REPUBLIC OF BULGARIA
Ministry of Education and Science

Better Science for a Better Bulgaria 2025

Vision for a research policy strategy in support of society and economy

OVERALL OUTLINE

Meeting societal and economic challenges based on a rich science history….
Bulgaria has a rich history of internationally acknowledged scientific and technological expertise and successes in a considerable number of areas. Today's fast moving and interconnected world, requires Bulgaria's science and innovation system to strive towards success and achievements.

We are on a continent and in a globalised world increasingly in need of cutting-edge knowledge and technologies to overcome mounting societal and economic challenges. Examples are related to health, ageing/demographics, environment, climate, energy, security, but also of course to growth and employment in general, which are in turn linked to important issues as inequality and social exclusion.

Overcoming difficulties and barriers in science and research….
Over the years, several independent, international organisations[1] have taken stock of Bulgaria's research and innovation system and its performance and have issued recommendations on ways forward. Past governments put out efforts to overcome some of the shortcomings that have appeared in the research system, by trying to introducing specific reforms. The political instability, institutional rigidities and a growing distrust amongst key stakeholders in the research and innovation system, have left these reform attempts insufficient.

Since then, the present government undertook concrete steps. It already developed an "Innovation Strategy for Smart Specialisation" and adopted an Operational Programme "Science and Education for Smart Growth 2014-2020." At the initiative of the government, Bulgaria was in 2015 the first EU Member State to take part in the EU's Horizon 2020 Policy Support Facility, a rigorous, independent peer review of Bulgaria's research and innovation system. By end 2015, this exercise has given Bulgaria a complete, up-to-date picture and a refreshed set of evidence-based recommendations.

One of the main conclusions is that research and innovation still have a huge potential to benefit Bulgarian society and to boost its economic development.

[1] Inter alia the OECD, the World Bank and the European Commission

A renewed strategy for a more robust research system, based on dialogue, trust, partnership….
Now is the time to have a consensual reassessment of the place where the Bulgarian scientific system and what are its prospects. The next steps, which are outlined in this strategy should lead to a real, renewed and trust-based partnership with all key stakeholders in research and innovation.

Some of the puzzle pieces are already there[2]. Determination and will for change is present, through consistency of reforms, with a strong correlation and functioning in practice amongst institutions, both at government level and at the level of stakeholders.

This paper sets out the vision on what the government intends to put into such a partnership, into a renewed national strategy forging a robust Bulgarian research system, both in terms of capacity and quality, in support of society and economy: "**Better Science for a Better Bulgaria 2025.**"

New commitment, direction and openness….
The present government seeks to demonstrate new commitment (also in financial terms) and direction of development of the science and innovation communities across the state, in all its regions, as well as abroad, within our privileged EU and beyond.

This will establish trust amongst our citizens, our businesses, entrepreneurs and start-ups that Bulgaria's research system can deliver on their needs for and in a modern knowledge-based society and economy.

To show our young people, whether in Bulgaria or abroad, that taking part in developing Bulgarian science and research is worthwhile, and part of a rewarding career.

To go out of our relative international isolation and to achieve a broader recognition of Bulgaria's research and innovation from our foreign investors, from our neighbouring countries, from our partners in the European Research Area (ERA) and beyond. This will in turn increase Bulgaria's access to international research and innovation networks, to more trans-national funding and finance and with that to Bulgaria's research system's effective capability to achieve faster and better results to our society and economy.

For this reason, the renewed research strategy also contains Bulgaria's national roadmap for implementing the priorities of ERA.

Alignment….
Bulgaria needs to bring its overall research policy strategy in line with the thematic priorities of the "Innovation Strategy for Smart Specialisation" (ISSS) and to reinforce its objectives, by providing critical mass in research efforts and through

[2]Inter alia the ISSS, OP SESG, Higher Education Strategy, Law on Education, Regulation on Professonional Education, the Reform Programme of the Republic of Bulgaria 2020

the development of new technologies, in support of the most promising sectors. Alignment with the ISSS priorities will be an opportunity to enhance Bulgaria's research and innovation collaboration, connecting it effectively to similar efforts across European (neighbouring) regions. This in turn is aimed at shaping more competitive advantages and economic added value for current and future Bulgarian businesses. The alignment of Bulgaria's overall research strategy, including on the National research infrastructure roadmap, is a prerequisite for the final approval of the "Innovation Strategy for Smart Specialisation".

Together with the alignment with ISSS' thematic priorities, we need to better align and adjust the priorities for higher education development to the needs of research and the business. Human resources in research and innovation in this context are one of the key pillars in the government's present strategy.

Reforms….

The government's commitment, also in financial terms, is not an end in itself for Bulgaria's research system. A range of reforms are already mandatory, stemming from the "ex-ante conditionalities" in the EU Partnership agreement. These reforms will have to be met in terms of commitment and solid planning, before Bulgaria's research system can actually start profiting from the generous funds contained in the Operational Programme "Science and Education for Smart Growth". These EU funds are crucial to boost the national funding of Bulgaria's national research system in the years to come.

Hence, change and reforms, some quite profound, will therefore be inevitable, both on the side of the Ministry of Education and Science and on the side of the other key stakeholders in Bulgaria's science and research system.

While the present paper defines the long-term vision, it doesn't mean that changes are planned for a later stage. The urgent start of reforms has the advantage that some changes can be gradual, more easy, less painful, but they have to be set clearly from the start.

Reforms in the research system are part of Bulgaria's broader reform challenges, which the present government is addressing every day: reforming the judicial-, the healthcare- and the pension-systems; transition towards e-government, working on tax-compliance.

Change in attitude….

First and foremost is achieving an overall change in thinking about and within the Bulgarian research system. As the vision presented in this paper demonstrates, the government expresses readiness for and commits, for the sake of increasing the capacity, quality and effectiveness of Bulgaria's research system. This will lead to increase of the prosperity of Bulgaria in an interdependent Europe and in a globalized world.

A RENEWED RESEARCH STRATEGY BASED ON 4 PRINCIPLES:

The renewed research strategy aims to achieve maximal impact on Bulgaria's society and economy, and is based on four key principles. They should be applied by presumption, not by choice or randomly. It is therefore key that these principles are elevated into the core strategic goals and modes of operation of all actors and stakeholders involved. There is no further room for complacency on systemically applying these principles.

Principle 1: Partnerships in three dimensions

- Partnership amongst the **research and innovation performing and dependent/demanding organisations – scientific organisations, universities and businesses, their confederations and civil society organisations**. These partnerships have different dimensions - territorial, sectoral, result-orientated and common European. They could be about creating and enhancing excellence, critical mass, generating new incomes and contributing for growth and employment.

- Partnerships amongst **institutions developing and implementing (sectorial or generic) policies in science and innovation, basically aimed at inter-ministerial coordination.** There is a continued need for effective coordination mechanisms within the government structures. The ministry of Education and Science is committed to a more effective partnership at different levels between the governments institutions defining and implementing policies and actions in science and innovation, in particular with other ministries (economy, health, environment and water, agriculture), as well as effective alignment with other sectorial policies, such as regional policy, defence and security, transport and ICT. Inclusion of the ministry of finance this partnership will be encouraged.

- Partnerships amongst **institutions developing and implementing (sectorial or generic) policies in science and innovations** on the one hand, and **research and innovation performing and dependent/demanding organisations** on the other hand. This aims at ensuring a dialogue and the preparation of an agenda that will show what research and innovation performing organisations can and are expected to deliver to sectorial policy needs.

Principle 2: Complementarity and synergy

The renewed research strategy for Bulgaria seeks complementarity and synergies with other strategies' objectives and results, such as the Innovation Strategy for Smart Specialisation, the National Reform Programme, the Strategy for development of research in the agrarian sector 2009-2018, Economic analysis of Bulgaria and others. The aim is to achieve synergies and build on these, rather than to duplicate and/or sustaining discordance between policies and priorities.

Principle 3: Equal involvement of stakeholders

The strategy affects the entirety of stakeholders in research and innovation. It is subject of open debate and should reflect all constructive proposals and measures that will positively and significantly impact the outcomes of its application. The ministry of economy and the ministry of finance are co-sponsors of this strategy, which should not only safeguard coherence but also the provision of the necessary resources for its successful implementation.

Principle 4: Trust

The most challenging principle is the one of trust. Trust is hugely important for a positive attitude in and around any system, and it takes big efforts and will.

Over the past years, systemic trust in Bulgaria's R&D system is shaken[3]. This has had an overly effect on the readiness of the main actors in research and innovation to reach out to each other from their "trenches". It has also negatively affected the preparedness of young people enter a science and innovation system that doesn't seem welcoming to the new generations. It has also undermined the confidence of businesses and entrepreneurs to rely on Bulgaria's research system to provide them with useful knowledge and technologies to further develop and expand their businesses.

The present strategy aims to help and restore trust amongst the main actors in research and innovation, to reach out to each other and to reinforce result oriented actions in a collaborative and positive attitude. The Ministry of Education and Science can decisively contribute to restoring trust of Bulgaria's main actors in research and innovation, by promoting transparency in the development and application of the new policies.

A transparent and open setting of research priority is essential in providing them with financial and human resources. Trust requires clear vision regarding the mechanisms for allocating funds among scientific fields, through clear and broad understanding to overcome conservatism in the system.

[3]"Report on the Peer Review of the Bulgarian R&I system under the PSF", 2015

A RENEWED RESEARCH STRATEGY BASED ON 4 PILLARS:

Pillar 1: Renewed commitment to raising public investment in research

Bulgaria in the bottom ranks of EU R&D intensity….
Following a rapid decline of Bulgaria's R&D intensity (combined public and private investment as percentage of GDP) from 2.16% in 1990 to 0.56% in 1995 (after which it stabilized)[4], it has taken Bulgaria 14 years to get its R&D intensity up from 0,5% in 2000 to 0,8% in 2014[5]. With that, Bulgaria still is in the bottom ranks of EU countries' investment in R&D (24th place of the 28 EU Member States, leaving only Croatia, Latvia, Cyprus and Romania behind) and well below the EU average of 2,03% R&D intensity in 2014 (versus 1,8% in 2000, albeit before the 3 enlargement rounds of 2004, 2007, when Bulgaria acceded, and of 2013).

To reach Bulgaria's stated 2020 R&D intensity target of 1,5%, an annual growth of 11% is required. To note that over the period 2007-2014, Bulgaria's annual increase of R&D intensity amounted on average 9%, while over the period of 2000-2014 this annual growth amounted only 3,5%.

The need for higher public investment in R&D….
Bulgaria's public share in R&D investment (combined government and HE sector) has however declined from 0.35% in 2007 to 0.25% in 2013[6].In 2014 and 2015 the public share of R&D intensity has been maintained at that level.

More needs to be done in terms of increasing the public share of investments in the sector. As the EC Policy Support Facility peer review reports[7]: "*Whatever the evidence on the possible 'new' role of the business sector, domestic or foreign, in increasing overall investment in R&D in Bulgaria, for it to be sustainable in the long term, it will be essential for public funding….to become more in line with what other countries at the level of development of Bulgaria spend as a percentage of GDP. Relying only on foreign investments will create, and already does, huge discrepancies in the use and functions of BAS, AA and HEIs for the economy and quality of life in Bulgaria …"*

A substantial increase of public investment in R&D will not only help to reinforce those sectors identified in the Innovation Strategy for Smart Specialisation, but also benefit a revamped, competitive Bulgarian broader science and research base to better meet our societal challenges, as well as to support newly emerging creative and economic sectors.

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[4]DG Research and Innovation –Unit for the analysis and monitoring of national research policies – Data Eurostat, DG ECFIN

[5]"Science, Research and Innovation Performance of the EU", European Commission, 2016

[6]Ib idem footnote 3

[7]"Report on the Peer Review of the Bulgarian R&I system under the PSF", 2015

A commitment to public R&D investment of (0,45%) by 2020 and 0,67% by 2025….

In the EU, as in most developed economies, the accepted ratio of public/private investment in R&D is 1/2. In line with that, and with the stated goal of Bulgaria to reach 1.5% R&D intensity by 2020, it will be the ambition of the Ministry of Education and Science to expand the public investment in research from 0.25% currently to (0.45%)of GDP in 2020. Moreover, a new goal of 2.0% R&D intensity by 2025, with which Bulgaria would reach the current EU average R&D intensity, would require a further rise in the public R&D investment to 0.67% in the longer term.

The ambitious commitment for substantial increase of public investment in R&D in Bulgaria rests on two distinct components. First, there is the new OP SESG, with €243m (on average about €34,5m per year) from the dedicated priority axis 1, while priority axis 2, also contains research related budget. Second, there is the state budget component, which currently stands at approximately BGN200m per year.

In the years to come, the state budget component would first of all need to rise substantially to provide the necessary room to meet the minimum co-funding requirements from the funds allocated through the OP SESG. Only for priority axis 1 this will require an additional amount of €43m, or €6.1m on average per year until 2021/2022).

Secondly, the state budget component would need to increase in order to support a new palette of targeted activities, developing competition between research organizations and for research-business joint programmes in smart specialization areas, as part of the reform efforts in the Bulgarian research system (see pillars below). The OP SESG doesn't contain funds for those components. This would require an additional BGN20m net per year, after deduction of an increasing amount over the years to be saved from efficiency gains in Bulgaria's research system overall.

On this basis, and assuming an average annual GDP growth of (3%), and naturally subject to government and Parliament approval, it is estimated that the state budget component for research would need to increase to BGN220m in 2017, BGN262m in 2018, BGN289m in 2019 and to BGN320m by 2020, and by 2025 it is expected to reach BGN 500m.

It is in this way and together with the expected investment component mentioned above through the OP SESG, that the ministry of Education and Science has the ambition to raise Bulgaria's public investment in research to (0,45%) of GDP in 2020.

The level of the state budget component beyond 2020 would depend on the envelope size of any new OP dedicated to science and education in the new planning period, as well on a new evaluation of the Bulgarian science and research system. However, based on the ambitions a public investment in R&D of 0,67% of GDP by 2025 could be envisaged.

Towards a more relevant and accountable public research base….
The substantial additional public investment in R&D is to facilitate an ambitious reform of the public research sector in Bulgaria as a whole, in terms of its organization, methods of funds distribution, its support to human resources in research and to research infrastructures (see below in the other pillars). To make the public research sector more focused, competitive and future oriented, and with that more relevant, geared to the opportunities it can give to provide solutions for existing and new Bulgarian businesses to be more innovative in providing better and new products and services that deliver more revenues, adding growth and employment.

At the same time, the public research sector should commit to socially significant goals and more accountable for their actions and should increase its efforts to demonstrate that its results contribute to social and economic development of the country. This will facilitate public and political support for extra investment in Bulgaria's research base.

Pillar2: Reforms in the R&D system

Stability to facilitate reforms…
Progress has been made regarding stability, which is key to attracting investment and to achieve a knowledge based economy. Bulgaria has many reform challenges, which the government is addressing progressively and irreversibly. Stability guarantees progress on reforming the judicial-, healthcare- and pension-systems; moving towards e-government, working on tax-compliance. The new commitment to boost public R&D investment is to provide new stability to the research sector, while facilitating the following main institutional reforms.

Mandatory reforms to achieve the preconditions for implementing Operational Programme "Science and education for smart growth '….
Many of the proposed reforms presented here are already mandatory, stemming from the so-called "ex-ante conditionalities" set by the EU. These reforms will have to be met in terms of commitment and solid planning, before Bulgaria's research system can actually start profiting from the inventory of Operational Programme "Science and Education for Smart Growth". These EU funds are crucial to boost Bulgaria's national research system in the years to come. It underscores the urgency with which Bulgaria has to address these issues.

Achieving efficiency and effectiveness of the system…
The commitment to raise public investment in research by 2020 and 2025 respectively, will bring Bulgaria up to the current average R&D intensity in the EU. And the public investment increase will obviously be implemented gradually. These are in themselves two more compelling arguments why Bulgaria should radically improve the organisation of its public investment in research: boosting the quality, efficiency and effectiveness of its public research system. Last, but not least, Bulgaria's engagement in building the European Research Area also relates to effective national research systems.

On this basis, in the short term Bulgaria intends to achieve:

Shift to performance-based funding by default….
Based on implemented assessment and control, the greater part of institutional funding for each research organization will be result-based, introduction of multi-annual plans and performance contracts involving regular institutional evaluations using objective international criteria related to performance indicators. Budget plans will integrate monitoring and evaluation mechanisms, publicity and traceability of inputs and justification of expenditures based on analytical statistics and constant data exchange.

Increase the share of competition-based funding….
Gradually, but substantially increase the project- and programme-based share of funding to actors in research, including institutional ones, at the expense of generic institutional funding, while maintaining a certain level of basic institutional funding. This will also allow bringing different institutional actors together on a programme or project base.

Competitive funds allocation by default based on calls for proposals and peer review…
All public bodies responsible for allocating funds for R&D competition-based by default. Increase of the programming portion of the funds invested in research, based on independent and objective evaluation pf the proposals, introducing best practice and internationally accepted principles and standards for evaluation and monitoring.
New agency for better and more competitive research funding….
Revamp the National Science Fund into a solid and respected, politically and operationally independent research funding agency, implementing substantially increasing multi-year funding programmes for research grants by means of transparent, responsible, quality-based competition, the strict criteria for which are to be laid down based on international standards and practices.

Rationalisation of research performing organisations…
Restructuring and modernizing research organizations, including universities in order to overcome the fragmentation of the research sector in Bulgaria. Improving the critical mass, equalizing efforts, increasing the efficiency of public resources invested in research organizations and avoiding duplication of infrastructure. The largest share of the foreseen budget increase will be directed to sectors that have undergone international assessment, proposing reforms for traceable, visible, with broad public impact scientific result and determinative effect for both the research and economic development of the country. As a result, until 2020 it is expected national centers of excellence and centers of excellence to be established, bringing together the existing scientific capacity in leading scientific fields that are unique to the country and unmatched regionally, and contribute to building the European Research Area.

Modernization of the research infrastructure in Bulgaria as an attractive destination for research and innovations

The national research infrastructure is a source of income, influence and effects that cover 30% of infrastructure for the public sector, 40% infrastructure serving the modernization of technology in defense and security, 40% infrastructure with a direct impact on ecology and the environment, 55% with effect on improved health (especially prevention), 60% effect on regional policies and 70% supporting scientific production of BAS institutes.

Establish an R&D Liaison office in Brussels….

Complementing diplomatic channels, the vast majority of EU Member States have since many years a dedicated research and development liaison office in Brussels. The added value of these offices[8] lies in their dedicated communication channels between major research actors in their home countries and those in the Brussels beltway that are in the know about the latest opportunities for funding and collaboration. The establishment of a Bulgarian R&D Liaison Office in this context would not only give a strong sign of political engagement on the European Research Area, but it would open up many practical channels for Bulgarian research organisations and their researchers to engage more effectively in successful trans-national collaboration.

Pillar3: Strategic priorities, alignment with smart specialization and beyond

Rationale for strategic priorities and factors for their choices….

To focus science and research in strategic priority areas is crucial for achieving critical mass, efficiency of investments, building competitiveness advantages and skilful human resources for the benefit of the economy and society.

The choice of long-term priorities is determined by three main factors:
(A) Expectations as to which sectors of the Bulgarian economy will grow most actively in the following years, including what kind of scientific-educational provision will be needed;
(B) Existing capacity, strengths and potential of research organisations and the perceived need of business operators;
(C) Global trends and the priorities of the EU(H2020).

Selecting such strategic priorities enables Bulgaria to concentrate its expanding, but still limited resources on those sectors that are economically most promising. The aim is to increase the efficiency of research and innovation and to create conditions to achieve significant scientific results and multiplier effects in the economy.

The presence of stable priorities, at least for some years, also greatly reduces abrupt and frequent changes in the guidelines on research related redeployment, as well as the opportunities for financing.

[8] http://www.iglortd.org/members

Need to bring research policy strategy in line with ISSS….
Bulgaria needs to bring its overall research policy strategy in line with the thematic priorities of the "Innovation Strategy for Smart Specialisation". To reinforce its objectives, by providing critical mass in research efforts and the development of new technologies, in support of our most promising sectors.

This in turn is aimed at shaping more competitive advantage and economic added value for current and future Bulgarian enterprises. The alignment of the overall strategy, including a national roadmap for research infrastructure is a necessary condition for final approval of the Innovation Strategy for smart specialization.

The added value of knowledge beyond the priorities of ISIS ….
Bulgarian science and research is expected to have a greater contribution to societal challenges set out in the EU framework program "Horizon 2020", which are a challenge for all Member States, but have direct relation to Bulgarian society. What is needed is quality and transparent assessment of the scientific system to determine those scientific fields, with capacity to contribute to specific societal challenges.

Looking ahead to 2025 other areas are likely to emerge, from growing economic and / or social interest, requiring experience and extracting knowledge from the Bulgarian sector of science and research.

Hence, the proposed focus on the following research priorities….
The priority areas for research development for the period up to 2025in the present Strategy are determined based on:
(A) Expectations about which sectors of the Bulgarian economy will grow most actively in the coming years, including what scientific and educational provisions will be needed;
(B) The existing capacity, strengths and potential of research organizations and the recognized need for businesses;
(B) Global trends and priorities of the EU ('Horizon 2020').

Proposed priority research areas in the renewed Bulgarian research Strategy to 2025 :

- Mechatronics, clean technology and new energy and energy efficient technologies;
- Health and quality of life, green and eco-technologies, biotechnologies, eco-foods, purification and waste technologies;
- Environmental protection. Utilisation of raw materials and bio-resources; environmental monitoring.
- Materials and Nanotechnology;
- Information and communication technologies;
- National identity and anthropology. Socio-economic development and governance.

Research in the priority areas are based on priority areas identified in ISSS and national achievements of fundamental sciences, which should be considered as a horizontal priority.

The operational plan for the implementation of the present Strategy has a time frame of 4 years (2016-2019), after which an evaluation of the implementation is foreseen and the development of a plan to reach the goals by 2025 according to the new programming period of the EU. It sets out how these priorities will be addressed in practice and over time. Complementing the benefits of a reformed research and development system, stated in Pillar 2, the following principles will be applied in determining a coordinated approach to strategic priorities:

Synergies through alignment of national programmes….
An integrated approach is needed to align the national programmes with the strategic priorities, comprising all major research actors active in the areas concerned, across Bulgaria's regions. Actors active in the business sectors and in the public policy sectors, as well as civil society where applicable should be systemically and actively involved in this exercise.

Centres of excellence and competence, research infrastructures….
Major vehicles to focus research activities, create critical mass on the strategic priorities and to ensure a direct connection with business and public policy sectors, will be centres of excellence and competence (including regional ones) and aligned with the research infrastructures roadmap. These structures are also to give fresh impetus to more systemic and effective knowledge and technology transfer mechanisms.

Piloting and roll out of joint R&I programmes….
Science-business cooperation and a more entrepreneurial orientation and mind set are also to be fostered through piloting and, with time and funding expansion, roll out of new joint R&I programmes. These initiatives should be oriented towards a) implementation of concrete results and solutions for business in specific sectors to enhance their technological advancement or/and to overcome technological gaps in their current economic activity or b) fostering research and innovation activity within RPOs (incl. universities) in specific fields of economy interests, defined under ISSS and creating paths for commercialization of research and technological results.

Stronger connections with the European Research Area and beyond….
The approach under this pillar, in combination with renewed commitments of Bulgaria under the ERA Roadmap, including on e-science, will assist Bulgaria's research system to break with its relative international isolation. Strategic choices on trans-national and international cooperation and better use of Bulgaria's diasporas in research, will help to establish a Bulgarian "research brand" and achieve a broader recognition from our foreign investors, from our neighbouring countries, from our partners in the ERA and beyond.

This will decisively increase Bulgaria's access to international research and innovation networks (e.g. ERA Joint Programming Initiatives, Joint Technology Initiatives, EIT Knowledge and Innovation Communities); to privileged access to key research infrastructures across Europe; to more trans-national funding and finance (amongst others from Horizon 2020), etc. These international linkages will in turn boost Bulgaria's research system's effective capability to bring quicker and better results for the Bulgarian society and economy.

Pillar 4: Human resources

Human resources are key to achieving the goals…

All the goals set out in the present vision will be rendered null and void without the necessary human resources to deliver on them and in the future. There is a lot of expertise, talent and energy in Bulgaria's research system. However, Bulgaria suffers from demographic decline. The country has fewer researchers in all main categories compared with the EU average. Nearly half of professors are over 65 years of age and migration of younger researchers to other (EU) countries or to jobs outside R&D is a rule, rather than an exception. Increasing the number of researchers is therefore a monumental challenge, not just in view of the foreseen rise in public funding for R&I. But also in terms of developing and maintaining the necessary quality of new human resources, in view of the ambitions for a reformed research system.

Incentives for research careers at all stages and to retain and attract young talent from Bulgaria and abroad….

Rapid and decisive action are required to put into place a system of incentives for research careers at all stages and to retain and attract young talent from Bulgaria and abroad into science and innovation

It should be ensured that both the Bulgarian authorities and all public research organisations ensure that recruitment, promotion and funding of researchers is performed in an open, transparent and merit-based manner, using the necessary metrics and international peer review practices.

All public research organisations, in particular the universities and institutes of the Bulgarian Academy of Sciences, should adopt and put into practice the European Charter for Researchers and the European Code of Conduct for Recruitment. This will lead to a transparent working environment and career development based on rewarding performance, and to ensure open and transparent recruitment practices.

In this context, it is crucial that the next generation of researchers should be well equipped to take up jobs in the research and innovation sectors. The education system in Bulgaria does not stimulate sufficient interest in research as a career. PhD candidates receive a very traditional research education that often lacks modern elements, including mastering foreign languages and training in the so-called 'transferable' skills that are crucial in research interaction with the business sector and for innovation in general. PhD candidates in Bulgaria suffer from very

low salaries. This makes doctoral studies abroad more attractive, contributing to brain drain and making it hard to recruit foreign young researchers to come to Bulgaria.

Partnership to address shortcomings in terms of qualifications, career and salary structures…

To address these shortcomings a partnership is sought with and between BAS, AA and the universities to ensure that doctoral programmes become more international, incentivise the mobility of PhD students, establish better connections to market needs, and ensure higher quality in different disciplines. The so-called European Principles of Innovative Doctoral Training could be applied by all institutions performing research in Bulgaria.

The partnership also implies initiatives to work towards more competitive salary levels and structures, with room to differentiate, fix and adjust researchers' remuneration levels based on individual performance. This should go hand in hand with a dedicated augmentation of the public funding base.

The partnership between BAS and the universities should be based on medium-term HR planning (rolling 3-5 years) concerning pensioning versus new positions for younger generations of researchers, including working on a better gender balance in Bulgaria's public research base.

National commitment to support postdoctoral researchers…

Progressive roll out of sizeable, dedicated individual fellowship programmes, to retain Bulgarian postdocs or re-attract those working abroad, and to attract international researchers to Bulgaria.

The state will implement a more effective policy aimed at improving the economic and social status of researchers and at creating attractive conditions for scientific activities that give them a sufficient dose of professional confidence. The state will encourage the return and integration of highly qualified Bulgarian scientists working at research institutions abroad. It will initiate actions to modernize all aspects of the structure and management of research organizations to increase their scientific and human potential. It will also provide support for collaboration between the Bulgarian diaspora and research organizations in the country by introducing special schemes for it. Work will continue to support the participation of Bulgarian research teams and scientists in international and European programs and initiatives. However, it is necessary to have a mechanism for periodic evaluation of the research staff and the work of researchers.

Addressing research integrity and gender….

The ministry of Education and Science is committed to work with the public research institutions to ameliorate the quality of Bulgaria's researchers by systemically addressing research integrity in the upper curricula of researchers' training and to active policies on improving the gender balance in research, especially in terms of senior researchers.

Next steps

The vision set out in this paper and detailed further in its annexes, constitutes an ambitious, but realistic and above all highly necessary research strategy for Bulgaria. The overall objective is to boost the capacity, focus, quality and effectiveness of Bulgaria's research base; to considerably enhance its contribution to solutions for the grand challenges facing society and to decisively contribute to knowledge and technology-based innovation, economic growth and employment in the years to come.

Although it is a long-term vision, its implementation should be taken at hand firmly and as soon as feasible.

Major elements, of a legislative nature of a matter of finance, require preparation and planning. The ministry of Education and Science is committed to work on that in a constructive spirit with all stakeholders concerned, while recognising the urgency of reform. This goes in particular for the need to meet the ex-ante conditions before the Bulgarian research system can benefit from the financial envelope of the OP SESG and from the final approval of the ISSS. Also the budgetary planning, in particular with a view of the national budget for 2017, requires coordinated action.

That is why the Ministry of Education and Science will initiate the following next steps:

- Build a broad-based political consensus comprising the government, parliament and political actors in Bulgaria's regions to support this vision;
- Build broad and sustained support for this vision amongst the stakeholders in the Bulgarian R&I system, including businesses and its associations;
- Raise awareness and enhance support amongst civil society and media;
- Raise awareness and build support amongst European and international partners in research and innovation;
- Start the process for the legislative initiatives and financial measures in accordance with the present vision;
- Elaborate a comprehensive multi-annual action plan to implement this Strategy.