordination across sectoral ministries, funding agencies and monitoring bodies (Diagram 1). The fragmentation of the Bulgarian R&I system is replicated in the differentiation of priorities and approaches across different strategies and agencies.

Table 1 below reviews the six leading strategic documents and lists the two funds that distribute resources for R&I according to specific strategic priorities. These documents, although in line with the main policy framework, outlined in the actualisations of the National Development Programme ([CM, 2012a](#)) and the National Reform Programme for 2013 ([CM, 2013a](#)) and 2014 ([CM, 2014a](#)), show the diversity of stakeholder positions and expectations (Table 1).

**Table 1. Strategic Documents, Priorities and Strategic Co-alignment**

<b>Strategic Document</b>	<b>Priorities</b>	<b>Strategic Co-alignment</b>	<b>Budget &amp; Finance</b>
<p><a href="#">National Roadmap for Research Infrastructure</a> (National Roadmap) (2014)</p>	<p>Nine infrastructure projects have been approved, as follows: 1.National university complex for biomedical and applied research (BBMRI); 2.Centre for fundamental and applied microscopy research in biology, medicine and biotechnology (EuroBioImaging); 3. Sea and ocean research and marine technologies for participation in collaborative research under EURO-ARGO; 4. Technologies for renewable energies and for improved energy efficiency; 5. Regional astronomy centre for scientific research and education; 6. Integration and development of digital resources in Bulgarian for language and cultural heritage under the European programmes CLARIN (Common language resources and technology infrastructure) and DARIAH (ClaDa); 7. European social survey for Bulgaria (ESS); 8. Supercomputer research, computer modelling, simulations and applied research for the industry, pharmaceuticals, medicine, energy, transportation and environmental science (EGI.eu and PRACE); 9. National cyclotron centre for applied research in nuclear medicine, nuclear physics, nuclear energy research, radiochemistry and radio pharmacy.</p> <p>Five additional infrastructure projects are highlighted as national priority and approved for project development: 1. Advanced material technology research and manufacturing facility with application to conservation technologies (INFRAMAT); 2. Innovation research in agriculture and food; 3. Alliance for cell technologies; 4. National geo-information centre; 5. Eco and energy saving technologies (<a href="#">CM, 2014b</a>).</p>	<p><a href="#">European Strategic Forum for Research Infrastructure</a> (ESFRI); <a href="#">European Centre for Nuclear Research</a> (CERN); <a href="#">European Space Agency</a>; <a href="#">European Laboratory for Molecular Biology</a>; <a href="#">Innovation Strategy for Smart Specialisation</a>; <a href="#">National Roadmap for Research Infrastructure</a> (2010)</p>	<p>Financed through the state budget (projected €93.268m), NSF, Horizon 2020, MES, &amp; OPSESG.</p>
<p><a href="#">National Research Development Strategy 2020</a> (NRDS) (2014)</p>	<p>Promoting five priority areas for the development of scientific research in Bulgaria: 1) energy, energy efficiency and transport, development of green and eco –technologies; 2) biotechnologies and bio-foods, health and quality of life; 3) new materials and technologies; 4) cultural and historical heritage; 5) Information and communication technologies as a horizontal theme.</p>	<p><a href="#">National Reform Programme 2014</a>; <a href="#">Science Europe Roadmap</a>; <a href="#">Cooperation in science and technology</a> (COST); FP6 and FP7; <a href="#">Horizon 2020</a></p>	<p>NIF, NSF, MES, ME</p>

Strategic Document	Priorities	Strategic Co-alignment	Budget & Finance
<a href="#">Innovation Strategy for Smart Specialisation</a> (ISSS) (2014)	Priorities in: 1) mechatronics & clean technologies; 2) information and communication technologies; 3) bio-technologies; 4) nano-technologies; 5) creative industries; 6) pharma; 7) food processing.	<a href="#">Horizon 2020; National Innovation Strategy (2006)</a>	Financed by the state budget, OPIC and OPSESG, Horizon 2020, NSF, NIF, OPHRD
<a href="#">Strategy for the Development of Higher Education in Bulgaria</a> (SDHE) (2014)	Protection of the national tradition; inclusion; driven by outputs and sustainable results; growth through adaptation; transparency and justice; accessibility; improving the quality of the higher education and meeting European standards; introducing advanced funding model and increasing the finance; openness towards the socio-economic environment; enhancing the link with the labour market; modernisation of the professions; stimulating scientific and research activities in universities; overcoming the negative trends in academic career development; promoting life-long learning through advanced digital forms of training.	<a href="#">Europe 2020, European Strategy for Smart, Sustainable and Inclusive Growth; National Development Programme Bulgaria 2020; NRDS; ISSS; FP6 and FP7; COST, Science Europe Roadmap, Horizon 2020</a>	National budget and Operational programs. Approved action plan, including 14 indicators for monitoring and evaluation ( <a href="#">CM, 2014k</a> )
<a href="#">National Strategy for Life-long Learning 2014-2020</a> (2014)	Reduction of the dropouts from the professional education system aged 18-24 from 12.5% to less than 11%; increase of the proportion of higher education graduates aged 30-34 - from 26.9% to 36%; increase of employment for age group 20-64 - from 63% to 76%; development of an integrated education system throughout all levels; development of stakeholder financing of the system through shared responsibilities between employers, students and the state; development of the socio-cultural and educational environment for active citizen participation; enhancement of the education-business partnership, based on core competencies and entrepreneurship in all forms.	<a href="#">Europe 2020 European Strategy for Smart, Sustainable and Inclusive Growth</a>	To be financed from the state budget, EC Erasmus and other EC OP (approved without budget)
<a href="#">National Strategy for the Promotion of Small &amp; Medium Size Enterprises 2014-2020</a> (2014)	To encourage innovation, ecologically friendly products and services and internationalisation orientation.	Co-aligned with the programme of the Bulgarian Government 'Statehood, Development and Justice'	Financed by the state budget and EU operational programmes

Strategic Document	Priorities	Strategic Co-alignment	Budget & Finance
<a href="#">National Innovation Fund</a> (NIF)	7 <sup>th</sup> round (2014) – priorities in machine building (C28, C29), electronics (C26, C27), pharmacy (C21), chemicals (C20.4), furniture (C31), food processing (C10, C11, C12), ICT (J62, J63), creative industries (J58, J59, J60)  6 <sup>th</sup> round (2012) - priorities in information and communication technologies; instrumentation; biotechnology, pharmaceuticals and chemicals; advanced materials and nanotechnology; sustainable waste treatment and eco-friendly technologies; energy efficiency and renewable energy technologies.	<a href="#">National Innovation Strategy (2006)</a>	(2014) 52 approved proposals (state subsidy €5.103m)  (2012) 36 approved proposals (state subsidy €4.658m)
<a href="#">National Science Fund</a> (NSF)	Adopts the <a href="#">National Research Development Strategy 2020</a> as a strategic platform with the overall aim to fulfil the strategic targets set in Europe 2020; to modernise the science base through enhanced public funding; to deepen the analysis of the barriers for innovation and entrepreneurship; to facilitate the transformation of the society into a knowledge-based society; and to promote the growth of eco-technologies in the Bulgarian economy.	FP6 and FP7; <a href="#">NRDS</a> .	MES

All strategies in Table 1 include analysis of strengths and weaknesses, opportunities and threats in their respective sphere of impact. Only ISSS builds upon an international analysis undertaken with support from the World Bank. All strategies address specific EU priorities and have an implementation time frame to 2020, action plans with indicative funding, and promote some form of cross-border cooperation, and leveraging effects of EU instruments. ISSS and NRDS address frontier science and include specifically investment in infrastructure. All of the documents treat separately the education, science and innovation components of the R&I system, all of them refer to some form of monitoring of the implementation process, and envisage some form of narrowly defined action. The actions in these implementation plans address societal challenges defined in the context of the EU recommendations for Bulgaria with some reference to the challenges for Europe 2020. All of them focus on both generic developmental challenges and thematic policy priorities.

The implementation plans include details of prospective financing through budget allocation under the two ministries MES and ME, and competitive funding from the two established funds [NSF](#) and [NIF](#), as well as EU structural funds. The two funding agencies NSF and NIF currently use different priorities for programme funding, based on different strategic documents, while [BAS](#) in its Programme for Stabilisation and Development for 2012-14 ([BAS, 2011](#)) does not refer to any strategic document.

Currently MES articulates three R&I policy orientations: strengthening the research infrastructure and its integration in the ERA through the National Roadmap ([CM, 2014b](#)); enhancing the science capabilities through the NRDS 2020 ([CM, 2014d](#)); and promotion of scientific research and doctoral training within the university system through the SDHE ([CM, 2014h](#)). All three policies address EU priorities and aim to leverage EU instruments projecting complementary financing through the budget, EU structural funds, and private

sector participation. There is no vision on the proportion of institutional vs. programme funding in any of the current documents, but all strategic documents developed by MES review Bulgaria's participation in the previous framework programmes and envisage active participation in Horizon 2020.

The first National Roadmap in Bulgaria was created in 2010 as a response to the initiative of the European Strategic Forum for Research Infrastructure ([ESFRI](#)). In its essence the National Roadmap aims to create incentives for the restructuring of competitive knowledge and technology assets across BAS, the university sector, public and private science labs. The implementation of the National Roadmap envisaged complementary financing from the state budget, from NIF, Horizon 2020, as well as the OP 'Science and Education for Smart Growth', OP 'Innovation and Competitiveness', and OP 'Regions and Growth', whereby money is to be disbursed by MES. The approved infrastructure projects from 2012 and the amendments from 2014 all aim at a strong co-alignment with European infrastructure consortiums. The National Roadmap from 2014 ([CM, 2014b](#)) is among the few strategic developments that has completed all stages of national and European level of consultations and has approved budget for its implementation although the level of coordination and a guarantee for sustainable investment in individual projects is still unclear. Individual infrastructure projects are well linked to the European science space, but show little connectivity to local stakeholders and businesses at regional and national level.

The NRDS after its original development in 2006 has undergone through two updates in 2011 ([CM, 2011b](#)) and in 2014 ([CM, 2014d](#)). Its main orientation has been inward looking at the restructuring and financing of the current science capabilities in Bulgaria and at the enhancement of the participation of Bulgarian research organisations in European framework programmes and initiatives such as: FP5, FP6, FP7, Horizon 2020, European Cooperation in Science and Technology ([COST](#)); Science Europe Roadmap ([Science Europe, 2013](#)); European Strategic Forum for Research Infrastructures ([ESFRI](#)); cooperation with the Joint Research Centre ([JRC](#)) and the Joint Technology Initiatives ([JTIs](#)) – among others. The NRDS does not articulate a clear vision for a frontier science that builds upon a close science – education – innovation integration as a strategic consolidation of knowledge capabilities across the university sector, BAS and their collective economic impact. It also does not offer links towards the strategy for development of the higher education, the smart specialisation strategy, or the promotion of innovation in the economy.

The newly adopted Strategy for the Development of Higher Education (SDHE) ([CM, 2014h](#)) builds upon a package of previously accomplished education reforms and a package of new educational strategies, such as: national strategy for life-long learning, for development of the professional education and training, or for the development of teachers and trainers ([MES](#)). The strategic priorities outlined in SDHE are: reforms of the institutional and programme accreditation framework; introduction of differential institutional funding for universities and HEIs which takes into account the quality and employability of graduates and the scientific outputs; building scientific capabilities in HEIs; integration of the scientific activities of HEIs, BAS research organisations, and regional actors; encouraging the dialogue and participation between HEIs and businesses; new modes of financing for doctoral research, financial incentives for high quality publications, or university-industry and pan-European collaborative research projects. The implementation plan of SDHE focuses on strategic priorities which are similar to the priorities outlined in NRDS, such as: development of a monitoring system for scientific

outputs; development of the research and innovation infrastructure; incentivizing private sector participation in scientific activity; encouraging triple helix partnerships (university-business-government) at regional level and developing a network of regional institutions to support regional development; strengthening the integration between science-education-innovation in SMEs; and stimulating the development of entrepreneurial universities.

Both documents SDHE ([CM, 2014h](#)) and NRDS ([CM, 2014d](#)) treat the issues of enhancing the research capabilities in HEIs and the need to accelerate the knowledge transfer at all levels of the education, research and innovation process. Regarding the specific EU priorities, these documents articulate different goals and implementation plans, but are complementary in the ethos. The question that emerges, is why MES has not attempted to create a broader strategic platform that encompass research, innovation and education in a unified policy framework, but continues to treat each element of the NRIS separately? Such fragmentation potentially generates inefficient allocation of resources. All three strategic documents, developed by MES, need further co-alignment across their spheres of impact and a link to the ISSS.

ISSS has been developed as a pre-condition for the European structural funds for 2014-2020 and is among the newest strategic efforts that aim to bridge across the activities of ME and MES. The strategy is formulated on the basis of a comprehensive mapping of science and technology capabilities in the Bulgarian economy and aims to promote the development of innovation capacity in specific priority areas with competitive potential to increase the value added of national products and services, and to support technology transfer in domestic enterprises towards ICT upgrade and resource effectiveness ([CM, 2014j](#)). The strategy aims to focus investments from EU structural funds, from foreign investors, domestic business and government expenditure on specific targets with strategic potential. The thematic areas with relative comparative advantage for Bulgaria are selected on the basis of a cross analysis between economic activities with export potential and R&D spending, and concentrated high value outputs from scientific publications. ISSS co-aligns its strategic objectives with the National Development Programme: Bulgaria 2020 ([CM, 2012a](#)), and addresses the issues of the five set targets for Bulgaria in Europe 2020, including a gradual increase of R&D spending to 1.5% of GDP ([CM, 2014a](#)). Although ISSS attempts to integrate the innovative capabilities of BAS with the private sector, it fails to position university research in this context. A worrying observation is that ISSS does not have clear implementation platform, including a clear vision for the role of the Sofia Tech Science Park.

Among the other relevant strategic documents are: the National Strategy for the Promotion of Small and Medium Size Enterprises 2014-2020 (2013, approved 2014) ([CM, 2014c](#)), and the National Strategy for Life-long Learning 2014-2020 ([CM, 2014f](#)), both of which need to be integrated with the other strategic documents and implementation plans in order to create a comprehensive policy programme across the science, technology and innovation space. The National Strategy for the Promotion of Small and Medium Size Enterprises ([CM, 2014c](#)) is the only strategic document, which is co-aligned with the objectives of the ISSS ([CM, 2014j](#)). BAS maintains its own priorities (ICT, energy, nano-science and advanced materials, bio-medicine, bio-diversity and ecology, climate change and risks, astronomy and space research, culture and identity, man and society). NIF and NSF are disjoint in their priorities, operations and practices.

Overall, the details in Table 1 indicate a significant internal misalignment across related strategic documents, and the need for a more consolidated policy framework across the

science, innovation and economic development spheres of governance. None of the strategies, described in Table 1, envisages a potential coordination link with the Council for Protection of Intellectual Property Rights at the CM, the Bulgarian Patent Office ([PO](#)), or IP issues related to knowledge creation and transfer. None of the strategic documents proposes a unifying policy framework, or a coordination agency where education, science and technology upgrade are treated as interconnected capabilities.

The lack of a unifying agency for the coordination of smart specialisation and financing across the R&I system can be identified as a major impediment to effective policy integration across higher education, science, internationalisation and technology entrepreneurship. MES, ME and EU structural funds are still developing communication interface, and there is no clear strategic institutional platform or financial mechanism for the utilisation of complementary funding for RDI. One of the most experienced agencies for programme allocation of funds for the last programme period [BSMEPA](#) has facilitated investment in the technology transfer infrastructure in Bulgaria and has built potential links across the applied science-industry interface with a good overview of regional and cluster capabilities. They are, however, focused on innovation in small and medium size firms, and are distant from the science infrastructure in BAS and the education capabilities in Bulgaria.

**Table 2a. MES budget by policy framework related to RDI (in million €)**

MES budget by Policy Framework	2009	2010	2011	2012	2013	2014
Higher education and development of the science potential, incl.:	58.937	42.578	37.482	45.552	33.899	25.951
• Student support	0.284	0.269	0.813	4.618	4.602	4.598
• International exchanges	2.330	1.270	1.411	1.403	1.506	1.375
• Monitoring and development of the science outputs and building a knowledge-based link between education-science-business	5.609	0.816	0.440	0.286	0.679	12.136
• Coordination and monitoring of the science potential for integration in the European science space and the global information network		7.376	11.284	11.378	9.434	6.132
• Promotion of scientific research based on programme-based finance	41.491	30.956	18.647	18.604	16.054	
<b>HEI budget</b> (education and research)	214.895	157.464	170.282	176.521	192.271	192.141
BAS budget	48.968	30.553	31.478	31.767	31.857	38.371

Source: MES budget: [2009](#), [2010](#), [2011](#), [2012](#), [2013](#), [2014](#); Budget Law: [2009](#), [2010](#), [2011](#), [2012](#), [2013](#), [2014](#).

The strategies enlisted in Table 1 have been only recently approved by the CM, so there are details only for planned financial measures. The tables below contain budgetary expenditure for previously funded RDI activities by the two leading ministries MES and ME. Bulgaria did not have a specialised operational programme for innovation and the tables in this section list the main innovation-related national policy programmes for the past five years.

The funding for 'development of the science potential' decreases over the period 2009-2014 with exception of 2012, when it marks a marginal recovery (Table 2a). There is a significant downward trend in the budget for 'promotion of scientific research based on programme-based finance, which is €41.5m in 2009, €16m in 2013, and nil for 2014. The budgets for BAS and HEIs decrease in 2010, but marginally recover in 2013 and 2014 (Table 2a). MES currently does not report which policy frameworks distribute resources as institutional grants and which ones – on a programme basis. The budgets for HEIs and BAS represent institutional block grants disbursed according to legal requirements and ministerial decisions (section 2.5.2).

ME has a specialised programme for promotion of innovation in small entrepreneurial firms, which is part of its policy framework on competitiveness and sustainable economic development. The budget for this programme increases over the years, but overall remains very small (€0.310m for 2014) (Table 2b). Funding for RDI from ME is generally programme based and involves specific calls either via NIF, or as part of Eureka and Eurostars frameworks.

**Table 2b. ME budget by policy frameworks related to RDI (in million €)**

	2010	2011	2012	2013	2014
Policy 1 'Sustainable economic development and competitiveness', incl.:	16.334	15.547	16.501	16.145	18.375
• Programme 2 'Promotion of entrepreneurship and innovation'	0.174	0.174	0.208	0.260	0.310

Source: ME Budget [2010](#), [2011](#), [2012](#), [2013](#), [2014](#).

A significant contribution to R&D funding for the period 2007-2013 is the EU OP 'Competitiveness' and one of its priority axes 'Economic development based on knowledge and innovation'. Within this priority area there are two thematic sub-priorities, supporting innovative activities of firms, and the development of innovation infrastructure (Table 2c). The disbursement of funds under this OP amount to nearly €99m, of which €14m national subsidy and €85m EU contribution from the contracted €226m (Table 2c, [UMIS](#)).

**Table 2c. State Grants and EU contributions from OP ‘Competitiveness’ 2007-2013, priority axes: ‘Innovation and knowledge based development of the economy’**

OPC Thematic Priorities 2007-2013	Actually paid in million €	
	Total grant	EU contribution
Support for innovation activities in firms (incl. technology and innovation start-ups, innovation products & services, R&D support in firms)	86.195	73.776
Development of innovation infrastructure (incl. establishment of technology parks, technology transfer centres, applied research in research organisations and the creation of Sofia Tech Park)	12.745	10.834
Total:	98.940	84.610

Source: [Unified management information system for the EU structural instruments in Bulgaria \(UMIS\)](#). Information is updated on: 15.11.2014.

**Table 2d. State subsidies for programme funding, calculated on the basis of disbursed funds per active projects (in million €)**

State Subsidy for Programme Funding	2005-2007	2008	2009	2010	2011	2012	2013	2014
NSF		43.868	30.098	4.431	2.082	7.837	10.559	10.545
NIF	20.553	3.681				4.658		5.103

Source: own calculations, based on: summary of the contracts: [NSF 2008-2010](#), [NSF 2011-2012](#); annual programmes: [NSF 2013](#), [NSF 2014](#); list of projects funded by [NIF](#).

The two funds NSF and NIF both disburse grants on the same programme principles and both do not account how these funds are distributed across the science and innovation space (Table 2d). Data from the ‘National statistical institute’ ([NSI](#)) for the period 2000 – 2013, on the other hand, accounts for the structural changes in thematic R&D expenditure by sciences in the Bulgarian economy. The NSI data shows significant increase of the R&D expenditure for medical sciences from 4-8% (for the period 2000-2008) to 44-43% (2013). Contrary to this trend, the R&D expenditure in agriculture science decreases from 30% in 2000, to 7% in 2013. Government spending dominates the natural sciences (46% for 2013), while R&D expenditures by the business enterprise sector is greater in medical sciences (68% for 2013).

### **2.3 National Reform Programmes 2013 and 2014**

The National Reform Programmes from [2013](#) and [2014](#) address the EU country specific recommendations, and in particular, the issues of tax collection, pension reforms, active employment policies for older working people, accessibility and effectiveness of social services to children and elderly, as well as the implementation of the youth guarantee framework, youth professional counselling, identifying the skills needs in the economy and

in the labour market, and modernising the legal framework for schools and HEIs. Although the report for undertaken activities by the government refers to new measures for support of the cooperation between educational institutes, research institutes and enterprises, there are no measurable results yet ([CM, 2014a](#); [EC COM, 2014c](#)).

Both programmes for 2013 and 2014 develop action plans to address the specific national RDI targets for Bulgaria in Europe 2020: a gradual increase of R&D spending in Bulgaria up to 1.5% of GDP by 2020, a decrease in the rate of school dropouts to 11%, and an increase of the number of people with a university degree in the age group 30-34 up to 36% ([CM, 2011a](#)).

Regarding the improvement of the business environment for innovation and growth, the government enlists a number of new and enhanced measures. Among these are: cutting red tape, development and implementation of e-Government strategy, improving the quality of the judicial system, counteracting corruption, access of SMEs and new start-ups to financing, absorption of EU funds for support of innovation, reforms in the energy and transport sectors, new mechanisms for effective water and waste management, among others. Among the specific R&I measures are the development of new strategic documents such as the Innovation Strategy for Smart Specialisation ([CM, 2014i](#)), National Strategy for the Promotion of Small and Medium Size Enterprises 2014-2020 ([CM, 2014c](#)), and National Strategy for Development of Public Procurement ([CM, 2014e](#)), all of which have been already approved in 2014.

In the new framework of the Partnership Agreement for the period 2014-2020, Bulgaria has proposed two mutually complementary operational programmes in the RDI area: OP 'Science and Education for Smart Growth' (OPSESG) and OP 'Innovations and competitiveness' (OPIC). The approved OPSESG is seen as an important mechanism for reviving and stimulating growth in the poorly funded and poorly performing Bulgarian science, education and innovation system. It will be hosted at MES and will operate with three priority areas. The first is focused on 'Research and technological development' (with a budget of €279m) for investment in: a) centres of competence, centres of excellence and research infrastructure; and b) strategic and applied research, staff training, access to technological platforms. The second is focused on 'Education and life-long learning' (with a budget of €258m) for investment in: a) quality of school education; b) access to high quality higher education; c) life-long learning; d) professional education and link with the labour market; and e) complementary horizontal measures. The third is focused on 'Educational environment for active social inclusion' (with a budget of €136m) investing in: a) enlarging active participation; b) socio-economic integration ([OPSESG](#)).

OPIC will be hosted at ME and will have two priority axes. The first will focus on '*entrepreneurship, export and production potential*' as a base for accelerated growth, and will have two investment platforms: 1) encouragement of the investments in scientific research and innovation activity, development of the connections between the business and scientific centres, and support for improved production capacities and pilot production in key technologies; and 2) support for the increase of capacity of small and medium-sized enterprises for the acceleration of their contribution to economic growth and development of innovation processes. The second priority axis is focused on '*green and efficient economy*' as a guarantee for sustainable growth. It will use two distinctive investment platforms: 1) support for transition to resource-efficient economy and encouraging of green growth; and 2) encouraging of energy efficiency and utilization of energy from renewable sources in the enterprises ([ME, 2013](#)).

The National Reform Programme for 2014 (NRP 2014) also envisages increased financing for applied science research, incentives to entrepreneurial firms with high value added activities to hire additional labour, encouraging investment for improvement of the scientific infrastructure, and improving the mechanisms for evaluation of scientific outputs ([CM, 2014a](#)).

The implementation strategies envisaged in the NRP 2014 ([CM, 2014a](#)) are co-aligned with the specific EU recommendations and national targets for Europe 2020, and with the four strategic priority axes in the new Bulgaria-EU Partnership Agreement. These, however, do not go far enough, embracing the new EU vision for rapid acceleration and sustainable growth. The proposed implementation measures are focused separately on: 1) building adequate educational infrastructures and educational environment for social inclusion and life-long learning; 2) modernization of the scientific research infrastructure; and 3) technological development, entrepreneurship and promotion of innovation of SME and new instruments facilitating access to finance. Many of the measures envisaged in the action plan refer to processes such as modernisation, strengthening, encouragement, and carry limited vision about the incentives at organisational and entrepreneurial level that can drive the economy towards smart, sustainable and inclusive growth.

The NRP 2014 in its section of measures towards achieving Europe 2020 RDI targets articulates three different strategic directions. One direction is focused on ISSS and the plans for investment in product and technological roadmaps ([CM, 2014j](#)). Another direction highlights measures for promotion of applied research through the network of centres of excellence, technological transfer centres, Sofia Tech Park and building the innovation infrastructure. A third strategic orientation builds upon the National Roadmap ([CM, 2014b](#)) and NRDS 2020 ([CM, 2014d](#)), towards integration with the European scientific research area. There is currently no measure in the action plan to build complementarities across the 'national roadmap for research infrastructure', the technology transfer centres (mainly in HEIs), and the technological roadmaps at industry, regional and firm level.

The policy mix behind all these strategic orientations could be defined as basic and with a supply-side orientation. It is supported by allocated funds from EU OPs and from the government budget. The measures are inward looking rather than outward looking towards pan-European linkages and do not build upon leveraging across the European research area, or the implementation of radical changes for an accelerated growth.

Although the new amendments to the legal acts reflect on EU recommendations to the NRP and the NDP, they remain constrained by a governance paradigm based on the principles of creating large consultative bodies with very broad representation of interests and stakeholder participation, but with insufficient use of monitoring procedures and measures, or explicit implementation mechanisms.

## ***2.4 Policy developments related to Council Country Specific Recommendations***

There are seven Country-Specific Recommendations (CSR) ([EC COM, 2013d](#)), three of which are indirectly related to the science and innovation system: 1) higher education reform and strengthening cooperation between education, research and business; 2) implementing an e-government strategy; 3) improving the start-ups and SMEs access to finance. The policy

measures and initiatives included in the action plan are defined in general terms and refers to promoting the development of advanced technologies, supporting access to new markets, increasing access to finance, and developing human capital and skills.

In its action plan the government acknowledges the need for integration of education, research and business activities, but the main actions refer to drafting the strategy and policy documents that address each separate sphere of the NRIS (see Table 1). As part of the integration process, the government reports a successful implementation of an integrated information platform that brings together data from the Bulgarian Patent Office, the Register of Scientific Activities in Bulgaria (BulCRIS) and the National Centre for Information and Documentation. There is, however, no monitoring information about the use of this facility.

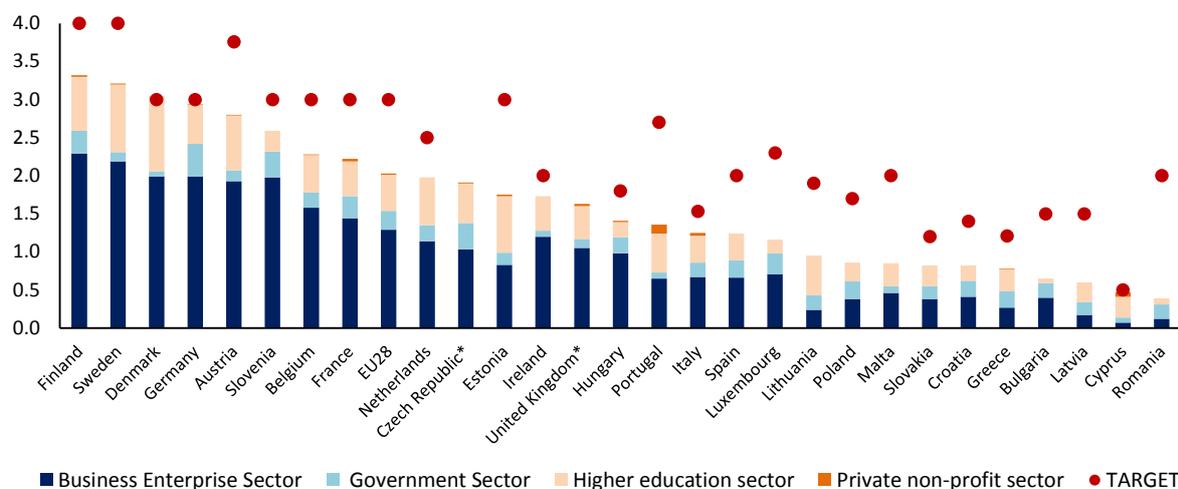
The NRP 2014 reports on the provided support for the education of 250 young scientists, for the organisation of three scientific schools, three science exchanges, over 150 publications in foreign media and for 20 indexed magazines ([CM, 2014a](#), p.23). The NRP, 2014 reports also on the implementation of 167 measures for improvement of the business environment, which are expected to achieve a 20% reduction of the administrative burden for business, equalling €156m savings for businesses per annum ([CM, 2014a](#), p.29). The report on the administrative reform and the development of e-Government outlines a number of proposals and work in progress ([CM, 2014a](#), p.37). These policies, however, are not co-aligned yet with the priorities set in the ISSS ([CM, 2014j](#)), and will require revision and adaptation. The ICT measures in the action plan that envisage to build 'Digital Bulgaria' and 'e-Government' have no budget and remain a tentative measure at the stage of interdepartmental consultation ([CM, 2014a](#), p.115).

## **2.5 Funding trends**

### **2.5.1 Funding flows**

In the latest Innovation Scoreboard 2014 Bulgaria is classified in the group of modest innovators ([EC Report, 2014c](#)). This poor performance is strongly correlated with the low level of funding for R&D in the country (Figure 3). There is a positive trend, however, of increased proportion of R&D performed by business enterprises (Figure 4b). As a result of the EU operational programmes and instruments implemented under ME, the R&D performed by the business sector (as percentage of GERD) increased from 30% in 2009, to 50% in 2010, followed by 61% in 2013 (Figure 4b). This figure is close to the EU28 average of 64% (Table 3).

**Figure 3. Gross domestic expenditure on R&D (GERD) for 2013 (percentage of GDP)**



Source: Eurostat, Dec. 2014

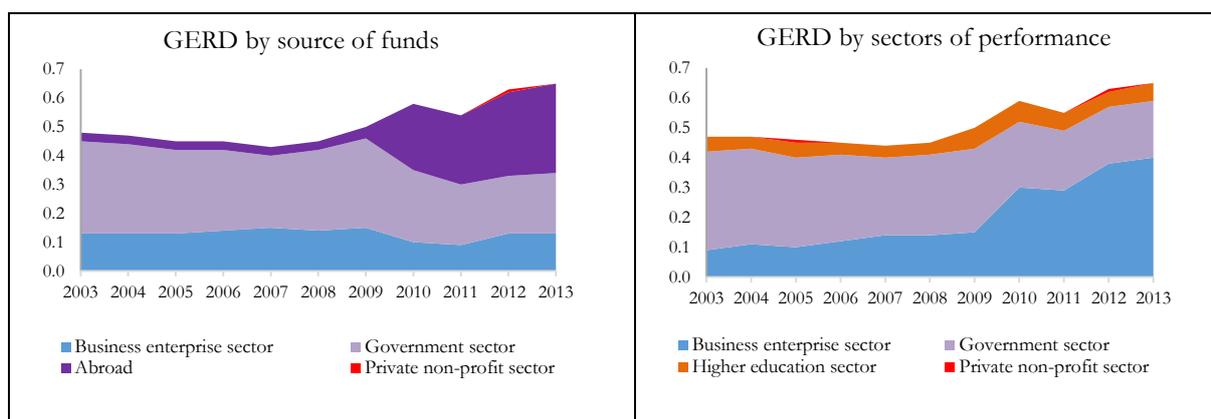
Notes: Ireland 2012; \* No R&D target value

The surge of R&D expenditure by business enterprise to 0.4% of GDP for 2013 is attributed mainly to sectors such as ‘services of the business economy’ (Eurostat, Dec. 2014). The decrease in the proportion of government sector expenditure both by source and by sector of performance, however, indicates for serious problems in the public sector and difficulties to respond to the challenges outlined in Horizon 2020 (Figure 4a and 4b). This decline refers mainly to direct funding (in grants, loans and procurement), as currently there are no tax or other incentives to firms apart from the programmes under the EU structural funds.

In spite of the surge in spending for the period of 2009-2013, the private sector share of R&D funding as a percentage of GDP decreased from 0.15% (2009) to 0.09% (2011), and raised again in 2012 and 2013 to 0.13% (Table 3). A positive development is the emergence of R&D funding from the third sector in 2012 (0.01%) (Table 3), but this trend is not sustained in 2013. A positive phenomenon in Bulgaria is also the emergent R&D funding from venture capital, which is still weak and vary over the years from 0.018% of GDP in 2009 to 0.004% in 2013 (Table 3).

A worrying trend is the relative decline in R&D performed by the government sector from 55% in 2009 to 30% of GERD in 2013 and R&D performed by the HEIs - from 14% of GERD in 2009 to 9% in 2013 (Table 3, Figure 4b). The equivalent figures for EU28 are 12% government sector and 23% HEIs (2013). These figures indicate that a radical turnaround is required by the Bulgarian government to accelerate the investment in R&I in the country.

**Figure 4. R&D expenditure (GERD) by source of funds (4a) and by performance (4b) as % of GDP**



Source: Eurostat, Dec. 2014.

The investment trend for the period 2009–2013 (GERD by source of funds) shows a decline of the proportion of government funding from 0.31% to 0.21% respectively (Figure 4a). These figures include both the decline in government expenditure and the R&D performed by research institutes and HEIs. This decline is partially compensated by the surge of funding from abroad from 0.04% (2009), to 0.31% (2013), mainly due to the EU operational and structural funds (Figure 4a and Table 3). The relative proportion of R&D funding by source for 2013 (Figure 4a), is 48% from abroad, followed by 32% from government and 20% from business enterprises, demonstrate improved absorption of EU funds through various mechanisms.

For the period 2009 – 2013, there is a relative decline in the total government budget appropriations or outlays on R&D (GBAORD) from €117.822m to €102.476m, while the EU28 average for 2013 is increased to € 90,505.611m (Table 3). Overall, the numbers for government budget appropriation (general vs. sectoral R&D expenditure) show an increase of the proportion of general expenditure for advancement of knowledge from both university and non-university source and decrease of the sectoral R&D expenditure (including all industry sectors) (Table 4). The numbers for 2012 and 2013 particularly show a trend towards co-alignment with the EU28 proportions of general vs. sectoral R&D expenditure. This however cannot be interpreted as necessarily a positive change in Bulgaria as behind the decreasing sectoral R&D expenditure stand decrease funding for applied research and close to-market innovations.

**Table 3. Basic indicators for R&D investments**

	2009	2010	2011	2012	2013	EU28* (2013)
GDP growth rate	-5.5	0.4	1.8	0.6	0.9	0.1
GERD (% of GDP)	0.51	0.59	0.55	0.62	0.65(p)	2.02(e)
GERD (euro per capita)	24.7	29	29.8	34.6	36.6(p)	539.2 (e)
GBAORD - Total R&D appropriations (€ million)	117.822	99.713	96.421	101.144	102.476	90,505.611
R&D funded by business enterprise sector (% of GDP)	0.15	0.10	0.09	0.13	0.13(p)	1.1 (2012)(e)
R&D funded by private non-profit (% of GDP)	0	0	0	0.01	0(p)	0.03e (2012)
R&D funded from abroad (% of GDP)	0.04	0.23	0.24	0.29	0.31(p)	0.2(e) (2012)
R&D funded by the structural funds (European Commission) (% of GDP)	0.02	0.02	0.02	0.02	:	:
R&D performed by HEIs (% of GERD)	14.0	11.8	10.2	8.0	8.7	23.2
R&D performed by government sector (% of GERD)	55.2	37.3	35.8	30.0	29.7	12.2
R&D performed by business enterprise sector (% of GERD)	30.0	50.3	53.2	60.6	61.0	63.8
Share of competitive vs. institutional public funding for R&D	:	:	:	:	:	:
Employment in high- and medium-high-technology manufacturing sectors as share of total employment	3.8	3.2	3.3	3.6	3.8	5.6
Employment in knowledge-intensive service sectors as share of total employment	27.7	28.9	29.1	29.8	30.3	39.2
Turnover from Innovation as % of total turnover		7.6				13.4 (2010 EU27)

Source: Eurostat, Dec. 2014; \*The EU28 average data; (: ) - not available; (e) – estimated; (p) – provisional.

The category ‘General advancement of knowledge’ refers to the actual institutional appropriation of funds by R&D performers (research organisations and HEIs). As a proportion of GDP, the finance for scientific research in Bulgaria represents only 0.02%, which remains consistently low throughout the entire period (Table 3).

**Table 4. Government budget appropriations or outlays on R&D (GBAORD) by socio-economic objectives (percentage of total GBAORD)**

	2007	2008	2009	2010	2011	2012	2013	2013 EU28
General advancement of knowledge	37.86	38.24	60.87	46.16	45.10	45.40	49.57	52.55
Other civil R&D appropriations	61.69	61.31	38.54	50.73	52.56	52.95	49.04	42.82
Defence	0.45	0.45	0.58	3.10	2.33	1.66	1.40	4.62

Source: Eurostat, Dec. 2014.

For the period 2007-2012, Bulgaria received the total of €196m from the EU structural funds (RIO elaboration on DG REGIO data)<sup>11</sup>. Only 0.1% of these funds have been allocated to financing of scientific research (including research infrastructure), compared with 3% for innovations. In contrast, the average EU percentage of funding for research infrastructure exceeds 30% (CM, 2014d, p.12).

One of the main funding sources for 2007-2013 with contribution to RDI is the OP 'Competitiveness', managed by ME, which has disbursed in total €99m for projects, of which €86m EU contribution (UMIS, Table 2c). In addition to these funds, BSMEPA manages NIF and coordinates Bulgaria's participation in Eureka and Eurostars, where the latter are associated with pan-European project funding. Data for cumulative Eureka and Eurostars funding and investment are not currently available.

A projection of the Ministry of Finance, describes a scenario for GERD as a percent of GDP where Bulgaria meets its target (Table 5). This scenario is based on estimates for growth, and positive changes of GDP, increased absorption of EU funds, and accelerated government expenditure for RDI.

**Table 5. Progress towards the national target (data for 2014-2020 are based on projections by the Ministry of Finance).**

Total GERD as % of GDP	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	0.55	0.62	0.65	1.01	1.09	1.18	1.28	1.27	1.38	1.50

Source: Innovation Strategy for Smart Specialisation (CM, 2014j, p. 107).

<sup>11</sup> The data on structural funds (RIO elaboration of DG REGIO data) is low in comparison to data reported elsewhere such as last year's country report. One of the explanations for this difference is the definition adopted. The data presented here refers to Core RTD (See Annex for categories included), whereas the information provided elsewhere adopts a broader definition of RTDI and linked activities. In addition the data reported here refers to ERDF funding only and does not include cohesion funds.

### 2.5.2 Project vs. institutional allocation of public funding<sup>12</sup>

The funding for RDI is regulated by a number of legislative acts, such as: Higher Education Act ([NA, 2014c](#)); Law for BAS ([NA, 2013a](#)); Law for Promotion of Scientific Research ([NA, 2013e](#)); Rules for NSF ([MES, 2014b](#)); Rules for Management of the NIF ([ME, 2014d](#)); Law for Public-Private Partnership ([NA, 2012](#)); and Law for the Agricultural Academy ([NA, 2013d](#)). There is institutional allocation of funds for RDI to all state HEIs and public research organisations. BAS receives its budget with a parliamentary decision, while the Agrarian Academy (AA) is funded by the sectoral Ministry of Agriculture and Food (MAF), but is under dual subordination of MES and MAF ([NA, 2013d](#)).

The institutional grant of BAS is determined by the Parliament, where the Academy submits its annual reports for evaluation. There is no formal requirement for the structure of performance evaluation. Internally BAS subsidy is distributed across all research institutes following a decision of the complex self-governing structure of BAS (as stipulated by the Law for BAS). For 2014, 80% of the subsidies are distributed across all institutes for employee salaries and 20% differential component of the grant is allocated first to cover the costs of patents (€5000 per patent), and then according to measurable R&D outputs, such as 40% for publications, 20% for citations, 20% for completed Doctoral theses, 15% for R&D project income, and 5% for outreach or expert and societal contributions ([BAS, 2013](#)).

The Higher Education Act (HEA) stipulates that the education grant is constituted on the basis of the number of students ([CM, 2012d](#)). HEIs receive additional differentiated funding based on a complex performance evaluation, using 68 indicators for measurement of the quality of education, the volume and value of research and publication outputs, the educational environment, services, the direct contribution to the labour market, and the evaluation from accreditation ([NA, 2014c](#), 91a (2)). The weight of different groups of indicators is as follows: education 30%, R&D 28%, labour market realisation 42% ([NA, 2015](#)). This performance-based funding mechanism, however, is not implemented in full.

According to the law, the autonomous HEIs can generate income for their budget from alternative sources and the state provides a subsidy for research, innovation and creative activities specific for the area of the HEIs not less than 10% of the education grant ([NA, 2014c](#), art 90 (1), (2), art. 91 (7)). The institutional grant for HEIs, however, is subject to a ministerial decision by MES, and for 2014 all public universities and HEIs received in total

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<sup>12</sup> **Institutional funding** is defined as the total of national budgets in a given country, attributed to an institution, with no direct selection of R&D project or programmes and for which money the organisation has more or less freedom to define the research activities to be performed." Institutional funding can be in the form of non-competitively allocated **Block funding**. Institutional funding may also be allocated in a **variable/competitive** manner tied to institutional assessments. **Project funding** is defined as the total of national budgets in a given country, attributed to a group or an individual to perform an R&D activity limited in scope, budget and time, normally on the basis of the submission of a project proposal describing the research activities to be done". Steen, J. v. (2012), "Modes of Public Funding of Research and Development: Towards Internationally Comparable Indicators", *OECD Science, Technology and Industry Working Papers*, 2012/04, OECD Publishing. <http://dx.doi.org/10.1787/5k98ssns1qzs-en>.

€4.1m, or 2.77%<sup>13</sup> institutional funding for research, distributed on equal basis to all state HEIs in addition to their education grant ([MES, 2014c](#)).

Project funding in Bulgaria refers to a number of different mechanisms. These are: the calls from the national funding bodies NSF and NIF; EU structural funds, EU FP6 and FP7; and national programme funding from the budget according to sectoral ministerial policies and subject to some form of application and a competitive tender. Most policies and programmes funding involves a EU structural fund components and hence, is organised on a project competitive basis.

Project allocation of funding for science is regulated by the Law for Promotion of Scientific Research ([NA, 2013e](#)) and disbursed by NSF. BAS is the main recipient of funding for scientific research, as there is very little research undertaken at universities. The observed tendency for increase of the proportion of project funding in Table 6, however, does not demonstrate necessarily a positive trend, as it is associated with an overall freeze of institutional funding and an overall low success rate of Bulgarian applications in FP6 and FP7 programmes and low absorption of EU structural funds.

MES budgeted for 2014 for activities that support development of the science potential amounts to €26m, which is the lowest figure since 2009 (Table 2a). ME budget for promotion of entrepreneurship and innovation marginally increases from €174 thousand in 2010 to €310 thousand in 2014 (Table 2b), but remains overall very small.

**Table 6. Institutional and Programme Funding for BAS**

	2009	2010	2011	2012	2013	2014
BAS subsidies in million €	48.968	30.553	31.478	31.767	31.857	38.371
BAS % additional project funding from other sources	44%	43%	40%	48%	:	:

Source: Table 2a and [BAS, 2012, p.101](#).

NSF and NIF are managed at ministerial level (MES and ME). Both funds have open calls to all public and private research performers, including HEIs, research organisations and private enterprises. The new legislative framework encouraged public-private research partnerships. The selection criteria for project funding are stipulated in their 'Rules', as well as for each tender organised by MES and ME. Regarding the assessment of projects for competitive tender, there is an effort to raise the project assessment process to world standards and both funds have amended their rules to incorporate enhanced measures for peer review involving international experts. The transparency, however, of the selection process is still being criticised at a national level and the accountability is hampered by the lack of robust monitoring mechanism (see section 2.7 below).

For the last two years – 2013 and 2014, NSF has disbursed just over €11m per year. This figure is 3-4 times lower than the value for 2009 and 2008 (Table 2d). NIF's budget for 2008 is €3.7m. Due to considerations for overlap with EU structural funds, there are no

<sup>13</sup> This ratio has been calculated on the basis of the transfers of different type of subsidies for individual HEIs for 2014 (see document at <http://www.mon.bg/?h=downloadFile&fileId=2145>). This proportion is similar since 2009.

calls between 2009 - 2011 and in 2012 NIF invests €4.7m. The budget for 2014 is marginally increased to €5.1m, disbursed to 52 new projects in 9 sectors, incl. instrumentation, electronics, pharma, chemicals, furniture, food processing, ICT, and creative industries (Table 2d).

Regarding the international project funding, Bulgaria has participated in FP5, FP6 and FP7. In FP6 Bulgaria received only 371 successful projects for €42m, which is equivalent to a success rate of 0.62% from all project participation and 0.24% from the total value of EC contribution ([EC Report, 2008](#)). The number of projects in FP7 is 532, with total value €99m, which is almost double the figures for FP6 (JRC elaboration based on e-Corda data). The university sector has received 32% of all projects from FP7 and has absorbed 45% of the total value of funds, followed by BAS and AA with 26% each ([CM, 2014d](#), p.34).

In conclusion, the main funding mechanisms for scientific research represent a balance between institutional block grant and project-based allocation. The variety of mechanisms used does not allow for a statistical representation of this proportion. The main funding streams are dominated by public competitive funding (from national and mostly European sources). The introduction of further tax incentives for R&D expenditures and indirect support are currently discussed. Categories for innovation funding such as venture and seed capital are existent, but very weak. As a percentage of GDP venture capital funding is declining from 0.018 in 2009 to 0.004 in 2013 (Table 3). The main challenge for building a robust assessment framework is the fragmentation of the system for distribution of funding, and the weak monitoring and evaluation practice across all mechanisms.

### **2.5.3 R&I funding**

R&I funding is channelled via ME and is managed predominantly by the Bulgarian Small and Medium Enterprises Promotion Agency ([BSMEPA](#)). ME manages the OP 'Competitiveness' 2007-2013, which contributes to a number of R&I related priority axes and policy objective. The Ministry implements a number of policy programs with impact on R&I, with a budget for 2014 for its policy framework on 'Competitiveness and sustainable growth' (incl. innovation and entrepreneurship, infrastructure and promotion of investment) of €18m (as a marginal increase from previous years - between €15.5m-€16.5m for the period 2010-2013) (Table 2b). There are no details of the type of funding mechanism used for these policies. Under the OP 'Competitiveness', the ministry uses a priority axis for 'Economic growth based on innovation' and in 2014 €99m are disbursed on a project basis for innovation activities in firms, including €13m national subsidy and €86m EU contributions (Table 2c). A lot more funds are made available to research performers on a project basis within the policy on 'Entrepreneurship and business environment' (€389.841m) ([UMIS](#)). The specific programme areas under this policy are: business support infrastructure, energy technology development, promotion of collaboration and cluster development.

BSMEPA manages NIF, Eureka and Eurostar projects and networks, and the cluster policy implementation measures. These funding mechanisms encompass mainly the final stage of the RDI cycle, which is close to market. Although universities and research institutes participate in these funding programmes, there is a lack of information on the scale of collaboration, or on coordination across NSF priorities and the research strategies for BAS and the AA, or the research active HEIs.

All grant subsidies disbursed through NIF are direct government funding for R&I both to the private and the public sector. For *R&D projects* the maximum grant is €255,623 for a period of 12-36 months. For *feasibility projects* the maximum subsidy is €25,562 per projects with duration of up to one year. The established ceilings for both types of projects can be raised depending on the category and the availability of effective collaboration with a research organisation or other firm. Bulgarian organisations involved in international projects under “Eureka” can also apply for a NIF grant. Calls for applications under ME require the applicant firms and research organisations to leverage own funds in different proportions, according to their size and according to the specific call. Most calls use standard instruments with little encouragement of partnership, collaboration, or mobility. Exceptions are: the programme for cluster development and inter-firm collaboration (total funding €4.9m with EU contribution €4.2m); the development of technology transfer offices (total funding €0.9m with EU contribution €0.7m); development of new technology centres (total funding €1.8m with EU contribution €1.6m) and the project for Sofia Tech which has an allocated budget, but has delayed the implementation ([UMIS](#), Nov. 2014).

The inflow of EU funds since 2010 has increased the share of programme and project funding for R&I considerably. The allocated ERDF and cohesion fund support for the 2007-2013 period amounts to €310m for RDI and linked activities, and €292m for support for innovation in SMEs ([EC Report](#), 2014a). The core RTD funding allocated to Bulgaria for the period of 2007-2012 is €196m (RIO elaboration on DG REGIO data)<sup>14</sup>.

At present there are no indirect support mechanisms for R&I, such as tax incentives. Corporate tax, however, is low – 10%, and acts as an incentive. There are also some preconditions put in place to accelerate investment in technology upgrade. The Law for Corporate Income Tax states that a taxable entity (i.e. private company) has the one-off right to decrease its tax base by the historical cost of an intangible fixed asset (result from R&D activity) if among others, the R&D activity in question has been commissioned’ ([NA, 2014d](#), art. 69). In addition, ME has implemented a special programme for improving the access to finance for small and medium size firms. This issue, however, remains a bottleneck in the system, particularly in the context of the requirement for contribution in applications to the OPC.

Overall the funding of the RDI process is fragmented at strategic and institutional level, as well as at the level of funding mechanisms for disbursement of public and EU structural funds. Among the future plans are the allocation of funds for the National Roadmap 2014-2020 with planned subsidies from the budget for €93.2m, which will be disbursed by MES on a programme basis along with the EU structural funds component under OPSESG ([CM, 2014b](#)), while ME will remain responsible for the implementation of OPSESG.

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<sup>14</sup> The data on structural funds (RIO elaboration of DG REGIO data) is low in comparison to data reported elsewhere such as last year’s country report. One of the explanations for this difference is the definition adopted. The data presented here refers to Core RTD (See Annex for categories included), whereas the information provided elsewhere adopts a broader definition of RTDI and linked activities. In addition the data reported here refers to ERDF funding only and does not include cohesion funds.

## **2.6 Smart Specialisation (RIS3)**

The main aim outlined in the ISSS strategic document ([CM, 2014j](#)) is that Bulgaria changes its position from the group of modest innovators, to the group of moderate innovators. In order to achieve this goal, the strategy identifies two core objectives: 1) to focus the investments for the development of the innovation potential in the main priority areas (see Table 1), developing new technologies to enhance the *value added* in the economy; and 2) to provide support for the accelerated technology upgrade and adoption of new methods improving the *resource effectiveness* of enterprises. The selection of the priorities in the document are based on the strategic capabilities of mechatronics and clean technologies, information and communication technologies, biotechnologies, nano-technologies, creative industries, pharma and food processing.

Although the selection of priority areas is based on a cross analysis of the strengths in scientific capabilities and export and investment activities in sectors of the economy, the implementation plan envisages mainly intervention at business enterprise level. The strategy does not propose specific incentives for the integration of the elements of the NRIS, including the activities of HEIs or science and knowledge transfer activities. ISSS is co-aligned internally with the National Reform Programme and the National Development Programme. Its implementation though relies on the coordination across the NRDS 2020 strategy ([CM, 2014d](#)), the National Roadmap ([CM, 2014b](#)), the National Strategy for the Promotion of Small and Medium Size Enterprises ([CM, 2014c](#)), and the Strategy for the Development of Higher Education. These strategic documents, however, do not envisage an integrative platform, agency, or mechanism that can bring together university, academy and industry research for commercial application and with economic impact. The co-alignment across theoretical and applied research, or innovation infrastructure and higher education capabilities including entrepreneurship education, is not well established. There are no clear links with the implementation of the strategies currently under supervision of MES.

## **2.7 Evaluations, consultations, foresight exercises**

The R&I system in Bulgaria is characterised by a weak policy evaluation practices. There are at present some monitoring and evaluation procedures, but the results from the assessment exercises are not publicly circulated to all stakeholders, and are not used to influence policy design and programme implementation, or to improve the funding mechanisms.

During the last two years of 2013 and 2014 all elements of the R&I system have been put under scrutiny, as six new strategy documents for MES and ME have been developed and approved. Each strategic document proposes a specific monitoring and evaluation framework, relevant to the specific area of the R&I system. There is at present no adequate legal framework for coordination of the evaluation procedures across MES and ME, NSF and NIF, or the two evaluation agencies under the Council of Ministers - NEAA and NAVET (Diagram 1). Each agency has its own governance structure and monitoring and evaluation procedures, understood primarily as evaluation of the operations of the agency itself, or instructions to beneficiaries for individual project evaluation, and not as evaluation of the outputs from policy implementation, or from other investment and tender decisions.

More systematic evaluation procedures are implemented for the EU structural funds, where Bulgarian agencies undertake regular assessment exercises as required by each EU programme. The new single information web portal for EU structural funds ([EUfunds](#)) provides an opportunity not only for enhanced transparency and integration of information, but also for the implementation of new quality monitoring procedures. The current monitoring exercise includes details of individual operational programmes, their budgets, data on calls for proposals, contracted projects and amounts, and transferred funds. An institutional coordination mechanism is established at the level of CM across all EU structural funds, which includes a central coordination agency, a governance structure for each structural fund with monitoring committees. Under this mechanism the monitoring committees develop monitoring plans, while the external evaluators undertake the assessment exercise. The monitoring takes place at three distinctive levels: the micro level of beneficiaries, the mezzo level of programmes and the macro level of national coordination unit at the specific ministry. Within this framework, ME has developed its own instrumentation with indicators to monitor the outcomes from the investments under the OPC ([ME, 2014e](#)).

The two ministries that are directly involved in R&I policies have different procedures for monitoring and evaluation. Under ME, the main distribution of funds is managed by [BSMEPA](#) and evaluation and assessment procedures are designed at programme level. [NIF](#) has its own approved 'rules' for management stipulating monitoring and evaluation procedures prescribed at individual project level, while the procedure for its accountability refers to an annual report. Ex ante evaluation is undertaken according to the monitoring rules stipulated under Eureka and Eurostar programmes.

The [Science Directorate](#) and the [Higher Education Directorate](#) supervise the evaluation procedures at MES. Science Directorate is responsible for the monitoring of the [National Science Fund](#) (NSF), projects under FP6 and FP7, and the development of the National Roadmap for Research Infrastructure. It coordinates all bi-lateral science partnership, investment and sponsor agreements, and co-ordinates on behalf of the government the 'science-business link'. There is currently no established monitoring system that assesses the outputs from individual funding programmes. The 'rules' for NSF stipulate criteria for self-assessment by beneficiaries, monitored by a 'permanent scientific expert commission'.

All budgets and policy implementation activities financed under MES and ME are supervised at the level of CM by the National Council for Science and Innovation ([link](#)), National Council for Innovation ([link](#)), or the Council for Coordination and Management of the EU structural funds ([link](#)). There is no clear and unified monitoring strategy or procedure at this level.

At present the system for monitoring and evaluation of R&I performance of the public sector HEIs includes two disconnected elements. First this is the [Bulgarian university ranking system](#), developed by MES. The methodology elaborated by an independent consortium (OSI-MBMD-S) includes output-based indicators and the Ranking is operational since 2010. Second, this is the Register of the scientific activities in Bulgaria ([BulCRIS](#)), applying the Common European Research Information Format. This Register is under the supervision of the Science Directorate at MES. Information for the Register is supplied by the public organisations and by the funding agencies (NSF, NIF and others), and includes data on publications, public funds for science and innovation, scientific programmes, financial instruments, and research infrastructure.

Other mechanisms for monitoring and evaluation are described in individual legal and strategic documents. BAS is the only research performer that has undergone through a thorough international evaluation in 2009 by the [ESF and ALLEA](#). The Law for BAS stipulates a complex self-assessment procedures and accountability in front of the Parliament. NRDS does not articulate specific indicators for monitoring at project or programme level. The [Strategy for the Development of Higher Education](#) puts emphasis on the role of the [Bulgarian universities ranking system](#) and [NEAA](#), responsible for the legal framework and operational procedures for institutional and programme assessment and accreditation of the HEIs, as well as post-accreditation monitoring and control. The newly approved [National Strategy for Life-long Learning 2014-2020](#), supervised by the National Council for Life-long Learning at the CM, envisages annual monitoring by the CM. The [National Strategy for the Promotion of Small & Medium Size Enterprises 2014-2020](#) puts emphasis on the financial reporting of the beneficiaries under NIF and other programmes run at BSMEPA. The monitoring and performance assessment of the research infrastructure consortiums selected in the [National Roadmap](#) will be undertaken by an inter-ministerial coordination committee that involves European experts. The monitoring and assessment procedure is prescribed first at the level of individual infrastructure consortiums (with representatives from MES, ME, appointed international boards of experts and NGO participation), and second at the level of the National Roadmap (the Science Directorate at MES will approve annual reports). Evaluation criteria at individual infrastructure level will include: scientific excellence (incl. publications, patents, citations), institutional capacity (academic staff, doctoral students, age participation), management and financing of international projects and partnerships, participation in competitive funding, socio-economic benefits, relevance and outputs (incl. methodology, technology, products and services), national, regional and European partnerships.

[ISSS](#) proposes one of the most elaborated evaluation procedure across the R&I space in Bulgaria. Among the indicators for monitoring are: incentives for cooperation along the entire value chain, access to finance, programme finance and internationalisation, organisation and management capacity, training, incentives for FDI and outsourcing, government procurement, reducing the red-tape, quality improvement, new product development, cluster participation, participation in European projects, participation in university-industry links, among others. According to ISSS, the implementation will be supervised by a new 'Council for Smart Specialisation' at the CM, and will include 4 ministers (ME, MES, MTITC and MAF), 4 senior representatives of the sciences, and 4 representatives from business, as well as regional authorities and employer organisations.

Although the legislative framework for the RDI activities already stipulates some forms of monitoring, there is effectively lack of systematic ex ante and ex-post policy evaluation, impact analysis, evaluation of the results and outputs, or assessment of the quality and efficiency of funding through R&I programmes.

Although stakeholder consultations are relatively new, the governance system itself is based on a large number of consultative bodies at the level of CM, sectoral ministries, or executive agencies and funding bodies. There are no evidence, however, that such stakeholder representations in consultative bodies enhances either the transparency and accountability, or the critical evaluation of policy outcomes. The newly approved strategic documents, with exception of ISSS, do not include foresight exercises, or other technology mapping, industrial research and specific assessment of capabilities. Many of the strategic documents contain evaluation of strengths, weaknesses, opportunities and threats, but are

focused on investing in and upgrade of current capabilities rather than refocusing for smart specialisation. The R&I system currently does not collect systematic data on specific outputs from funding and does not have established evaluation tools for benchmarking and impact analysis.

### **3. National progress towards realisation of ERA**

#### ***3.1 ERA priority 2: Optimal transnational co-operation and competition***

Bulgaria participates in a number of transnational cooperation initiatives, strengthening both the competitiveness of the national research performers and their collaborative capabilities. Bulgaria has been involved in 30 joint calls ([NETWATCH](#)) and supports a number of bilateral and multilateral initiatives, such as programmes with Austria, France, Germany, Slovenia, Slovakia, Romania, Macedonia, Russia, India, China, Switzerland, Iceland, Norway, Lichtenstein and Ukraine. Under the collaborative Swiss programme for scientific exchange with the new EU member-states, for example, about 6 million Swiss francs have been invested in thematic priorities such as: eco farming, agriculture and forestry and waste management, social disparities and regional inequalities, and research into new medication forms ([EC COM, 2014g](#); [NSF](#)).

Bulgaria is a member of the European Organization for Nuclear Research ([CERN](#)), the European Science Foundation ([ESF](#)), the International Thermonuclear Experimental Reactor ([ITER](#)), the European Organisation for the Exploitation of Meteorological Satellites ([EUMETSAT](#)), and the European Centre for Medium-Range Weather ([ECMWF](#)).

Concerning the Joint programme initiatives, the country participates as observer only in one of the 10 on-going initiatives, namely 'Cultural heritage and global change: a new challenge for Europe' ([ERA](#)). Considering the priorities outlined in the NRDS, it is an omission by the research institutions and funding authorities not to join and support initiatives, such as: [FACCE-JPI](#) (on agriculture, food security and climate change), [Urban Europe](#) (on eco-friendly and intelligent intra- and interurban transport), [JPI Climate](#) (on alternative energy systems), or the JPI '[More Years, Better Lives](#)'.

The new policy framework for pan-European and international research collaborations is enhanced with the officially approved strategy documents: ISSS, NRDS 2020, and the National Roadmap. Alongside the priorities set in these documents, the Joint Innovation Centre of BAS ([JIC-BAS](#)), which operates in collaboration with [Enterprise Europe Network](#) and [PROINNO](#) Office for Technological Transfer, promotes in its own way pan-European research collaboration. Currently, there is no systematic monitoring and evaluation of the international research and innovation activities in Bulgaria, as BulCRIS has very short experience, and BAS as the major scientific performer undertakes self-evaluation. The main observed indicators remain participation in projects and absorption of funds. The participation of Bulgarian research institutions in EU Framework Programmes (FP6 and FP7), COST cooperation projects of member states, and research cooperation with associated countries and third countries are all under the supervision of the Science Directorate under MES.

Bulgarian participation in FP7 currently stands with a share of 0.6% and the country has received 0.3% of total EC contribution, which is a marginal improvement from the previous framework programme. FP funding in Bulgaria represents €13 per inhabitant (EU average €72 per capita) for the period 2007-2013. The figure of FP funding per inhabitant represents also 0.1% of the gross domestic expenditures on R&D (GERD) for the period 2007-2011, while EU average is 3% of GERD for the same period ([EC COM, 2014g](#), p. 63).

The research performers in Bulgaria, and in particular BAS, have been very active in [COST](#) initiatives, which are coordinated directly by MES. Bulgaria has lead one COST action in nanotechnology with 28 participating countries. Bulgarian researchers have taken part in collaborative actions in 11 thematic research areas, which include 414 action initiatives. Among these are: Food and Agriculture (FA) – 69 actions; Materials, Physics and Nanosciences (MPNS) – 57 actions; Forests, their Products and Services (FPS) – 50 actions; Earth System Science and Environmental Management (ESSEM) – 48 actions; Individuals, Societies, Cultures and Health (ISCH) – 48 actions; Information and Communication Technologies (ICT) – 43 actions; Transport and Urban Development (TUD) – 23 actions; Trans-Domain Proposals – 6 actions; and Targeted Networks – 4 actions. The country representatives for COST are hosted at MES and at NIF, and it is not very clear whether there are any joint coordination and evaluation across NIF, MES, or JIC-BAS.

Bulgarian participation in [ERA-NET](#) is relatively weak ([EC Report, 2014f, p.11](#)). Bulgaria is currently represented in ERA-NET by 15 organisations: four ministries, BAS, one funding agency (NSF), three state agencies (BSMEPA, State Agency for Information Technology and Communications, and National Service for Plant Protection); two scientific institutes within BAS (Institute of Information and Communication Technologies and National Institute of Meteorology and Hydrology), one national institute (Institute for Nuclear Research and Nuclear Energy), one university (Technical University of Varna), one HEI (Academy of the Ministry of Interior), and one NGO (Agency for Sustainable Development and Euro-integration – Ecoregions). These agencies represent different levels of engagement – from co-funding – to observer status. The inclusion and enrolment of Bulgarian participants indicates a need for a systematic mapping of capabilities across the RDI space and enhanced coordination and collaboration across ERA-NET participants to leverage institutional support. The country has participated in a total of 24 ERA-NETs and one ERA-NET+Plus actions, of which seven have been completed in 2014. Overall six actions are undertaken under FP6 and 18 actions - under FP7 ([EC Report, 2014f](#)). Seven actions are due to end in 2014, one in 2015 and two in 2020 ([EC COM, 2014g](#)).

The innovation policy of ME follows the vision outlined in the National Strategy for the Promotion of Small and Medium Size Enterprises 2014-2020, emphasizing the need to enhance the innovation and internationalization capacity of small firms in Bulgaria ([CM, 2014c](#)). ME since 2011 coordinates Bulgaria's participation in two Article 185 initiative(s) - Eureka and Eurostars ([EUREKA](#)). Subsequently, the 'Rules for management' of NIF have been amended to provide opportunities for Bulgarian companies and research institutes under Eurostars to receive match funding by the budget of NIF ([Article 20](#)). The Bulgarian institution that is responsible for the organization and coordination of participation in Eureka and Eurostars is [BSMEPA](#).

There are three successfully completed projects with Bulgarian participation, and seven currently running, three of which are looking for new partners ([EUREKA](#)). The projects are in the field of electronic devices and sensor intelligent systems; IT management systems for distribution of energy and data handling product lifecycle management systems; reproductive medicine and diagnostic instruments for health care; environmental treatment and spectrometry for monitoring environmental parameters; agri-food clusters and programmes; technological innovation in tourism and leisure, and advanced materials for the development of lightweight air turbine engine. The budget for Eurostars II (2014-2020) is €1,284b, with 33% participation from the EC and Bulgaria is already leading a project in

collaboration with Austria and Switzerland in the field of analytical tools ([NIF Presentation, 2014](#)).

Overall ME has financed applied research, measured by quantitative indicators, such as: number of newly developed or upgraded products/services; number of newly developed or upgraded technologies; number of realized partnerships between businesses and research organizations, number of supported Centres of excellence and Competence centres, and number and value of supported projects ([CM, 2014a](#)). Other quantitative targets, measured by ME are: proportion of SMEs implementing innovation, or a collaboration agreement with other firms and organisations; proportion of firms implementing product, process or marketing innovation; proportion of revenue from innovation products and from selling on-line; number of SMEs participating in EU funded projects, or SMEs that organise training for their staff, or support external staff training ([CM, 2014c](#)). Currently, the initiatives by ME prioritise the raising of competitiveness in the economy, but do not recognise the importance of smart specialisation, strategic co-alignment with European industries and integration within European value chains.

One of the leading strategic co-alignment activity is the country participation in the EU Strategy for the Danube Region ([EUSDR](#)), led by a multilateral (and macro-regional) strategy, developed by the Commission in cooperation with [14](#) countries in the Danube region. The project comprises of science and technology cooperation across the region, including six scientific clusters launched by 2013 ([EC COM, 2014g](#)).

One of the lead activities for co-alignment and integration of the Bulgarian science and technology capabilities within ERA is the continuing work on the National Roadmap. As part of the first stage, Bulgaria has followed the procedure for evaluation of the scientific infrastructure, its categorisation and the selection and approval of Bulgarian consortiums for integration into the European Strategic Forum on Research Infrastructures (ESFRI). The process of integration with European research infrastructure has accelerated after the upgrade of the National Roadmap in 2014. Through the ESFRI mapping, Bulgaria has nine approved research infrastructure consortiums, which include a large number of participating research organisations and a budget of €93.268m ([CM, 2014b](#)) for its implementation until 2019 ([CM, 2014a](#), p.101). These are: 1. National University Complex for Biomedicine and Applied Research; 2. Centre for Advanced Microscope Analysis for Fundamental and Applied Research in the Field of Biology, Medicine and Biotechnology; 3. Infrastructure for Sustainable Development in the Field of Marine research; 4. Energy Conservation and Carbon Energy; 5. National Centre for High Performance Distributed and Cloud Computing; 6. European Social Study for Bulgaria; 7. National Interdisciplinary Research Infrastructure for Resources and Technologies for the Bulgarian Language and Cultural heritage; 8. Regional Astronomy Centre for Research and Education; and 9. National Cyclotron Centre in the field of nuclear medicine, nuclear physics and energy, radiochemistry, and radio pharmacy ([CM, 2014b](#)).

These consortiums integrate science and technology capabilities across a large number of research performers in Bulgaria, including 17 Universities, 21 research institutes of BAS, 10 specialised centres from the medical universities in Sofia and in Plovdiv, 6 national research facilities, 1 research institute from the Agriculture Academy, 1 NGO, and 1 firm ([CM, 2014b](#)). All nine consortiums have strategies co-aligned with their European partners.

All approved consortiums from the National Roadmap have national budgets (in total €484,000 for 2015 and €510,000 for 2016), and envisage a balanced combination of

institutional and programme funding from national and European sources, including NSF, Horizon 2020, as well as [OPSESG](#), [OPC](#), and [OPRD](#). Representative scientific, technical and financial committees, governed by specific objectives and roles, and representatives from MES, ME and other relevant ministries, will manage all scientific infrastructure consortiums. The consortiums will be managed through mid-term scientific programmes, will be governed by international boards of experts, and will include NGOs to ensure the socio-economic application of the scientific results. The overall implementation of the National Roadmap will be monitored by an inter-ministerial council ([CM, 2014b](#)) and the key indicators to measure success are quantitative measures, such as: number of publications of Bulgarian researchers/scientific research units in international magazines; number of patents per 100 thousand residents; number of international projects, developed at the centres of excellence and competence centres; number of international projects with Bulgarian researchers involved ([CM, 2014a](#)).

The existing priorities and strategic research agendas are not yet sufficiently coordinated to meeting the grand challenges – either at national or at Pan-European level. The country, however, has undertaken some measures to remove legal and other barriers to Europe-wide competition. Non-nationals are eligible to participate in Bulgarian competitions for research grants. Bulgaria still needs to set a more coherent institutional framework that will enable research performers to contribute to the integration across ERA and to meet the grand challenges of sustainable and inclusive growth.

The main research funders in Bulgaria ([NSF](#), [NIF](#)) indicated that they do not have specific measures supporting European co-alignment of priorities and capabilities. These core intermediary institutions are not actively promoting either the implementation of a particular science and innovation strategy, or a particular European policy orientation. For example, ME work with a number of lead business associations that show very low interest in ERA challenges and opportunities. The Bulgarian Industrial Association (BIA) has not published any information on activity related to science and innovation potential in firms since 2013 ([link](#)); the Bulgarian Chamber of Commerce (BCC) does not support any particular initiative related to the enhancement of the innovation potential of firms, or financial support for innovation; the Association of the Industrial Capital in Bulgaria last promoted innovation in firms in 2011; and the Confederation of the Employers and Industrialists in Bulgaria is not engaged in European wide activities.

No relevant information was found about the degree of implementation and mutual recognition of evaluations that conform to international peer-review standards as elaborated in the ESF peer review guide. A formal comprehensive evaluation of Bulgaria's participation in the framework programmes of the EU is planned for 2014. Bulgaria cooperates with the META group in the project [MIRRIS](#) (Mobilising Institutional Reforms in Research and Innovation Systems). The aims of MIRRIS is to encourage a better exploitation of European research and innovation programmes and participation in the ERA of the [13](#) target countries, including Bulgaria. The project sets a process of analysis, dialogue, and mutual learning among key concerned stakeholders, namely research, innovation and institutional actors.

## **3.2 ERA priority 3: An open labour market for researchers. Facilitating mobility, supporting training and ensuring attractive careers**

### **3.2.1 Introduction**

The mobility of researchers is framed by two parallel frameworks. On one hand, the regulatory environment stipulates provisions for researcher and staff mobility (i.e. the Higher Education Act ([NA, 2014c](#)), the Law for Development of the Academic Staff (LDAS) ([NA, 2013c](#)), the 'Rules' for its implementation ([CM, 2014g](#)), or the Law for the Students and Doctoral Students Loans ([NA, 2013b](#)). On the other hand, the university autonomy and the autonomy of BAS give staffing decision-making powers to individual institutions.

Most of the researchers are employed by the public sector, and primarily by BAS, AA and HEIs. Although there is a marginal trend towards decrease of researchers in the public sector and increase of their numbers in the business sector, this trend is still too slow to advance the restructuring of the labour market in co-alignment with European trends (Table 7).

The national labour market for researchers is suppressed both from the demand and from the supply side. On the demand side this is due to the limited resources for financing R&D both by the public and the private sector. On the supply side, this is due to the low wages and low popularity of the research profession. There is no process of accelerated growth of researchers in the university sector and the universities at large remain teaching institutions. The low employment of researchers by the higher education sector is a critical impediment both to the demand and the supply side of the labour market. The negative demographic forecasts are expected to worsen the position of HEIs, unless a specific policy framework is created to support the growth of research activities undertaken within Bulgarian universities. A survey with researchers states that non-competitive salaries, archaic research infrastructures, administrative burden, a low level of R&D funding as well as a low level of funding from industry are the main obstacles to researchers' mobility in Bulgaria ([Deloitte, 2012](#)).

**Table 7. Researchers in Bulgaria (FTE – full time equivalent)**

	2009	2010	2011	2012	2013	EU28 2013
Researchers (FTE – full time equivalent)	11,968	10,979	11,902	11,300	12,274	
% Of total employment in FTE	0.34	0.32	0.36	0.34	0.36	0.71
Higher education sector	37%	33%	38%	33%	33%	39%
Business sector	14%	14%	13%	19%	22%	48%
Government sector	49%	52%	49%	47%	43%	12%
Private non-profit sector	0%	1%	1%	1%	1%	1%

Source: Eurostat, Dec. 2014

### **3.2.2 Open, transparent and merit-based recruitment of researchers**

According to the guidance on implementation of the Law for Development of Academic Staff (LDAS), all open research positions must be published in the Bulgarian Official Journal and on the institutional web sites - though they are mainly published in Bulgarian language. The new law eliminates the age criterion formerly applied to applicants for scientific positions, including post-doctorate positions. LDAS provides for the use of defined evaluation criteria, which are made available to candidates in advance, and stipulate requirements for feedback on the decisions taken by the scientific appointment panels. Job vacancies are also published on other platforms (e.g. the labour agency) and the [EURAXESS](#) jobs portal, but these are not statutory requirements. The regulatory environment, hence, strengthens the practice of transparent and merit-based recruitment of researchers, but does not address the cultural and language barriers towards integration with the European Research Area.

The overall enhanced transparency, however, does not address one of the main structural challenges to effective labour market for researchers, which is the discrepancy in salary levels. As a result, the academic profession, in the same way as the research career, represents an unattractive proposition to young researchers. The institutional financing of universities and research organisations is another barrier to offering attractive employment opportunities for researchers, limiting both the full-time and part-time opportunities.

Overall, both the regulatory provisions and decisions by autonomous universities do not envisage special measures to evaluate the level of openness, transparency and merit-based recruitment – as a practice, or its legal framework. Hence, currently there is no knowledge on whether special actions are required or not in this respect.

### **3.2.3 Access to and portability of grants**

Regarding cross-border access to and portability of national grants in accordance with the European Council Directive 2005/71/EC from 12 October 2005, there is the obligation by law for HEIs and BAS to apply policies to remove barriers which hamper cross-border access. The implementation, however, is incomplete, and the impediments lie both within the autonomous research performers and the funding bodies that have not introduced contract-specific requirements as part of the grant-disbursement process. The legislative framework supporting Europe-wide access to funding is incomplete and there is no explicit provision for admitting third country nationals for the purposes of scientific research and portability of grants.

### **3.2.4 EURAXESS**

The [EURAXESS](#) network in Bulgaria has coordinating offices located at three establishments – Sofia University, the Institute of Technology and Development (ITD), and the New Bulgarian University (NBU). There are currently fourteen [EURAXESS](#) centres in Bulgaria, hosted in five cities by overall ten universities, BAS, one NGOs, one foundation, and one industry cluster (ICT cluster in Sofia). [EURAXESS](#) portal contains practical information concerning professional and daily life, as well as information on job and funding opportunities. The coordination activities of the offices, however, are not very

effective. The number of researcher posts advertised through the [EURAXESS Jobs](#) portal per thousand researchers in the public sector in Bulgaria was 0.4 in 2013 and 0.7 in 2012, compared with 9.0 among the Innovation Union reference group and an EU average of 43.7 ([Deloitte, 2014](#); [2013](#)). This negative trend reflects certain conservative HR practices and barriers, which require further investigation.

### **3.2.5 Doctoral training**

The regulatory environment for doctoral training in Bulgaria is established by the Higher Education Act ([NA, 2014c](#)), LDAS, and the Rules for its implementation, adopted by individual universities. In details, the procedure is standardised and requires the development of individual training programmes for doctoral students, which are approved by the student, the supervisor and the Faculty Council within each HEI. Doctoral plans can be developed only within already accredited PhD programmes, and the students are required to complete exams, to undertake pedagogical activity and to defend publicly their research thesis.

The new OP 'Science and Education for Intelligent Growth', under the priority axis for Life-long learning envisages a new support for project-based doctoral training in any of the scientific priority areas, or economic sectors ([MES, 2014d](#), p. 192). NRDS also envisages the introduction of a project-based doctoral programme, and financing for researchers' mobility and publications. However, in the implementation programme for 2015, developed by MES, there are no specific measures to support these activities, hence, it is unlikely that there will be any developments in the current provision of doctoral training during 2015 ([MES, 2014e](#)).

### **3.2.6 HR strategy for researchers incorporating the Charter and Code**

The Rectors' Conference has signed the European Charter for Researchers and the Code of Conduct in 2008. These principles and requirements of the Code of Conduct should ensure observance of values such as transparency of the recruitment process and equal treatment of all applicants, in particular with regard to the development of an attractive, open and sustainable European labour market for researchers. These principles are complementary to those outlined in the European Charter for Researchers. Still, there are no specific regulations or schemes in Bulgaria for a national implementation of these principles and for increasing the researchers' salaries, or other entitlements.

In addition to the Rectors' Conference in Bulgaria, the Charter and the Code have been signed by Varna Free University (VFU), which has received subsequently in 2012 the [HR Excellence in Research Award](#) for its published 'Self-assessment' and 'Plan for action' (see [EURAXESS, RECTORS](#) and [VFU](#)).

Although NRP 2014 envisages support for the implementation of the Law for Student and Doctoral Candidates Loans through disbursement of grants and financial support, there are no specific activities and plans to promote doctoral training and the effective implementation of the HR strategy for research excellence ([CM, 2014a](#)). The individual HEIs in Bulgaria as autonomous entities also have not advanced a vision and an action-plan in this direction.

### **3.2.7 Education and training systems**

The regulatory framework that shapes the education and training system is outlined in the Higher Education Act ([NA, 2014c](#)) and the LDAS ([NA, 2013c](#)). The implementation of these two legislative acts is a responsibility of the autonomous HEIs. The two legislative acts postulate generic requirements for the process of selection, enrolment, training and habilitation, and the transfer of responsibilities and decision-making power to 'Faculty scientific councils' within the universities and HEIs. Apart from these legal requirements, MES and NEAA do not maintain specific policies towards science and technology priorities, or benchmarking for excellence in education.

The analytical documents preceding the Strategy for the Development of Higher Education ([CM, 2014h](#)) acknowledge skills shortage in the system, deficiencies in the curriculum, lack of entrepreneurial education and training in the formal programmes, and insufficient emphasis on generic and transferable skills, such as critical thinking, problem-solving, teamwork, creativity and communication skills. The new OP 'Science, Education and Intelligent Growth' envisages a special priority policy area on transforming the universities in Bulgaria into 'Centres of knowledge' integrating the triangle of education, science and innovation ([MES, 2014d](#)). Other policy objectives, outlined in the new OP are: the optimisation of the university system to enhance the effectiveness of government funding through internal restructuring, enhanced monitoring and evaluation of the quality of outputs, and introduction of advanced funding models according to quality of outputs. Special measures will be implemented to invest in the capacity of academic and research personnel, including training for protection of IP and their successful integration in ERA.

## ***3.3 ERA priority 5: Optimal circulation and access to scientific knowledge***

### **3.3.1 E-infrastructures and researchers electronic identity**

The government envisages in its investment programme the building of the next generation broadband communication infrastructure (NRP 2014, [CM, 2014a](#)). The measure includes development, public consultation and adoption of a national plan for broadband infrastructure for the next generation access. This measure will be evaluated with key indicators, such as number of users as individuals, families and enterprises. The development of the draft has been scheduled for mid-2014 and it is expected that the implementation deadline will be scheduled for 2015.

### **3.3.2. Open Access to publications and data**

Bulgaria's efforts to implement the digital ERA and contribution towards ERA priority 5 concerns policies on access and preservation of scientific information through building and maintaining high-performing computing, and access infrastructures such as on-line databases. MES provides since 2008 national access to scientific information of the best quality, 'Bibliometric' resources and analytical tools. The beneficiaries are 58 research institutions, public and private universities, and research centres in hospitals. Additionally, 'Bulgarian Information Consortium' ([BIC](#)) has been set-up as an organization of 38 members, representing academic institutions, libraries and the public, aimed at resource

sharing. The mission of BIC is to provide the best information resources at the best possible price to the Bulgarian users.

ERA initiative 'Open access infrastructure for research in Europe' ([OpenAIRE](#)) is on-going since 2010 and includes setting up of data repository for open access to research outputs, journal articles, conference papers and datasets of various kinds. As of March 2012 Bulgaria has six Open Access repositories managed by the Institute of Mathematics and Informatics at BAS, Sofia University, New Bulgarian University, Medical University Sofia, and Burgas Free University ([OpenAIR BG](#)). In 2013 Bulgaria has made available 51 journals in the Directory of Open Access Journals (DOAJ), compared with 6 journals in 2007 (NIF, 2013). In addition, Bulgaria has achieved 56% adjusted score for open access contribution, compared with 58.8% average European participation measure (Archambault, et.al., 2014). Bulgaria's participation as of June 2014 encompass 7821 open access publications in 13 on-line repositories ([OpenAIR BG](#)).

BAS central library provides also free on-line access to digital resources. The resources are accessible via BAS IP addresses. There are different databases for on-line resources ([CL BAS](#)). Among these is the 'WorldCat' – the largest worldwide bibliographic database, providing the foundation of cooperative library services in metadata management, discovery, resource sharing and collection management ([OCLC WorldCat](#)). As a member-state Bulgaria supports the work to improve access to the information held in libraries around the globe and reduction of the costs for libraries through collaboration. Through these activities Bulgaria has made a significant progress toward participation in the 'open access' movement and the 'digital repository infrastructure in European research' ([Driver](#)).

The digitalization of valuable materials from the St. Cyril and Methodius National Library collections started in 2006. In autumn 2007 these digital images have become accessible for users through the library's website. Over 290,000 files have been digitalized by the end of 2012, including manuscripts, old printed books, unpublished documents from the Bulgarian historical archive and Oriental department, portraits and photos, graphical and cartographical editions, Bulgarian newspapers and journals from 1844 to 1944 – images and their systematic descriptions. Users could search in the electronic archive through the specialized system DocuWare. The digitalized originals are offered as free access for users.

## 4. Innovation Union

### 4.1 Framework conditions

During the 2014, the efforts of the government were focused on improving the business environment and reducing the administrative burden, and on enhancing the social dimension of policies, including combating against youth unemployment and reducing regional disparities. In addition, a number of improvements in the statutory framework were drafted to enhance budget revenue collection, to accelerate the absorption of EU funds, to support ongoing optimisation of the administration, and to focus on e-governance.

The RDI-related policy measures and initiatives that are associated with the development of a large number of strategic documents outline the strategic directions for reforms aiming at complementary promotion of innovation in the SME sector, strengthening of the high technology capabilities particularly within the [ESFRI](#) research infrastructure consortiums, supporting access to finance and access to new markets for SMEs and high technology firms, and developing human capital and skills within the university system ([CM, 2014a](#)). Overall, these policy measures support a supply type of policy action. There is no overall strategic design in which supply side and demand side complement each other.

A key element in the policy integration is the [Strategy for Development of E-government](#) for the period 2014–2020, which aim to improve the gap in public administration, and to provide comprehensive on-line services (currently only 2% of administrative services) ([CM, 2014a](#)). Complementary to this are the actions envisaged in the National Strategy for Promotion of Small and Medium Size Enterprises 2014-2020 ([CM, 2014c](#)) and ISSS ([CM, 2014j](#)), which explicitly describe the need to create synergy across the support measures for innovation and for entrepreneurship. ISSS also highlights the fact that Bulgaria has established the economic foundations for entrepreneurship, offering the lowest income tax for individuals (10%), the lowest corporate tax (10%), and is among the countries with the lowest VAT (20%). ISSS promotes also the vision that financial incentives have to be created both on the demand and the supply side of the innovation process through active search by the industry for scientific solutions, and enhanced offer of applied scientific solutions that address real challenges and specific social and economic needs ([CM, 2014j](#), p. 92).

Overall, the new strategic developments address some of the voluntary framework conditions, such as ‘peer review of competitive tenders’, but are short of provisions for ‘optimum dissemination and use of research findings’; protection, management and sharing of intellectual property rights’, and ‘funding of cross-border research’. The weakest points in the current strategic package are the lack of forward-looking activities, inadequate evaluation of joint programmes, and insufficient incentives for collaboration.

As already outlined in ISSS, the successful implementation of strategic measures towards impact on economic growth and sustainability requires partnership across all stakeholders, including central and regional authorities, scientific circles, industry, NGOs and social partners. The Innovation Scoreboard indicates clearly the insufficient collaborative networks in the RDI space. Although the innovation labour force in Bulgaria represents 75%

of the EU average, the proportion of SMEs and networks in the RDI sector is only 22% of the EU average, and the proportion of innovators is only 9% of the EU average ([CM, 2014j](#)).

## **4.2 Science-based entrepreneurship**

NRP 2014 ([CM, 2014a](#)) reports a number of measures undertaken in 2013 that aim to enhance science-based entrepreneurship. Among these are: the development of Sofia Tech Park, and the provision for an entrepreneurship training for young talents and scientists from R&D units with ideas with high innovative potential. Under the OP 'Human Resources Development' ([OPHRD](#)) since 2012 young people who have completed their doctoral studies have been encouraged and supported to engage in R&D practice for one month internships in high-tech firms and R&D infrastructure centres. OPHRD supports also the setting up and running of structured innovative doctoral training programmes, providing funds for mentoring, research training, and developing entrepreneurial skills.

Measures to promote general entrepreneurship among young people are included in the NRP 2014 and refer to the setting up of a joint working group to develop an action plan and a new comprehensive strategic document that encompasses all activities, seminars and information campaigns promoting entrepreneurship among students and young people across the country. The evaluation measures for this initiative include: number of conducted seminars; number of attending students /young people; and adopted plan ([CM, 2014a](#)),

Previous observations for 2004-2008 confirm that only 16% of the Bulgarian SMEs have undertaken innovation activities, which is the lowest in EU ([CM, 2014j](#)). This is explained by the sectoral concentration of SMEs – (91% of all firms are micro-firms with less than 10 employees and operate primarily in the small-scale retail and low value added activities. Bulgaria has almost three times less SMEs undertaking R&D, then countries such as Slovakia, Denmark, Austria and Hungary, where the size of the labour force is comparable to the labour market in Bulgaria ([CM, 2014j](#)). The lack of entrepreneurial education in professional schools and the HE sector is recognised as one of the main obstacle to growth of entrepreneurship in the technology and innovation sector. ISSS recognises that the main challenge for innovation entrepreneurship is its integration in pan-European value-chains and international scientific research partnerships.

Within the OP 'Innovation and Competitiveness' ([OPIC](#)), in addition to the measures for support of innovations in the business sector, there is a strong emphasis on applied research oriented towards the business sector, as well as the development of Sofia Tech Park, and strengthen the network of technological centres, thematic laboratories and technology transfer offices. Investments in this network have been channelled through NIF, with contributions from the public and the private sector as co-finance. Since 2010 two contracts have been concluded for building 'Centres of excellence' – the 'Institute for solid state physics' and the 'Institute for polymers' – at BAS ([CM, 2014a](#)). The period of 2013 and 2014 is characterised by efforts to support the infrastructure on which technology spin-off companies can flourish, such as the implementation of 24 contracts for support to offices for technological transfer and technological centres in the amount of €6.5m. The public funding for this infrastructure (including Sofia Tech Park) amounts to €4.4m for

2014, €3m for 2015, €10.3m for 2016 (Of these funds – 15% come from national co-financing) ([CM, 2014a](#)).

In the field of applied research, or science-based entrepreneurship 35 projects have been supported in 2013, with total amount of €7.6m (of which 60% state subsidy extended through NIF). The projects are in the following sectors: ICT, energy efficiency, chemical industry, computer production, healthcare, electronic and optical products ([CM, 2014a](#)).

### **4.3 Knowledge markets**

The system for protecting intellectual property rights constitutes of the Bulgarian Patent Office (BPO), and the Council for Protection of Intellectual Property Rights. The database of the BPO is synchronised with the European patent office. While patent activities decline in 2009 and 2010, they recover sharply in 2011 and have sustained the number of applications annually (Table 8). The key patent areas where Bulgaria has some distinctive technologies and high value added products and services are: computer technology (9%), engines, pumps and turbines (7%), special machines (6%), civil engineering (6%); electrical machinery, apparatus and energy saving machinery (6%), pharmaceuticals (5%), transport (5%), medical technology (4%), measurement (4%), basic material chemistry (4%), and others ([WIPO, Dec. 2014](#)).

**Table 8. Patent applications to the EPO by priority year at the national level**

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Bulgaria	21.28	17.63	23.32	27.13	12.18	18.65	15.83	16.97	21.3	22.18

Source: [Eurostat, Dec. 2014](#).

The distribution of patents across 10 specific technology areas and the high volume of ‘others’ (44.6%) demonstrate the wide diversity of technology capabilities in the economy. Although re-focusing of these capabilities along the selected priorities is very important to achieve a critical mass, their linking as technology chains is even more important to enhance the R&D scope of the economy.

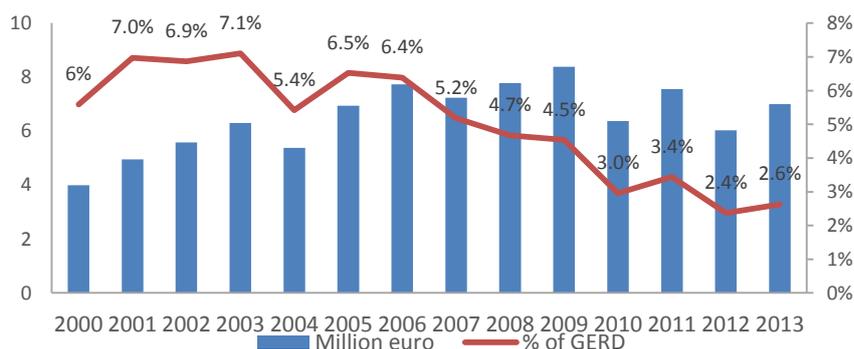
Currently, there are no explicit policies that address issues of the knowledge markets either internally, or externally. The financial support offered to firms and research organisations for innovation includes patent registration. This funding however does not provide explicit incentives to increase the patent activity. The action plans to promote training in IP protection are also insufficient. There are currently no national trading platforms for IP – to match the supply and the demand.

## 4.4 Knowledge transfer and open innovation

The activities supporting open innovation and knowledge transfer at university level are still at initial stages of development. There is very little interaction and cooperation between academia and industry. HEIs show little engagement with stakeholders at regional or industry level and there is a substantial gap between the university supply of professions and the labour market demand. The decline of GERD since 2006 has worsened the situation. The relatively low level of privately funded public R&D (less than €7m for 2013, or only 2.6% of GERD) is an evidence of the gap in collaboration with the public sector R&D (RIO calculations based on Eurostat data, Figure 5).

This situation is confirmed with the relatively low 113 place (from total 144 countries) that Bulgaria occupies in the World Economic Forum Competitiveness Report regarding the global ranking for university-industry collaboration in R&D (WEF – index component 12.04). Although there are significant number of public-private co-publications, their impact on strategic technological capabilities is low.

**Figure 5. Privately funded public R&D trend in € m and as % of GERD<sup>15</sup>**

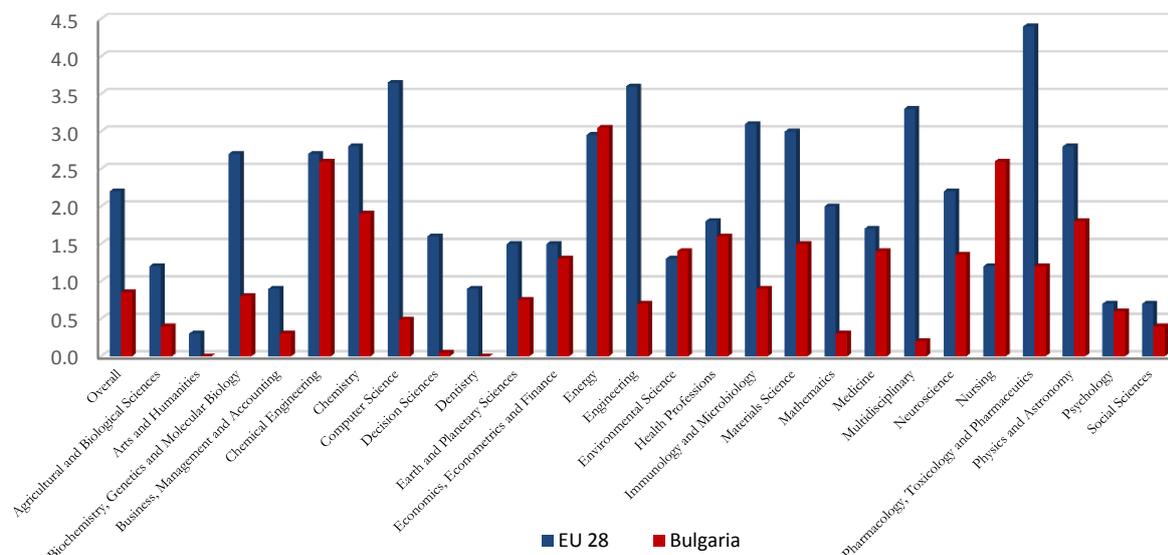


Source: RIO calculations based on Eurostat data, Dec. 2014.

The main scientific and technological areas in Bulgaria that show strength simultaneously in a number of key indicators are: chemical engineering and chemistry, energy and environmental science and technologies, health, medicine, bio-pharma and pharmacology, molecular biology and genetics, physics and astronomy, advanced materials and nano-science (CM, 2014j) (Figure 6). Among the key areas where there is already effective collaboration and co-publications between research organisations and private firms are: energy, chemical engineering, nursing, and chemistry. A number of other scientific fields show initial stage of co-publications, which can be seen as a positive sign of engagement and complementarity between science and industry in Bulgaria (Figure 6).

<sup>15</sup> Private sector comprises BES and PNP; Public sector refers to GOV and HES. Charts cover the years 2002-2012 (for some countries with certain gaps in data series).

**Figure 6. Share of public private co-publication by field compared to the EU-28 average**



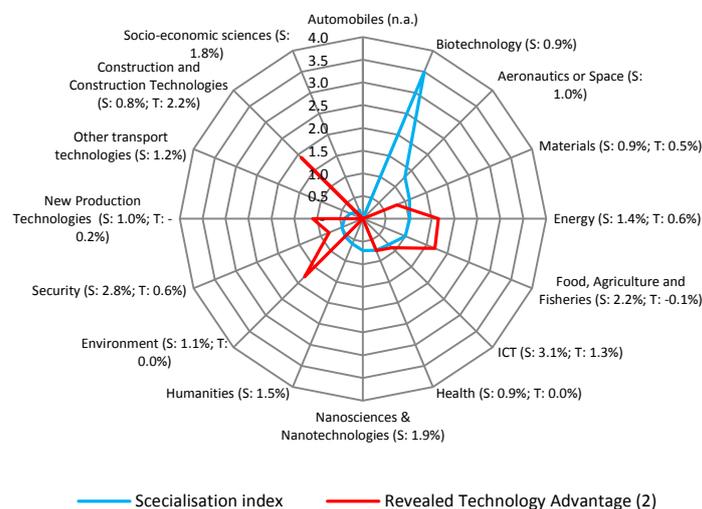
Source: RIO elaboration on Elsevier's Scopus/Scival data ([Scival](#)).

A cross-sectional analysis in the 'Innovation Union Progress Report' for Bulgaria reveals also a significant mismatch between the country specialisation index (based on the number of publications), and the revealed technological advantage (based on the number of patents). The leading specialisation index for Bulgaria is in biotechnology, aeronautics and space research, while the leading technological advantages are in environment, construction technologies, food agriculture and fisheries, energy and the environment ([EU Report, 2014e](#), Figure 7).

The country has taken already initial steps in a number of measures to counteract the negative trend in GBOARD and R&D performance. MES has three policy initiatives directed to fill this gap. 1. A centralised system for internships in industry was developed and tested between 2012-2014. The capacity of the system will allow HEIs to offer 60,000 internship placements with 14,000 employers ([MES, Student Placements](#)). 2. The programme for stipends, managed by MES and BAS disbursed between 2009-2014 the total of €42th (from the €102th contracted) to doctoral students undertaking PhD research at a national company ([NSF 2009](#)). This programme was implemented through NSF and aimed to build an effective link between science and industry through the active participation of enterprises in the development of doctoral dissertations. 3. The project 'Science and business' with a budget of €2.6m financed specific activities such as: improving the communication 'science-business' through networking across sectors; promotion of research results; presentation of successful research products for society and business; and improving the qualifications of researchers to meet the needs of the labour market ([S2B](#)). Among the target activities under this programme is the development of an interactive and integrated national platform that include BulCRIS, BPO data, and information on PhD dissertations from the 'National information and documentation office'.

ME through the OPC has implemented a large number of programmes to enhance the innovation potential in Bulgaria. One of the earliest financial schemes for knowledge transfer, implemented during 2008-2011, disbursed knowledge transfer vouchers to micro, small and medium enterprises (NIF 2009). For the period 2011-2014, the ministry awarded 65 contracts and disbursed €9.738m (from a budget of €30m) to support R&D activities at firm level. This represents 33% implementation. The recipients of these grants were partnerships between private firms and research organizations or universities from Bulgaria and other EU countries (OPC). The outputs from this scheme were measured by the funding agency with indicators such as: number of R&D jobs created; number of researchers employed by enterprises; application and registration of industrial designs, utility models, trademarks, and patents.

**Figure 7. S&T national specialisation in thematic priorities 2000-2010 (matching scientific and technological specialisations)**



Source: Research and Innovation Performance in the EU. Innovation Union Progress at the Country Level 2014 (EC Report, 2014e, p. 44).

ME and NIF have funded two types of innovation capability projects - industrial R&D and experimental development, or technical feasibility projects. NIF disbursed €4.658m to 36 projects in 2012 and €5.103m to 52 projects in 2014. The aims in these projects were to develop new products, processes or services that raise efficiency; to improve the innovative potential and technological level of enterprises; to increase private investment and to enhance innovative processes (ME, 2014d). The monitoring of the fund highlights that the instrument has produced a profound impact on recipient firms, such as 39% of them increased the level of employment, 79% - introduced a new product to the market, 66% entered new markets, and 71% improved sales and revenue (CM, 2014d, p. 17).

One of the latest initiatives of ME is the Technostart programme with a budget of €205 thousand, which aims to encourage the innovation activity of young entrepreneurs in Bulgaria - students, PhD researchers and graduates in the earliest stage of the entrepreneurial cycle - to submit and work on a new business idea. Under this programme 169 candidates received a grant of €10,000 towards the cost of fixed assets (including

equipment, computers and hardware), and the cost of intangible assets (including software, registration of new products / services, patents, licenses, trademarks, utility model or industrial design) ([ME](#)).

Regarding the link between science and industry, ME has been instrumental in engineering the foundations for technological centres business incubators and technology transfer offices in Bulgaria. All projects were established during 2011-2014 with funding from OPC, where ME successfully financed 33 organizational establishments, including technology centres, incubators, technology transfer offices and new Science and Technology Park 'Sofia Tech' (Table 10).

**Table 10. Technology transfer infrastructure financed under OP 'Competiveness' 2012-2013**

	Technology Transfer Offices	Science and Technology Park	Technological Centres	Business Incubators
Contracts (stared)	16	1	4	12
Total value in €m	1.905	42.685	3.917	5.425
% Of implementation	38%	85%	20%	30%

Source: [UMIS](#) (own calculations).

The future support for these knowledge transfer organisations is outlined in the action plan and the budget in the NRP 2014 (Table 11). The policy framework for the development of the *technological centres* aims to promote entrepreneurs' access to research knowledge and commercialisation of R&D activities. The financial mechanisms include a contribution of 30% of the project value by the beneficiaries. The key performance indicators of this scheme are: number of supported / created TTOs; number of enterprises using the services of the TTOs; number of jobs created in supported TTOs; investments generated in TTOs; number of projects in support of business, entrepreneurship and new technologies; number of implemented investment projects ([OPC](#)).

**Table 11. Strategic measures in NRP 2014 for implementation in the area of knowledge transfer**

Strategic Measure NRP 2014	Budget
Technological centres; certifying and measuring laboratories, building the pilot project for technological park Sofia Tech Park	€4.4m for 2014, €3m for 2015 €10.3m for 2016 (Of these funds – 15% come from national co-financing)
24 contracts for technological transfer centres	€6.5m
Promotion of innovations in the enterprises	€51.1m for 2015; €76.7m for 2016. €500.4m for the period 2014-2020
Access of SMEs and new start-ups to financing	€176m from ERDF and €31.1m national co-financing (2014-2015) €85m for ERDF and €15m national co-financing, OPIC – 2016-2020
Financing of applied science research	€4.1m for 2014, €9.7m (2015); €9.7m (2016)

Source: Europa 2020: National Reform Programme 2014 update 2014 ([CM, 2014a](#), p. 92, 102-104).

The policy framework for *technology transfer offices* promotes the transfer of new knowledge and technology and addresses a broad population of potential performers, such as universities, public research organisations, private sector companies and not-for-profit organisations ([OPC](#)). The main impediment to the low 38% implementation is the inability of the applicants (universities and public research organisations) to match the funds from the OPC. As a result, five contracts were cancelled and the successful ones were reduced in value. One of the key projects under ME is *Sofia Tech Park*, which is established with the aim to strengthen the competitiveness of science and entrepreneurship in Bulgaria, to become a platform for the development of technology start-up companies, and to accelerate the process of commercialization of research ([Sofia Tech](#)).

Bulgaria currently does not collect systematic information on most of the indicators for evaluation of the knowledge transfer system. The collection of this information has to be enhanced through an update into the current interface of the register for scientific activity, managed by MES.

#### **4.5 Innovation framework for SMEs**

Currently, one of the priorities of the Bulgarian government is to develop new financial instruments for financial support to SMEs. The high rate of insolvency due to lack of capital is a barrier for growth and an impediment to other initiatives, such as innovative clusters or collaboration activities. Although there are insolvency regulations in place (most of them implemented as amendments to the Trade Law since 2006 ([NA, 2014c](#))) these do not lead to a significant restructuring. In addition, there are currently no special provisions for a second chance support to failed entrepreneurs.

BSMEPA promotes a number of EC target initiatives for support to innovative SMEs, such as EU R&I programmes ([link](#)), selected financial instruments under Horizon 2020, including '*fast tract to innovation*' (with a budget of €100m for financing up to 70% of the project costs ([link](#))), or the special Prize for technological solutions for '*Collaborative sharing of spectrum*' and '*Breaking the optical transmission barriers*'. BSMEPA promotes also the '*National export portal*' ([link](#)), and reports achievements from previous support to export activities by SMEs, such as: 85 participations in international trade fairs with 867 participating Bulgarian firms, and 26 trade missions abroad with 349 firms for the period 2010-2014 ([BSMEPA, 2014](#)). The most clearly defined frameworks that support pan-European SME collaboration in innovation are Eureka and Eurostars ([link](#)).

There is a cluster map for functioning clusters in the country. These clusters, however, are more relevant to regional development initiatives, rather than fostering innovation. It is expected that the next wave of financing of the National Roadmap and the next stage of development of the *centres of excellence* and the *technology transfer offices* will strengthen the innovation framework for SMEs. The schemes for financing innovation in SMEs are currently under revision in terms of allocation of structural funds across MES and ME and within the new OP for 2014-2020.

## 4.6 Venture capital markets

The European Private Equity & Venture Capital Association (EVCA) has issued a special report on the venture capital markets and private investment activities in Central and Eastern Europe for 2012 and 2013. The report acknowledges, that in 2013 the investment activities in Bulgaria decline, which is associated with a fall in the level of buyout deals – a similar trend as observed in Hungary, Slovakia and Ukraine. Overall, Bulgaria marks its highest level of annual private investments in 2009 (€185m), which declines to €7m in 2011. The recovery in 2012 is marginal (€84m), and is followed by another drop to €11m in 2013 ([EVCA, 2014](#), p.12).

From the total private investment, most of the venture capital amount is invested in start-ups, where the figure for 2013 marks a significant increase to €4.7m (from €88th in 2012) (Table 12). This trend, however, is counteracted by a massive decline in the buyouts – from €84.076m in 2012, to 0 in 2013. The investment in growth also declines from €6m in 2012 to €3th in 2013 ([EVCA, 2014](#)).

In order to improve the situation related to access to financing by SMEs, the Bulgarian government reported in 2013 the creation of equity funds, under which 56 SMEs received financing in the amount of €2.87m ([CM, 2014a](#), p.92). The *Mezzanine fund* in 2013 disbursed loan products to 4160 SMEs by extending loans amounting in total €358m. Other instrument providing financing with a risk-sharing element is the *Guarantee fund* and the initiative JEREMIE (with 4200 transactions supported in 2013) ([CM, 2014a](#), p.92).

The new measures, planned for 2015 include acceleration of the implementation of the following equity funds: '*Venture capital fund*', '*Seed capital financing fund*', '*Seed financing fund*' (for start-up investments), '*Mezzanine fund*' (for start-up investment and loan products), '*Co-financing fund*' (selected fund managers), and other instrument providing financing with a risk sharing element ([CM, 2014a](#), p.92). Some of these funds have been made already available in 2014, such as the newly formed Venture Capital Fund, Seed Capital Financing Fund, Eleven and LAUNCHub, which distributed by April 2014 about €6.5m investments to almost 100 start-ups ([CM, 2014a](#), p.92).

**Table 12. Type of investment 2012-2013 (no bank leverage included) (in € x 1,000)**

	2012				2013			
	Seed	Start-up	Later-stage venture	Total venture	Seed	Start-up	Later-stage venture	Total venture
Bulgaria	0	88	0	88	0	4,718	380	5,098

Source: [EVCA, 2014](#), Central and Eastern Europe Statistics 2013, pp.20.

Business angel activities in Bulgaria for 2013 include 52 Business Angels and 2 Business Angel Networks, which have invested in 37 companies, creating 163 jobs. Although the average investment per angel and per company are relatively small, the numbers show a visible presence of this type of capital (Table 13).

**Table 13. Angel investment 2013**

	# BAs	# BANs	# Companies Financed	BA Inv 2013 (€m)	YoY	BA Inv 2012 (€m)	Jobs created	Average Inv. per company (€)	Average Inv. per BA (€)	Average Inv. per BAN (€m)
Bulgaria	52	2	37	2.9		n.a.	163	77,027	54,808	1.4

Source: [EBAN, 2014](#), p.5.

Note: BAs - Business Angels, BANs - Business Angel Networks, Inv. – investment.

## **4.7 Innovative public procurement**

In response to the country specific recommendations, the Bulgarian government undertook in 2013 special measures for improving the access of SMEs to public resources. The amendments to the Law on Public Procurement simplifies the requirements for sub-contractors of projects financed with public funds and provided the opportunity for direct payments to the sub-contractors ([CM, 2014a](#), p.38). This Law postulates that procurement of scientific and R&D services undertaken by an EU consortium is exempt from the requirement of public tender, enabling direct procurement to stimulate innovation firms ([NA, 2014f](#)). The Bulgarian Public Procurement Agency ([PPA](#)) promotes the EC Communication from 2007 ([EC COM, 2007](#)) for the procurement of R&D and innovation services, supporting the innovation activities in the EU. The newly adopted Strategy for Public Procurement ([CM, 2014e](#)) postulates that the regulatory framework for implementation of the new European Directives related to protection of the environment and promotion of innovation should be completed by 2016.

## **5. Performance of the National Research and Innovation System**

### ***5.1 Performance of the National Research and Innovation system***

The European framework for evaluation of NRIS compares member states against key measurable outputs and reveals that Bulgarian performance indicators show value significantly below the EU average. The new government initiatives put in place are expected to improve the output levels. The new OPIC and OPSESG that are currently developed for implementation plan to address the weaknesses, already highlighted in the country strategic documents, approved in 2014.

In 2012, Bulgaria produced 5.07 publications per 10,000 inhabitants on average, which is well below the EU-28 average (13.8). Internationally co-published papers are 44.5% of all the publications. In 2012, Bulgaria had about 226 international scientific co-publications per million population. In the period 2002-2012, a bit more than 5% of the Bulgarian scientific publications were in the top 10% most cited publications worldwide in comparison with 11% of top scientific publications produced in the EU28 (Science Metrix, 2014)<sup>16</sup>. The share of public-private co-publications in Bulgaria is 0.8% in the period 2008-2013 against 2.8% for the EU28<sup>17</sup>.

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<sup>16</sup> These publication data are based on Elsevier's Scopus database. ScienceMetrix, Analysis and Regular Update of Bibliometric Indicators, study conducted for DG RTD. They represent an update of the data displayed in the table below. See also [http://ec.europa.eu/research/innovation-union/index\\_en.cfm?pg=other-studies](http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=other-studies).

<sup>17</sup> SciVal 2014, Scopus based publication indicators derived from Elsevier's SciVal platform, [www.scival.com](http://www.scival.com) last accessed December 2014.

**Table 14. Assessment of the Performance of the National Research and Innovation System**

<b>1. ENABLERS</b>	Year	BG	EU
<b>Human resources</b>			
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	2011	0.60	1.70
Percentage population aged 30-34 having completed tertiary education	2012	26.90	35.80
<b>Open, excellent and attractive research systems</b>			
International scientific co-publications per million population	2012	212.90	343.15
Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	2009	3.22	10.95
<b>Finance and support</b>			
R&D expenditure in the public sector as % of GDP	2012	0.24	0.75
Venture capital (early stage, expansion and replacement) as % of GDP	2012	0.00	0.08
<b>2. FIRM ACTIVITIES</b>			
R&D expenditure in the business sector as % of GDP	2012	0.39	1.31
<b>Linkages and entrepreneurship</b>			
Public-private co-publications per million population	2011	4.05	52.84
<b>Intellectual assets</b>			
PCT patent applications per billion GDP (in PPS€)	2010	0.35	3.92
PCT patent applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	2010	0.05	0.85
<b>3. OUTPUTS</b>			
<b>Economic effects</b>			
Contribution of medium and high-tech product exports to trade balance	2012	-5.23	1.27
Knowledge-intensive services exports as % total service exports	2011	25.47	45.26
License and patent revenues from abroad as % of GDP	2012	0.05	0.59

Source: European Commission, IUS Database (2014).

The performance indicators in Table 14 demonstrate underperformance, weak capabilities, and insufficient dedicated resources within the NRIS in Bulgaria. The impact of underfunding, the low level of absorption of EU funds, the lack of systematic monitoring and assessment of performance at national level, and the lack of a coordinated strategic approach at system level integrating education, science, technology development and

business innovation, has had a negative impact on the performance of the system on all indicators.

The insufficient institutional support to research performers is a major impediment to effective implementation of new funding mechanisms. Institutions are essential in terms of facilitating spill-over effects on skills and organisational capabilities. The main observations below summarise the key weaknesses in the policy and framework and the institutional environment that can explain the underperformance, and which are challenges for the country.

1. Promotion of research and innovation at all relevant policy levels is already in the pipeline, as it has been included in the action plan of the NRP 2014 and in the newly approved strategic documents for implementation (see Table 1). Encouraging promotion of research and innovation activities is embedded in the rules for management of the two funding agencies NSF ([MES, 2014b](#)) and NIF ([ME, 2014d](#)). Although all main strategic documents refer to addressing major societal challenges, such as: resource efficiency, climate change, health and ageing, and towards deriving competitive advantage, there is no common implementation platform where co-alignment of strategic intent and resource allocation can occur. The separation between activities undertaken by MES, ME and BAS, as well as other sectoral ministries, continues to proliferate in the system. There is still a fragmented approach to addressing the challenges of Europe 2020 and the mobilisation of institutional resources for support and action. The fragmentation is exhibited by the variety of strategic documents, prepared with a specific and narrowly focused vision for the future.
2. The highest level of policy making institutions, responsible for the design and implementation of research and innovation policies also exhibit a narrow specialisation under the separate 'Standing Committees' at the National Assembly and separate Councils of the CM (Diagram 1). There is a limited indication that the broad stakeholder representation in specific decision-making bodies at the CM improves cross-ministerial coordination and strengthens the impact on the NRIS. Part of the same fragmentation challenge is currently the unclear responsibility for the implementation of one of the most integral strategic document – ISSS.
3. There is no coherent innovation policy in a broad sense, as the implementation of the ISSS is in its initial stage. The expectation is that the implementation of ISSS will co-align all strategic documents and action plans. ISSS provides a good overview of the demand and supply policies that are required to consolidate the innovation outputs and their application to the economy, but has limited vision on the education component of the system and the role of HEIs and regional innovation centres.
4. The NRP 2014 contains a detailed Action Plan with allocated budgets addressing most of the current challenges. The finalisation of the OPSESG and OPIC programmes are expected to bring more clear view on the commitment of the government to meet its own investment target, as well as – the mechanisms to stimulate private investment in R&D.

5. The challenges for the higher education in Bulgaria are related to fundamental questions about restructuring, quality of provision, evaluation of academic outputs, and enhancing entrepreneurial education, as well as improving access and co-alignment with the labour market. These priorities represent a step before a selection of best practice, or a stage before an emphasis on excellence can be raised. The legal framework is mostly in place, however, some legal provisions are not fully implemented.
6. The education and training system (mostly the secondary, professional and life-long learning) currently does not provide the right mix of skills, and the restructuring of the provision is a major challenge to the authorities. Most of the strategies developed by MES are aiming to address these deficiencies.
7. There are already a number of R&I partnerships at regional, national and international level. These, however, do not receive sufficient institutional support and represent scattered initiatives at program and project level. Further consolidation of these activities will occur under the implementation of the National Roadmap. These practices, however, need to be consolidated under a common and transparent evaluation framework that measure the effectiveness and efficiency of funding of the R&I system. Although the regulatory framework has been adapted to facilitate researcher mobility, the practice is very limited. Further institutional support should enhance the capabilities of research centres and centres of excellence to share skills and platforms, seeking to build collaborative advantage.
8. The framework conditions are still at the stage of development and cross-ministerial discussions. The system for protection of IP stands as neglected and outside the main thrust of current policies – due to the low level of activity. It is essential that any current design and development efforts consider the position of the Bulgarian Patent Office and the other components of the IP system.
9. The current funding bodies NSF and NIF operate in a very different way, and continue to adopt different rules and principles, which is an impediment to efficient resource allocation across the R&I system. They follow different strategic priorities and have different capabilities to combine resources from the budget with EU structural funds and FP funds. Although there is a new effort to include international experts in the evaluation procedure, the implementation and impact of this effort are limited.
10. The public sector is still not a driver of innovation due to limited public procurement practice and disconnected initiatives. The e-Government task and initiative is an example, where the Government can lead its ICT sector to enhance and accelerate the implementation of the e-Government programme.

## ***5.2 Structural challenges of the national R&I system***

Many aspects of the R&I system still function in isolation from each other. The autonomy in the university sector and BAS create competition for resources (rather than

collaboration), and small scale initiatives, rather than achieving a critical mass in core capabilities that enhance national competitiveness and have direct impact on addressing the socio-economic challenges of the country. The optimisation of the system is required at all levels – from the level of research performers, to the level of funding bodies and support agencies, and to the highest level of integrated strategic platforms for priority setting, coordinated action, leveraging resources, systemic monitoring and evaluation. Integration and complementarity of support and policy instruments is required to generate synergies across ministerial and organisational activities, common, transparent and detailed evaluation of outputs and effects across sectors, and simplicity for accessing resources and advise for innovative firms, entrepreneurs and research organisations.

The main weaknesses and opportunities for the current NRIS are describes in Table 15. Most of the weaknesses have been already identified in national strategic documents, such as: ISSS, NRDS, NRP and the draft implementation plans for the OP ‘Innovation and competitiveness’ (2014-2020) and the OP ‘Science and education for smart growth’ (2014-2020). The complex challenges of managing NRIS and the complex and competitive environment for technology upgrade require a policy mix and coordinated action across national and pan-European agencies and platforms and demand a unified approach at country level. Hence the main challenges for Bulgaria are to design this unified framework that will enable all levels of the NRIS to contribute with their strengths to addressing the challenges of sustainable and inclusive economic growth.

**Table 15. Evaluation of the weaknesses of the national research and innovation system.**

<b>Weaknesses</b>
Extremely low level of GERD / GDP and BERD/GDP. At present the low level of funding is used to explain the underperformance of the entire system and this is obscuring the identification and acknowledgement of other structural inefficiencies.
Fragmented strategic vision across large number of strategic documents, and insufficient coherent integrated approach to stimulating innovation, science, technology and industry upgrade for economic growth. Shared responsibilities and duplications across different Councils and Ministries at the highest level of policy decision making contributes to proliferation of fragmentation throughout the consultation, decision making and implementation phases of the process.
Insufficient development and implementation of monitoring mechanisms, which are also not sufficiently co-aligned and coordinated across agencies, policies, and strategies. The current practice is based on a mix of self-assessment, self-reporting, and some elements of formal assessment, and does not provide a coherent picture for the effectiveness of allocation of funds and monitoring of performance.
Scientific research is isolated from industry. The work at public research organisations, although aspiring fundamental research, makes limited contribution to addressing the challenges of the country. The current funding frameworks that stimulate collaborations across industry, university and science establishments have created some results, but with marginal impact on the system and the economy.
Insufficient integration and collaboration between the public sector research performers (i.e. universities and research organisations from BAS), which are currently competing against each other for funding. The protection of individual institutional autonomy is a barrier to networking, integration and co-specialisation based on competence, achievements, new ideas, and entrepreneurial thrust.
Lack of effective platforms and networks to integrate the emerging system of technology transfer offices, centres of excellence and research infrastructure hubs. The small scale of the internal market for innovation products and services requires a strong and concerted effort to up-scale the activities of individual suppliers and to open access to the global demand for new science, technology and R&D services.

Conservative hiring practices by firms for high skilled and science workers, and by university and science organisations, for innovation practitioners. As a result, the labour market for researchers is weak and not attractive enough as a career proposition for young people.

Weaknesses throughout all level of education – including vocational and professional, primary, secondary and tertiary education. The large number of new strategic documents focused on the education system highlights its underperformance due to insufficient institutional support, and lack of coordination.

Poor performance on all indicators from the Innovation Scoreboard suggests that the implementation of ‘indicator-driven’ individual measures is not sufficient and there is a need for a systemic approach aiming at a radical transformation of the science, technology and innovation system.

### **Opportunities**

The need for technological upgrade of the industry creates an internal market for innovations. Targeted procurement policies could feed into the development of internal service-cycles between the demand and the supply of advanced knowledge and technology solutions. The implementation of specific government policies, such as e-Government, or advanced health care, could be used for innovation in services.

Investment in e-Government and the upgrade of the digital infrastructure will create positive demand for ICT innovation and growth. Support for digitalisation of firms will expand the internal market for value-added ICT services and will enhance the opportunities for growth of innovation firms in the ICT sector.

Pan-European collaboration and integration of R&D capabilities will enable internal specialisation of research performers in Bulgaria, as well as the circulation of knowledge and capital. These, however, should be coordinated at a national level, where sufficient institutional support is made available to individual research organisations and centres of excellence, as well as cross-fertilisation platforms for spill over effects.

Measures that target the mapping of the scattered scientific and research capabilities will enhance the national portfolio for multinational investment. Mapping of science and technology capabilities and RDI activities at regional and sectoral level will enable individual scientists and entrepreneurs to identify pathways for co-alignment, as well as government agencies to monitor the progress of implementation of individual strategic priorities.

## **5.3 Meeting structural challenges**

In response to leading EU policies and previous EC country specific recommendations the Bulgarian government has developed an extensive portfolio of policy documents and procedures for implementation. Most documents critically evaluate the causes for underperformance and the opportunities for growth. Among the lead documents are: National Development Programme: Bulgaria 2020; National Reform Programme, 2014 update; Europe 2020; Partnership Agreement of the Republic of Bulgaria, outlining assistance from the European structural funds and investment for the period 2014-2020; and National Roadmap for Research Infrastructure.

Most recently, all ministries and sectors of activities developed comprehensive strategies, outlining their vision for the future. For example, MES currently implements 13 individual strategies addressing deficiencies in the education system ([MES, Strategies](#)). These strategies, however, now present a new challenge for a coherent integration and coordination across the boundaries of *levels of education*, application to *sectors of the economy* and individual *sectoral ministries*.

The governance of the system is executed through laws and ministerial decisions, where each law addresses a narrowly defined subject and jurisdiction. Although there is a clear division of responsibilities between the two leading ministries MES and ME, there is no sufficiently institutionalised coordination interface. The proposed draft of the Law for Innovations institutionalises this division, by confirming that ME will take a lead on the innovation policy, the implementation of ISSS, the disbursement of EU framework funding and the management of the OP 'Innovation and competitiveness', while MES has been made responsible for managing the OP 'Science and education for smart growth' (2014-2020), including the coordination and development of the national research infrastructure under the National Roadmap. There is no forward-looking vision, for example, how the national roadmap consortiums could affect regional innovation and cluster growth.

Although the recent amendments to the Law for Promotion of Scientific Research explicitly permit co-funding across NSF, NIF and other budgetary establishments, this regulatory provision does not facilitate by itself the coordination across MES and ME for the development of the national research infrastructure, or the effective integration of centres of excellence, technology transfer offices, universities and research organisations under BAS in the development of their scientific, innovation, and R&D portfolio. There is still confusion across the implementation and co-alignment of the newly adopted strategies ISSS, NRDS, and the National Roadmap.

Currently, there is no provision or policy measure to tackle the deeply engrained separation in scientific activities and doctoral training across the universities and BAS, as both elements of the system need institutional support, particularly in terms of upgrade in entrepreneurial skills and linking with the industry. Although there are policy measures to tackle the low level of entrepreneurial skills and the separation between industry and academia, the lack of institutional support and an integration procedure in bridging these gaps reinforces the fragmentation and small scale of individual approaches and solutions.

In this context, the evaluation of the appropriateness of the policy mix is problematic, as the main challenges lie in the existing institutional infrastructure designed and developed to implement this policy mix. The effectiveness of implementation lies in coordination across, MES, ME, NIS, NIF, BSMEPA, Science Directorate (MES), Higher Education Directorate (MES), Directorate General for structural funds (MES), the Council for coordination and management of the EU structural funds (CM), as well as all other Councils of the CM enlisted in Diagram 1.

It is important that policy makers use all currently available assessment of the innovation performance of the country and formulate strategic response to each indicator where Bulgaria is falling behind the EU average. Policy actions, however, should aim to address the challenges at a systemic level, where funding frameworks or policy decisions pursue multiple objectives and targets, and facilitate spill over effects from R&I and from funding across all sectors. Spill over effects should be sought across the public and the private sector, as well as specific regions and sectors of the economy.

The development and implementation of specific measures, such as new financial instruments should be seen as drivers for encouraging science and technology based entrepreneurship and participation from SMEs, or nurturing pro-active behaviour on both sides of the supply and the demand side for scientific knowledge and capabilities. These drivers should target an accelerated absorption of EU funds, raised labour productivity and value-added in the economy, optimisation of the system using European best practice,

nurturing pan-European and international collaboration, mobility, co-specialisation and integration, or effective co-alignment between the structural challenges and the national priorities for reforms in various parts of the system.

The increase both of the volume and the intensity of R&D funding and the effectiveness of R&D investment in the public and the private sector should be used as a leverage for restructuring of the system, reducing fragmentation of R&I administration, strengthening the country's representation at pan-European coordination forums ([IGLO](#)), enhancing effective monitoring and assessment of performance, and employing performance measurement and evaluation in future policy design.

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- Administrative Register. Административен регистър. Органи на изпълнителната власт (*Executive authorities*); <http://ar2.government.bg/ras/index.html>
- ASTRONET - <http://www.astronet-eu.org/spip.php?rubrique62&lang=en>
- BAS. Bulgarian Academy of Science; <http://nold.bas.bg/cgi-bin/e-cms/vis/vis.pl?s=001&p=0200>
- BSMEPA. Изпълнителна агенция за насърчаване на малките и средни предприятия, Министерство на икономиката и енергетиката (*Bulgarian Small and Medium Enterprises Promotion Agency, Ministry of Economy*);  
<http://www.sme.government.bg/en/>
- BulCRIS. Регистърът на научната дейност в Република България (*Bulgarian Current Research Information System*);  
<http://www.cris.government.bg/public/Locale.do?language=en&page=/public/Main.do>
- BULGARIA E-government Strategy (draft document);  
<http://workspace.unpan.org/sites/internet/Documents/UNPAN025639.pdf>
- CB. Consultative Bodies, Консултативни съвети;  
[http://www.saveti.government.bg/web/cc\\_13/1](http://www.saveti.government.bg/web/cc_13/1)
- CCAQSE. Център за контрол и оценка на качеството на училищното образование (*Centre for Control and Assessment of the Quality of School Education*);  
<http://www.ckoko.bg/>
- CEEPUS. Central European Exchange Program for University Studies;  
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- CL BAS. Централна библиотека на Българската академия на науките;  
<http://cl.bas.bg/information-services/on-line>
- CM. Council of Ministers; <http://www.government.bg/fce/index.shtml?s=001&p=0023>
- CM Councils. Консултативен съвет за насърчаване на малките и средните предприятия (*Consultative Council for Promotion of Small and Medium Size Enterprises*), Портал за консултативни съвети, Министерски съвет;  
[http://www.saveti.government.bg/web/cc\\_50/1](http://www.saveti.government.bg/web/cc_50/1)
- CM Councils. Координационен съвет за изпълнение и мониторинг на Националния план за изпълнение на Европейската гаранция за младежта 2014-2020 (*Coordination Council for Implementation and Monitoring of the National Plan for*

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CM Councils. Национален съвет за кредитиране на студентите и докторантите (*National Council for Loans to Students and Doctoral Applicants*), Портал за консултативни съвети, Министерски съвет; [http://www.saveti.government.bg/web/cc\\_402/1](http://www.saveti.government.bg/web/cc_402/1)

CM Councils. Национален съвет за наука и иновации (*National Council for Science and Innovation*), Портал за консултативни съвети, Министерски съвет; [http://www.saveti.government.bg/web/cc\\_54/1](http://www.saveti.government.bg/web/cc_54/1)

CM Councils. Национален съвет за тристранно сътрудничество (*Council of Ministers Consultative Bodies*), Портал за консултативни съвети, Министерски съвет; [http://www.saveti.government.bg/web/cc\\_13/1](http://www.saveti.government.bg/web/cc_13/1)

CM Councils. Национален съвет по иновации (*National Council for Innovation*), Портал за консултативни съвети, Министерски съвет; [http://www.saveti.government.bg/web/cc\\_48/1](http://www.saveti.government.bg/web/cc_48/1)

CM Councils. Съвет за защита на интелектуалната собственост (*Council for Protection of Intellectual Property Rights*), Портал за консултативни съвети Министерски съвет; [http://www.saveti.government.bg/web/cc\\_25/1](http://www.saveti.government.bg/web/cc_25/1)

CM Councils. Съвет за координация и управление на средствата от Европейския съюз (*Council for Coordination and Management of the EU Structural Funds*), Портал за консултативни съвети Министерски съвет; [http://www.saveti.government.bg/web/cc\\_204/1](http://www.saveti.government.bg/web/cc_204/1)

CM Councils. Съвет за развитие (*Council for Development*), Портал за консултативни съвети Министерски съвет; [http://www.saveti.government.bg/web/cc\\_401/1](http://www.saveti.government.bg/web/cc_401/1)

CM Councils. Съвет по Европейските въпроси (*Council for European Affairs*), Портал за консултативни съвети, Министерски съвет; [http://www.saveti.government.bg/web/cc\\_33/1](http://www.saveti.government.bg/web/cc_33/1)

COST. European Cooperation in Science and Technology; [http://www.cost.eu/COST\\_Actions](http://www.cost.eu/COST_Actions)

DOAJ. Directory of Open Access Journals <http://doaj.org/>

Driver. Digital repository infrastructure in European research, <http://www.driver-support.eu/national/bulgaria.html>

EMBL. European Laboratory for Molecular Biology; <http://www.embl.de/>

Enterprise Europe Network; <http://enterprise-europe-network.bg/about-us/about-een/>

ERA. European Research Area; Join Programming Initiatives; [http://ec.europa.eu/research/era/joint-programming-initiatives\\_en.html](http://ec.europa.eu/research/era/joint-programming-initiatives_en.html)

ERA-NET scheme; [http://ec.europa.eu/research/era/era-net\\_en.html](http://ec.europa.eu/research/era/era-net_en.html)

ESA. European Space Agency; <http://www.esa.int/ESA>

ESFRI. European Strategic Forum for Research Infrastructure; [http://ec.europa.eu/research/infrastructures/index\\_en.cfm?pg=esfri](http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri)

EUFUNDS. Single Information Web Portal for EU Structural Funds; <http://www.eufunds.bg/en/page/2>

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EUSDR - EU Strategy for the Danube Region; <http://www.danube-region.eu/about>

Horizon 2020. The EU Framework Programme for Research and Innovation; <http://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>

IGLO. Informal Group of RTD Liaison Offices; <http://www.iglortd.org/members>

JIC-BAS. Joint Innovation Centre of the Bulgarian Academy of Sciences; <http://jic-bas.eu/index.php/en>

Joint Programming Initiative Climate; <http://www.jpi-climate.eu/programme/objectivesvision>

Joint Programming Initiative More Years, Better Lives; [http://www.jp-demographic.eu/front-page?set\\_language=en](http://www.jp-demographic.eu/front-page?set_language=en)

Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI); <http://www.faccejpi.com/faccejpi/About-Us/What-is-FACCE-JPI>

Joint Programming Initiative Urban Europe; <http://jpi-urbaneurope.eu/>

JRC. Joint Research Centres; <https://ec.europa.eu/jrc/>

JTIs. Joint Technology Initiatives; [http://ec.europa.eu/research/jti/index\\_en.cfm?pg=about](http://ec.europa.eu/research/jti/index_en.cfm?pg=about)

MAF. Ministry of Agriculture and Food; <http://www.mzh.government.bg/mzh/en/Home.aspx>

MC. Ministry of Culture; <http://mc.government.bg/index.php?l=2>

ME. Ministry of Economy; <http://www.mi.government.bg/en/pages/about-us-1.html>

MES. Ranking System for Higher Education Institutions in the Republic of Bulgaria; <http://rsvu.mon.bg/rsvu3?locale=en>

MES. National Science to Business Platform; <http://s2b.mon.bg/en/home/>

MES. Главна дирекция "Структурни фондове и международни образователни програми" (*Office of Structural Funds and International Educational Programs*); <http://sf.mon.bg/?lang=bg>

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MES. Дирекция 'Наука' (*Science Directorate*); <http://www.mon.bg/?go=page&pagelid=5&subpagelid=313>

MES. Закони (*Legislative acts*); <http://www.mon.bg/?go=page&pagelid=7&subpagelid=57>

MES. Министерство на образованието и науката (*Ministry of Education and Science*); <http://www.mon.bg/?go=page&pagelid=5&subpagelid=34>

MES. Студентски практики (*Student Placements*); <http://praktiki.mon.bg/sp?m=10>

MES. Регистри (*Licensed Education Activities*); <http://www.mon.bg/?go=page&pagelid=8&subpagelid=78>

MES. Регистър на акредитираните висши училища (*Register of the Accredited Higher Schools in Bulgaria*); <http://www.mon.bg/?go=page&pagelid=8&subpagelid=167>

MES. Стратегии (*Strategies*); <http://www.mon.bg/?go=page&pagelid=74&subpagelid=143>

META - <http://www.meta-group.com/about-meta/Pages/about-meta.aspx>

MF. Ministry of Finance, <http://www.minfin.bg/en/>

Military Academy; <http://rnda.armf.bg/wp-content/uploads/000s/EN/About/Akademi/welk.php>

MTITC. Ministry of Transport, Information Technology and Communications, <https://www.mtitc.government.bg/>

NA. National Assembly of the Republic of Bulgaria; <http://www.parliament.bg/en>

NA. Standing Committees at the National Assembly; <http://www.parliament.bg/en/parliamentarycommittees>

NAVET. National Agency for Vocational Education and Training; <http://www.navet.government.bg/en>

NCPHA. National Centre of Public Health and Analyses; <http://ncphp.government.bg/en>

NEAA. National Evaluation and Accreditation Agency; <http://www.neaa.government.bg/en>

NETWATCH Network Information; <http://netwatch.jrc.ec.europa.eu/web/ni/network-information/networks>

NIF. National Innovation Fund; <http://www.mi.government.bg/en/themes/nacionalen-inovacionen-fond-19-287.html>

NSF. PhD Competition 2009; <http://nsfb.net/?id=1242>

NSF. Фонд научни изследвания (*National Science Fund*); <http://www.fni.bg/>

NSI. National Statistics Institute; <http://www.nsi.bg/en>

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OPAC. Operational Programme 'Administrative Capacity' 2007-2013; <http://www.opac.government.bg/en/home>

OPC. Operational Programme 'Development of the Competitiveness of the Bulgarian Economy' 2007-2013; <http://www.opcompetitiveness.bg/index.php?lid=2>

OPE. Operational Programme 'Environment' 2007 – 2013; <http://ope.moew.government.bg/en>

OpenAIRE. Open access infrastructure for research in Europe; <https://www.openaire.eu/>

OpenAIRE\_BG. Bulgarian OpenAIRE Repository; <https://www.openaire.eu/bulgaria/noads/oa-bulgaria>

OPHRD. Operational Programme 'Human Resource Development' 2007-2013; <http://ophrd.government.bg/>

OPIC. Оперативна програма 'Иновации и конкурентоспособност' 2014-2020 (*Operational Programmes 'Innovation and Competitiveness' 2014-2020*); [http://www.opcompetitiveness.bg/module3.php?menu\\_id=276](http://www.opcompetitiveness.bg/module3.php?menu_id=276)

OPRD. Operational Programme 'Regional Development' 2007-2013; <http://www.bgregio.eu/en/>

OPSESG. Оперативна програма 'Наука и образование за интелигентен растеж' 2014-2020 (*Operational Programme 'Science and Education for Smart Growth' 2014-2020*); <http://www.eufunds.bg/bg/page/985>

ОП 'Регионално развитие' 2014-2020; <http://www.bgregio.eu/programirane-i-otsenka/mrrb.aspx>

OPT. Operational Programme 'Transport' 2007-2013; <http://www.optransport.bg/en/>

OPTA. Operational Programme 'Technical Assistance' 2007-2013; <http://www.eufunds.bg/en/page/15>

PO. Patent Office of Republic of Bulgarian; <http://www.bpo.bg/>

PROINNO. Technology Transfer Office; <http://www.proinno-bg.eu/>

RECTORS. Съвет на ректорите на Висшите училища в Р България (*Rectors' Conference*); <http://rectors.bg/>

S2B. Science to Business platform; <http://s2b.mon.bg/en/home/>

SC. Standing Committees; <http://www.parliament.bg/en/parliamentarycommittees>

Scival; <http://www.scival.com/>

Sofiatech. Sofia Tech Park; <http://sofiatech.bg/en/>

UMIS. Unified management information system for the EU structural instruments in Bulgaria; <http://umispublic.government.bg/Default.aspx>

VFU. Varna Free University 'Chernorizets Hrabar'; <http://vfu.bg/en/>

World Economic Forum. Competitiveness Ranking; <http://reports.weforum.org/global-competitiveness-report-2014-2015/rankings/>

WIPO. World Intellectual Property Organisation; [http://www.wipo.int/ipstats/en/statistics/country\\_profile/profile.jsp?code=BG](http://www.wipo.int/ipstats/en/statistics/country_profile/profile.jsp?code=BG)

## **Annex 3 – Abbreviations**

AA - Agricultural Academy  
BAS – Bulgarian Academy of Science  
BSMEPA - Bulgarian Small and Medium Enterprises Promotion Agency, Ministry of Economy  
CCAQSE - Centre for Control and Assessment of the Quality of School Education  
CEEPUS - Central European Exchange Program for University Studies  
CERN - European Centre for Nuclear Research  
CEU – Council of the European Union  
CLARIN - Common Language Resources and Technology Infrastructure  
CM - Council of Ministers of the Republic of Bulgaria  
COST - European Cooperation in Science and Technology  
CSR - Country-Specific Recommendations  
DARIAH - Digital Research Infrastructure for the Arts and Humanities  
EC – European Commission  
EC COM – European Commission Communication  
EHC - European Haemophilia Consortium  
EHEA - European Higher Education Area  
ERA - European Research Area  
ERTRAC - European Road Transport Research Advisory Council  
ESFRI - European Strategic Forum for Research Infrastructure  
ESS-ERIC - European Social Survey European Research Infrastructure  
EU – European Union  
EU PVTP - European Photovoltaic Technology Platform  
EuMAT - European Technology Platform for Advanced Engineering Materials and Technologies  
EUSDR - EU Strategy for the Danube Region  
EVCA - European Private Equity & Venture Capital Association  
FACCE-JPI - Joint Programming Initiative on Agriculture, Food Security and Climate Change  
FDI - Foreign Direct Investment  
FP – Framework Programme  
GBOARD - Government Budget Appropriations or Outlays on Research and Development  
GCI - Global Competitiveness Index  
GERD - Gross Domestic Expenditure on Research and Development  
HEIs - Higher Education Institutions  
ICT - Information and Communications Technology  
IP – Intellectual property  
ISSS - Innovation Strategy for Smart Specialisation  
JEREMIE - Joint European Resources for Micro to Medium Enterprises

JIC-BAS - Joint Innovation Centre of the Bulgarian Academy of Sciences  
JPI - Joint Programming Initiative  
JTIs - Joint Technology Initiatives  
LDAS - Law for Development of the Academic Staff  
HEA - Higher Education Act  
MAF - Ministry of Agriculture and Food  
MC - Ministry of Culture  
ME - Ministry of Economy  
MES – Ministry of Education and Science  
MF - Ministry of Finance  
MIRRIS - Mobilising Institutional Reforms in Research and Innovation Systems  
MTITC – Ministry of Transport, Information Technology and Communication  
NA – National Assembly of the Republic of Bulgaria  
NAVET – National Agency for Vocational Education and Training  
NEAA - National Evaluation and Accreditation Agency  
NIF – National Innovation Fund  
NIS - National Innovation System  
NRDS - National Research Development Strategy 2020  
NRIS - National Research and Innovation System  
NRP - National Reform Programme  
NRRRI - National Roadmap for Research Infrastructure  
NSF - National Science Fund  
NSI – National statistical institute  
OP - Operational Programme  
OPAC - Operational Programme ‘Administrative Capacity’ 2007-2013  
OPC - Operational Programme ‘Development of the Competitiveness of the Bulgarian Economy’ 2007-2013  
OPE - Operational Programme ‘Environment’ 2007 – 2013  
OPHRD - Operational Programme ‘Human Resource Development’ 2007-2013  
OPIC - Operational Programme ‘Innovation and Competitiveness’ 2014-2020  
OPRD - Operational Programme ‘Regional Development’ 2007-2013  
OPRG - Operational Program ‘Regions and Growth’ 2014-2020  
OPSESG – Operational Programme ‘Science and Education for Smart Growth’ 2014-2020  
OPSIG - Operational Programme ‘Science and Intelligent Growth’ 2014-2020  
OPT - Operational Programme ‘Transport’ 2007-2013  
OPTA - Operational Programme ‘Technical Assistance’ 2007-2013  
OPTICON - Optical Infrared Co-ordination Network  
PO - Patent Office of Republic of Bulgarian  
PPA - Public Procurement Agency  
PRACE - Partnership for Advanced Computing in Europe

R&D - Research and Development

RDI – Research, Development and Innovation

RECTORS - Rectors' Conference of Higher Education Institutions

R&I – Research and Innovation

RPO - Regional Patent Offices

S2B - Science to Business

SC - Standing Committees

SDHE - Strategy for the Development of Higher Education

SME - Small and Medium-sized Enterprises

TTO – Technology Transfer Office

UMIS - Unified Management Information System for the EU Structural Instruments in Bulgaria

VFU - Varna Free University

WEF - World Economic Forum

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European Commission

**EUR 27323 EN – Joint Research Centre – Institute for Prospective Technological Studies**

Title: RIO Country Report Bulgaria 2014

Author: Emanuela Todeva

Luxembourg: Publications Office of the European Union

2015 – 82 pp. – 21.0 x 29.7 cm

EUR – Scientific and Technical Research series – ISSN 1831-9424 (online)

ISBN 978-92-79-49231-0 (PDF)

doi:10.2791/634274

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doi:10.2791/634274

ISBN 978-92-79-49231-0

