ERAWATCH COUNTRY REPORT 2010: Bulgaria

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Acknowledgements and further information:

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

The analytical framework and the structure of the reports have been developed by the Institute for Prospective Technological Studies of the Joint Research Centre (JRC-IPTS) with contributions from Directorate General for Research and Innovation and the ERAWATCH Network. The report has been produced by the ERAWATCH Network in the framework of the specific contract on ERAWATCH Research Inventory and Analytical Country Reports 2010 and 2011 commissioned by JRC-IPTS.

In particular, it has benefited from comments and suggestions of Slavo Radosevic, who reviewed the draft report. The contributions and comments of DG-RTD and Susana Elena from JRC-IPTS are also gratefully acknowledged.

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

Executive Summary

Bulgaria has a population of 7.56 million people. Bulgarian GDP decreased by 5% in 2009 to €35.042b. It is one of the countries with the lowest R&D intensity in the EU. Bulgaria's intramural R&D expenditure (GERD) has been decreasing over time – from 0.57% in 1999 to 0.49% of GDP in 2008 - almost 4 times less than the EU27 average (NSI[1] and Eurostat, 2008). The Bulgarian Business Enterprise R&D expenditure (BERD) is among the lowest in Europe at only 0.15% of GDP. However, the share of BERD has been increasing from 0.10% of GDP in 2002 to 0.15% in 2008.

Bulgaria faces a chronic shortage of public resources for R&D stretched across an oversized public institutional structure inherited from central planning. The outdated legal and institutional framework related to innovation and research, as well as the lack of long-term national financial planning of research, hamper the promotion of private investment in R&D and the achievement of the national R&D investment objectives.

The Bulgarian economy consists of almost 90% micro enterprises (NSI, 2008) and R&D remains largely state funded. This unfavourable environment for market-based innovations has resulted in a national innovation performance based more on the technology push than on the business pull.

Knowledge Triangle

Only few changes have occurred in the research policy of Bulgaria in 2009-2010. Most notably the Bulgarian government approved a national target for R&D expenditure for 2020 – 1.5% of GDP. The Bulgarian Parliament adopted the Law for Amendment and Supplement of the Law on Scientific Research Promotion, which envisages: (1) the establishment of large scientific and research centres; and (2) the start of more effective monitoring and evaluation of projects funded under the National Science Fund (NSF). However, these changes happened against the backdrop of continuing strategic policy planning uncertainty and falling public support for research. The draft of a new Strategy for Development of Scientific Research 2009-2019 has not been approved by Parliament. The Bulgarian government cut the budget of the Bulgarian Academy of Sciences (BAS), the biggest public R&D organisation, by roughly 40% of what was initially approved in the state budget for 2010. The budget subsidies for R&D in the state universities were completely suspended in the second half of the year. Hence, the adopted legislative changes still remain only "on paper".

Regarding innovation policy, the National Innovation Strategy adopted in 2004 is already out-dated and not being implemented in practice. The National Innovation Fund, the main tool of the strategy, ceased its activity in 2009–2010 due to on-going debate on the need for its restructuring, which was compounded by the impact of the economic crisis on public finances. Plans for NIF to merge with NSF have not materialised. In an effort to reinvigorate national innovation policy the Ministry for Economy, Energy and Tourism has proposed in 2010 the drafting of a Law on the Development of Innovations and has elaborated the Vision for the Development of

[1] National Statistical Institute (NSI), website: http://www.nsi.bg/

Bulgaria as part of the Europe 2020 Strategy. These developments have not yet produced any tangible innovation policy results.

Regarding education policy, the Bulgarian Parliament has adopted a new Law on the Development of the Academic Staff (LDAS), which abolished the previous act dating from 1972. The Ministry of Education, Science and Youth introduced the first university rating system, which is intended to serve as a tool for discretionary state funding according to universities' achievements. Additionally, a credit scheme for students has been launched for the first time since 1989. The implementation of the LDAC is blocked in most of the universities, due to a decision of the Constitutional Court to denunciate some paragraphs of the new law. Nevertheless, the main policy change, introduced by the LDAC, is the abolishment of a single national body that manages all academic career promotions (the Supreme Attestation Commission) and its replacement with scientific juries hosted within any particular academic institution. In 2010 there has been a double reduction of the pre-approved state subsidies for universities, and the draft of the changes to the Higher Education Act has been rejected.

Effectiveness of knowledge triangle policies

	Recent policy changes	Assessment of strengths and weaknesses
Research policy	Decrease of public spending for R&D and negative effect of the crisis. Enacted Law for Amendment and Supplement of the Law on Scientific Research Promotion (LPSR)	The LPSR provides for the building of large research centres and for better functioning of the NSF. These changes come, however, at a time when the Bulgarian government has cut public funds for R&D.
Innovation policy	A national GERD goal has been declared for 2020: 1.5% of GDP.	While adopting a national R&D goal has been a major breakthrough it comes against the backdrop of a lack of updated National Innovation Strategy and the ceasing of operation of the National Innovation Fund.
Education policy	Changed policy on academic career promotion (new Law on the Development of Academic Staff). The university rating system was launched but public financing was reduced	Career development and university rating are critical for the proper functioning of the system. However, policy changes remain largely on paper, with a long way to go to practical implementation. Part of the text of the new Law was rendered unconstitutional, which stopped the procedures for habilitation (i.e. acquiring scientific ranks) and obtaining of PhD degrees. The first ranking of the universities, which is intended to support the discretionary allocation of public resources according to university achievement, did not take into consideration the specifics of different universities.
Other policies	Both 2010 and 2011 budgets envisage a cut in resources for R&D, innovation and education. Delays in European funds' absorption persist	Considerable weaknesses result in the continuing delay of the OPs' implementation including, delays of state and regional bodies' payments to businesses, and increasing uncertainty for realising business investment programmes combined with no increase of the public financing of R&D and innovation. There are reports that beneficiaries experience difficulties in securing co-financing for the implementation of projects under the Competitiveness and Innovation Programme and other EU-funded programmes.

European Research Area

The ERA-research policies are formally integrated in the national research policy documents and strategies. Bulgaria is a member of several European research organisations and participates in EU-funded research projects. Bulgaria is also developing bilateral cooperation with 13 countries, with which agreements for scientific and technological cooperation have been signed (Ministry of Education, Youth and Science[2] and the National Science Fund). Although support for national policies for achieving the strategic ERA objectives has remained strong on paper, financially it is almost entirely dependant on EU-financing.

The main challenges for the national R&D system, incl. in relation to the ERA objectives, could be summarised as follows: a lack of adequate financial resources, a lack of consensus on the national research priorities, low level of absorption capacity of EU funds, including OP Competitiveness and OP Development of Human Resources, as well as institutional fragmentation in national policy making.

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

	ERA objectives	Main national policy changes	Assessment of strengths and weaknesses
1	Ensure an adequate supply of human resources for research and an open, attractive and competitive single European labour market for male and female researchers	New schemes were launched under the NSF and OP Development of Human Resources to stimulate the young researchers in the country.	Achieved harmonisation with EU policy on paper; however persistent lack of public funds and slow implementation of EU funds result in slow real convergence.
2	Increase public support for research	The public budget for science in 2011 is planned to increase in absolute terms, however it remains at 0.3% of GDP. In June 2010, the Bulgarian government adopted a GERD target of up to 1.5% of GDP by 2020.	GERD has remained at a steady low level at 0.49 - 0.5% of GDP. The financial crisis has had a negative effect on the public research budget.
3	Increase European coordination and integration of research funding	No change in national policy has been observed in 2010.	Bulgaria lacks national strategic guidelines for participation in European coordination and integration of research funding, which makes it difficult to influence European policy funding.
4	Enhance research capacity across Europe	Bulgaria participates in FP7, ESF, COST and other EU-programmes.	Public academic organisations have access to science databases. Still, Bulgaria lacks real concentration of public resources in priority scientific areas.

[2] Ministry of Education, Youth and Science, *Analysis of the State of Scientific Research in Bulgaria* (Sofia: Ministry of Education, Youth and Science, 2010), 82. http://www.minedu.government.bg/opencms/export/sites/mon/top_menu/science/news/analyse_researches_bg.pdf

	ERA objectives	Main national policy changes	Assessment of strengths and weaknesses
5	Develop world-class research infrastructures (including e-infrastructures) and ensure access to them	National Roadmap for Research Infrastructure was developed and approved by the Council of Ministers in 2010	Lack of financial, industrial and human potential for the construction and maintenance of big research infrastructures, combined with an obsolete material base.
6	Strengthen research institutions, including notably universities	New Law on the Development of Academic Staff enacted in 2010.	The NSF has provided some financial stimuli for research institutions but financial support to the universities has remained weak to bring about a qualitative change in their research activities is available.
7	Improve framework conditions for private investment in R&D	NIF has not distributed any funds to innovative companies since 2008. The JEREMIE and JESSICA funds were launched in 2010 but have not yet started operation.	There are no legislative or fiscal mechanisms to promote business investments in R&D and existing guarantee schemes have not produced tangible results.
8	Promote public-private cooperation and knowledge transfer	No change in national policy has been observed in 2010.	There are no effective policies to strengthen the links between R&D institutions and industry. There is also a lack of strong institutional policies in the field of intellectual property.
9	Enhance knowledge circulation across Europe and beyond	New initiatives to support the preparation of European projects under the 7FP and COST have been launched by NSF.	Various possibilities for international collaboration, co-publication and co-patent activities of Bulgarian and foreign researchers. Mobility is supported by the NSF and FP7.
10	Strengthen international cooperation in science and technology and the role and attractiveness of European research in the world	No change in national policy has been observed in 2010.	Lack of research priorities. Good participation in the ERA NET and ERA NET+ schemes, however they need to be in line with the national priorities.
11	Jointly design and coordinate policies across policy levels and policy areas, notably within the knowledge triangle	No change in national policy has been observed in 2010.	There are no common priorities presented by the government within the fields of science, education and innovation.
12	Develop and sustain excellence and overall quality of European research	An international evaluation of the Bulgarian Academy of Sciences (BAS) (2009); EU-review of NSF (2006); two evaluations of the universities; and introduction of a new rating system (launched in 2010). Decrease of the staff and research units within BAS.	Some quality control mechanisms have been put in place. Despite positive developments, Bulgaria is far from achieving European excellence and quality of research.

	ERA objectives	Main national policy changes	Assessment of strengths and weaknesses
13	Promote structural change and specialisation towards a more knowledge - intensive economy	The government's statement on the Europe 2020 strategy includes economic sectors for specialisation within the Bulgarian economy.	Export oriented and high technology sectors are expected to provoke the attention of foreign investors.
14	Mobilise research to address major societal challenges and contribute to sustainable development	No change in national policy has been observed in 2010.	Lack of clearly defined national thematic priorities. The opportunities for countering demographic change, climate change and energy security concerns are yet to be explored. The main financial resources for sustainable transport and energy efficiency are provided by EU funds.
15	Build mutual trust between science and society and strengthen scientific evidence for policy making	The independent assessments on funds spent and accountability to society, foreseen in the changes of the Law on Scientific Research Promotion. The changes are still "on paper" only.	There is a need for institutional restructuring and strengthening the collaboration between the public and private sector.

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1 Introduction

The main objective of the ERAWATCH Analytical Country Reports 2010 is to characterise and assess the evolution of the national policy mixes in the perspective of the Lisbon goals and of the 2020, post-Lisbon Strategy. The assessment will focus on the national R&D investments targets, the efficiency and effectiveness of national policies and investments in R&D, the linkages between research, education and innovation, and on the realisation and better governance of ERA. In doing this, the 15 objectives of the ERA 2020 are articulated.

The report builds on the 2009 report and streamlines the structure and updates the 2009 policy assessment in the domains of human resource mobilisation, knowledge demand, knowledge production and science-industry knowledge circulation. The information related to the four ERA pillars covered in the 2009 report is also updated and is extended in order to cover all six ERA pillars and address the corresponding objectives derived from ERA 2020 Vision.

Given the latest developments, the 2010 Country Report has a stronger focus on the link between research and innovation, reflecting the increased focus of innovation in the policy agenda. The report is not aimed to cover innovation per se, but rather the '**interlinkage**' between research and innovation, in terms of their wider governance and policy mix.

2 Performance of the national research and innovation system and assessment of recent policy changes

The aim of this chapter is to assess the performance of the national research system, the **'interlinkages'** between research and innovation systems, in terms of their wider governance and policy and the changes that have occurred in 2009 and 2010 in national policy mixes in the perspective of the Lisbon goals. The analysis builds upon elements in the ERAWATCH Country Report 2009, by updating and extending the 2009 policy assessment in the domains of resource mobilisation, knowledge demand, knowledge production and science-industry knowledge circulation. Each section identifies the main societal challenges addressed by the national research and innovation system and assesses the policy measures that address these challenges. The relevant objectives derived from ERA 2020 Vision are articulated in the assessment.

2.1 Structure of the national research and innovation system and its governance

This section gives the main characteristics of the structure of the national research and innovation systems, in terms of their wider governance.

Bulgaria has a population of 7.56 million people, or 1.5% of the EU27 population. Between 2004 and 2008, Bulgarian GDP experienced stable growth of over 6% annually. Due to the financial crisis, however, the country's GDP decreased by 5% in 2009 to €35.042b. The GDP forecast for 2010 amounts to €35.558b, i.e. the country produces 0.29% of the total EU27 GDP (Eurostat, 2010). Its GDP per capita in

Purchasing Power Standards was 43% of the EU27 average (Eurostat, 2008). Unemployment reached 10.2% in the first quarter of 2010, which was two times higher than in 2008 (NSI[3]). Bulgaria is one of the countries with the lowest R&D intensity in the EU. Bulgaria's intramural R&D expenditure (GERD) has remained at stably low level over time – from 0.57% of GDP in 1999, to 0.49% of GDP in 2004, to 0.52% of the GDP on R&D in 2009 (NSI). The level of R&D expenditures as a percent of GDP is almost 4 times lower in Bulgaria than in the EU27 (NSI, 2009 and Eurostat, 2008).

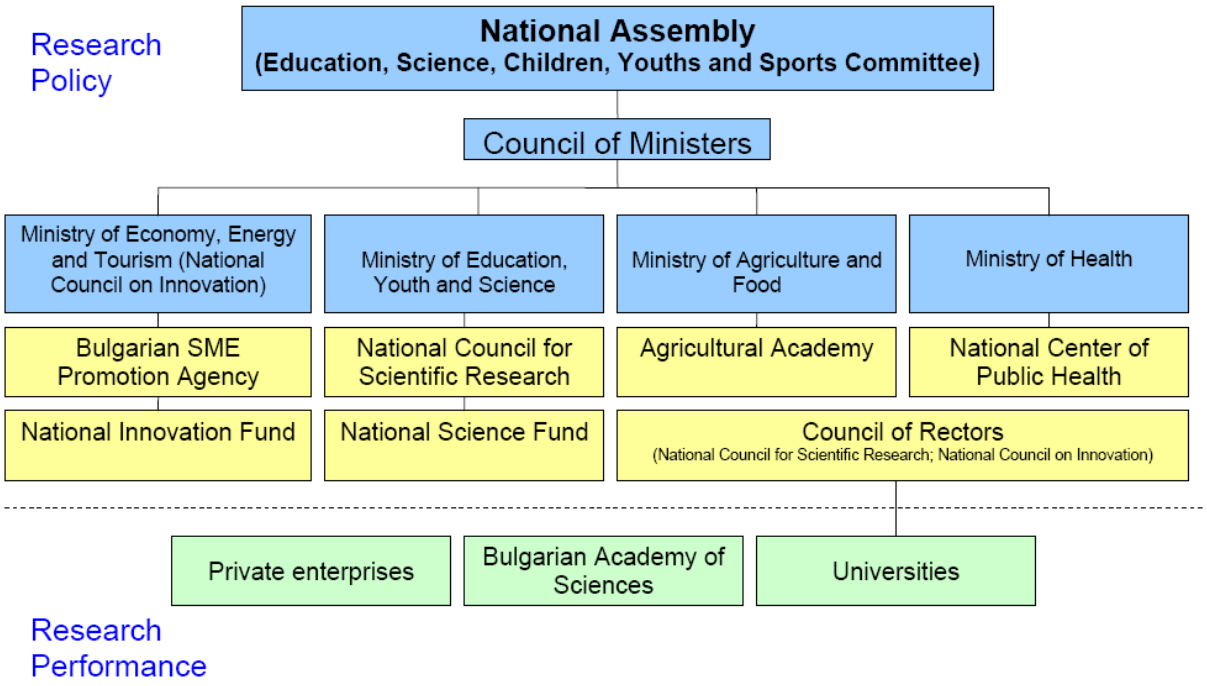
The Bulgarian research system is coordinated and financed centrally at national level with no regional dimension. The highest policy-making body is the Standing Committee on Education, Science, Children, Youths and Sports at the National Assembly. In practice, the Ministry of Education, Youth and Science designs and carries out national policy. The Ministry of Economy, Energy and Tourism co-shares some responsibilities for designing and implementing the national R&D policy, while the Council of Ministers endorses the most important strategic documents. A more detailed description of the structure of the research system is available on the ERAWATCH website.

Bulgaria has not yet developed a regional dimension to its innovation and research policy. Although by 2008 all six Bulgarian regions had developed Regional Innovation Strategies (RIS), no mechanisms at the national level support their implementation. The main obstacle to RIS implementation in Bulgaria is that Structural Funds are coordinated at the national level with little or no authority of regional administrations in the distribution of funds. The financing for innovation is not distributed according to needs and/or policy priorities, but to the regions with the most research institutions (budget funding) or with active applicants (EU funding).

The government sector is the main research funder and performer in Bulgaria. In 2000 the government sector provided 69% of the total R&D funding. In 2008, this share decreased, but the government sector still provided the bulk (61.18%) of the total R&D expenditures. The EU27 average in the same year was 33.5%. In 2008 the business sector in Bulgaria provided 30.62% of R&D funding (compared to the 55% EU27 average) and HEIs only 0.43% (NSI, 2008). A total of 6.84% of the R&D financing is provided from abroad and 0.92% from non-profit institutions (*see Annex, Table 6. Total Intramural R&D Expenditure (GERD) by Source of Funds and Sectors, 2008*). A description of the three research performer groups and details on the most prominent participants in R&D performance in Bulgaria is available in the Research Performers section of the ERAWATCH Country Profile for Bulgaria.

[3] National Statistical Institute (NSI), website: http://www.nsi.bg/

Figure 1: Overview of Bulgaria's research system governance structure



Source: ERAWATCH Research Inventory

2.2 Resource mobilisation

Since 2000, Europe has made evident progress towards ERA but at the same time it is clear that Europe's overall position in research has not improved, especially regarding R&D intensity, which remains too low. The lower R&D spending in the EU is mainly a result of lower levels of private investment. Europe needs to focus on the impact and composition of research spending and to improve the conditions for private sector R&D investments.

This section will assess the progress towards national R&D targets, with particular focus on private R&D and of recent policy measures and governance changes and the status of key existing measures, taking into account recent government budget data, including Structural Funds. The need for adequate human resources for R&D has been identified as a key challenge since the launch of the Lisbon Strategy in 2000. Hence, the assessment will include also the human resources for R&D. Main assessment criteria are the degree of compliance with national targets and the coherence of policy objectives and policy instruments.

2.2.1 Resource provision for research activities

Progress towards R&D investment targets

From 2002 to 2009 Bulgaria's total intramural R&D expenditure (GERD) as a percent of GDP has hovered around 0.5%, considerably below the EU average of 1.9% in 2008. Taking into account the real annual GDP growth, however, GERD is registering an increase in absolute terms in Bulgaria: from €99.319m in 2004 to €184.607m in 2009 (NSI, 2009). Public investments in education and RDI are not prioritised or included in the national multi-annual budget framework. Instead, financing is decided annually in the Law for the State Budget. The Law for the State Budget 2011 foresees the same relative amount of financing of the HEI and BAS as

in 2010. The Science budget for 2011 registers 11% increase in absolute terms, however, it remains comparatively low at 0.3% of GDP or 0.7% of all budget expenditures, which is the same share as in 2010. Thus the science budget structure, combined with the effects of the crisis resulted in lack of adequate financial support for modern research infrastructure.

Provisions for R&D activities

There is a lack of coordination and consistency between the main Bulgarian policy documents that relate to resource provision for R&D. These strategic documents include the Law on Scientific Research Promotion, the draft National Strategy for Scientific Research for the Period 2009-2019, the National Innovation Strategy, the Regional Plans for Development, the Regional Innovation Strategies, the Operational Programme Competitiveness, the Law on Higher Education, the Law for the Bulgarian Academy of Sciences, and the Strategy for Encouraging Investment in Bulgaria 2005-2010. Most of these documents present in a general way various, sometimes conflicting, priorities, and it is difficult to make an assessment of the overall thematic focus of national R&D policy or of the financial planning behind it.

Funding mechanisms

The main competitive public R&D funding instruments defined in the relevant strategic documents are the National Innovation Fund (NIF) and the National Science Fund (NSF). Due to considerations of overlapping with EU fund's programmes NIF has not disbursed any funds since 2008 when it reached a budget of €10.3m. Its future remains unclear. NSF's budget peaked in 2009 at €51.1m. In 2010, the government cut its budget to €25.5m. The NSF and NIF programmes need to be more diversified in their support to public and private R&D projects. They should be made more specific to differentiate themselves from European funds' instruments such as OP Competitiveness and prevent the outflow of company interest thus undermining the implementation of the national policy. The continuity of the provided support also needs to be ensured through establishment of joint priorities of NIF and NSF.

In addition to the two funds, the government provides direct budget subsidies to the public research organisations. Although in 2008, the ratio between national institutional (direct subsidies for public research organisations) and competitive funding almost equalised (from 90:10 in 2004), institutional funding has prevailed in the time of the crisis (ARC Fund, 2009). Competitive EU funds mechanisms are expected to boost private R&D spending and to improve the management capacity of national R&D policy making and implementation.

There are no legislative or fiscal mechanisms to promote business investments in R&D and existing guarantee schemes have still not produced any tangible increase in private sector R&D funding. Tax incentives for R&D expenditures have not attracted private enterprises. Bulgarian companies do not make use of the tax reduction possibility that the Law on the Corporate Income Tax (Art. 69) presents for two reasons: (1) most enterprises carry out R&D in-house while the law allows tax reduction only if the R&D activity is carried out by an external contractor - research institute or HEI, and (2) the law allows tax reduction only after the completion of the R&D activity even if it takes several years; the firms however prefer to report the R&D as part of their usual activity each year in order to reduce their annual taxes. In effect the tax reduction opportunity is not used. Moreover, there are no tax credits, nor tax reduction for patenting and/or for introducing an invention in the production.

Structural funds

The Cohesion and Structural Funds, and the European programmes play an important role in R&D funding in Bulgaria, since they are specifically directed towards innovation, research and human resources development, while public institutional subsidies mainly cover salaries and current spending in the public research institutions. For example, in the past decade on average 90% of total R&D spending (87% in 2009) has been directed towards covering running costs (NSI). The EU Structural Fund's Operational Programmes (OPs) relevant to R&D and innovations are the European Regional Development Fund (ERDF) financed OP Competitiveness and, to a much lesser degree, OP Regional Development, as well as the European Social Fund-financed OP Human Resources Development. The main focus areas of OP Competitiveness related to R&D are: the creation of innovative start-up companies, technological parks, adopting innovative products and processes, the promotion of clustering and technological modernisation. The OP has the potential to improve the innovation infrastructure and services. The focus in OP Competitiveness is strongly placed on the infrastructure and much less on building up R&D service provision capacity, which might result in under-use of the available funds or the supported infrastructure. OP Regional Development supports ICT (incl. broadband internet) on regional (NUTS2) and local (municipalities, administrative districts) level. OP Competitiveness allocates €551,588,378 for innovation (55.8% of the total ERDF support) for the 2007-2013 period (DG Regional Policy, 2010). In June 2010, the Managing Authority of OP Competitiveness made a payment of €199m to the European Investment Fund to set up the JEREMIE Holding Fund. It is expected that it will contribute €204m to the development of Small and Medium-Sized Enterprises (SMEs) in Bulgaria – twenty times more than the NIF budget at its peak in 2008. The JEREMIE Fund will provide funding to financial intermediaries, including banks, and institutions providing guarantees and venture capital funds. Since Bulgaria lacks traditions and capacity to work with VC funds, the country needs to increase its knowledge base and implement soft measures to build the capacity of potential applicants. OP Human Resources Development has a budget of €1,213m and provides an excellent opportunity for improvement of the quality of education and innovation. According to the text of the operational programme, 5% of the funds will be allocated for financing activities related to innovations and policy application. Although the programme launched new scheme to stimulate the work of young researchers in the country in 2010, its slow implementation results in slow real convergence. The absorption rate of the programme has been increasing each year reaching BGN 897m (€458.6m) contracted and BGN 196.9m (€100.7m) paid out funds by 31.01.2011. These amounts represent respectively 37.8% and 8.3% of the available budget for the 2007-2013 period (Information system to the Ministry of Finance). All OPs experience delays in implementation, including delays of state and regional bodies' payments to businesses. There are reports that beneficiaries experience difficulties in securing co-financing for the implementation of projects under the OPs, the Competitiveness and Innovation Programme and other EU-funded programmes. Thus achieving harmonisation with EU policies on R&D and innovation remains mostly on paper.

Bulgaria is actively participating in ERA-NET and ERA-NET+ schemes. In FP6 Bulgaria has successfully participated in 5 ERA-NET projects in the area of plant health research; polar research and urban strategies. Under the framework of the SEE-ERA.NET project for research cooperation with the Western Balkan countries Bulgaria participated in a pilot joint call initiative, now transformed in a new ERA-NET

PLUS project. In FP7, Bulgaria is partner of the BS-ERA-NET and Cultural heritage Net projects. There is no assessment of the impact of such schemes on Bulgaria's R&D performance.

Recent policy changes

In October 2010, the National Assembly amended the Law on Scientific Research Promotion to provide for a mandatory independent national and/or international assessment of the public funds spent on strategic research areas (as defined in the Draft National Strategy for Scientific Research), and particularly on the research projects and their results in order to ensure accountability. The law regulates the creation of new research centres, as well as the exploitation of the scientific infrastructure, classified as "unique" for Bulgaria. The law allows that financing from the National Science Fund can be used to cover expenditures, related to maintaining intellectual property rights, including patents. It places an increased focus on programme-oriented and competitive research funding. All these changes are recent and so far no mechanisms for their practical implementation have been put in place. It remains to be seen if the law will result in an increase in R&D expenditures in Bulgaria.

Main societal challenges

Taking into consideration all adopted and draft national strategic documents in the field of R&D and innovation in Bulgaria, one can observe that there is a lack of consensus and clearly defined, stable national thematic priorities in the research area. However, the adoption of national targets regarding the Europe 2020 Strategy identified some grand challenges calling for solutions to tackle them, e.g. reduction of greenhouse gases, increase of share of renewable energy sources and energy efficiency. Nevertheless, the documents that support these national targets have not set any mid- or long-term planning, incl. allocation of funding, for achieving these targets. In fact, the solutions towards the societal challenges rely first and foremost on EU funding, e.g. provided within the framework of the OPs that deal with sustainable transport, consumption and production and energy efficiency. (*Statistical data on national funding for some of the major challenges is available through Eurostat and is presented in the annex Table 5. Total GBAORD by NABS 2007 socio-economic objectives, 2008.)*

2.2.2 Evolution of the national policy mix geared towards the national R&D investment targets

Evolution of BERD

The business enterprise R&D expenditure (BERD) in Bulgaria has been gradually increasing as a share of GDP and as a proportion of the total R&D expenditures. Yet, the share of the government financing is still predominant, with the business sector accounting for 30.62% of all R&D expenditures (2008). The Bulgarian BERD (2008) is among the lowest in Europe – only 0.15% of GDP (or €51.699m), the same level as in Latvia (Eurostat, 2008). (*Additional statistical data is presented in annex Tables 7 and 8. Business enterprise R&D expenditure (BERD) as percentage of GDP and in absolute values).*

Policy Mixes towards increased private R&D investment

The main policy instruments for increasing private R&D funding have been the NSF and the NIF (until 2008). They have been recently complemented by the JEREMIE Fund (launched in 2010), OP Human Resources Development and OP

Competitiveness (2007). The OPs however experience a very low absorption rate due to a number of factors, such as lack of experience and shortage of administrative capacity in the OP management authorities and the beneficiaries, opaque administrative rules, fraud, etc. The policy routes to promote and increase R&D activities and collaboration are described in detail in the ERAWATCH Country report 2009: Bulgaria. Only a summary of the policies and the recent changes are presented below.

Promoting the establishment of new indigenous R&D performing firms, Stimulating greater R&D investment in R&D performing firms and Stimulating firms that do not perform R&D yet

OP Competitiveness is currently the only public source supporting the setting up of new Research Technological Development and Innovation (RTDI) companies. The government has set the following objectives for the programme: (1) to support 85 R&D projects for commercialisation of innovative ideas by 2010, and 275 by 2013; (2) to back 30 cooperation projects of enterprises and research institutions by 2010, and 110 by 2013; (3) to fund 33 projects for promoting ICT in enterprises by 2013 and 310 renewable energy projects; and (4) to finance 553 projects seeking to promote businesses, entrepreneurship and new technology by 2010, and 2,219 projects by 2013. The evaluation of the achieved results under the programme from the mid-term review in 2010 is still not available but OP Competitiveness has remained with one of the lowest absorption rates in Bulgaria. By 30.06.2010, only 4.7% of the contracted with the beneficiaries funds have been paid out by OP Competitiveness, and only 32.6% of the total budget of the programme has been contracted under successfully approved projects.

Attracting R&D-performing firms from abroad

So far foreign investors and multinationals have been attracted most often by the overall low production costs in the country. This has not been associated with the establishment of RTD units of these companies in Bulgaria (ARC Fund, 2010). There are no special schemes for attracting foreign R&D companies. Still in the ICT sector there is a small pool of multinational companies that outsourced their R&D departments or part of their tasks to their own branch companies in Bulgaria (e.g. VMWare, SAP) or to genuine Bulgarian firms (ARC Fund, 2011).

Increasing extramural R&D carried out in cooperation with the public sector

Cooperation between the private sector and public research institutions has long been identified as one of the main weaknesses of Bulgaria's R&D system. Only few instruments have been developed to target this challenge (TrendChart, 2008). In 2006 the National Science Fund launched a voucher scheme: SMEs received vouchers of BGN 8,000 (€4,090), which they could spend for buying R&D services from universities and scientific organisations. In 2008 the National Innovation Fund replicated the voucher scheme for SMEs. The companies received vouchers from BGN 5,000 (€2,556) or BGN15,000 (€7,669).

Increasing R&D in the public sector

In June 2010, the Bulgarian government adopted an ambitious GERD target of 1.5% of GDP in the framework of the Europe 2020 strategy, which can only be made possible through a steep increase in national R&D funds and the efficient use of EU funds. However, in 2009, due to the economic crisis Bulgaria cut state funding for R&D, including funding for the NSF. The NIF did not launch any new projects in 2009. In 2008 the NSF launched a financial scheme for co-financing of projects

participating in the FP7 with an annual budget of BGN 4m (€2m), which could boost Bulgarian participation in European research and innovation programmes.

Innovation-oriented procurement policies

There is no specific innovation promotion policy through public procurement besides a general exemption for R&D contracts. According to Art. 4 of the Public Procurement Act, state authorities could conclude public-private partnerships with contractors (business enterprise, public funded R&D organisation, or non-governmental organisations (NGOs)) without public procurement if the aim of the contract is "research for public benefit". The text states that the research and experimental development are not subject to public procurement, when the contractor pays for the service in full, however the acquired results and benefits do not remain exclusively for the contractor but are "public goods". On the one hand side this promotes research by avoiding the slow procurement procedures. On the other hand side it can be abused as a loophole. Cases of misuse of public funds through this exemption have been observed in the last 10 years, especially in the field of IT-related R&D (CSD, 2010).

Other policies that affect R&D investment

The overall business environment in Bulgaria, which is important for R&D investment, has not improved in 2010. According to the Ease of Doing Business ranking of the World Bank (Doing Business 2011 data), in 2010 Bulgaria ranked 51st out of 183 monitored countries, respectively 9th out of the 25 Eastern Europe and Central Asia countries. Bulgaria ranked best on getting credit and worse on enforcing contracts. The latter has been particularly detrimental to investment in R&D, in particular as it pertains to lax enforcement of intellectual property rights laws.

Barriers to and risks for attaining higher BERD

Several factors hinder the Bulgarian enterprises to increase their investments in R&D and related activities:

1. Lack of national strategic framework for the promotion of R&D and innovation. There is a need for revision of the legislation in the field of science and innovation, and clear setting of national priorities, based on projections of the future needs of the economy. There is fragmentation of the national R&D system and the allocation of resources is not market-driven, nor directed to the sectors that produce the most added value for the economy. There is no information database to serve the analytical process and the planning of measures. Achieving higher R&D intensity by 2020 requires a substantial increase in implementation, monitoring and evaluation capacity of the public administration and the policy-makers;
2. Lack of secure and predictable public funding for R&D in the mid- and long-term period. The overall level of public funding remains comparatively insufficient and venture capital is underdeveloped. Incentive mechanisms such as tax benefits have not been utilised;
3. The outdated structure of the national R&D system, which is still dominated by public research organisations. It is essential that public scientific organisations in the country increase their efficiency and market effectiveness through restructuring and regular international evaluations (ARC Fund, 2010). This will free up public resources for research and innovation policy promotion;

4. The economic crisis, the lack of demand on the domestic market, the lowest national income level in EU27 and the low-technology specialisation of the Bulgarian economy have all resulted in low demand for the development of innovations in the enterprises;
5. The absorption of EU funds, including such in support of R&D and innovation, is low. By 30.06.2010, only 13.5% of the contracted with the beneficiaries funds have been paid out by the OPs, and only 33.9% of the total budget of the programmes has been contracted in successfully approved projects.;
6. The downward trend in the share of employed persons in the technical fields and the continuing brain drain. More policies are needed to prevent the young people from leaving the country.

2.2.3 Providing qualified human resources

National context

According to Eurostat data, the share of employment in R&D in the total labour force has on average increased in EU-member countries, including Bulgaria. In 2008 it was 1.03% for EU27 and 0.48% for Bulgaria. Between 2000 and 2008, the number of total R&D personnel in Bulgaria increased by nearly 19%, from 16,853 to 20,097 people (NSI). There has been a persistent alarming tendency of a declining share of young Bulgarians choosing science and technology as their preferred career path. In 2009 the share of Human Resources in Science and Technology (HRST) in the economically active population of the age group 25-64 in Bulgaria was 32.2%, which was lower than the average EU27 value of 40.1% (Eurostat, 2009). This gap has widened in the past decade due to the higher growth rate in the EU27. The difference between Bulgaria and EU27 in 2000 was only 2.55 percentage points. The fact that the number of schemes supporting R&D personnel in universities and research institutes is much higher than that for companies might perpetuate the existing disconnect between science and business.

Articulation of education policies within the knowledge triangle

The 2007 Adult Education Survey by Eurostat showed that more than one-third of the EU27 population aged 25-64 years participated in formal and informal learning.[4] Bulgaria's record in this respect was comparable to the EU average. According to Eurostat data, science and technology has continually lost its value among university graduates in Bulgaria. The share of higher education graduates in science and technology fields in all students has declined since 2002 to reach 24.9% in 2007. This tendency mirrors wider EU27 developments. However, like in the EU27, the number of science and technology graduates in Bulgaria has continued to increase in the same period reaching 9,836 in 2008 (1.1% of the population aged 20–29 years).

This indicates a trend toward commoditisation of higher education in science and technology. In the case of Bulgaria it seems to also signal a decline in education standards as businesses continually complain about lack of qualified personnel as the one of the biggest hindrances to their competitiveness (IMD, 2010). The introduction of the university rating system in 2010 has been a positive signal in the direction of aligning business demands and national education policies. Businesses have also gradually stepped up their participation in formulating and financing

[4] Boateng, S.K., Significant Country Differences in Adult Learning, Population and Social Conditions, Eurostat, Statistics in focus, 44/2009

education curricula (ARC Fund, 2010). The ranking of the universities, which is intended to support the discretionary allocation of public resources according to university achievement, did not take into consideration the specifics of different universities and did not result in any practical change on the ground. The new Law on the Development of Academic Staff (2010) changed the policy on academic career promotion, however similarly to the ranking system, policy changes remain largely on paper, with a long way to go to practical implementation due to insufficient resources or other roadblocks.

Main societal challenges

A major societal challenge for Bulgaria is the aging of the scientific community, which is an outcome of the general tendency of aging societies in Europe and the low appeal of the science career. This is compounded by continuing brain drain, which has not been reversed by the country's membership in the EU.

2.3 *Knowledge demand*

The share of innovative enterprises that utilise new technological knowledge is increasing mainly due to expanding market share and standardisation requirements. The increased financial resources for the creation of new high-tech companies, promotion of entrepreneurship and technology innovation under OP Competitiveness can stimulate the demand for research products and the collaboration of research and business if the schemes are properly implemented. The high-technology sectors, including ICT, remain one of the leading drivers of economic growth. The structure of R&D spending by field of science is indicative of the field's innovative potential. NSI data for the period 2000–2007 shows that R&D spending in real and in growth terms has been highest in technical sciences followed by natural and agricultural sciences. Government spending however dominates the natural sciences and is, therefore, of primary importance in R&D spending growth. In contrast, R&D expenditures of the business enterprise sector in technical sciences are greater than those in the public sector. The ongoing neglect of applied social sciences narrows the opportunities for developing national policy options for addressing key societal challenges (ARC Fund, 2010). Most of the FDI in Bulgaria have been focused in real estate and related financial services, which have been related to pre-crisis credit lending boom and hence have not been conducive to knowledge demand. Accordingly, the Bulgarian economy has not been associated with technological innovation, but rather marketing and organisational innovation (ARC Fund, 2010). As a whole, the Bulgarian economy continues to have a low technology profile and cannot pull the creation of new knowledge. Despite the changes made in 2008 and 2009 in the Law on Investment Promotion, which envisage financial (incl. state aid) and administrative support for investments in technology parks, scientific research, ICT and education, Bulgaria is about to lose some of its competitive advantages such as the high-quality labor force and low personnel costs, due both to the decrease of the quality of education and the brain-drain.

2.4 *Knowledge production*

The production of scientific and technological knowledge is the core function that a research system must fulfil. While different aspects may be included in the analysis of this function, the assessment provided in this section focuses on the following dimensions: quality of the knowledge production, the exploitability of the knowledge creation and policy measures aiming to improve the knowledge creation.

2.4.1 Quality and excellence of knowledge production

Bulgaria responded to the economic crisis with a reduction of the budget allotted for R&D as early as 2009. Thus R&D intensity remains one of the lowest in Europe although R&D funds have increased in nominal terms in the past decade in line with strong GDP growth. Investment in research infrastructure has improved but remains sporadic and low. R&D personnel has increased due to higher demand from the private sector. In September 2010 the Ministry of Education, Youth and Science developed a National Roadmap for Research Infrastructures. In terms of outputs, there were only 15 Bulgarian patent applications with the European Patent Office in 2007, submitted mainly by large companies. The applications submitted under the national procedure average some 250 a year over the last ten years. About 50% of the applicants in Bulgaria come from individuals. The knowledge production by larger entities is also hampered by the insufficient number of high-technology business incubators, which could boost business science production. The total number of Bulgarian publications in the Essential Science Indicators has risen to 120% in 2004-2008 compared to the preceding five-year period but remains among EU countries with low performance.

2.4.2 Policy aimed at improving the quality and excellence of knowledge production

A key element of ensuring excellence of knowledge production, which has been missing in the Bulgarian R&D system, is quality control. Public research organisations are subject to only sporadic international evaluations. For example, according to the Statute of the Bulgarian Academy of Sciences, all R&D institutes of the Academy are subject to periodic institutional evaluation, but in practice, after the first one made in 1993, the next was the international evaluation carried out by the European Science Foundation (ESF) and the European Federation of National Academies of Sciences and Humanities (ALLEA) in 2009. The launch of the evaluation report coincided with the preparation of the restructuring at the academy, including a decrease of scientific and administrative staff and research units. However, the results of this restructuring are yet to be evaluated. Performance metrics employed in BAS do not imply any effects on the remuneration of scientists. Four senior EU experts reviewed the activity of the National Science Fund (1990) in 2006. European experts carried out NSF evaluation until 2008. In 2008 ESF changed its application procedure by adding a national stage to the evaluation of projects. Despite the positive developments, such as the quality control mechanisms put in place, the head of the National Science Fund noted that Bulgaria is far from achieving European excellence and quality of research and needs further investment and quality improvement.

2.5 Knowledge circulation

Tackling the challenges that European society faces in the 21st century will require a multi-disciplinary approach and coordinated efforts. Many debates and conferences, e.g. the Lund Declaration recognise that such complex issues cannot be solved by single institutions, technology sectors or MS acting alone. Hence strong interactions within the "knowledge triangle" (education, research and innovation) should be promoted at all levels. Moreover, in the context of increasing globalisation, cross-border flows of knowledge are becoming increasingly important. This section provides an assessment of the actions at national level aiming to allow an efficient flow of knowledge between different R&D actors and across borders.

2.5.1 Knowledge circulation between the universities, PROs and business sectors

The flow of knowledge between businesses, universities and public research institutes in Bulgaria remains limited (ARC Fund, 2010). The most compelling factor behind this is the predominance of the state sector in R&D financing and performance. In effect public research organisations lock in the biggest part of national financing without seeking links to the business sector and competing with universities for funding. Still, there are some initiatives that promote knowledge circulation. In October 2010 the OP Competitiveness opened a call for proposals "Support for cluster development in Bulgaria" with a budget of BGN 29,337,450 (€15m). The projects will be funded with grants from BGN 100,000 (€51,129) up to BGN 2m (about €1m). The National Science Fund supports young scientists who prepare their PhD thesis in an enterprise. The voucher scheme of the Ministry of Economy, Energy and Tourism with a budget of €1.02m for 2010 aims to encourage knowledge transfer to enterprises. The April 2010 calls under OP Human Resources Development under the scheme for "Strengthening the Relations between Educational and Training Institutions, Research Sector and Businesses" resulted in 21 signed contracts for €4.9m. It is still early to assess the overall efficiency of the different initiatives for promoting knowledge circulation.

2.5.2 Cross-border knowledge circulation

New initiatives to support the preparation of European projects under the 7FP and COST have been launched by NSF in 2009 and 2010 to boost cross border knowledge circulation. There also exist various national and European possibilities for international collaboration, co-publication and co-patent activities of Bulgarian and foreign researchers. Both the NSF and FP7 support researcher mobility. The scientific journals published in Bulgaria received better visibility as a result of the inclusion of six new Bulgarian journals in the Thompson Reuters database. Universities and PROs have increasingly better access to international knowledge through long-term agreements with European counterparts and through participation in the Framework programmes. Additionally, in May 2009 the National Science Fund opened a call for „Reintegration Grants for Bulgarian Researchers Working Abroad" with a budget for 2009 of €0.511m. The Ministry of Education, Youth and Science has signed bilateral scientific collaboration agreements with over 10 countries, implemented through calls of the NSF. The Bulgarian Academy of Sciences has concluded bilateral scientific cooperation agreements with 30 European counties and with 7 countries outside Europe. The NSF calls however often list a large number of eligible areas of research, which does not allow the achievement of critical mass of concentration on a specific topic. Additionally, there is lack of regional coherence in regard to research infrastructure, which blocks synergies within the country.

On the business side only 26% of the Bulgarian enterprises operating in innovation-intensive business sectors (as defined in Innobarometer 2009, p. 4) engage in international exchanges in support of innovation, such as cooperation, employment of staff, market testing of innovation products, as well as outsourcing or investment from/to other countries. Slovenia and Cyprus are leaders in this respect (with 61% each) (ARC Fund, 2010 and Innobarometer 2009). This trend is a result of the poor coordination of the actions at the different levels of governance and the neglected funding of the intermediary organisations that facilitate the technology transfer.

2.5.3 Main societal challenges

Bulgaria has not clearly defined cross-border collaboration and knowledge circulation priority research fields. Both the national and the cross-border collaboration projects address either pre-determined or wide-ranging, generic topics, and there is no policy that classifies the research areas as 'grand challenges' for Bulgaria. The lack of concrete and up-to-date national priority areas for research, including in regards to collaborative research, presents a major challenge for the future development of the research system.

2.6 *Overall assessment*

The most important challenges for the national research system remain the insufficient funding; the lack of effective public resource management; the lack of stimuli for attracting leading researchers from abroad; the lack of stimuli for young people to engage in R&D; the outdated research equipment and infrastructure; and the weak collaboration between the research institutes. In this regard the Bulgarian government needs to update the relevant strategies and legislation, start institutional restructuring and introduce thematic priorities and long-term planning.

Table 1: Summary of main policy related opportunities and risks

Domain	Main policy opportunities	Main policy-related risks
Resource mobilisation	• Development of National Research Strategy 2008-2018, which is to consolidate the activity and interaction of the main actors of the national research system. • Growing share of women engaged in research is a potential for increasing the human resources in science. • The mandatory assessments envisaged in the amendments of the Law on Scientific Research Promotion. • The newly adopted National roadmap for research infrastructure can increase the cross-border collaboration.	• Lack of adequate financial resources for modern research infrastructure combined with the effects of the crisis. • Lack of regional autonomy in defining the national research priorities. • Lack of consensus on the national research priorities. • Allocation of resources is not market-driven and is not directed to the sectors with highest value added. • Low absorption capacity of the EU funds, incl. OP Competitiveness. • Lack of schemes to attract foreign R&D companies.
Knowledge demand	• The increased financial resources for the creation of new high-tech companies, promotion of entrepreneurship and technology innovation under OP Competitiveness stimulate the demand for research products and the collaboration of research and business.	• Despite the changes made in 2008 in the Law on Investment Promotion, Bulgaria is about to lose some of its competitive advantages – high-quality labour force and low personnel costs, due both to the decrease of the quality of education and the brain-drain. • The Bulgarian economy continues to have a low technology profile and cannot pull the creation of new knowledge.

Domain	Main policy opportunities	Main policy-related risks
Knowledge production	• An external evaluation of BAS was carried out. • The EU-financing, specifically OP Competitiveness, provides opportunities for innovative start-ups and creation of technology parks. These will be important priorities for the next seven-year planning period. • Although still low, BERD is increasing.	• High degree of institutional fragmentation and inefficient distribution of funds. • Deterioration in the education system, negative effects of the crisis, incl. the process of "brain drain". • Low participation rates in the life-long learning. Qualification courses for the personnel are not priority for the enterprises. • Lack of effective tax and financial incentives for the business to increase the BERD. • Lack of risk (venture) capital. • Insufficient number of high-technology business incubators.
Knowledge circulation	• Better visibility of the scientific journals published in Bulgaria, as a result of the inclusion of 6 new Bulgarian journals (upon meeting the selection criteria) in Thompson Reuters database.	• Poor coordination of the actions at the different levels of governance. The funding to the intermediary organisations that facilitate the technology transfer is neglected. • Lack of regional coherence in regard to the research infrastructure prevents from achieving synergies within the country.

Table 2: Main barriers to R&D investments and respective policy opportunities and risks

Barriers to R&D investment	Opportunities and Risks generated by the policy mix
Insufficient number of adequate funding instruments and a weak coherence between NIF and NSF	O: Diversification of the instruments of NSF and NIF to support public and private R&D projects; co-funding of projects supported by FP7 and CIP; joint priorities of NIF and NSF to ensure continuity in the support. Launch of the JEREMIE and JESSICA funds in 2010. R: The weak collaboration between publicly funded institutions and the lack of national research strategy undermine the effects of increase in direct governmental aid. There are no long-term budget financing plans for specific research priorities or evaluation practices to ensure the quality of research and provide the basis for long-term planning.
Lack of human resources	O: Increase in the national budget financing of education and availability of EU-financed operational programmes to develop human resources. R: The number of schemes supporting the R&D personnel in the universities and the research institutes is much higher than that for companies, which may further deepen the lagging of BES.
Lack of links between the industry, educational institutions, and public research centres	O: NSF and NIF allow communication between the industry, educational institutions, and public research centres. This issue will be addressed according to the proposed RDI strategy and the joint national fund for research and innovation. R: Since the full potential of the two national funds is not used, this might reorient the companies towards the OP Competitiveness, and thus undermine implementation of the national policy.
Lack of venture capital	O. Increasing the knowledge base will help increase the appeal for capital to fund Bulgarian start-ups. Existing opportunities under the JEREMIE initiative to support the set-up of VC funds. Soft measures could be implemented to build the capacity of the potential applicants. R: Lack of critical mass of projects due to risk aversion among businesses and a lack of traditions and capacity to work with VC funds.

Barriers to R&D investment	Opportunities and Risks generated by the policy mix
Underdeveloped research and innovation infrastructure and services	O: Adequate infrastructure and services will increase both the level and quality of RTDI activities in the country, and will make the Bulgarian researchers more competitive at the European level. Opportunities exist under the OP Competitiveness. R: Lack of intermediary skills and companies not willing to use the R&D and innovation services. Focus in OP Competitiveness is strongly placed on the infrastructure and much less on the services, which might result in under-use of the available funds.

3 Interactions between national policies and the European Research Area

3.1 Towards a European labour market for researchers

The Communication Better careers and more mobility: A European Partnership for Researchers proposed by EC in May 2008 aims to accelerate progress in four key areas:

- Open recruitment and portability of grants;
- Meeting the social security and supplementary pension needs of mobile researchers;
- Providing attractive employment and working conditions;
- Enhancing the training, skills and experience of researchers

The Commission has also launched concrete initiatives, such as dedicated information services for researchers, in particular through the activities grouped under the name of EURAXESS – Researchers in Motion. Based on the assessment of the national situation in the four key dimensions detailed above, this section will conclude if national policy efforts are supporting a balanced 'brain circulation', with outward mobility levels matching inward mobility levels. High levels of outward mobility coupled with low levels of inward mobility often signal an unattractive national labour market for researchers and unsuitable research infrastructures. This may trigger, despite the policy efforts supporting the mobility the 'brain drain' rather than brain circulation.

3.1.1 Stocks and mobility flows of researchers

The educational structure of the population between 25 and 64 years shows Bulgaria's good position in respect to secondary education graduates, and its average one in respect to the higher education graduates. In 2008, Bulgaria had 20,097 employees in research and development, which represented a 19% increase compared to 2000. In the EU27 the largest part of the employed in R&D is in private business and higher education. In Bulgaria almost 60% of total R&D employment is in the state sector. The human resources in science and technology as a share of labour force in Bulgaria were 32.2% in 2009, which ranked the country among the EU laggards. The EU27 share for 2009 was 40.1%. The 2011 national budget for education was decreased from 4.3% (2010) to 3.3% of GDP, as well as in nominal terms – to BGN 2,535.4m, from the 2009 peak of BGN 2,981,4m. At the same time, the crisis in the real estate and the financial sectors has led to a decrease in the

number of work places open, especially at newly established enterprises, limiting the employment of highly skilled persons. There are also increased negative effects caused by population ageing and brain drain.

3.1.2 Providing attractive employment and working conditions

The orientation of the students towards a PhD degree has not changed despite the June 2008 increase of PhD scholarships from BGN250 (€128) to BGN450 (€230) per month and the possibilities provided for gratuitous financial support for young scholars under the Operational programme "Human Resources Development" (OPHRD). In 2007 and 2008, two calls were held under the OPHR, grant scheme "Support for the development of PhD students, post-PhD students, post-graduate students and young scientists" with a budget BGN 3.912m for the first year and BGN 9.779m for the second year. The implementation of the scheme created a conflict between the PhD students and the scientists in the positions assistant and research associate, which were not eligible for financing. This led to a certain increase in the number of PhD candidates, but did not improve the proportion of completed PhDs within the specified term. Only 15% out of an average of 4,000 PhD students per year defend their dissertation.

3.1.3 Open recruitment and portability of grants

Non-nationals are eligible to participate in the Bulgarian research competitions. NSF operates with a wide range of schemes, supporting individual scientists, scientific groups, universities, and business enterprises. The consortia may also include foreign individuals and teams of researchers.

3.1.4 Meeting the social security and supplementary pension needs of mobile researchers

Social security and supplementary pension of mobile researchers in Bulgaria are harmonised with the relevant EU legislation and regulations. When a Bulgarian public body sends a researcher to work abroad, it covers his/her stipend, but also social security. When a foreign researcher visits Bulgaria for the implementation of a research task or project, the Bulgarian organisation has no obligation to pay social security. This obligation is with the sending institution. Bulgaria has no general regulations on how social security and supplementary pension obligations are split between the sending and host if private organisations are concerned. For example, if a private Bulgarian research body or enterprise is involved as host or sending organisation in exchange of researchers, social security payments are settled on contractual (individual) bases.

3.1.5 Enhancing the training, skills and experience of European researchers

Accredited Bulgarian universities with doctoral programmes train foreign doctoral students and/or conduct PhD training in joint programmes with European and other universities. Further training of researchers, academic staff and postgraduate students takes place under the People (Marie Curie) Programme of FP7, as well as Erasmus Mundus. Training of PhD students and post-docs is implemented also under a scheme of the Operational Programme "Human Resources Development". There is no publicly available data and/or evaluation yet as to how effective these schemes have been in the past years.

3.2 Research infrastructures

Research infrastructures (RIs) are a key instrument in the creation of new knowledge and, by implication, innovation, in bringing together a wide diversity of stakeholders, helping to create a new research environment in which researchers have shared access to scientific facilities. Recently, most EU countries have begun to identify their future national RI needs, budgets and priorities in the so called National Roadmaps for Research Infrastructures. These strategic documents also set out a strategic view on how to guarantee and maintain access to research facilities. Although some countries invest heavily in RIs, none can provide all the required state-of-the-art facilities on a national basis. Several large RIs have already been created in Europe. While optimising the use and development of existing RIs remains important, new infrastructures are needed to respond to the latest research needs and challenges. European Strategic Forum for Research Infrastructures (ESFRI) was established in April 2002 to support a coherent approach to policy-making on RIs in Europe and to act as an incubator for international negotiations on concrete initiatives. This section assesses the research infrastructures national landscape, focusing on the national RI roadmap and national participation in ESFRI.

3.2.1 National Research Infrastructures roadmap

The Ministry of Economy, Youth and Science (MEYS) has developed a National Roadmap for Research Infrastructure, which includes big scientific complexes that service specific economic and social needs of the state and the Region of South-East Europe. The Roadmap introduces a procedure for Bulgaria's future participation in the European infrastructures and has the potential to increase cross-border collaboration in Europe. The procedure includes an international evaluation of the scientific institutions and an analysis of the effectiveness of the participation of the Bulgarian scientific community in the new regional or European infrastructural projects. Each new project will be subject to external evaluation and will be based on the cost – benefit approach. Still, by 2010 Bulgaria lacks financial, industrial and human potential for the construction and maintenance of big research infrastructures, and the available research material base remains obsolete.

3.2.2 National participation in the *ESFRI roadmap*. Updates 2009-2010

The National Roadmap for Research infrastructure identifies priority complexes that Bulgaria will support and benefit from. These are: EURO-ARGO (European global ocean observing system); SPIRAL2 (production system of on-line accelerated radioactive ions) and BBMRI (European structure for biobanking). Bulgaria is preparing to sign the Memorandum of Understanding for the participation in these complexes. MEYS will jointly apply for an ERIC (European Research Infrastructure Consortium) status of these priority RIs. In addition to the National Roadmap, the government's statement on the Europe 2020 strategy includes economic sectors for specialisation, with focus on the export oriented and high technology sectors, which are expected to provoke the attention of foreign investors.

3.3 Strengthening research institutions

The ERA green paper highlights the importance of excellent research institutions engaged in effective public-private cooperation and partnerships, forming the core of research and innovation 'clusters', mostly specialised in interdisciplinary areas and attracting a critical mass of human and financial resources. The Universities/ research institutions should be embedded in the social and economic life where they

are based, while competing and cooperating across Europe and beyond. This section gives an overview of the main features of the national higher education system, assessing its research performance, the level of academic autonomy achieved so far, dominant governing and funding models.

3.3.1 Quality of National Higher Education System

According to the Registry of Accredited Higher Educational Institutions in Bulgaria, maintained by the Ministry of Education, Youth and Science, the total number of higher educational institutions is 51. A total of 42 of them are universities, of which 37 are public universities. As of November 2010, there are 7 in-house R&D units in the higher education sector. During the 2008/2009 academic year the number of vacancies for PhD students in universities and research organisations has increased by 46% compared to the 2007/2008 academic year and reached 1,403 (1,049 full-time students and 354 extramural students).[5]

The universities in Bulgaria are public and private, some of them with widely diverse curricula. Five universities can be considered as providing majors in a wider area of sciences. The rest of them are specialised and some are even focused in only one study field. 63% of the universities are located in the three major cities: Sofia (17 universities), Plovdiv (5 universities) and Varna (4 universities). The average university size in Bulgaria is 5,600 students. The number of universities has expanded rapidly in the past two decades while personnel have remained largely unchanged. As a result educational and support expenses are increasing and the quality of teaching is declining. The major problems the higher education is facing in Bulgaria today: the distribution of the limited public budget resources among a large number of institutions; the complexity of own revenue generation; the lack of management experience; etc.

As of December 2009, 248 Bulgarian research teams participated in 181 projects financed by the European Commission. The financing of the Bulgarian participants amounted to €28,649,011. Universities are the most active participants. Sofia University and the Technical University - Sofia are the leaders among the Bulgarian participants in the Seventh Framework Programme. As of 2010, the Bulgarian universities rank first among Bulgarian institution according to the volume of funds received by the programme.

In the Bulgarian system for higher education there are two elements that aim to ensure education quality: The National Evaluation and Accreditation Agency (NEAA), and the internal (university) system for evaluation and maintenance of the education quality. The functioning of these elements has not been assessed and is generally perceived as ineffective.

3.3.2 Academic autonomy

The universities in Bulgaria have academic autonomy, which is expressed in academic freedoms and academic self-governance. Academic freedom consists of the freedom of teaching, conducting scientific research, freedom of creative expression and education. The academic self-governance is characterised by the freedom to elect and decide the term of governance bodies, self-determine the R&D and teaching staff, independent development and implementation of research projects. Regarding the financial autonomy of the universities, the rector approves all

[5] Report on the activity of the Ministry of Education and Science, September 2005-August 2008

university expenditures and the Academic Council decides on the salaries of the university personnel within a range, approved by the national legislation.

Regarding the public research institutions, the autonomy of the BAS is defined in the Law and the Statute of BAS. The research units of BAS are separate legal entities and also have the autonomy to allocate external funding from research projects and commercialise research products, in conformity with national and internal regulations. The restructuring that took place in 2009-2010 and the internal regulations of BAS however, have been criticised for increasing the centralisation of BAS management and at the same time – for limiting the autonomy and possibilities for bottom-up initiatives on the side of the institutes.

3.3.3 Academic funding

The funding of public universities is implemented through subsidies from the state budget and own revenues from research, consultancy, postgraduate qualification activities and revenues from tuition fees. The subsidy from the state budget provides funds for maintenance of the educational activity of the university, research and capital expenditures. Planning and resource allocation is based on differentiated standards by vocational areas per student and are based on the number of students.

The situation is similar in the state R&D organisations within BAS and the Agricultural Academy. There is no working mechanism for management and optimisation of expenditure based on the quality of R&D. Many of the state funded R&D institutes rely predominantly on the state subsidy with negligible effort for diversification of funding sources. Hence, their share of competitive (project based) funding remains low (own calculations, based on Annual reports of BAS and Agricultural Academy).

Budget funding of education varies between 4 and 4.3% of GDP and the funding of higher education comes between 0.9%-1% of GDP. This percentage does not differ from the EU-average but is relatively low in absolute terms. The low level of funding of the universities in absolute terms is one of the main reasons for the exodus of young people away from the academic career and away from the country. Not only salaries are low compared to the business sector, but also the conditions for scientific research and development are poor. The insufficient financial support reflects negatively on the wages and maintenance of facilities, equipment and research infrastructure. The insufficient financial support to the universities prevents them from intensifying their research activities.

3.4 Knowledge transfer

The importance of knowledge dissemination and exploitation in boosting competitiveness and contributing to the effectiveness of public research has been increasingly recognised by EC and EU Member States. Following the publication of the ERA Green Paper in April 2007, the EC Communication "Improving knowledge transfer between research institutions and industry across Europe" was issued, highlighting the importance of the effective knowledge transfer between those who do research, particularly HEIs and PROs, and those who transform it into products and services, namely the industry/SMEs

Several Member States have taken initiatives to promote and facilitate knowledge transfer (for instance new laws, IPR regimes, guidelines or model contracts) and many others are planning to intensify their efforts in this direction. However, these initiatives are often designed with a national perspective, and fail to address the transnational dimension of knowledge transfer. This section will assess the national

policy efforts aimed to promote the national and trans-national public-private knowledge transfer.

3.4.1 Intellectual Property Policies

There is a lack of strong policies in the field of intellectual property rights in Bulgaria and most inventors do not patent their inventions. Patent data show that R&D institutions and universities do not cooperate actively with companies – there is only one patent, jointly owned by a PRO and a company for the period 2006-2008.

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

No specific policy measures for the promotion of spin-offs have been adopted in Bulgaria.

There are no formal restrictions on mobility of research staff between the public and the private business. However, examples of such mobility are rare, since most of the research units are state funded. Mobility exists primarily towards foreign research units. The majority of business enterprises in Bulgaria does not have research departments and cannot attract research staff from the public R&D units. FDI in R&D in Bulgaria is limited, including those seeking to recruit Bulgarian researchers. The NSF funds doctoral research conducted in Bulgarian enterprises;

Collaboration between research institutions and SMEs is “hidden” and usually neither business enterprises nor public R&D units account officially their R&D activities because of lack of effective tax relief and other reasons.

The European Regional Development Fund’s supports innovative start-up companies, commercialisation of innovative products and establishment of technology parks in Bulgaria through OP Competitiveness. According to the Annual Implementation Report (AIR) of the OP up to 2009 there have been only 11 completed projects. Still, these remain important priorities for the next seven-year planning period. *For more information see section 2.2.1 Resource provision for research activities.*

Participation of persons employed in the private sector in the management of public universities is regulated in the Higher Education Act. According to Art. 35a. a board of trustees is established to each state university. The board consists of 7 members - donors of the high school, people with active social position, representatives of employers, of industry and professional organisations, representatives of the Student Council and of the Minister of Education, Youth and Science.

3.5 Cooperation, coordination and opening up national research programmes within ERA

The articulation between the R&D Framework Programmes, the Structural Funds and the Competitiveness and Innovation Programme is still underdeveloped in terms of coordination, synergies, efficiency and simplification. The policy fragmentation at EU and national level, and between EU and national policies can hinder the build of critical masses of research excellence, leads to the duplication of efforts, sub-optimal impacts of the different instruments and unnecessary administrative overheads. Differences between research selection procedures and criteria can also be an obstacle to the overall spread of excellence. This section assesses the effectiveness

of national policy efforts aiming to improve the coordination of policies and policy instruments across the EU, all part of the drive to create an integrated ERA.

3.5.1 National participation in intergovernmental organisations and schemes

A European Organisation for Nuclear Research (CERN) – until 2010, approximately 40 scientists, PhD students and technical staff from the Institute for Nuclear Research and Nuclear Energy had regular access to participation in various experiments carried out in the international organisation.

b. European Science Foundation (ESF) – Bulgaria participates in one big scientific research programme, which is financed on a national level in the sphere of monitoring global climate change.

1. International Thermonuclear Experimental Reactor (ITER) – an experimental step between present day knowledge in the sphere of plasma physics and the future energy-producing plasma power stations. The countries which participate are: all EU-member states, India, China, Russia, USA, South Korea and Japan;
2. Since 2008 the Ministry of Education, Youth and Science has provided all Bulgarian scientific organisations and universities with a license for access to the electronic databases with scientific publications in the platforms ProQuest, ScienceDirect, Scopus, ISI Web of Knowledge, etc.;
3. Bulgaria has an observer status in the European Molecular Biology Organisation (EMBO);
4. Bulgaria is a member of the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) and of the Convention for creation of the European Centre for Medium-Range Weather Forecasts.

The teams from the universities and BAS, which apply in the competitions of the Seventh framework Programme, are well-known winners of grants, which have acquired their experience from the participation in the Fifth and Sixth Framework Programmes. Two strong institutes stand out with five successful projects each – the Institute of Oceanology and the Institute for Parallel Processing. This tendency has been seen since the Sixth Framework Programme. Many of the scientific institutes of BAS have not participated in successful projects and more than 30% have not participated at all in the open schemes. Among the more active fields are biological and technical sciences.

The situation is similar for the universities with high regional concentration of successful candidates. The universities in Sofia have the strongest presence (Sofia University St. Kliment Ohridski and Technical University - Sofia), followed by Plovdiv (University of Plovdiv Paisii Hilendarski, Agrarian University and Medical University - Plovdiv). The activity of the institutions of higher education is still low.

There is a significant presence of small and medium enterprises in competitions of the Seventh Framework Programme. The EC defines Bulgaria as a good example in respect to the positive balance of participations on behalf of the non-state sector. Furthermore, the SME participations are in scientific projects, which is a good sign for the inclusion of the private business in the exploitation of scientific results.

Bulgaria has been a member of the COST programme since 1998, when this was one of the most successful instruments for the creation of international partnership

networks. The programme is co-financed by the Seventh framework programme. The latest data show that as of September 2009, 218 Bulgarian organisations have participated in a total of 184 actions under the COST programme. Out of these actions, 95 are active as of 2010. In 53 of these actions there is more than one Bulgarian organisation participating.

Still, Bulgaria lacks national strategic guidelines for participation in European coordination and integration of research funding, which makes it difficult to influence European policy making. And despite Bulgaria's participation in the FP7, ESF, COST and other EU-programmes, Bulgaria lacks real concentration of public resources in priority scientific areas.

3.5.2 Bi- and multilateral agreements with other ERA countries

Bulgaria has developed bilateral cooperation with 13 countries (Ministry of Education, Youth and Science and the National Science Fund), with which agreements for scientific and technological cooperation have been signed. There are competitions regularly announced under these agreements for bilateral research projects. Over the last few years there has been a significant increase of the number of states with which Bulgaria has scientific cooperation.

The Ministry of Education, Youth and Science has also signed agreements with Turkey, USA and Austria, but the joint programmes for support of research projects and exchange are not yet effective.

3.5.3 Other instruments of cooperation and coordination between national R&D programmes

In 2007 the Ministry of Education, Youth and Science (MEYS) introduced a new initiative to support the preparation of European projects under the Seventh Framework Programme. This instrument was expanded in 2009 to include the preparation of projects under the European Programme COST. Less than 2% of all projects submitted to the Seventh Framework Programme have used it.

In 2008 the Ministry of Education, Youth and Science started another support scheme for European scientific programmes – the scheme for co-financing of projects that are already successful under the Seventh Framework Programme. As of 2010, 43 scientific projects have submitted a request for financing, out of a total of 158 projects. The application procedure has been simplified as much as possible, and the term to receive national co-funding is 3 months as of the application date.

As of October 2010 Bulgaria is actively participating in 8 ERA-NET schemes and 1 ERA-NET+ programme recognising the significance of such coordination of priority areas and of funding. These schemes however cannot fulfil their intended aim if national priorities remain unclear.

3.5.4 Opening up of national R&D programmes

The national research funding schemes are open for development of networking activities between Bulgarian research teams and their counterparts in Europe. Bulgaria has shown interest in participation in the joint programmes on Cultural heritage. Still there is no clear engagement of the country for an active role in a Joint Technology Initiative. One of the reasons is the underdeveloped industrial sector in the country and insufficient private funding for research activities. This, along with lack of clearly defined priority research areas and still insufficient project-based funding are the barriers for Bulgaria's integration into the joint European initiatives.

3.6 International science and technology cooperation

In 2008, the European Commission proposed the Strategic European Framework for International Science and Technology Cooperation to strengthen science and technology cooperation with non-EU countries. The strategy identifies general principles which should underpin European cooperation with the rest of the world and proposed specific orientations for action to: 1) strengthen the international dimension of ERA through FPs and to foster strategic cooperation with key third countries through geographic and thematic targeting; 2) improve the framework conditions for international cooperation in S&T and for the promotion of European technologies worldwide. Having in view these aspects, the following section analyses how national policy measures reflect the need to strengthen the international cooperation in S&T.

3.6.1 International cooperation

The collaborative research programmes of the National Science Fund are the main venue for funding international research cooperation in Bulgaria. Infrastructure projects have only been financed in 2008 and they have not involved foreign participation although they were open to it.

3.6.2 Mobility schemes for researchers from third countries

The Visa Package – Transposition of the Council Directive 2005/71/ES from 12 October 2005 (on specific procedure for admitting third-country nationals for the purposes of specific research) was implemented in 2007. The managing authority for the transposition of the Directive 2005/71/ES (Directive) is the Ministry of Interior (MI). The Ministry of Education, Youth and Science (MEYS) is a co–managing authority for Articles 2, 5, 6 of the Directive. MEYS adopted Order № 1 on the rules and procedures for inclusion of national research organisations in the national list of organisations having the right to employ third-country residents on research positions.

There are no targeted national schemes for researchers from third countries. However, participation in joint calls under the ERA-NET projects is an opportunity for third country scientists' mobility.

4 Conclusions

4.1 Effectiveness of the knowledge triangle

There have not been many policy changes in Bulgaria in the area of research policy and innovation in 2009-2010. Strategic planning remains uncertain as the National Innovation Strategy (2004) is outdated, while National Research Strategy, a document necessary to consolidate the activity and interaction of the main actors of the national research system, is still not in place. Nevertheless there have been individual policy measures which have the capacity to increase the effectiveness of the knowledge triangle, such as the new rules for science career advancement. However, these face inadequate and unpredictable public investment in research and innovation as financial support for the knowledge triangle has withered in Bulgaria in 2009-2011 in the wake of the financial crisis.

Table 3: Effectiveness of knowledge triangle policies

	Recent policy changes	Assessment of strengths and weaknesses
Research policy	Decrease of public spending for R&D and negative effect of the crisis. Enacted Law for Amendment and Supplement of the Law on Scientific Research Promotion (LPSR)	The LPSR provides for the building of large research centres and for better functioning of the NSF. These changes come, however, at a time when the Bulgarian government has cut public funds for R&D.
Innovation policy	A national GERD goal has been declared for 2020: 1.5% of GDP.	While adopting a national R&D goal has been a major breakthrough it comes against the backdrop of a lack of updated National Innovation Strategy and the ceasing of operation of the National Innovation Fund.
Education policy	Changed policy on academic career promotion (new Law on the Development of Academic Staff). The university rating system was launched but public financing was reduced	Career development and university rating are critical for the proper functioning of the system. However, policy changes remain largely on paper, with a long way to go to practical implementation. Part of the text of the new Law was rendered unconstitutional, which stopped the procedures for habilitation (i.e. acquiring scientific ranks) and obtaining of PhD degrees. The first ranking of the universities, which is intended to support the discretionary allocation of public resources according to university achievement, did not take into consideration the specifics of different universities.
Other policies	Both 2010 and 2011 budgets envisage a cut in resources for R&D, innovation and education. Delays in European funds' absorption persist	Considerable weaknesses result in the continuing delay of the OPs' implementation including, delays of state and regional bodies' payments to businesses, and increasing uncertainty for realising business investment programmes combined with no increase of the public financing of R&D and innovation. There are reports that beneficiaries experience difficulties in securing co-financing for the implementation of projects under the Competitiveness and Innovation Programme and other EU-funded programmes.

4.2 *ERA 2020 objectives - a summary*

While support for national measures / policies for achieving the strategic ERA objectives has remained strong on paper, financially it is almost entirely dependant on EU-financing. Bulgaria has tried to support national measures for human resources, infrastructure and knowledge most notably through the National Science Fund but these efforts have seen falling financial support in recent years.

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

	ERA objectives	Main national policy changes	Assessment of national strengths and weaknesses with regard the specific ERA objective
1	Ensure an adequate supply of human resources for research and an open, attractive and competitive single European labour market for male and female researchers	New schemes were launched under the NSF and OP Development of Human Resources to stimulate the young researchers in the country.	Achieved harmonisation with EU policy on paper; however persistent lack of public funds and slow implementation of EU funds result in slow real convergence.

	ERA objectives	Main national policy changes	Assessment of national strengths and weaknesses with regard the specific ERA objective
2	Increase public support for research	The public budget for science in 2011 is planned to increase in absolute terms, however it remains at 0.3% of GDP. In June 2010, the Bulgarian government adopted a GERD target of up to 1.5% of GDP by 2020.	GERD has remained at a steady low level at 0.49 - 0.5% of GDP. The financial crisis has had a negative effect on the public research budget.
3	Increase European coordination and integration of research funding	No change in national policy has been observed in 2010.	Bulgaria lacks national strategic guidelines for participation in European coordination and integration of research funding, which makes it difficult to influence European policy funding.
4	Enhance research capacity across Europe	Bulgaria participates in FP7, ESF, COST and other EU-programmes.	Public academic organisations have access to science databases. Still, Bulgaria lacks real concentration of public resources in priority scientific areas.
5	Develop world-class research infrastructures (including e-infrastructures) and ensure access to them	National Roadmap for Research Infrastructure was developed and approved by the Council of Ministers in 2010	Lack of financial, industrial and human potential for the construction and maintenance of big research infrastructures, combined with an obsolete material base.
6	Strengthen research institutions, including notably universities	New Law on the Development of Academic Staff enacted in 2010.	The NSF has provided some financial stimuli for research institutions but financial support to the universities has remained weak to bring about a qualitative change in their research activities is available.
7	Improve framework conditions for private investment in R&D	NIF has not distributed any funds to innovative companies since 2008. The JEREMIE and JESSICA funds were launched in 2010 but have not yet started operation.	There are no legislative or fiscal mechanisms to promote business investments in R&D and existing guarantee schemes have not produced tangible results.
8	Promote public-private cooperation and knowledge transfer	No change in national policy has been observed in 2010.	There are no effective policies to strengthen the links between R&D institutions and industry. There is also a lack of strong institutional policies in the field of intellectual property.
9	Enhance knowledge circulation across Europe and beyond	New initiatives to support the preparation of European projects under the 7FP and COST have been launched by NSF.	Various possibilities for international collaboration, co-publication and co-patent activities of Bulgarian and foreign researchers. Mobility is supported by the NSF and FP7.

	ERA objectives	Main national policy changes	Assessment of national strengths and weaknesses with regard the specific ERA objective
10	Strengthen international cooperation in science and technology and the role and attractiveness of European research in the world	No change in national policy has been observed in 2010.	Lack of research priorities. Good participation in the ERA NET and ERA NET+ schemes, however they need to be in line with the national priorities.
11	Jointly design and coordinate policies across policy levels and policy areas, notably within the knowledge triangle	No change in national policy has been observed in 2010.	There are no common priorities presented by the government within the fields of science, education and innovation.
12	Develop and sustain excellence and overall quality of European research	An international evaluation of the Bulgarian Academy of Sciences (BAS) (2009); EU-review of NSF (2006); two evaluations of the universities; and introduction of a new rating system (launched in 2010). Decrease of the staff and research units within BAS.	Some quality control mechanisms have been put in place. Despite positive developments, Bulgaria is far from achieving European excellence and quality of research.
13	Promote structural change and specialisation towards a more knowledge - intensive economy	The government's statement on the Europe 2020 strategy includes economic sectors for specialisation within the Bulgarian economy.	Export oriented and high technology sectors are expected to provoke the attention of foreign investors.
14	Mobilise research to address major societal challenges and contribute to sustainable development	No change in national policy has been observed in 2010.	Lack of clearly defined national thematic priorities. The opportunities for countering demographic change, climate change and energy security concerns are yet to be explored. The main financial resources for sustainable transport and energy efficiency are provided by EU funds.
15	Build mutual trust between science and society and strengthen scientific evidence for policy making	The independent assessments on funds spent and accountability to society, foreseen in the changes of the Law on Scientific Research Promotion. The changes are still "on paper" only.	There is a need for institutional restructuring and strengthening the collaboration between the public and private sector.

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List of Abbreviations

ARC Fund	Applied Research and Communications Fund / Фондация „Приложни изследвания и комуникации”
BAS	Bulgarian Academy of Sciences / Българска академия на науките
BERD	Business Expenditures for Research and Development / Бизнес разходи за научно-развойна и изследователска дейност (НИРД)
CEC	Commission of the European Communities / Комисия за европейските общности
CERN	European Organisation for Nuclear Research / Европейска организация за ядрени изследвания
COST	European Cooperation in Science and Technology / Европейско сътрудничество в науката и технологиите
ERA	European Research Area / Европейско изследователско пространство
ERA-NET	European Research Area Network / Мрежа на Европейското изследователско пространство
ERP Fund	European Recovery Programme Fund / Европейски програмен фонд за възстановяване
ESA	European Space Agency / Европейска космическа агенция
ESFRI	European Strategy Forum on Research Infrastructures / Европейски стратегически форум за изследователски инфраструктури
EU	European Union / Европейски съюз
EU27	European Union including 27 Member States / Европейски съюз включващ 27 страни-членки
FDI	Foreign Direct Investments / Преки чуждестранни инвестиции
FP	European Framework Programme for Research and Technology Development / Европейска рамкова програма за развитие на науката и технологиите
FP7	7th Framework Programme / Седма рамкова програма
GBAORD	Government Budget Appropriations or Outlays on R&D / Държавни бюджетни кредити и разходи за НИРД
GDP	Gross Domestic Product / Брутен вътрешен продукт
GERD	Gross Domestic Expenditure on R&D / Брутен вътрешен продукт за НИРД
GOVERD	Government Intramural Expenditure on R&D / Държавни разходи за НИРД
GUF	General University Funds / Общи университетски фондове
HEI	Higher education institutions / Институции на висшето образование
HERD	Higher Education Expenditure on R&D / Разходи на университетите за НИРД
HES	Higher education sector / Сектор на висшето образование
IP	Intellectual Property / Интелектуална собственост
MEET	Ministry of Economy, Energy and Tourism of Bulgaria / Министерство на икономиката, енергетиката и туризма

MEYS	Ministry of Education, Youth and Science / Министерство на образованието, младежта и науката
NIF	National Innovation Fund / Национален иновационен фонд
NSF	National Science Fund / Фонд „Научни изследвания”
OECD	Organisation for Economic Co-operation and Development / Организация за икономическо сътрудничество и развитие
OP	Operational programme / Оперативна програма
PRO	Public Research Organisations / Публични изследователски организации
R&D	Research and development / Научно-изследователска и развойна дейност
RI	Research Infrastructures / Изследователски инфраструктури
RTDI	Research Technological Development and Innovation / Изследователско-технологично развитие и иновации
S&T	Science and technology / Наука и технологии
SF	Structural Funds / Структурни фондове
SME	Small and Medium Sized Enterprise / Малки и средни предприятия
VC	Venture Capital / Рисков капитал

Annex: Additional information

Table 4: Total GBAORD by NABS 2007 socio-economic objectives in Bulgaria, 2008

Objectives	Millions of euro	% of the total R&D appropriations
Exploration of earth	10.42	9.59
Environment	0.85	0.78
Exploration of space	2.03	1.87
Transport, telecommunication and other infrastructure	1.09	1.01
Energy	10.02	9.22
Industrial production and technology	11.68	10.75
Health	0.46	0.42
Agriculture	24.96	22.98
Education	2.30	2.12
Culture, recreation, religion and mass media	0.15	0.14
Political and social systems	2.64	2.43
R&D financed from General University Funds	4.56	4.19
R&D financed from other sources	37.00	34.05
Defence	0.49	0.45
Total civil R&D appropriations	**108.16**	**99.55**
Total R&D appropriations	**108.65**	**100**

Source: Eurostat; Note: Numbers may not add up due to rounding

Table 5: Total Intramural R&D Expenditure (GERD) by Source of Funds and Sectors – 2008 (thousand euro)

Source of funds	Total	Sectors			
		business enterprises	government	higher education	non-profit institutions
Total	**166,607**	**51,698**	**97,160**	**16,000**	**1,749**
Business enterprises	51,021	43,976	3,742	2,798	505
Government	101,926	5,108	88,185	7,491	1,142
Higher education	719	3	133	571	12
Non-profit institutions	1,541	243	1,148	92	58
Abroad	11,400	2,368	3,952	5,048	32

Source: National Statistical Institute, 2008 (data extracted: 08.10.2010)

Table 6: Business enterprise R&D expenditure (BERD) as percentage of GDP*

	2008	2007	2006	2005	2004
European Union (27 countries)	1.21	1.19	1.18	1.15	1.16
European Union (15 countries)	1.28	1.25	1.23	1.2	1.21
Bulgaria	0.15	0.15	0.12	0.1	0.12

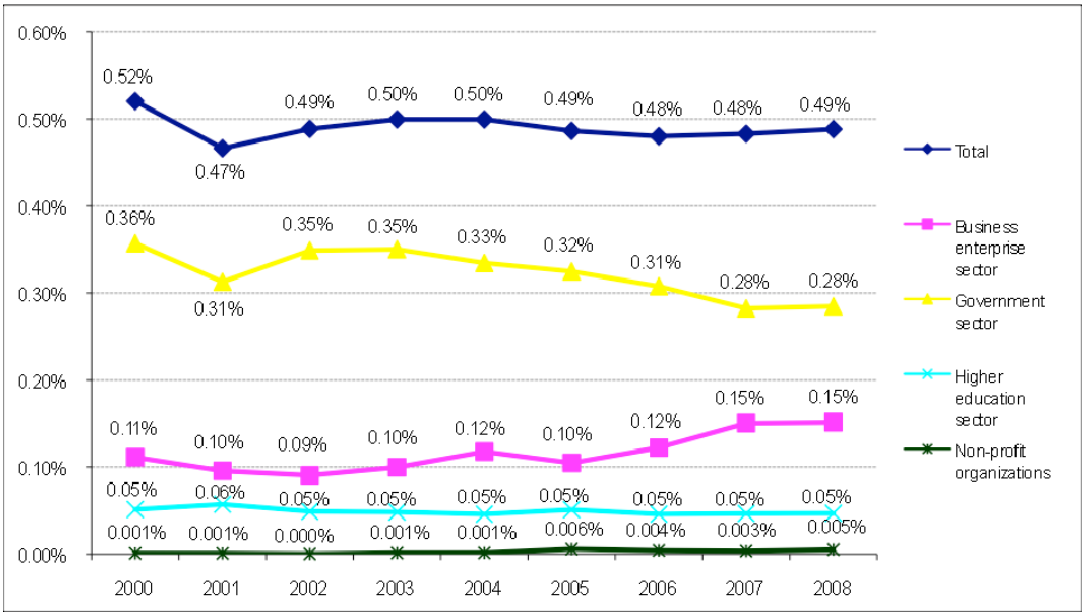
Source: Eurostat

Table 7: Business enterprise R&D expenditure (BERD), absolute values

	2008	2007	2006	2005	2004	2003
Bulgaria - BERD, Millions of euro	51.70	43.49	30.88	22.91	23.55	17.72

Source: Eurostat

Figure 2: R&D intensity in Bulgaria (%)



Source: NSI 2010, own calculations

Table 8: Competitions of the National Science Fund for 2009

Name of competition	Share of the competition's budget in the total NSF budget for 2009
Young scientists	1.2
Encouraging scientific research in priority spheres	24.7
Ideas	8.8
Development of scientific infrastructure	23.8
Scholarships for young scientists, preparing Ph.D. papers in national companies	0.4
Scholarships for post-doctoral internships in foreign scientific organisations	0.7
Sabbath year for prominent Bulgarian scientists	0.9
Return of established Bulgarian scientists working abroad	1.8
Stimulating of innovation in SMEs	0.4
Establishment of university research complexes	14.1
Development of centres for top achievements	14.1
Scientific periodicals	0.4
Bilateral cooperation, current (As of November, 2010)	2.6
Preparation of projects within 7 FP, current (As of November, 2010)	0.2
Co-funding of projects within 7 FP, current (As of November, 2010)	4.9
Co-funding of international assessment of scientific institutions, current (As of November, 2010)	0.9

Source: National Science Fund, 2010