NATIONAL STRATEGY OF SCIENTIFIC RESEARCH TO 2020

…I want Europe to emerge stronger
from the economic and financial crisis….
José Manuel Barroso
European Commission Chairman

The National Scientific Research Strategy of the Republic of Bulgaria reflects the Government's policy as part of its responsibilities for the country strategy development. The Strategy should facilitate the development of the Bulgarian science by making it a factor for economic development based on knowledge and innovation.

The headline targets by 2020 at European level are defined as following[1]:

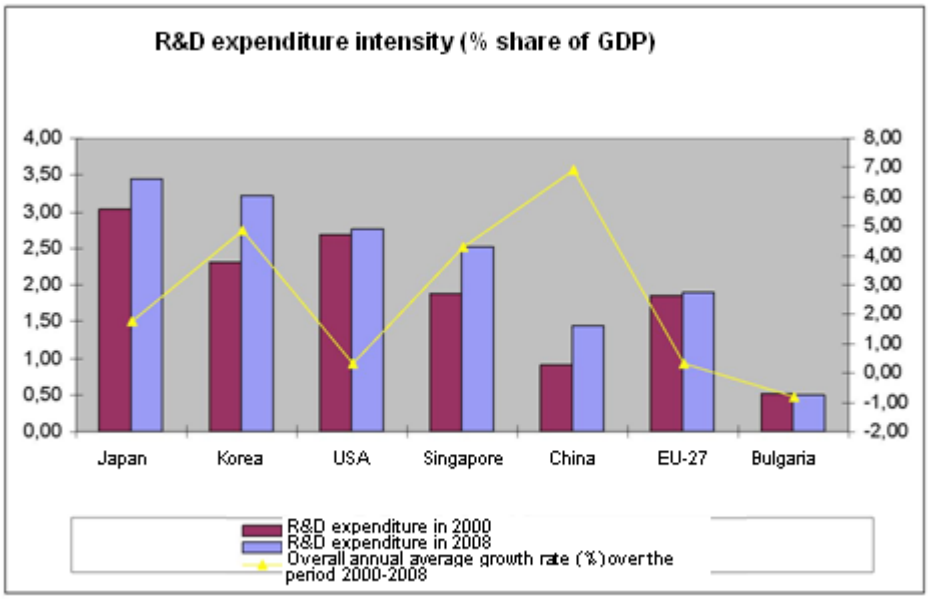
1. 75 % of the population aged 20-64 should be employed;
2. 3% of the GDP should be invested in Research and Development (R&D);
3. The "20/20/20" climate and energy targets should be met including up to 30% emissions reduction compared to the current emission values;
4. The share of early school leavers should be under 10% and at least 40% of the younger generation should have a tertiary degree;
5. 20 million less people should be at risk of poverty.

More than ever, research and innovation are key competitive advantage for meeting these targets in the global economic competition.

Many analysts suggest that the countries that form the so-called group BRIC (Brazil, Russia, India and China) have considerable human and material resources and by 2040 their combined GDP could gradually overtake that of the G-6 countries. More importantly, R&D account for a large percentage of the GDP in these countries (Figure 1).

[1] http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf

Figure 1

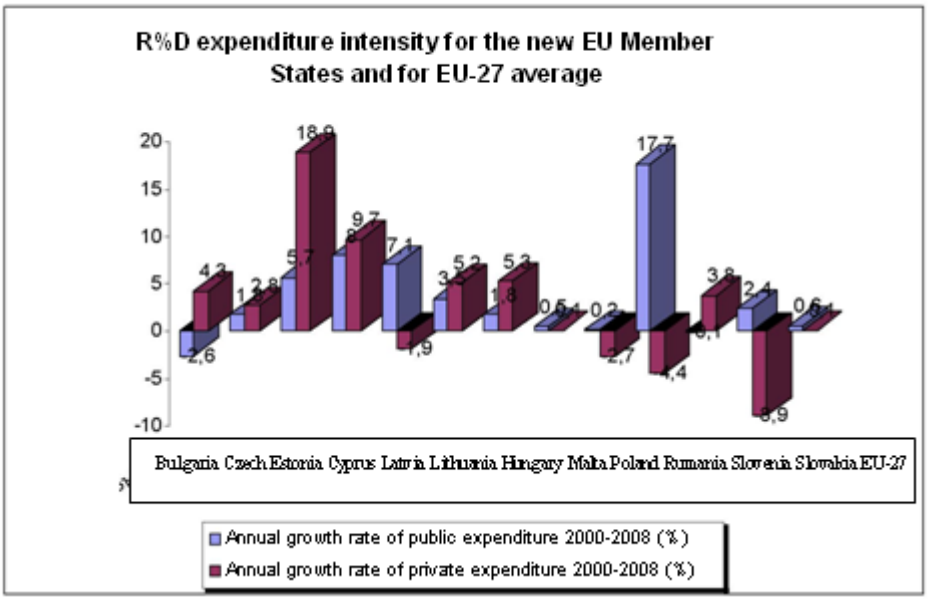


Source: Eurostat

The countries, which register high R&D expenditure intensity, also register strong economic growth and increasing share in the knowledge and innovation global market.

Bulgaria lags behind the new Member States in terms of R&D investment intensity. According to Eurostat, the average annual growth of Bulgarian public expenditure for R&D as a percentage of GDP has been negative over the period 2000-2008.
The growth rate of private investment is positive, but the overall share of private investment remains very low.

Figure 2



Source: Eurostat

Based on the results of the Global Innovation Scoreboard[2] the EU-27 countries and their main international partners share several key features:

- Only four countries ranked among the top-ten are EU Member States;
- The EU-27 average occupies the 20th position;
- The new Member States fall within the group of catching-up countries and Bulgaria ranks 38th out of 48 countries surveyed. It is noteworthy that further deterioration of our innovative profile is observed by each of the observed indicators. It is particularly noticeable for the indicator "Human Resources", where compared to 1995 and 2000 Bulgaria drops by 11 positions (2008).

Despite the considerable efforts for creating suitable environment for research, technology and innovation, the EU lags behind the USA, Japan and the fast growing Asian countries in many respects.

The high industrialized countries control the high-tech market because out of 50 basic macro-technologies they possess 46 and produce 80% of the high-tech products. 22 of these macro-technologies are developed and controlled by the USA, that also possesses one-third of the global high-tech sector and is followed by Japan with 17% share of the high-tech market and Europe ranks third – a leader in the energy-saving technologies and biotechnologies.

Bulgaria not only faces the same challenges as the developed EU Member States but it should operate under the conditions of one of the slowest-growing economies within the EU. Thus, the effective management of science as an economic factor for sustainable growth, employment and dynamism of the national economy is a priority of the Bulgarian Government.

The current National Strategy of Scientific Research aims at:

- contributing to the transformation of the Bulgarian society into "knowledge society";
- contributing to the development of a national economy based on eco-technologies;
- formulating national science policy that will provide opportunities and define prospects for achieving the targets set forth in the Europe 2020 Strategy, and
- contributing the creation of integrated European research area.

[2] GIS, Global innovation Index, http://www.proinno-europe.eu/page/thematic-papers-1. This is an international system measuring the innovative profile of the EU Member States and their major international partners on the basis of three composite indicators – Firm Activity and Outputs, Human Resources and Infrastructure and Absorptive Capacity.

The Strategy sets objectives and specifies measures aimed at ensuring higher quality of research and innovation, including promotion of appropriate environment and business stimulus for investment in scientific research projects. It specifies target values, which should be reached as a result of implementation of the defined measures. It also suggests indicators, which will allow analysis of the measures' implementation and of the effectiveness level of the conducted science policy.
The Strategy provides stable framework for the development of research institutions and science and innovation in Bulgaria over the next ten years. On the basis of the Strategy action plans, specifying the concrete measures for its implementation will be drawn up. The implementation effectiveness of the set targets and measures will be evaluated by independent external experts every three years.

The National Strategy of Scientific Research has been developed within the concept of research, technological development and innovation being the drivers of the knowledge-based economy. It is consistent with the objectives of the National Innovation Strategy of Bulgaria and its implementation measures for increasing the competitiveness of Bulgarian enterprises by strengthening the scientific capacity; joint financial instruments for support of science and innovation and building centers of competence in priority areas in economy.

At national level the Strategy provides the scientific organizations, universities and the whole academic research community with the necessary framework within which they can formulate their views and plans for participation in national R&D activities, by giving priority to programme funding. Furthermore, the Strategy provides the society and the legislator with information about the Government striving for effective use of public funds for R&D.

At international level, the National Strategy reflects the Bulgaria's efforts to raise the investments in science and technological development to 3 % of EU's GDP, according to the objectives of "Europe 2020" by achieving accelerated use of the results of research and innovation, modernizing the scientific process and implementing efficient European models and practices.

The Strategy reflects the EU priorities of building European Research Area:

- Concentration of public resources and investments in priority research areas;
- Support for research infrastructure and sustainable development of effective research organizations;
- Inclusion of the private sector into the research and innovation processes;
- Better coordination of education, research and innovation policies;
- Promotion of the free movement of people, knowledge and technologies.

The National Strategy of Scientific Research contains several important components ensuring its effectiveness:

I. **Priority areas for science and innovation development** defined on the basis of:

- Priorities set out in the Programme of the Government of European Development of Bulgaria;

- The thematic priorities of the European research programmes and initiatives (Seventh Framework Programme FP7; COST Programme for European Cooperation in Science and Technology, the European Roadmap for Research Infrastructures, Joint Research Centre and the Joint Technology Initiatives);

- Existing analyses and assessments of the scientific system and the institutions in the country. [3]

The national research priorities reflect the political will and commitment to our country's strategic development in the following years. The investment allocation towards priority areas will allow the "grand challenges" to be met and linking the research and innovation results to the needs of the economy to be achieved.

II. **Instruments for achieving the Strategy's objectives**, which introduce joint financing schemes, accumulated resources from different financial sources and a set of incentives that create a favorable environment for stimulating R&D activities;

III. **Assessment of the achievement of the Strategy's objectives**, which provides continuous monitoring and feedback during the implementation of specific measures. The assessment will measure the effectiveness and efficiency of the Strategy's implementation and will serve as a corrective for future actions.

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[3] http://www.bas.bg/cgi-bin/e-cms/vis/vis.pl?s=001&p=0149&n=000115; http://www.bas.bg/clpp/bg/interproiects/prl9.htm; http://www.proiecteverest.org/EVEREST Expert Report.pdf; http://www.nsfb.net/sYStem/storage/National Science Fund of Bulgaria.doc: http://www.consilium.europa.eu/uedocs/cmsUpload/ItemlO-BGPolicYMixPeerReviewReport-Finalvers.pdf: http://siteresources.worldbank.orgЯNTBULGARIA/Resources/ABCreport volume 1 .pdf

CURRENT STATUS AND PROBLEMS OF SCIENTIFIC RESEARCH IN BULGARIA

In Bulgaria the largest structural sector in terms of GDP is the service sector, followed by the manufacturing one. In the developed countries the share of agriculture is smaller than those of manufacturing and service sectors, while in Bulgaria it is still relatively high.

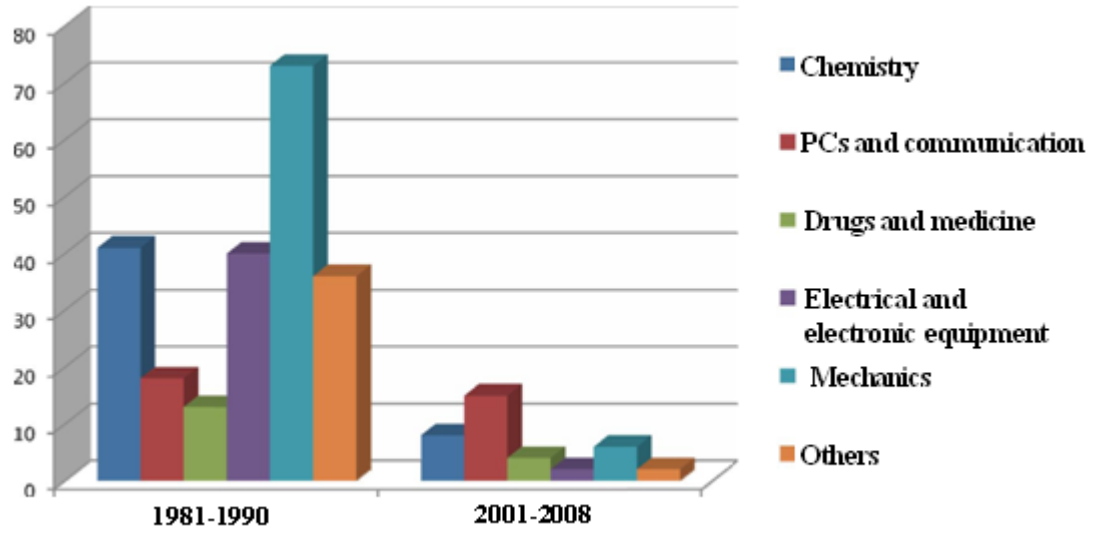
When the world economic crisis broke out Bulgaria had the lowest GDP per capita in the EU.

The observed economic growth has sharply slowed from its current pace in the recent years since it had been mainly due to traditional and high-return market segments such as construction, real estate and finance. At the same time innovative and knowledge-intensive technologies haven't been developed to promote the competitiveness of the economy. In our country only a small part of innovation is developed by the industry and the sectors dependent on cheap labor achieve high levels of value added. During the past seven years (2001-2008, according to the World Bank)[4] the export potential of our country has also been concentrated in traditionally strong, but labor-intensive and sectors based on the import of natural resources. According to Eurostat data in 2008, the share of high technology manufacturing exports as a proportion of total manufacturing exports is 3.57 %, compared to the values for other new Member States between 4 and 6.5 % and for EU-27 average -15 %.

The innovative capacity has sharply contracted during this period. This is evident from the change in the patent intensity before and after 1990 and from the very low level of patent application and issuing of patent protection certificates by the European Patent Office, Japan Patent Office and the United States Patent and Trademark Office (USPTO). Triadic patents (i.e. those submitted toand granted by all three offices - the European, the Japanese and the American ones) are very rare. According to Eurostat data in 2005 in Bulgaria they were 0.13 per million population.

[4] http://www.worldbank.bg/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/BULGARIAEXTN/0,,contentMDK:22622283~menuPK:305444~pagePK:2865066~piPK:2865079~theSitePK:305439,00.htm

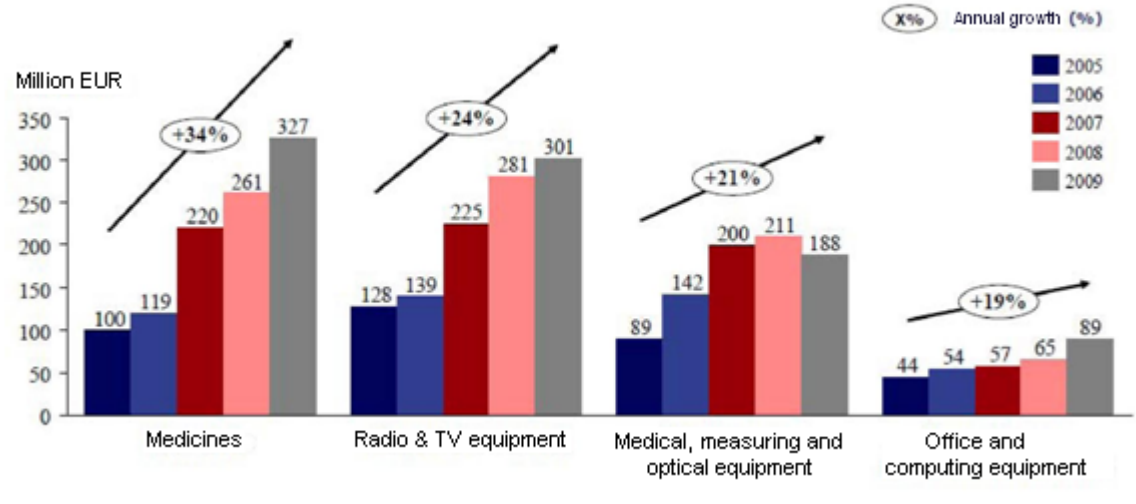
Figure 3



Source: World Bank

A positive signal is the fact that since 2000 patents have been granted for new areas of the industry such as communications, for example, but Bulgaria lags behind the EU-12, which, as a group, lag behind the innovation leaders in Europe (Finland, Denmark and Germany). The Bulgarian export of medium and high technology manufacturing products, shown in Figure 4, has low values compared to the EU average value, but even during the global economic crisis growth of these products has been observed as proportion of the total exports.

Figure 4



Source: Eurostat and MEET

The investment climate in Bulgaria is assessed as relatively favorable. The macroeconomic situation is stable, the corporate tax rates are low, the burden of

employment legislation is acceptable, and the access to finance and the availability of various financial resources have been significantly improved in the recent years before the global economic crisis took place. However, the labor productivity in Bulgaria remains low.

On the other hand, however, the level of investment in research and development activities is very low and continues to fall because **the R&D is funded and implemented mostly by the public sector.** Besides, the low level of R&D investment leads directly to low levels of innovation and makes it even more difficult for business to learn and use technologies from abroad.

The Government is aware of these obstacles and has taken actions aimed to update the legislative framework for science and innovation, Law for Academic Development in Bulgaria was adopted, new Law on the amendment of the Law on Scientific Research Promotion was adopted, a draft of Innovation Act is being drawn up. National Roadmap for Scientific Infrastructure was adopted. A number of measures were introduced to enhance the competitiveness of the Bulgarian economy.

The most significant measures are:

- National R&D investment target of 1.5 % of the GDP by 2020 was set as part of the national position on the European 2020 Strategy;
- Provision of venture capital funds and efficient use of EU schemes - JEREMIE Initiative and other guarantee funds;
- Amendment to the Investment Promotion Act, which will provide for state co-investments of up to 50 % for R&D projects;

Despite these efforts, according to the European Map of Innovation, Bulgaria together with Romania and Latvia, is one of the catching-up countries in terms of innovative development and competitiveness[5]. The Index of Bulgaria for 2008 is 0.221 and this is the lowest value among the Member States. EU-27 average index is 0.457.

The reasons for this are the following:

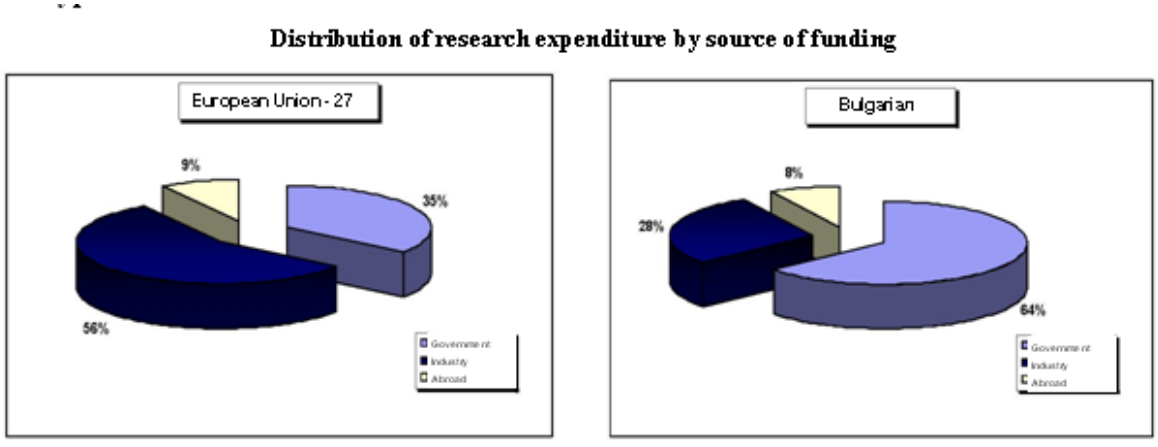
[5]European Innovation Scoreboard 2009, http://www.proinno-europe.eu/page/european-innovation-scoreboard-2009. This is index evaluating indicators such as "Human Resources", "Finance and Support" "Firm activities" and "Outputs".

Firstly, Bulgaria lacks strategic vision and stable policy for the development of science. The lack of clearly defined research priorities and obligation for annual growth of public funding for science, places us as strongly "catching-up" country compared to the EU average, with constant value of 0.48 percent of GDP up until 2009 and decreasing trend in the three-year budget forecast – down to 0.3 percent of GDP.

The second reason is the unfavorable ratio between public and private investment. In Europe and the individual Member States, the majority of investment in science is made by the "non-state sector". The highest share of private investment is observed in the highly developed European countries such as Germany, Finland, Sweden, Denmark, and France. In other countries such as Latvia, Malta, Greece, Estonia, etc., the funding for "higher education" sector is dominant. Bulgaria has the most unfavorable structure in terms of sectoral funding of science, which is characterized by a high burden of government spending at the expense of the rest and low levels of funding for research in "higher education" sector.

Thirdly – the unfavorable expense structure in the public sector and lack of resource concentration. The institutional support to numerous scientific organizations at a very low share of programme-project financing prevails. There are no competitive environment, independent and external (international) expertise of scientific ideas, developments and results.

Figure 5



Source: OECD

The fourth reason is the artificial separation of science from the higher education imposed by the model of science and innovation system in the country up until 1990 and the difficulties for overcoming the vision of universities as purely education structures. It is a matter of fact that if students are not dedicated to scientific careers and activities in their educational programmes, they could be hardly expected to take subsequent interest

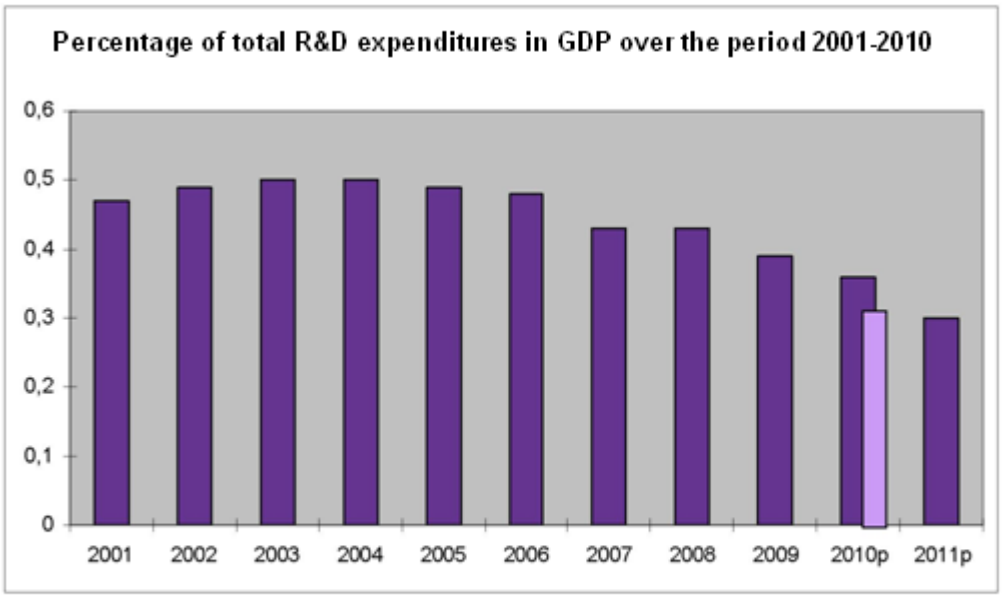
in scientific careers. This directly reflects on the new generation young people exodus from science and engineering education.

The fifth reason is the existing financial instruments for science and, more correctly, its "scarcity". There are only few national tools for support of research and development projects. The only two existent funds - the National Fund for Scientific Research and the National Innovation Fund are not sufficient. There are no sectoral research programmes, for example in the fields of health care, agriculture or environment. There are no specialized national programmes in a specific scientific field, nor any support for scientific infrastructure, even for the implementation of the National Roadmap for Scientific Infrastructure. This puts restrains to the emergence and implementation of competitive scientific ideas. Moreover, the State does not effectively use the scientific potential to facilitate the administrative process or to carry out strategic analyses in key economic sectors or strategic studies in socially significant areas.

Not lastly, the sixth reason is the inefficient use of various sources of funding to solve specific scientific task or a significant economic or social problem. Beside the national funds there are various programmes for funding research and technological development at European level. The Structural Funds were defined by the European Commission as determinant of the optimization of the scientific systems of the new Member States. Bulgaria is not sufficiently aware of this fact as only 0.1 % of the Structural Funds could be used to support research activity and particularly building scientific infrastructure and R&D complex.

During the period 2007-2010 there have been only 30 registered beneficiaries - scientific organizations under the Structural Funds and solely under the Operational Programmes (OPs) "Human Resources" – for establishing scientific potential among doctoral and post doctoral students and under the "Regional Development", the latter referring to energy efficiency. The funds absorption under the OP "Development of the Competitiveness of the Bulgarian Economy", Priority Axis 1 "Development of Economy Based on Knowledge and Innovation Activities" is only 0.42%.

Figure 6



Source: NSI 2009

Additional problem is the fragmentation of funding provided by the two main national instruments - the National Fund for Scientific Research and the National Innovation Fund. on On one hand, priority trends are not determined and the other, there is no established dialogue between the two instruments to ensure complementarity and synergy.

Financial instruments, that are new to our country, but relatively well known across the world, should be introduced so that they could lead to acceleration of technological innovation – programmes providing initial capital funds for verification of innovative ideas, start-up enterprise schemes and venture capital schemes.

Conclusions:

- Research and innovative technology priorities significant for the economic and social development should be set;
- Progressive increase of funding for research and technological development as percentage of GDP should be achieved, especially by taking actions to stimulate private investment in science;
- It is important that the government and scientific institutions should strengthen their actions to ensure effective knowledge transfer and to guarantee market stability for new scientific developments.
- The use of Structural Funds for science, scientific infrastructure and

innovation is of great significance. This will guarantee stability of funding for larger-scale research projects which will have added value and increasing over time effect on the economic and regional development. Percentage of national expenditure for research under the Structural Funds should be determined.

- The state should actively intervene by defining the concept, structure and business model of those units that could successfully implement market innovations through stable public-private partnership.

Human Resources

Intellectual potential defines the capacity for conducting scientific research and innovation. Knowledge and skills promote the implementation and application of new research results and technologies.

The issue of acute shortage of human resources in science and technology and of the exodus of scientists to more developed economies such as the USA, Japan, Singapore and other countries has arisen at European level since 2005. The low interest of young people to engage in science, the general trend of population aging and now the global economic crisis simultaneously depict an adverse profile of the scientific community.

These trends in Bulgaria are more distinct, as there are other barriers to scientists, particularly to young people. These are low wages, no freedom to choose workplace, slow career advancement. The adopted new Law for Academic Development aims at introducing flexible and expeditious procedures for obtaining scientific degree, but for now it doesn't solve the low-wage problem of scientists.

We should take into account the trend in reduced inflow of young people into science as a whole.

The exodus of young people from science and engineering professions is a factor conducive to low innovation activity. Engineering specialists are very important to the economy of every country, as on one hand, they develop innovations that are central to the technological prosperity and economic growth, and on the other hand, they help to enhance the economic competitiveness. Bulgaria is among the leaders within the European countries in terms of employment of engineers, but over 76% of the graduate engineers do not work according to their specialty while the average value is 28%. The ratio is highest in Bulgaria. [6]

[6] According to data of EUROSTAT and FEANI - federation of professional engineers, October 2009, "European Engineering Report"

This trend will go deeper in the future. The number of young people aged 15-34 since 1990 has decreased by 300 000.[7] The number of secondary school graduates will decline because of the low inflow and the high drop-out rate of early school leavers -14%.
According to a research carried out by the Programme for International Student Assessment (PISA) the student assessment on the level of utilization of scientific knowledge at the age of 15, Bulgaria ranks 28th out of 29 European countries surveyed.[8] This will also affect the interest in natural sciences and engineering among young people, which is even now low - 24% (according to NSI) of the students choose to study science, mathematics, engineering and architecture.

The age profile of scientists is also adverse. According to the register of the academic staff at the universities supported by the Ministry of Education, Youth and Science (MEYS) in 2008 there was no professor under 35 and only 12 were between 35-44 years of age. Over 600 professors (out of 1290) are over 65. According to the Higher Attestation Commission (HAC) there are 134 senior scientific associates aged between 35 and 44 years (out of 2700) and the majority of senior scientific associates are between 45 and 54 years of age (990 out of 3138). The total ratio of scientists under 35 years old (defined as "young scientists" mainly for the purpose of programme funding) to the scientists of other age groups is about 1:10.
The low interest in doctoral degree and the increasing proportion of PhD students who have dropped out or will complete their degree beyond the stipulated term are indicators of insufficient attractiveness and ineffective preparation for attaining "doctoral" degree.

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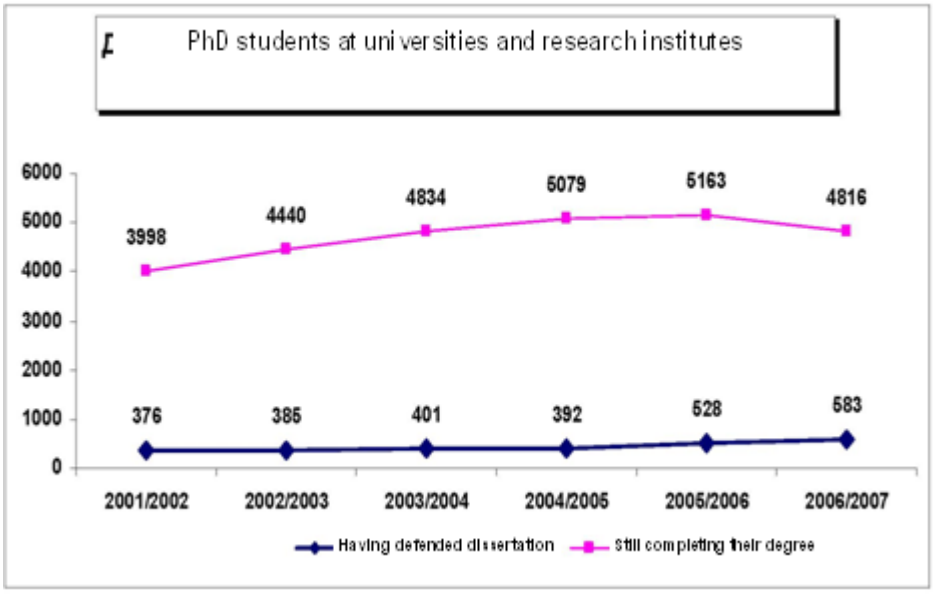
7 The statistics show that if today people aged 15-34 are approximately 2 103 259, in 2015 their number will be 1 747 648, and in another 5 years – approximately1555 852 according to data presented in the National Youth Development Strategy

8 PISA comprises 65 countries such as China, Singapore, Japan and New Zealand;

Figure 7



Source: MEYS, HAC

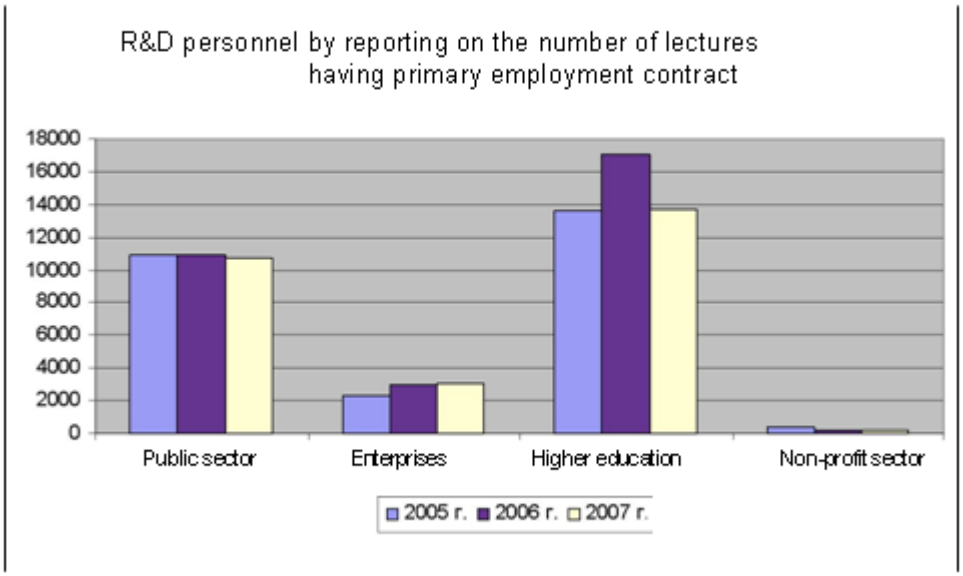
Bulgarian research organizations don't recognize mobility as a fundamental right of the scientists. There are practices of internal mobility, especially between similar scientific groups, but examples of inter-institutional mobility are rare. The schemes introduced by the National Fund for Scientific Research cannot have a significant positive impact because of certain impediments (e.g. legal, administrative, etc.) related to the reintegration of Bulgarian Scientific Diaspora and the inapplicability of temporary employment contracts. The year-long trend of scientific potential concentration in the capital should be also taken into account, since the regional research and innovation centers are poorly developed.

The institutional structure of R&D employees in our country is atypical. In the European countries the predominant share of R&D employees are in the private and in the higher education sectors. In Bulgaria, nearly 60 % of R&D employees is in the public sector - funded by the state budget and namely in scientific organizations with dominant institutional funding mechanism compared to the EU average which is 13 %. Figure 8 demonstrates the structure of R&D personnel in terms of the number of lecturers, and not in terms of employment equivalent, due to lack of applicable national methodology for reporting lecturer's work-load in higher education. According to a survey conducted by MEYS in 2009, data from universities indicate that the work-load of R&D lecturers varies between 20 and 30%.

We should also take into account the gradual increase of R&D personnel engaged in the sector "enterprises" during the past three years, in the presence of trend in slight

decrease of scientists in "the public sector" and of almost total lack of scientists working in NGOs.

Figure 8



Source: NSI

Employment in high-tech and medium-tech industries and knowledge-intensive services is an indicator of innovation process implementation. Up until 2007 Bulgaria follows the European trends in employment in high-tech manufacturing sectors, i.e. in initial reduction of employment in these sectors up until 2004 and in subsequent gradual increase, but our country still lags behind the EU average.

Conclusions:

- Actions should be undertaken to overcome negative trend in reduced inflow of young people into science and to provide incentives for their retainment through scientific career opportunities as well as special care to ensure the introduction of scientific approach also into the secondary education. The State should stimulate the research interests of students through participation in various projects and initiatives (priority task of the National Youth Development Strategy as well);

- It is important that the free flow of intellectual capital is guaranteed through governmental efforts to create favorable environment - legal, social and material one with a view of making scientific careers attractive and popular occupation;

- The continuous training opportunities are of great significance, including distance

learning in higher education, improvement of scientific employees' qualification and skills and realization of joint programmes for scientific training and practice between academic and business communities.

Internationalization

The development of science in Bulgaria both in the short and in the long term is associated with the European Union and its major policies and trends. These policies are set by the Lisbon Strategy and the adopted new Europe 2020 Strategy and refer to actions aimed not only at intensive R&D funding and building new R&D infrastructures, but also at creating **networking of national and joint research programmes and strengthening the cooperation between Europe and third countries**, through their involvement in joint research projects and networks, participation in building regionally significant scientific infrastructure and stimulation of knowledge and experience transfer.

Membership in international organizations is one of the means of access to global knowledge and use of the most accurate and latest generation equipment.

Our participation in international structures and experimental mega projects, besides being a sign of prestigious scientific recognition, enables the exchange of knowledge, establishment and participation in international networks, accumulation of research and management experience, use of unique research infrastructure, databases and other research sources.

It is, however, important that the participation of Bulgarian scientists in international networks also brings intellectual and financial returns as well as direct benefits for the Bulgarian academic community, society, economy and especially for the small and medium enterprise sector.

European Framework Programmes for research, technological development and demonstration activities are the most efficient instrument for building the European Research Area. Participation of all Member States is their inalienable obligation. Bulgaria fully uses these instruments since 1997.

European Framework Programmes support the conduct of applied and fundamental research through cooperation between EU Member States. Industry and especially small and medium enterprises have open access to them, with the purpose of enhancing competitiveness, the scientific and technological potential of the European industry. Non-EU Member Countries, which could be major industrialized countries such as the USA, Japan and Australia or developing countries such as China, India and Ukraine, also have access to the instruments of the Framework Programmes. This promotes the establishment of global research networks, transfer of more knowledge and intellectual potential.

Bulgaria's participation in the Competitiveness and Innovation Programme is not sufficiently active. The Programme supports three main areas - innovation and competitiveness, energy efficiency and information and communication technologies.

Through this programme the European Commission supports the development and operation of national networks of businesses that are interconnected on a European scale. This is a public service in the area of innovation, technology transfer and support for small and medium enterprises (SMEs) to participate in various programmes and initiatives. The network has been operating in Bulgaria for 10 years, and until 2008 it is known as two separate networks - European Innovation Centres and Euro Info Centres. Its realization is possible through European grants covering 50% of the provided services. At national level a supporting mechanism should be introduced to expand the participation of various research and innovation structures in the network, including the public organizations.

The participation of the Bulgarian institutions in the other two sub-programmes is also unsatisfactory. For example, under the "ICT Policy Support Programme" for the period 2007-2010 only 18 successful projects amounting to EUR 2 400 million have been completed.

Beside the Framework Programmes, in which Bulgaria has already gained experience and has gradually increased its activity and successful participation, we have good chances of participating in some of other ongoing initiatives - Cooperation in Science and Technology Programme -COST, the schemes for joint research centers; schemes for coordination of national projects. Contributing to this activity is the introduction of national instruments guaranteeing co-financing of successful research activities under European programmes as well as under schemes providing support for the new project preparation. This practice must be maintained over time as the European programmes will become more competitive and more difficult of access. This perspective puts focus on application-oriented developments, which require broad partnerships, including industry participants.

It is important that we have an active stance on the new European initiatives, such as implementation of joint programming initiatives between the individual Member States. This is a long-term strategic process and it is performed through voluntary mechanism of partnership between the countries. The implementation of joint programmes will increase the effectiveness and impact of national funding on R&D activities in strategic areas.

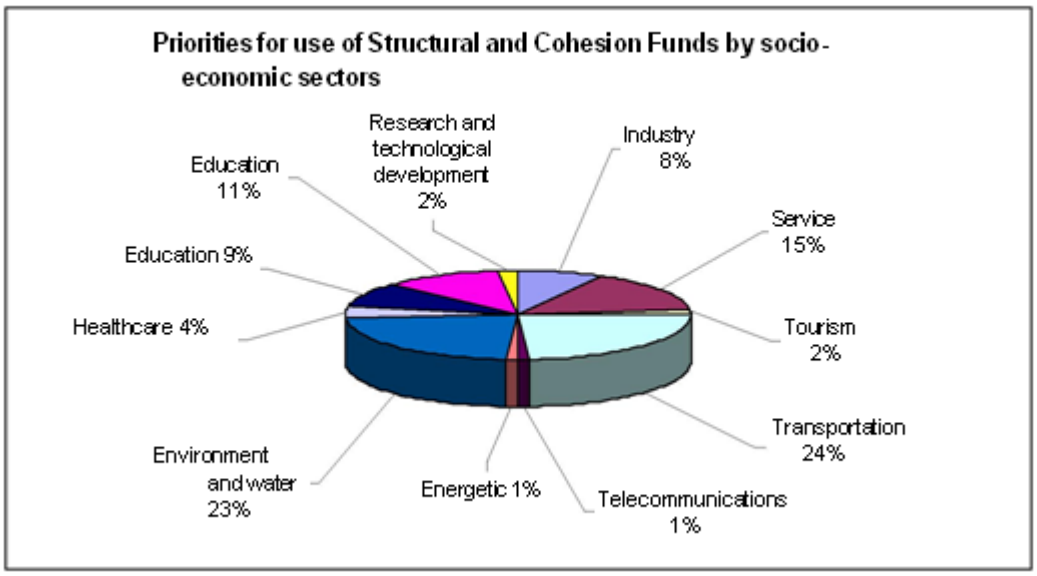
The project implementation through bilateral scientific and technological cooperation is of great significance to us being a reliable partner in demand in future. The gradual expansion of the partner countries on European and global scale is important for the building of large interdisciplinary research networks and consortia. MEYS currently has more than 15 current agreements for bilateral scientific and technical cooperation in a wide geographic area.

Bulgaria through the Ministry of Economy, Energy and Tourism (MEET) became a member of Eureka Initiative and of EUROSTARS Programme and our participation is expected to boost the industrial potential of joint innovative project development with the scientific community.

The implementation of structural and cohesion instruments in the science and technology area is still weak. Lack of flexibility in their use is observed, particularly regarding the implementation of national strategic schemes such as the National Roadmap for Scientific Infrastructure (NRSI); Bulgaria's participation in the new regional initiatives such as the Danube Strategy in which R&D activities play a central role and regarding activities within the Regional Cooperation Council in South-Eastern Europe. Moreover, Bulgaria does not use the opportunities to play host to the initiatives within these programmes and as a result of this, these activities are assigned to our neighboring countries such as Croatia, Bosnia and Herzegovina, Serbia, Romania and other neighboring countries.[9]

Figure 9 shows that the resources provided by the Structural instruments for research and technological development are insignificant, in terms of the European recommendations and practices. As a whole, they are not generally consistent with the important national priorities, since sectors "Energetics" and "Telecommunications", which also rely on the application of scientific knowledge and expertise, amount to a total of 2%.

Figure 9



Source: National Strategic Reference Framework 2007-2013

The specific opportunities provided by cohesion instruments are not used either. They could provide a tool for initiating large-scale projects such as the European territorial interest groups. [10]

[9] More than 30 ongoing initiatives, of which only one is coordinated by Sofia, are listed in the programme of the Regional Cooperation Council.

[10] Regulation № 1082/2006 of the European Parliament for European territorial interest groups

Conclusions:

- It is of paramount significance to support the Bulgarian scientific teams in their preparation and participation in European programmes and initiatives so that our participation becomes more effective.
- National support for the development of national innovation, entrepreneurial networks and business networks is important;
- The active use of structural funds is necessary to support the tangible achievement of national objectives for investment in science and more active business participation in the conduct of scientific and technological developments;
- Our participation in various European and international organizations and the extension of scope of bilateral agreements are key elements of knowledge transfer and use of many modern scientific infrastructures.

MAIN OBJECTIVES, TASKS AND MEASURES FOR DEVELOPMENT OF SCIENTIFIC RESEARCH IN BULGARIA

The active development of science and scientific research is a priority of the Bulgarian government and takes central position in the European Development Programme.

The following objectives have been defined in it:

1. CONSTRUCTION OF COMPETITIVE NATIONAL RESEARCH INFRASTRUCTURE AS AN ELEMENT OF THE EUROPEAN RESEARCH AREA.

2. IMPROVEMENT OF THE SERVICE AND CONTROL OF THE RESEARCH INFRASTRUCTURE IN BULGARIA.

3. STRENGTHENING THE INTEGRATION BETWEEN THE SCIENTIFIC INSTITUTES AND UNITS OF THE PUBLIC SCIENTIFIC ORGANISATIONS AND UNIVERSITIES IN BULGARIA AND THEIR RELATIONS WITH THE BUSINESS in compliance with the PUBLIC PRIORITIES.

4. RAISING THE SCIENTISTS' STATUS IN SOCIETY.

The tasks and measures for development of scientific research are aimed at dealing with the challenges our country faces in the field of science and they all form the national scientific policy directed toward achievement of the above-stated objectives.

The issues not yet settled by the Bulgarian officials and academic circles are:

1. Sustainability and forecastability of investments in R&D where the basic indicator used is the objective stated in Decision of CoM No. 803 of 10.11.2010 regarding the adoption of the draft National Reform Programme of the Republic of Bulgaria (2010 – 2013) in pursuance of the Europe 2020 Strategy. An important component in raising R&D investment is the increase of financing from European funds and programmes and private sector investment;

2. Lack of dynamics of the public scientific system institutional structure and no utilisation of the cohesion policy instruments for its updating;

3. Impossibility for renovation of the scientific personnel, highly unfavourable age structure and incentives, including unattractive educational programmes and modules aimed at stimulating young people toward scientific career;

4. Small share of programme funding for scientific research and change of ratio between public and private investment;

5. Impossibility of the organisations to develop mobility schemes – internal and inter-institutional, as well as inter-sectoral, for which there are also normative obstacles.

6. Absence of the programme principle in the realisation of doctoral studies and need of

introduction of predominant project financing of the doctoral studies under projects of interest for the institution;

7. Breach of coherence between the education, science and innovation policies;

8. Underdeveloped innovation infrastructure; inactive innovation mediators (clusters, technology centres; technology transfer offices; centres for commercialisation of patents and intellectual property, etc.);

9. Limited instruments inefficiently applied at national scale in support of innovation – start-up funding schemes; guarantee and venture capital funds;

The present strategic vision is intended not only to answer the European perspectives but also to set national objectives and indicators that will place our country in the position of a "moderate innovator" by 2020 in the European Innovation Scoreboard.

TASK 1. INCREASING THE INTENSITY, EFFECTIVENESS AND EFFICIENCY OF R&D ACTIVITY IN FAVOUR OF THE ECONOMY AND SOCIETY

Measure 1. Introduction of financing model stimulating competition, development and application of results in society and economy and increase of the funds for research and innovation.

The main challenge for Bulgaria is not only to increase the funds allocated for science so as to overcome its lagging behind the EU average indicators but also to introduce a financial model, which, being cost-effective, should raise the quality of the scientific research carried out and encourage competition between the scientific institutions.

An important accent in the policy for development and raising the efficiency of scientific research and innovation is the creation of sufficient incentives for consolidation of the R&D structures and the scientific potential. The aim is that through combination of financial resources, infrastructure and scientific staff strong R&D units be created and recognised that will perform quality scientific research and will be competitive at European and world level.

Actions will be undertaken for decentralisation of R&D funding resources and engagement of various institutions in the utilisation of various instruments.

The state will support the development of experimental research centres for carrying out competitive scientific research and solution of important scientific tasks that will concentrate scientific staff, financial resources and modern R&D equipment necessary for carrying out significant inter-disciplinary scientific research.

Instruments:

1.1. Introduction of a financing model stimulating competition and development that will be based on the quality of research carried out;

1.2. Increase of the funds for scientific research and innovation to 1,5% of GDP by 2020, of which at least 0,6% will be public contribution;

1.3. Increase of the share of programme funding at the expense of institutional one in the scientific organisation maintenance costs;

1.4. Support to the development of joint research centres for concentration of a critical mass of scientific potential aimed at implementation of the national sector policies;

1.5. Encouraging the establishment of new and the maintenance of existing scientific teams of scientists from various scientific organisations.

Measure 2. Introduction of scientific research priorities

The definition of priority scientific areas is of key importance for the development of scientific research and innovation. The statement of clear, long-term priorities related to the national economic interests and the interests of the society will allow for concentration of the limited resources, increase of efficiency of scientific and research activity and creation of conditions for achieving important scientific results. This way sustainable development of scientific activity will be achieved that is needed not only by the scientific community but also by the economy and the society. Sustainability is impossible when frequent changes are made to the fields of research, the related reallocation of resources, as well as to the funding rules.

The definition of priority areas is based on:

- The priorities of the Bulgarian government defined in the European Development Programme[11];
- Analysis of the scientific activity in Bulgaria[12];
- Economic analysis and export potential analysis performed with the support of the World Bank[13];
- The EU scientific priorities when accounting for the leading market initiative[14] – with a view to achieving better integration and complete utilisation of EU instruments in the field of scientific research;

11 http://www.government.bg/fce/001/0226/files/03.11.2009FINAL-ednostranen%20pechat1.pdf
12 http://www.mon.bg/opencms/export/sites/mon/top_menu/science/news/analyse_researches_bg.pdf
13 http://www.mee.government.bg/doc_vop/Economic%20Strategy%20savet%20razvitie.ppt
14 http://ec.europa.eu/enterprise/policies/innovation/policy/lead-market-initiative/

• Analysis of the Esko Aho Group regarding the measures for creation of Innovative Europe[15];

• Areas with stronger presence of foreign direct investment[16];

• The priority areas of the Seventh Framework Programme[17];

• The need of promotion of applied research – with a view to meeting the needs of the business and strengthening the collaboration between the academic and the private sector;

Based on this, the priority areas of the Science Development Strategy of Bulgaria by 2020 are:

1. **Energy, energy efficiency and transport. Development of green and eco technologies;**
2. **Biotechnologies and ecological foods;**
3. **New materials;**
4. **Cultural and historical heritage**
5. **Development of fundamental research under programme and competitive principle to the amount of 15% of the public expenses on science.**

Information and communication technologies will be developed **as a horizontal topic** that affects all spheres of life and economy.

The support for scientific activity will be continued through institutional financing based on developed scientific programmes and plans in order to maintain the level of scientific knowledge and specialists relevant for the state, needed in various fields of economy and governance, as well as creation of innovative solutions.

Instruments:

2.1. Introduction of targeted national thematic programmes under the priority areas;

2.2. Development of scientific complexes under the priority areas; (This instrument is closely related to Measure 2 of Task 3 regarding the development of the national research infrastructure);

2.3. Provision of specific mechanisms for carrying out scientific research in response to urgent needs;

2.4. Support to scientific development through institutional financing based on prepared scientific activity programmes and plans in priority areas;

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15 http://ec.europa.eu/invest-in-research/pdf/download_en/aho_report.pdf

16 According to data from the Bulgaria Invest Agency as of March 2010, www.investbg.government.bg

17 http://cordis.europa.eu/fp7/cooperation/home_en.html

Measure 3. Research potential development through creation of attractive conditions for scientific career, professional growth, qualification and specialisation of scientists

The quality of the performed scientific research depends mainly on the human potential – highly qualified and motivated researchers.

The state will follow a more efficient policy toward raising the scientists' economic and social status and creating attractive conditions for scientific activity that will give them sufficient professional self-confidence. The state will encourage the return of highly qualified Bulgarian scientists working at foreign institutions abroad. Support will be provided also to the collaboration between the Bulgarian diaspora and the scientific organisations in Bulgaria through introduction of specialised schemes. The activity will continue in support of the participation of Bulgarian scientific teams and scientists in international and European programmes and initiatives. At the same time there should be a mechanism for periodic evaluation of the scientific staff and the scientists' work.

Special attention will be paid to attracting and keeping young and talented people in science. Programme operation will continue, and they will be further developed, under which young scientists may receive support following the project principle – introduction of "project-based" doctoral studies, post-doctoral programmes, funding of young people's participation at international conferences, provision of funds for publication in reference magazine, etc. Measures are foreseen for raising students' interest toward R&D activity, creation of conditions for gaining contemporary knowledge by the young generation and training of a new generation of scientists.

Instruments:

3.1. Introduction of horizontal programmes in support of the scientific potential;

3.2. Stimulation of research activity in Master's programmes;

3.3. Introduction of "project-based" doctoral studies;

3.4. Support to doctoral and post-doctoral programmes;

3.5. Promotion of scientist mobility and support to the development of career centres and regional scientist mobility units as part of the European Mobility Network.

Measure 4 Integration of the Bulgarian science into the European Research and University Area

Bulgaria's participation in the European Framework Programmes will continue to be encouraged through the existing promotion schemes and introduction of new targeted activities supporting Bulgaria's inclusion in various joint programmes and initiatives. Attention will be paid to setting up and development of scientific networks, in which scientific information, knowledge and technologies will be freely exchanged. Accent will

be placed on extending the participation in international networks in national priority areas.

The state will make efforts to ensure and extend the access of the Bulgarian scientific community to the most important cutting-edge information platforms and data bases.

The practice will be continued and further expanded for carrying out information campaigns and training on strengthening the capacity of scientific teams for absorption of funds under the national and European programmes, incl. the Scientific Research Framework Programmes and the EU Structural Funds.

Bulgaria will play an active role in performing the activities under the regional strategies and programmes such as the Danube Strategy and the activities of the Regional Cooperation Council for South East Europe.

Instruments:

4.1. Coordination of national, regional and European policies and programmes;

4.2. Introduction of targeted schemes supporting the participation of the national scientific community in European programmes and initiatives;

4.3. Introduction of the complementarity principle of the financial instruments and utilisation of at least 8% of the Structural Funds for development of R&D for solving the problems of the economy and the society, including for construction of research infrastructure (see Measure 2 of Task 3);

4.4. Reciprocal launching of national scientific programmes for participation in trans-national programmes with shared financing by the Member States and the European Commission;

4.5. Access to European and International organisations and research infrastructure;

4.6. Maintenance, optimisation and extension of the access to up-to-date data bases of reference scientific publications and communication infrastructure;

4.7. National support to the functioning and extending the partnership within the European Innovative Enterprise Network.

TASK 2 ESTABLISHMENT OF A SUSTAINABLE EDUCATION-SCIENCE-BUSINESS RELATION AS A BASIS FOR DEVELOPMENT OF KNOWLEDGE-BASED ECONOMY

Measure 1. Stimulation of private sector involvement in scientific activity:

The involvement of the private sector in R&D is one of the main tasks of the EU. It has been stated as an activity in almost all Community political documents. It is envisaged that the business is involved not only through direct investment but also as a beneficiary of scientific knowledge and products and a stable partner in the knowledge triangle. The establishment of effective partnership between scientific organisations, universities and

business enriches all participants in the process with new knowledge and skills and creates high added value to the economy. The participation of the business in scientific and educational process supports the creation of a new generation of scientists and entrepreneurs that furthers the establishment of a new market profile and of conditions for attracting more investment. The balanced involvement of the various partners, as well as the active role of the business in the scientific process generate new knowledge, lead to creation of innovative products and renovate the economy condition. Science services and the participation in introduction or creation of new technologies in industry are necessary to guarantee intelligent, sustainable growth with more efficient utilisation of resources.

Innovation in Bulgaria forms[18] a small part of the added value of the Bulgarian industry – 26% according to data from the Ministry of Economy, Energy and Tourism (MEET) and Eurostat, as compared to an EU average value of 45%. Having in mind the structure of the Bulgarian economy, i.e. a predominant share of small and medium-sized enterprises (SME), the efforts should be targeted toward securing start-up capital for these companies and subsequently development of their market sustainability. This is pre-defined by the world trends – during the 1980s 80% of the R&D investment comes from big companies with more than 25,000 employees; for a 10-year period this percentage decreases by 20 points in favour of increase of the share of SME to 25%[19].

Instruments:

1.1. Extension of the schemes providing start-up capital to finance risk research and guarantee company sustainability at the market;

1.2. Introduction of schemes for design of engineering disciplines at universities;

1.3. Introduction of employment promotion schemes for young researchers at companies;

1.4. Exchange of results and effective know-how transfer between the Scientific Research Fund and the National Innovation Fund;

1.5. Pro-active measures for intellectual property protection.

All instruments related to establishing the connection between the knowledge triangle elements will be utilised under the leading role of the Ministry of Economy, Energy and Tourism.

18 http://www.mee.government.bg/doc_vop/Bg.econ.02.07.2010.pdf

19 http://www.crp-eut.org/2010_Chesbrough.pdf

Measure 2. Strengthening the integration between the knowledge triangle elements

The strong and steady relations between science and business are in the basis of knowledge-based economy development. The integration of the educational and scientific process is an inseparable policy of the Bologna process and it creates stable conditions for generation and utilisation of scientific knowledge. The three elements of the knowledge triangle imply sustainability of the scientific and educational process relation. Binding various knowledge elements in an integrated environment is a prerequisite for sustainable and inclusive growth, as well as for promotion of economy with high employment levels. This implies also the availability of proper human resources that is to answer the needs of the various fields, as well as the quick realisation of scientists and entrepreneurs. Thus, conditions will be created for labour market modernisation and flexible educational bridges will be created between the various sectors.

The introduction of schemes in support of the academy-industry relation and the demand for staff by the business imposes the introduction of differentiation of educational institutions and on this basis – definition of those that will perform intensive scientific activity. The latter will guarantee the reproduction of a new scientific generation of the science and innovation system.

The Ministry of Economy, Energy and Tourism will have a leading role in the application of some of the instruments under this measure.

Instruments:

2.1. Introduction of targeted programmes supporting scientific activity in SMEs and creation of managerial culture for collaboration with scientific institutions;

2.2. Training of young personnel on demand and with the financial commitment of the business;

2.3. Establishment of networks of regional institutions and scientific organisations for implementation of targeted regional tasks and programmes;

2.4. Furthering and intensification of knowledge transfer through schemes for creation of scientific incubators;

2.5. Maintenance of a national interactive platform for linking education, science and business.

TASK 3 CREATION OF FAVOURABLE ENVIRONMENT FOR SCIENTIFIC ACTIVITY

Measure 1. Introduction of scientific activity evaluation

The introduction of an efficient system for R&D evaluation is a component of each modern science policy. This system allows for monitoring the process of absorption of funds, the performance level of the scientific tasks and the results of the scientific activity. The evaluation is important because it gives the state the opportunity to analyse how efficient scientific policy is and to design measures for its improvement based on comparability and commensurability of R&D quality to the world and European standards.

Evaluation is an important instrument of the state in the introduction of new political measures in various fields, including in the scientific and innovation system. It helps decision-makers with a preliminary situation analysis and extrapolates the effect and usefulness of applying new decisions over time.

In addition, companies could use the results of this evaluation and search for forms of collaboration with certain R&D structures. The evaluation enables scientific organisations in their turn to formulate their future R&D objectives and optimise their activity. Research quality evaluation guarantees publicity and transparency in spending public resources and provides an opportunity for targeted public discussion on the main issues of the national scientific policy.

Instruments

1.1. Carrying out impact assessment in application of new solutions and measures in the field of science and innovation;

1.2. Introduction of compulsory, regular international evaluation of the organisations providing financing to and carrying out scientific research, R&D and innovation;

1.3. Regulation of long-term objective evaluation and monitoring criteria of scientific programmes and results;

1.4. Definition of a system for regular internal evaluation of scientific organisations with clear long-term criteria.

Measure 2. Development of research infrastructure:

The development of research infrastructure is one of the main priorities of the European strategy 2020. Research infrastructure occupies a main place in the knowledge triangle and is a linking element between the three components of this triangle. Building, maintenance of and access to modern research infrastructure guarantees high quality of research, contemporary training process and opportunities for attracting intellectual

potential, entrepreneurship promotion through the possibility of new knowledge generation and its transfer to the national economy. Research infrastructure creates serious pre-conditions for establishment of regional scientific complexes performing area-specific tasks. Research infrastructure is a natural medium for initiation and development of public-private partnership and for maintaining sustainable relations between the parties involved in it. It is a fundament for the construction and development of traditional infrastructure and for offering new employment opportunities requiring specific competences. Besides that research infrastructure encourages international scientific collaboration, thus enriching and extending the experience and knowledge accumulated by various scientific teams. The availability of a modern base creates favourable conditions for scientists and their families while guaranteeing their free movement and circulation and prevents loss of intellectual potential.

The efficiency of this type of activity significantly improves the effectiveness of scientific research that is measured by means of various indicators such as publication activity, patent activity, useful models, etc.

The European Commission report on the key science, technology and competitiveness data states that the Structural Funds are the most important instrument for funding research infrastructure in the new Member States. For the 2007-2013 programming period these countries allocate a total of EUR 5 bln. to support specifically the infrastructure construction[20]. Unfortunately Bulgaria is one of the countries that do not have such priority areas and respectively has no financing in this respect.

An important measure of the Bulgarian government will be to link the national strategic documents with the utilisation of the Structural Funds for scientific and research activity and particularly for the elaboration of a National Roadmap for Research Infrastructure (NRMRI).

Instruments:

2.1. Elaboration of a National Roadmap for Research Infrastructure coherent with the priorities of the scientific strategy;

2.2. Utilisation of Structural Funds for construction of national research infrastructure for effective involvement in the European Roadmap for Research Infrastructure;

2.3. Creation of new scientific landscape through concentration of scientific equipment and installations for reaching significant scientific results;

2.4. Support to publication activity, communication networks, digitalisation of depositories and unique scientific collections, etc.

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[20] P. 114, http://ec.europa.eu/research/era/pdf/key-figures-report2008-2009_en.pdf

Measure 3. Strengthening the social dimensions of science

The new trends of the European Strategy are directed toward awareness raising of the society about scientific and innovation achievements, as well as their opportunities for improving quality of life. It is important that ethic norms be guaranteed for various types of research and trust be increased when carrying out advanced scientific research. In this respect the role of the media and non-government organisations is important for provision of reliable information channels for various scientific novelties. Getting acquainted since earliest age with capabilities of science implies greater interest in dealing with science and creates an environment for a new highly educated generation. The aim is that science becomes a part of the popular society culture and regularly occupy a deserved place in public life. In this respect the establishment of specialised "science shops" at various scientific organisations is highly advisable. These are specialised structures, which ensure the link between society needs and the carried out scientific research. They provide access of the non-government sector to scientific work and are the place where the students realise socially useful and significant research as part of their education programme.

3.1. Extending the scientific activity register with a platform for publication of the results of the publicly funded research projects and programmes, linked to the European platform for free access to publications and results;

3.2. Carrying out dialogue with the society on the role of science and establishment of "science shops";

3.3. Promotion of a series of information initiatives under competitive principle for demonstration of scientific achievements;

3.4. Introduction of a programme for promotion of scientific activity of students at schools and universities;

3.5. Regulation of scientific activity awards for raising the prestige of the scientists.

MONITORING INDICATORS FOR ACHIEVEMENT OF THE OBJECTIVES AND IMPLEMENTATION OF THE TASKS AND MEASURES OF THE NATIONAL SCIENTIFIC RESEARCH DEVELOPMENT STRATEGY

2020

I. Main Indicators

Indicator	Description	Valuation Method	Current Value	Target Value – 2020
R&D expenses as part of GDP	According to Eurostat http://epp.eurostat.ec.europa.eu/tgm/web/table/description.jsp	CoM Decision passed regarding the National Reform Programme in pursuance of the objectives of Europe 2020 Strategy	0.36%	1.5%
Public R&D expenses as part of GDP	The public R&D expenses are the amount of R&D expenses made by the government sector and the higher education sector	Calculations of the European Commission pursuant to Note RTD.C3/PV/PB D (2010) 521583 to the members of the Science and Technology Committee and of the Scientific Research Working Group	0.2%	0.6%
Private R&D expenses as part of GDP	The private R&D expenses are the amount of R&D expenses made by the business sector and the private not-for-profit sector	Calculations and forecasts by the MEET	0.16%	0.9%
Turnover from innovation	According to Eurostat http://epp.eurostat.ec.europa.eu/tgm/web/table/description.jsp	Economy Strategy, MEET	10.3%	13.5%
Share of export of high-technology products	According to Eurostat http://epp.eurostat.ec.europa.eu/tgm/web/table/description.jsp	Economy Strategy, MEET	3.3%	5.5%
Percent of utilisation of Structural Funds for R&D	Percentage of resources allocated for codes 01 and 02 as per the common activity classification	Interim programme reviews, initial values	1%	10%

II. Monitoring Indicators

Indicator	Description	Valuation Method	Current Value	Target Value – 2020
Percentage of public resources for science used in priority scientific areas	Expenses on institutional programmes and scientific projects used for research in one of the defined priority areas	The assumptions are based on the expected number of projects to be financed (The base year is the year of Strategy adoption because so far no national priority areas have been defined)	0 (For the period 2006 – 2009 through targeted programmes this percentage is about 10% of the public expenses)	60%
Number of modern research infrastructure constructed per priority scientific areas	Number of projects under the National Roadmap for Research Infrastructure (NRMRI) falling within the priority areas and awarded funding for material base creation	The assumptions are based on the fact that by 2013 restructuring may be performed of some of the measures of Competitiveness OP and after 2013 there will be specialised priority axes under this OP	0	5
Number of participations in the European Roadmap for Research Infrastructure	Number of project, in which Bulgaria participates as official partner and pays membership fee	Based on the update of the NRMRI	6	10
Number of institutional programmes under the priority areas	Financing of the research activity of scientific organisations based on a long-term research programme	The assumptions are based on the fact that a system for evaluation of the national research activity will be introduced.	0	3
Number of joint research centres	Formation of joint research centres, in which there will be modern equipment for carrying out interdisciplinary research and work based on project funding.	The assumptions are based on the fact that after 2013 within the new programming period there will be a specialised scheme under the Competitiveness OP supported via various programmes under the national R&D funds.	0	2
Number of established national research networks	Number of informal groups working under a joint research programme, sharing common equipment and expertise (able to collaborate for a certain period of time under a national research infrastructure or joint scientific centre) and exchanging knowledge, scientists and experience.	Based on annual scientific reports by the research organisations	25	115
Number of consortia participating in European research programmes, initiatives and networks	Number of formations of Bulgarian research organisations participating in projects financed under European research instruments	Data base of the European Commission and data from the research organisations	As of 2010 320	By 2013 550 For the period 2013-2020 750
Number of electronic data bases with ensured access for scientists	Number of licences of the Ministry of Education, Youth and Science (MEYS) for access to electronic data bases	Data from MEYS	3	5
Number of collaboration projects between science and business	Number of joint R&D projects commissioned by the business	Data from the Competitiveness OP and assumptions based on this about the following programming period	30	By 2013 110 For the period 2013-2020 250

Number of persons with a "doctor" academic degree	Number of graduated doctorate students	National Statistic Institute	580	1150
Share of students graduated with natural and engineering majors every year	Percentage of the graduated students with natural and engineering majors	National Statistic Institute	21% or 62 838	31% or about 90 000 if assuming that total number of students will be maintained to 300 000 by 2020
Number of patents and industrial designs defended before the European Patent Office	Number of certificates issued	European Patent Office, EUROSTAT	9	30

TASKS AND MEASURES OF THE NATIONAL SCIENTIFIC RESEARCH DEVELOPMENT STRATEGY

Task	Measures	Description	Results of Task Implementation
Increasing the intensity, effectiveness and efficiency of R&D activity in favour of economy and society	1. Introduction of financing model stimulating competition, development and application of results in society and economy and increase of the funds for research and innovation.	It is foreseen that the ratio between institutional financing and competition-based programme financing be optimised. Long-term research programmes in priority areas will be introduced and implemented by various teams and will be regularly assessed by external experts. Gradual increase of investment in R&D is envisaged with combined utilisation of existing resources – national funds, European programmes and Cohesion instruments.	Concentration of resources and research potential; Interdisciplinary programme opportunities Efficient utilisation of national and European funds;
	2. Introduction of scientific research priorities.	Definition of 5 national priorities, in which at least 70% of R&D financing will be concentrated. Specialised thematic programmes will be supported in these areas; critical mass of intellectual potential and infrastructure will be concentrated, strong scientific directions will be formed, which will be the basis for development of modern trend schools;	Definition of priority areas, which will be reference points for the business regarding the scientific competences and potential;
	3. Research potential development through creation of attractive conditions for scientific career, professional growth, qualification and specialisation of scientists.	Solving the problem of "brain drain" and small number of young people interested in and having qualities for a scientific career. A set of actions is needed covering various policies within the competences of MEYS, MEET and Ministry of Labour and Social Policy. An integrated approach must be applied – starting with promotion and deepening mathematics and scientific knowledge as early as the school age; encouragement and creation of conditions for doctoral studies and easy access to professional development. It is also important to provide opportunities for qualification and development of competences of acknowledged scientists and support to their participation at European and international forums.	Restoring the prestige of the scientist profession. Establishment of Bulgaria as a desired partner under the European programmes for the Western Balkans, Danube Region and Black Sea countries;
	4. Integration of Bulgarian science into the European Research and University Area	The EU membership has introduced new opportunities and commitments of Bulgaria. Inter-linking national	Participation in at least two joint programmes/initiatives

		programmes between various Member States is a priority of the European Commission. This way concentration is achieved of resources, scientists, research infrastructure and higher added value of the results is expected. It is important for Bulgaria to maintain and introduce new schemes supporting and extending the opportunities in front of the Bulgarian scientists to attend and be involved in the various research initiatives of the Community.	and extending the involvement in ERA-NET projects for co-ordination of the national programmes in priority areas defined by the Strategy.
Establishment of a sustainable education-science-business relation as a basis for development of knowledge-based economy	1. Stimulation of private sector involvement in scientific activity 2. Strengthening the integration between the knowledge triangle elements	Research activity results find a response among the academic circles, society and business. They help for maintaining the high level of research, development of new perspective directions, improving the quality of life; they are present in each segment of state governance and of course are crucial for economy and competitiveness development. For the new scientific knowledge to be realised in practice it is necessary that mechanisms be created for its profitableness and market realisation opportunities. This requires also better integration between the institutions creating and offering scientific knowledge and those that demand it. In addition, a trend is established that requires the economy to be based on novelties and innovation as a result of their demand and necessity.	Increasing the business investment in R&D; Increasing the science costs within the Higher Education sector; Opportunities for establishment of start-up, including the availability of innovation mediators supporting innovative ideas and their realisation; Increasing the SME capacity for technological development
Creation of favourable environment for scientific activity	1. Introduction of scientific activity evaluation 2. Development of research infrastructure	Evaluation is an inseparable part of the process of provision and increase of investment in a certain sphere. Scientific research is not an exception from this rule. Evaluation of the results of introduction of new policies and measures is the basis for the effective and efficient implementation of the present Strategy. The expert evaluation of the results and of the science system actors will provide the grounds for concentration of more resources or the withdrawal of the state support from non-prospective spheres. Criteria and evaluation system will be designed with the main issue being the availability of international benchmark and competences; It is necessary that an environment be created for carrying out quality research. This cannot happen	International evaluation of higher education school research activity; Regular review of research activity results; Implementation of the projects of the National Roadmap and international evaluation of efficiency; Access to European infrastructures through direct participation in

	3. Strengthening the social dimensions of science	without the construction of modern infrastructure, i.e. cutting-edge installations, access to electronic data bases and networks, availability of standard laboratory premises and an opportunity for carrying out competitive research and for provision of unique and/or new services, technology transfer, etc. As installations of such type are very expensive and a single state cannot afford them, even a strong economy as Germany, for example, Bulgaria assumes the approach of establishment of regional partnership structures to be linked to the large European infrastructure. This way we will not be isolated and the actions will be commensurate with the capabilities of the national economy – the development of the national infrastructure and the participation in European consortia is linked to the Strategy priorities, to the solid scientific competences of our country and to the geographic location, e.g. a state from the Black Sea region, from the so-called Danube region. The society-related role of science is often neglected in Bulgaria. In practice it is only during the last 3-4 years that the need of "advertising" science and its capabilities started to be realised. This is a product that has no value and its benefits cannot be measured and presented quantitatively. At the same time a big part of the society underestimate it because of considering it an area of the elite, intelligible and accessible by few people. Promotion of science and its achievements is developing at a quick pace as a profession in Europe. Bulgaria is lagging behind in terms of activities and capabilities.	European consortia and through targeted programmes supporting Bulgarian teams in carrying out mid-term research at unique European complexes; Establishment of a research activity award; Awareness raising about research results and achievements; Initiatives for raising the interest of young people toward science, exact and natural sciences in particular; Greater publicity of results.