



**INNOVATION STRATEGY**

**FOR SMART SPECIALISATION**

**THE REPUBLIC OF BULGARIA**

**2014-2020**

## TABLE OF CONTENTS

<b>SUMMARY .....</b>	<b>5</b>
<b>INTRODUCTION .....</b>	<b>11</b>
The European Context .....	11
National context .....	11
<b>1. SOCIO-ECONOMIC ANALYSIS .....</b>	<b>13</b>
1.1 General macroeconomic overview .....	13
1.2. Business support policy .....	14
1.3. Foreign Direct Investments .....	16
1.4. Sectoral specialization in manufacturing and services. ....	17
1.5 Export / import and trade by sectors .....	22
1.5 Established and emerging clusters .....	22
1.7. Regional specialization. ....	25
• High-tech industries and knowledge-intensive services. ....	26
• Medium-high and medium-low tech industries and market services (financial intermediation not included) .....	27
• Low-Tech industries and less knowledge-intensive market services .....	28
1.8. Quantitative analysis for identifying potential areas for intensive innovation development .....	35
1.8.1. Methodological Approach .....	35
1.8.2 Results .....	36
1.9. SWOT analysis of the socio-economic conditions .....	36
<b>2. CAPACITY FOR INNOVATION AND RESEARCH PERFORMANCE .....</b>	<b>38</b>
2.10. Innovation capacity of the firms .....	38
2.11. Research performance .....	41
2.12. Human capital in research and innovations .....	44
2.13. National funding in technology and innovation .....	47
• Infrastructure .....	47
• Programmes for scientific research activity support .....	51
• Financing the innovation activity of the enterprises .....	53
2.14. International research collaboration .....	54
• Participation of the business sector (SMEs in particular) in EU programmes .....	54
2.15. Quality analysis for identification of potential spheres for intensive innovation development .....	56
2.15.1 Methodological Approach: .....	56

2.15.2 Results.....	57
<b>2.16. Cross analysis for identifying potential technological spheres for intensive innovation development (specialization) .....</b>	<b>57</b>
2.16.1 Methodological Approach:.....	57
2.16.2 Results.....	57
1. Identification of technological field “Mechatronics and Clean Technologies” .....	58
2. Identification of technological field “ICT” .....	58
3. Identification of technological field “Biotechnologies” .....	59
4. Identification of technological field “Nanotechnologies” .....	59
5. Identification of technological field “Creative Industries”, including cultural industries .....	59
6. Identification of technological field “Pharmacy” .....	60
7. Identification of technological field “Foodstuff Industry” .....	60
<b>2.17. SWOT analysis of the innovation and scientific research potential .....</b>	<b>61</b>
<b>3. ICT AND ICT POTENTIAL .....</b>	<b>63</b>
<b>3.18. Review of the existing infrastructure and existing services .....</b>	<b>63</b>
✓ Broadband infrastructure / access .....	63
✓ e-Government.....	63
✓ Education, research and innovation infrastructure.....	65
<b>3.19. Review of the expansion / development of the infrastructure .....</b>	<b>65</b>
<b>3.20. Expenditures and investments in ICT by enterprises.....</b>	<b>66</b>
<b>3.21. Mapping the ICT sector.....</b>	<b>68</b>
<b>3.22. Social factors / penetration of ICT and compliance with European Digital Agenda.....</b>	<b>69</b>
• Digital literacy .....	70
• Use of the Internet by the population .....	70
• Use of the Internet and ICT by enterprises .....	70
• E-commerce .....	71
• Use of public e-services by citizens and enterprises .....	71
<b>3.23. SWOT and ICT potential.....</b>	<b>71</b>
<b>4. SUMMARIZED SWOT ANALYSIS.....</b>	<b>74</b>
<b>5. INNOVATION STRATEGY FOR SMART SPECIALIZATION 2014-2020 .....</b>	<b>77</b>
<b>5.24. Vision .....</b>	<b>77</b>
<b>5.25. Description of Objectives.....</b>	<b>78</b>
5.25.1. Wide consultation procedure .....	78
5.25.2. From technology areas to thematic areas.....	80
5.25.3 Objectives and development of Bulgaria.....	81
<b>5.26. Description of background of the Thematic areas.....</b>	<b>82</b>
5.26.1. Objective 1 – Vertical dimension .....	82
5.26.1.1. “Mechatronics and clean technologies” .....	83
5.26.1.2. “Informatics and information and communication technologies” .....	85
5.26.1.3. „Industry for a healthy life and bio-technology” .....	87

5.26.1.4. „New technologies in creative and recreational industries” .....	91
5.26.2. Horizontal activities under Objective 1 .....	93
5.26.2.1. Activities leading to an effective research and business partnership .....	93
5.26.2.2. Activities leading to the improvement of human resources .....	97
5.26.2.3. Activities leading to an adequate environment and infrastructure including e-governance .....	99
5.26.3. Activities under Objective 2 .....	102
5.26.3.1. Resource efficiency activities under Objective 2 .....	102
5.26.3.2. Activities for ICT applications in the industrial sector .....	104
<b>6. FINANCIAL PLAN .....</b>	<b>105</b>
<b>7. EFFECTIVE AND COORDINATED GOVERNANCE OF IS3 .....</b>	<b>107</b>
<b>8. MONITORING AND EVALUATION OF IS3 .....</b>	<b>112</b>
<b>ANNEXES .....</b>	<b>117</b>
<b>1. Action plan .....</b>	<b>117</b>
1.1 Actions completed before September 2014 .....	117
1.2 Potential actions to be considered .....	125
1.3 Future Actions to be completed until June 2015 for compliance with EAC 1.1 and 1.2 .....	127
<b>2. Main sources and documents used for the development of the Strategy .....</b>	<b>134</b>
<b>3. Tables and Statistics .....</b>	<b>136</b>

### SUMMARY

Bulgaria as part of the EU is facing serious economic challenges that require the implementation of an ambitious economic policy. By the Innovation Strategy for Smart Specialisation (IS3, ISSS, the Strategy) Bulgaria declares its vision for a policy change and overcoming of the existing socio-economic challenges:

- Low labour productivity;
- Low share of high-tech production;
- Demographic crisis – aging of population;
- Providing high quality and healthy life;

The development and implementation of the Strategy should be understood as a dynamic process of adopting the most appropriate areas to focus intervention on.

An effective partnership is needed to implement the Vision and objectives of the Strategy. The central and local government, industry and academia, NGOs and all stakeholders need to be involved in an on-going dialogue to reach a common understanding on the ways and means of achieving economic growth. This version of IS3 is part of a process that will continue during the years of the new budgetary period of the Operational Programmes. The strategy includes conclusions, views, and proposals, experience – positive and not only positive – from the implementation of past measures and actions; it is a summary of good examples of successful policies of other countries to determine the focus of the policy in the next programming period. Based on tradition, industrial and research capacity and potential, based on the competitive advantages it is necessary to plan and implement measures to address the major challenges facing the society. The Strategy should be implemented by means of a well-functioning monitoring and evaluation mechanism, and in partnership with all stakeholders, realising effectively the “process of entrepreneurial discovery” and if necessary changing the interventions for implementing the Strategy. It is necessary to ensure a relationship between smart specialisation and the objective of strengthening the orientation of public funds towards the results as a whole.

IS3 is based on the concept of a broader understanding of innovation<sup>1</sup> going beyond investment only in research or only in the manufacturing sector; it is also based on building competitiveness through design

---

<sup>1</sup> „**Innovation** is putting into use a new or significantly improved product (good or service) or a production process, a new marketing method or a new organisational method in business practice, workplace organisation or external relations that create market advantages and increase the competitiveness of companies at that – according to Manuel d'Oslo 3e édition© OECD/EUROPEAN COMMUNITIES 2005).

**Innovation** is often defined as a new idea which proved successful in practice. The new idea may be a new product, practice, service, production process or a new method of organisation. This new idea can be established as an innovation only if it becomes more or less basic application or proves its usefulness in practice. Transformation into basic application does not always depend only on the strength of the creative idea. It also depends on market opportunities, the willingness of the industry to accept it, economic efficiency, presentation and perception, random external factors, etc. Before the new idea can actually become a basic application, we cannot evaluate these factors and say whether the idea will find a market or whether it will be frequently applied/used. It is therefore not possible to be sure in advance whether the idea will become an innovation: one can only determine subsequently whether a new idea has led to true innovation.

Oftentimes it is not possible to define “innovation” in advance and identify certain activities as “innovative”. The familiar innovation concepts include unidirectional (“linear”) and interactive (“systems”) innovations. Linear innovation is based on a research approach where the new ideas are the result of research and have been put into practice by unidirectional (linear) transfer of knowledge. Change and innovation are expected to be designed and organized, predictable and rationally planned.

and creative industries, innovation in the social sector and services, new business models and innovation based on practice.

Smart specialisation is “smart” for two reasons:

- Identifying the priorities by politicians in close partnership with the industry (not addressing them at the regional level because of the strong centralisation in the governance of the country);
- This process is taking global trends into consideration, stimulating the businesses to be ambitious but realistic in terms of what can be achieved if they will combine their capabilities in clusters and networks.

The first two parts of the Strategy cover the issues of the socio-economic analysis and capacity for research and innovation performance.

The challenges facing the industry are as follows:

- Bulgarian exports include mainly low-tech products;
- Internationalisation of Bulgarian enterprises is low;
- Contribution of foreign direct investment in technology transfer is limited;
- Industrial production is extremely energy intensive, energy inefficient;
- Labour productivity is low – as a result of the above factors.

Change can be made if in the identified thematic areas of the Strategy the following is stimulated:

- Attracting leading investors in high-tech industries and services, who can invest in the research units in the priority areas of the Strategy;
- Developing research and innovation infrastructure, including electronic infrastructure;
- Improving the quality of workforce – training of personnel necessary for the industry; increasing the number of students studying engineering, computer science; retaining and attracting talent; introducing the dual system;

---

In interactive “systems” innovations, the base is also a result of research, but also of practice and intermediaries, consulting services, non-governmental organisations, researchers, etc. as participants in a “bottom-up” process. Interactive innovation includes existing (sometimes tacit) knowledge, which is not always purely scientific. Innovations created by an interactive approach often provide better targeted solutions that are easier to apply, as the process is favourable for accelerating the deployment and adoption of new ideas.

Both approaches to innovation are equally valid, but the consequences for programming are different. The linear approach is based on information activities, and linear methods for consulting and training. The interactive model relies mainly on collaboration, sharing of knowledge and mediation methods of consultation. This approach helps to develop the initial research results into practical applications and create new ideas through mutual enrichment of the participants

**Innovation activities** are carried out by entrepreneurs using existing knowledge and technology to develop and distribute new products and practices. An ecosystem that encourages entrepreneurship creates conditions for identifying business opportunities and facilitates access to ‘raw materials’, necessary for their development. State intervention in this process is intended to remove barriers to entrepreneurs’ activities by providing appropriate incentives and legal and regulatory framework. However, even with existing stable institutional framework, innovation is often hampered by market failures. Given the uncertain outcome of innovation, companies are often reluctant to make sufficient investments in applied research. Especially in Europe, fear of failure is the main obstacle to innovation, although the knowledge generated in this way can be of great public value. In an environment where failure is stigmatized and has its business and social cost, government intervention to stimulate innovation and entrepreneurship is mandatory.

- Implementing technological modernisation in the manufacturing sector by using resource-efficient/waste-free technologies reducing pollution at the source, and reducing carbon emissions;
- Raising intra-firm productivity by improvements based on new techniques of management of new business models;
- Introducing high-tech components and knowledge-intensive business services in traditional industries and services;
- Promoting internationalisation of enterprises so that they can enter the international markets;
- Reduce bureaucracy through more effective e-government.

The strategy consists of the following main parts:

- Analytical part which covers the socio-economic analysis, analysis of the capacity for innovation and research performance, and analysis of ICT and ICT potential. The SWOT analysis summarises the conclusions of the analyses;
- Strategic part, which formulates the vision, strategic and operational objectives for realising the vision; the proposed main activities associated with the achievement of the strategic objective, and an indicative financial plan;
- Proposal for effective and coordinated management of IS3 with an elaborated mechanism for monitoring and evaluation.

The analytical part summarises data and conclusions set out in many materials prepared specifically for the Strategy and in connection with the new programming period for the Structural Funds.

Based on a quantitative analysis (p. 1.7) and a qualitative analysis (p. 2.15) an intersection point is sought in the cross analysis (p. 2.16) where the quantitative and the qualitative evaluation of the potential of each economic activity is set out. Quantitative evaluation highlights the strengths of the economy. Qualitative analysis summarizes the state support to the economic activities through the National Innovation Fund, OPC, NSRF and other public instruments. Cross analysis gives a full evaluation of how quantitative advantages are complemented by qualitative ones, which determines the future potential for accelerated technological development. The logic of identification is to locate the intersection point between the group of economic activities and services and the research areas, where the expenditures of the business and the state for R&D are concentrated. Based on this analysis, the following technology areas have been defined:

- Mechatronics and clean technologies;
- Information and Communication Technology;
- Biotechnology;
- Nanotechnology;
- Creative industries, including cultural ones;
- Pharmacy;
- Food industry;

On the basis of proposals from businesses, and the established and declared interest of the academia to participate in international projects, including Horizon 2020<sup>2</sup>, and on the basis of the assessment of

---

<sup>2</sup> Bulgarian research organizations and enterprises will be entitled to participate in EU programs, if the joint project is in accordance with the national thematic areas identified in the Strategy

international trends and market potential, four thematic areas have been identified and certain product and technology niches, services and productions have been specified:

- Information and communication technology;
- Mechatronics and clean technologies;
- Industries for healthy life and biotechnology (including food);
- New technologies in creative and recreation industries;

**Vision:** (about which all agreed) **By 2020 Bulgaria must make a qualitative leap in its innovation performance at EU level to tackle public challenges in the field of demography (reverse brain drain and youth entrepreneurship), sustainable development, intellectual capital and the nation's health.**

**Strategic Goal: By 2020,** Bulgaria will move from the group of “modest innovators” into the group of “moderate innovators”<sup>3</sup>.

In practice, this change in the indicators will be implemented through an effective policy for promoting:

- Innovation, research and development of human capital;
- Investment in high-tech areas in which Bulgaria has traditions, has created professionals and successfully competes on the international market;
- Export-oriented industries;

The strategic objective will be realised by achieving two operational objectives:

**Objective 1:** Focus the investment for the development of innovation potential in the smart thematic areas (for creation and development of new technologies leading to competitive advantages and increase in the added value of domestic products and services).

**Objective 2:** Support for accelerated implementation of technologies, methods, etc. which improve resource efficiency and application of ICT in the enterprises in all industries.

Objective 1 will be implemented by two types of measures: vertical and horizontal.

Vertical measures are aimed at the development of the respective research and industrial areas; horizontal measures will stimulate the links between research and businesses, the attracting and retaining of quality human resources in the respective areas and the functioning of a favourable innovation environment.

For each of the four areas, the global trends, the situation in Bulgaria, and the challenges and upcoming activities have been summarised. This will allow under the OP to propose appropriate measures to address the identified challenges.

To improve the partnership between research institutes and businesses, it will be necessary to apply a combination of approaches for “active demand” and “high quality (research) supply”. Good cooperation requires also a relevant infrastructure. Research infrastructure is part of the knowledge triangle. The Centres of Excellence will create serious preconditions for the development of advanced technologies, where we have created scientific potential.

The Bulgarian research system is still isolated from the industry. A small part of the research results are aimed at improving the technological level of the industry and can hardly be implemented. It is encouraging that its structure is changing, due to focusing on new dynamic areas – quality of life, use of

---

<sup>3</sup> IU Scoreboard



alternative energy sources, use of biodiversity as a source of resources, use of natural resources as a source of raw material for improving the nation's health. The development of sectors having a high level of knowledge will attract and retain young people in the country and will reduce the "brain drain".

To encourage the recruitment of highly qualified staff in the enterprises will be also a prerequisite for the development of their research units, which is the foundation for the creation of new knowledge. The quality of research in universities will play a significant role in the rapid penetration of innovation into the market. For this purpose restructuring of teaching hours will be needed in order to provide more time for research that is particularly necessary for the career development of young scholars.

An important part of the research infrastructure is the electronic research infrastructure. E-infrastructure is an essential prerequisite for the successful participation of Bulgarian research laboratories in the EU research programmes.

For the needs of the industry it is also necessary to reform vocational education and training. To keep the workforce moving in pace with the time it will be necessary to continue to apply the incentive measure for "lifelong learning".

Bulgaria's lagging behind in the field of "green markets" (energy efficiency technologies, waste treatment and recycling technologies, mobility and transport technologies, water supply and sewerage technologies, environmental and systems engineering, life sciences, nanotechnology, eco design, etc.) must be assessed as an opportunity for participation on a relatively "broad" market. Because of the huge gap in this field, a fast and efficient utilisation of technology and knowledge is required in order to achieve a degree of integration in this market. A key role is played by the state, which should, especially through public procurement under OPRD and OPE 2014-2020, provide opportunities for the businesses to implement innovative solutions in the sectors of waste, water, energy efficiency and energy technologies.

Stimulation of resource efficiency would improve energy independence and independence from increasingly expensive raw materials for industrial production. Implementation of modern technologies will be essential to increasing productivity and competitiveness of production.

The extensive use of ICT in the industry includes activities related to the optimisation of management and production processes, e-commerce and e-business, provision of affordable interactive on-line services (and digital inclusion for disadvantaged people and groups, the elderly and people with impaired mobility) plus opportunities for flexible, distance and part-time work (including mothers), expanded use of ICT in the resource management activities, energy management, tracing of environmental characteristics and effects on climate change, environmental protection and monitoring in general, participation in international platforms, distance and on-line trainings for companies and employees, environmentally-friendly and energy-efficient transport and improved mobility by implementing smart transport systems, etc. The areas for application of ICT are unlimited and lead directly to improved business performance. It is therefore necessary to encourage the use of ICT in all spheres of the industry.

IS3 will be implemented through the instruments of OPIC and OPSESG/Grand the national budget within the three-year budget forecast, NSRF, NIF.

Measures for implementation of ISSS will be secured financially mainly by the Operational programmes OPIC and OPSEIG, and the part remaining for the account of state budget will be at the amount not exceeding the allocated resources for innovation within the frame of the laws for the state budget for every year of the planning period till 2020.

Achieving National Objective 2 of the National Programme for Reforms – so that investment in R & D can reach 1.5 % of the GDP by 2020 – is not an end in itself. It is a guarantee that the state encourages the development of technology, new products and the development of the existing ones, promotes the improvement of education, and promotes the building of the necessary research and innovation

infrastructure. The role of the Strategy is to identify the areas with the greatest potential for growth and direct the support thereto.

The process of defining product and technology niches will continue throughout the whole programming period on the basis of an on-going dialogue with representatives of industry, academia, and all stakeholders with an annual monitoring to track the implementation of the necessary actions to achieve the objectives formulated in the Strategy. The results of monitoring will impact the decisions of the Council for Smart Growth on changing the interventions, if necessary. Evaluation of the results will be regularly made by an independent assessor, external for the system. Based on the knowledge gained from impact evaluation, the future interventions will be more effective in terms of the development of the country.

The strategy proposes a mechanism for coordinating and implementing the performance of the Innovation Strategy for Smart Specialisation. Drawing from the experience of successful countries in terms of innovation, following the recommendations of the European Commission, taking into account the general understanding of high level management of the policy for growth, the Strategy proposes to establish a Council for Smart Growth with the Council of Ministers, chaired by the Prime Minister. Members of this Council from the central government are 4 ministers – those of MEE, MES, MTITC and MAF, 4 academics – renowned scholars scientists and researchers, 4 business representatives – successful businessmen of high reputation in the community. The Council will have the task and responsibility to determine the trend of development of the thematic areas of the economy for which there is public consent that these areas are leading and promising for the country.

.

## INTRODUCTION

### The European Context

The Innovation strategy for smart specialization is based on "the process of entrepreneurial discovery" for identifying the economic priorities within the research and innovation to create a competitive advantage through the development and tuning the country's strengths in research and development to industry needs. The aim is to respond to new opportunities and changes in the market by focusing investments in areas that provide increased value added of the economy and its competitiveness on international markets. ISSS is inherently a process that will continue throughout the program period.

Innovation strategy for smart specialization (ISSS) is being developed in accordance with the strategy of the Union 2020 for smart, sustainable and inclusive growth, and to achieve thematic goal 1 of Art. 9 Regulation (EU) 1300/2013 - "Strengthening research, technological development and innovation." ISSS is a thematically precondition from Annex XI of the regulation and on its implementation the allocation of funds under the "Innovation and Competitiveness" and "Education and science for smart growth" depends.

The process of identification of smart specialization is dynamic, involving partners from the economic and scientific fields, as well as civil society to identify areas in which the country has a chance to excel and show its image in the international market.

Measures undertaken to continue the process of entrepreneurial discovery will allow to support those areas that have the potential for growth and that will contribute most to solve the socio-economic challenges facing society.

Placing an emphasis on supporting national specialization will lead to greater concentration and more effective use of national and European public funding, but also to improved coordination and synergies between initiatives taken at EU, national and regional level. ISSS is being developed in accordance with the vision of Bulgaria as defined in the National Development Plan - Bulgaria 2020 Action Plan for the Danube Strategy „for unlocking the potential of the economy."

Based on the experience from the implementation of OPC 2007-2013 and in accordance with the recommendations of the EC, ISSS provides a system for the identification and support of smart specialization, such as:

- engaging leading entrepreneurs and partners in development and innovation activities in academia and business;
- focusing on supporting national areas of specialization;
- integrating processes vertically;
- based on data and facts;
- concentrating spending on research and innovation by eliminating unprofitable phenomena such as fragmentation or duplication of research funds;
- indicating the intersectoral areas of specialization;
- creating conditions for increasing private investment in research and innovation.

### National context

ISSS is based on the analyses and conclusions of the implementation of the Innovation Strategy of the Republic of Bulgaria (2004), lessons learned from the implementation of the Operational Programme "Development of the Competitiveness of Bulgarian Economy" 2007-2013 (OPC) and is developed in coordination and to supplement goals and priorities of the National Reforms Programme, National Development Program Bulgaria 2020. ISSS is being developed and will be implemented nationwide in coordination and to supplement the National Strategy for Scientific Research 2020, National Roadmap for

Research Infrastructure. ISSS is coordinated with the 'National Strategy for the Promotion of Small and Medium Enterprises 2014-2020', taking into account the conclusions and recommendations in the annual reports on the development of SMEs; updated National Strategy for population demographic development in Bulgaria (2012-2030) and the National Concept for promotion of active life among old people (2012-2030). During this planning period it is not provided for the development of innovative strategies for smart specialization on regional level (classification NUTS II), however the needs and challenges at regional level are the basis of this document and a key element in the strategy implementation.

## 1. Socio-economic analysis

### 1.1 General macroeconomic overview

The Republic of Bulgaria became a Member State of the European Union in 2007 and ranked 12th in area, 16th in population and 22nd place in GDP in 2012 and 2013. The country is under a currency board regime (binding national currency to the euro) and is characterized by industrialized, free market economy, medium developed private sector and a relatively small domestic market.

In the latest edition of the Global Competitiveness Report of the **World Economic Forum**, Bulgaria is ranked 57<sup>th</sup>, 5 places up compared to the previous report. The country's improved competitiveness is the result of the combined effect of activities in the areas that are used to assess the Global Competitiveness Index. In terms of technology readiness Bulgaria has moved eight places up and occupies 44<sup>th</sup> position. The country has a remarkable result in access to high-speed internet, broadband internet access and the number of Internet users. However, Bulgaria has dropped down in the higher education and training index (69th position, 6 places down) and labour market (61st position, 12 places down). Performance is poor in the innovations index (2.97) and institutions index (3.38). (Rating Scale with a maximum 7). In order to improve its competitiveness, Bulgaria needs to focus its efforts on improving the quality of the labour force (increasing investment in education, with the introduction of mechanisms to accommodate the needs of industry) and on stimulating the vigour in the demand and introduction of new technologies, promoting the absorption of innovations by the market, building capacity to absorb and adapt foreign technologies and knowledge

After the financial and economic crisis, Bulgarian economy is on a path of slow recovery due to relatively low demand. In 2010-2011 the engine of growth was the external demand, while in 2012-2013 the focus was on the domestic demand. GDP growth in Bulgaria in 2012 and 2013 amounted to 0.8% and 0.9%. The state of economic activity in the EU has a direct impact on the country's exports, and indirectly on consumption and FDI, therefore it can have a mixed impact on future GDP growth. In comparative terms, GDP per capita in 2012 was 47% of the average for ES28, which is the lowest level among the Member States. In turn, this position is directly related to the level of productivity of the Bulgarian economy. Reaching the average level of income in the EU requires catching up in productivity, which in the medium term is not possible without technological modernization and changes to the business model of corporate governance. Bulgaria needs an active integration policy for FDI and innovation policy at the sectoral level, to build capacity in the labour force for the absorption and adaptation of modern technologies and knowledge.

The slow recovery of the Bulgarian economy has an impact on the **unemployment** rate, which, albeit slowly, has gradually increased from 9.47 % in 2010; reaching 11.3% in 2013. **Youth unemployment** is a major problem for the existence of a competitive economy and active social inclusion. Businesses still do not give priority to the quality of the workforce, which can be seen in the limited investment in continued vocational training. Linking education with the needs of the labour market, especially private business and high-tech industries, is a "bottleneck" in the sustainable economic development of Bulgaria. It is necessary to link admission in Bulgarian universities to the needs of professionals in these areas and increase the share of engineering graduates and science and education initiatives in the utilization of new knowledge. The current education structure is not conducive to transition to innovation-based growth.

Bad demographics (higher proportion of people over working age than those of working age) will intensify workforce problems. Therefore Bulgaria should focus its efforts on reducing the dropout from the education system by encouraging work habits formation and educating staff (secondary and tertiary) in accordance with the needs of industry.

The **Currency Board** allows the maintenance of price stability by ensuring the stability of the national currency.

It is expected over the period to 2016 for the **budget deficit** to gradually decrease - from - 1.5% of GDP in 2014 to - 0.7% of GDP in 2016

There is progress in the provision of electronic services by the tax and customs administrations and the introduction of other facilities for citizens and businesses, and this has had a positive impact on **tax collection** - a key aspect of macroeconomic development.

**Grey economy** remains a major obstacle to the achievement of sustainable economic growth. Along with moonlighting work, it negatively affects the achievement of macroeconomic objectives, quality and productivity at work and social cohesion, reducing tax revenues and directly affecting the underfunding of social systems.

### 1.2. Business support policy

Government policy in support of enterprises is based on two complementary approaches:

- Creating a favourable overall environment for business and
- Improving access to finance, both for start-ups and emerging businesses.

The main objective of the first approach is the implementation of a policy to reduce the administrative and legal burden, reduce obstacles for trade, privatization and de-monopolization and improving taxation, establishing e-government, as well as creating a positive public attitude and entrepreneurial culture.

The second approach is realized through the implementation of diverse programs to support entrepreneurs in dealing with specific problems - preparation for starting a business, financing and investment, company growth, quality management, export activity, staff training and development etc., all implemented by national and European programs and funds.

Bulgaria is the Member State with the lowest income tax on individuals (10%) and with the lowest corporate income tax (10%) and is among the top countries with the lowest rates of VAT (20%). Such a business environment is oriented to actively attract FDI and entrepreneurial development. However, low corporate tax and low cost of labour are not sufficient to stimulate economic development. They are not sufficient conditions for an export-oriented enterprise, seeking FDI-based technology. The strength of the Bulgarian entrepreneurship is the result of relatively favourable business environment in terms of access to credit, investors' protection and starting a business. However, Bulgaria has serious weaknesses related to the performance of contracts, addressing issues in bankruptcy, cross-border trade, obtaining building and production permits, obtaining access to electricity<sup>4</sup>, which hinders the effective development of entrepreneurship.

The role of the state is to create and develop a sustainable environment and favourable conditions for business. An independent and expeditious legal system must be in place. The business sector needs the administrative burden to be reduced and the development of e-government, which will not only accelerate the absorption of EU funds, but will also lead to better coordination and monitoring of national and local policies.-

Simplifying and facilitating licensing and permits regimes is a priority for the Bulgarian government. Work on the implementation of the already adopted packages to reduce the regulatory burden on Bulgarian companies will continue and new packages will be included. Measures will be taken to reduce to a

---

<sup>4</sup> <http://www.doingbusiness.org/data/exploreeconomies/bulgaria>

maximum of 3 months the time required to obtain licenses and permits to undertake and carry out a specific activity by an enterprise. By the end of 2015 the Bulgarian government (in the Strategy for administration development) will continue employing the rule that the introduction of a new license or registration will be balanced by the removal of another such regime. Acceleration of bankruptcy procedures will be introduced providing a second chance for honest entrepreneurs.

Bulgaria's place in relation to the global technological frontier and leading economies points to the adoption of new technologies as a major area of innovation policy. This requires knowledge, skills and the workforce capacity to absorb new technologies and accelerated especially in the areas of their specialization. Bulgaria has the potential to develop the education of the younger population, but at the same time much is to be desired as the transition to a higher stage of technological development requires skills to adapt and develop in many new technology areas. Given the low levels of performance and technology, the national policy needs to address not only the expansion of education, but even more to focus on improving its quality; targeting the areas of current and future demand, i.e. coordination of policies in innovation, education, training and the labour market is needed.

Another important factor which will support the development of the innovative and high-tech potential of Bulgarian business is ensuring its access to additional markets and sources of projects, grants and commercial financing through the national membership of Bulgaria in the European organizations and initiatives with activities in high technology. For example, by strategy and membership of Bulgaria in CERN (European Organization for Nuclear Research), ESA (European Space Agency), in European public-private partnerships for research and innovation. European public-private partnerships aim at developing new technologies, products and services that provide the European industry with a leading role on world markets. They are financed by public funds from "Horizon 2020" research and innovation and private investment by leading industry companies for implementation and commercialization. SME's can also participate. Joint enterprises/Joint undertakings/are entities that are created for Joint Technology Initiatives (JTIs.). Bulgaria has taken steps to join the SP "Biotechnology" (BBI), SP "Fuel cells and hydrogen-2" (FCH-2) and SP "ECSEL" - Electronic components and systems for European leadership. Bulgaria also participates in other programs: "AAL" - to improve the quality of life of older people, "EMPIR" - metrology solutions to social challenges such as energy, environment and health, which are funded jointly by the "Horizon 2020" and the member country and the program Eurostars-2.

Each of these corresponds to the technology areas for smart specialization in Bulgaria identified below.

State support for the development of entrepreneurship and entrepreneurial culture - SBA events and awards. Bulgaria participates in the competition for European awards for promoting entrepreneurship. There is a preliminary selection of candidates at national level under the leadership of the Ministry of Economy and Energy and the selected candidates take part in the European competition. The aim is to identify and grant recognition to those who most successfully promote entrepreneurship in Bulgaria and serve as an example in the implementation of policies and practices in this area, by drawing attention to the importance of entrepreneurship, encouraging and inspiring future entrepreneurs. The following projects have been realized: Brandiko, Th13teen Arts and TECHNOSTART.

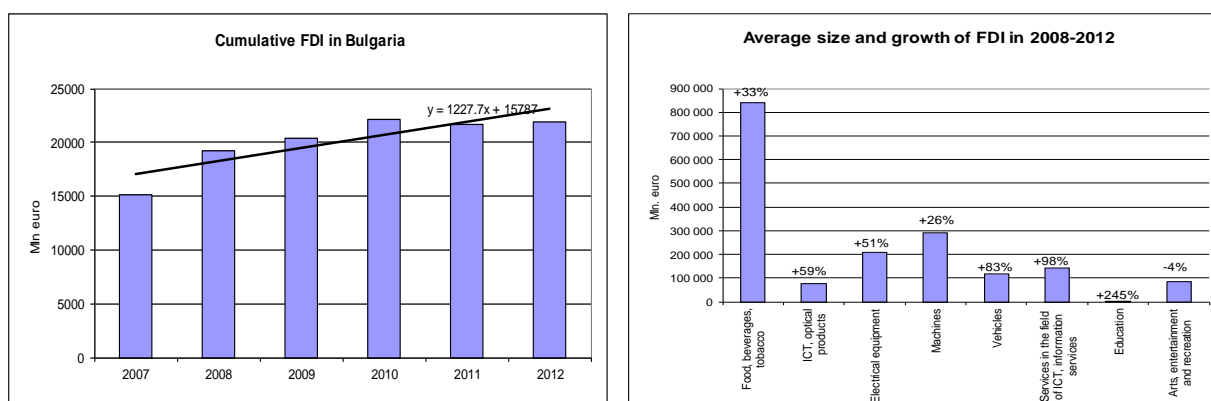
In the implementation of this strategy other participations of the country in joint European partnerships can be seen and supported according to the specific conditions.



## 1.3. Foreign Direct Investments

The policy for promoting investments<sup>5</sup> is aimed at increasing economic activity and technological development in production and services with high added value as well as the creation of new productive jobs and decreasing regional disparities in socio-economic development.

Investments are a key driver of growth and an important factor for improving the competitiveness of the economy by improving productivity as a result of technological innovation and process optimization in enterprises, improving resource efficiency, expanding opportunities for exports, particularly as a result of foreign direct investment (FDI).



Source NSI BG

Special legislation assists the policy of encouraging investment by implementing administrative and financial incentives, including shortened procedures and individual administrative services; acquisition of state and municipal property under facilitated conditions; financial support for construction of components of the necessary technical infrastructure; financial support for staff training and for partial reimbursement of compulsory employer contributions for newly hired employees; a package of government incentives for priority investment projects.

The government's goal is to promote investment in high-tech industries and services for opening highly productive jobs as well as jobs in the regions with the highest unemployment rate:

- **Machine building, electronics, automotive, medical equipment, optical products, medicines, etc.;**
- **Information and Communication Technologies (ICT) and scientific research;**
- **Technological and industrial parks for high-tech industries and innovation.**

Encouraged economic activities include:

- **Activities in the industrial sector:** processing, including high-tech industries.
- **Activities in the service sector:**
  - Activities defined by Eurostat as high and intensive knowledge-based services: creation and deployment of software products and services based on computer technology, accounting and auditing activities, tax consultancy, professional

<sup>5</sup> Primarily through the implementation of special legislation: Investment Promotion Act (IPA) and its Implementation Regulations



activities in central offices, architectural and engineering activities, technical testing and analysis, research and development, education and human health.

- Logistics, incl. transport infrastructure - airports, ports etc.
- Office administrative and support activities, activities of telephone service centres and other business support activities.

The total volume of investments after the crisis year 2009 amounted to little more than 1 billion. Euros, with frequent cases where output is larger than input.

In structural terms, after Bulgaria joining the EU, nearly one third of the accumulated investments are in manufacturing (mainly in "production and distribution of electricity and heat", "production of rubber and plastics and non-metallic materials," "metallurgy", textiles and clothing, footwear and leather"). They are followed by the "real estate transactions" (16%), "Trade, repair of motor vehicles and motorcycles" (15%) and "communication" (13%). In terms of dynamics, the biggest investments increase is in mining and quarrying (4 times), education (nearly three times) in the field of information technology and services (approximately 2-fold). Within manufacturing investments in automobile production and distribution of electricity and heating have almost doubled. Investments in metallurgy have increased by 60%, while those in the production of computer, electronic and optical equipment by 59%. Foreign investments contribution to technology transfer is limited.

**Foreign direct investments are oriented towards important components of the innovation system (education and ICT), as well as sectors with potential for development as automotive (83%), electrical equipment (51%), food products and beverages (30%), etc. .**

### 1.4. Sectoral specialization in manufacturing and services.

The analysis of the GDP *structure* after Bulgaria becoming an EU member shows relative stability and emphasizes the importance of the industry and services sector in the economic development of the country:

- Agricultural Sector - 5%;
- Industry - 25% (mining and quarrying, manufacturing, production and distribution of electricity, heat and gas, water supply, sewerage, waste management and remediation activities)
- Construction - 6.0%;
- Service sector - 64%.

In terms of the *dynamics* of the added value generated in the period 2007-2013, it is most increased in the services sector (38.0%), followed by the industrial sector (33.0%), agricultural sector (18.0%) with construction experiencing a negative change (9.0%).

Manufacturing is a leading sector, providing almost 80% of the production output. ***The share of added value in production*** is highest in high technology activities:

- High-tech activities - 35%
- On average, high-tech activities - 23%
- On average, low-tech activities - 11%
- Low-tech activities - 24%

Leading among medium and high-tech economic activities are medicinal products, computer and communication equipment, machinery and metal products, where the share of value added in manufactured products is between 30-35%.

Services sector creates 64% of total value added in the country, accounting for nearly 40% of the value of services provided. Share of value added in the provision of services is greatest in high-tech knowledge-intensive services:

- Knowledge-intensive market services - 34%
- Knowledge-intensive high-tech services - 51%
- Less knowledge-intensive services - 32%
- Other less knowledge-intensive market services - 40%

Within the high-tech services those that stand out are information technology (58%), telecommunications (52%), information services (51%). The share of value added in providing knowledge-intensive market services is greatest in legal and accounting services (61%) and in less knowledge-intensive market services, particularly in trade, the share fluctuating between 43-49%

**Employment** in industry is estimated at 617 000, with 525 000 in manufacturing only. Services employ about 1 million, i.e. twice as many employees as in the manufacturing industry.

In terms of technological intensity of economic activities, employment is concentrated in medium-low and low-tech activities (82%), as well as providing less knowledge-intensive services (81%), i.e. in high-technology sectors of production and services provision 18-19% of employees are employed in the manufacturing and services sectors.

To establish the *comparative competitive advantages and production and export specialization* of Bulgarian products, the Balassa methodology<sup>6</sup> was used. Comparative competitive advantages (production and export specialization) were found for 85 product groups covering 79.5% of Bulgarian exports in 2012 and 76% in 2011

The share of high-tech exports was 5.6% (2012). This is owed equally to the production of computer, electronic and optical products and manufacture of medicinal substances and products.

The exports of medium and low-tech products (71%) are predominant, with 65.3% the result of production and export specialization, which provides competitive advantages of Bulgarian products in international markets. It is owed most to products as monofilament plastic fibres, metal salts, energy producing facilities, fertilizers, electrical cables and conductors, machinery for agriculture and forestry, household appliances, bearings (ball or roller), printed circuit boards, resistors, apparatus for the management and distribution of electricity, bicycles, perfumery, cosmetics and essential oils, forklift trucks, electric transformers and pumps in the group of medium-high technology activities; ores of precious metals, lead, copper, zinc, packaging, household glass, sanitary articles, vegetable fats and oils, ceramics, minerals and steel products from the group of medium-low technological activities, and wheat, barley, corn, tobacco, clothing, oil seeds and oleaginous fruits, preserves and more from the group of low-tech activities.

In seven product groups Bulgaria is a leader among EU member states and the Balkans in comparative competitive advantages (Monofilament plastic fibres, metal salts, ores of precious metals, lead, copper, oil seeds and extraction of "soft" oils, women's clothing).

---

<sup>6</sup> Estimates made cover 258 product groups (third level of aggregation according to SITC rev.4), distributed according to the global technology intensity of each economic activity (KID2008). All member states of the ES28 are taken into account, as well as Balkan non-member states.

<http://www.mi.government.bg/files/useruploads/files/innovations/compadvantagesbg2014part1.pdf>  
<http://www.mi.government.bg/files/useruploads/files/innovations/compadvantagesbg2014part2.pdf>

In terms of technological intensity sectors (economic activities), the following conclusions could be made:

- Most businesses and most employees are concentrated in low-tech activities and they generate the majority of added value;
- In high-tech activities, labour productivity is above the national average;
- 82% of the employees are engaged in low-tech activities and they create 75% of value added in technological activities;
- Medicinal substances and products are characterized by a minimum number of employed and maximum labour productivity;
- Production of clothing is characterized by maximum number of employed, high export orientation and minimum labour productivity.

In terms of ***sustainable economic development***, the solution is increased productivity and added value rather than the supply of goods and services at low prices.

Two emerging areas stand out, which were identified during the stakeholders consultation. They cannot be captured through the international standard classifications.

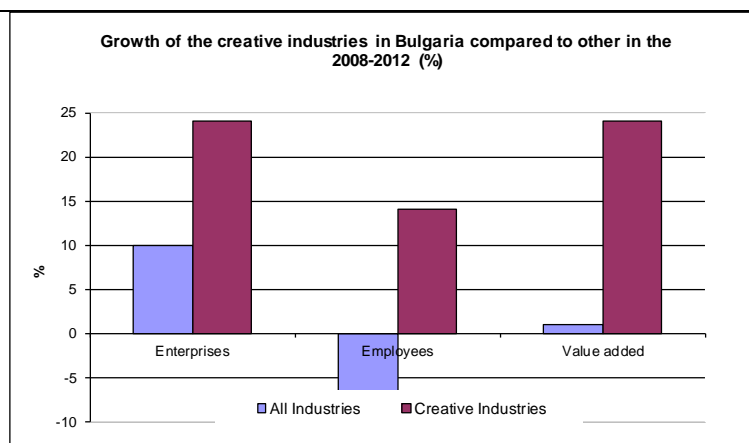
### ***Creative Industries***

Dynamics in the development of creative industries in Bulgaria stands out significantly amid slowed growth for the entire economy.

Growth in the number of enterprises, employment and added value is at times higher than other sectors. This is mostly due to the contribution of information technology, information services and the production of movies, TV shows and recordings. At the same time, there is a significant delay in architectural and advertising activities. But there is obvious overall progress in the creative industries.

For the period 2008-2012, the number of enterprises in Bulgarian creative industries increased by 23.5% against 10.6% for the whole economy. Value added also grew 23.5%, while growth in enterprises from all sectors was only 0.7%. Most significant is the difference in employment growth. As businesses in the creative industries employment for the period increased by 13.7%, there was an overall decrease by -9.6% in other sectors.

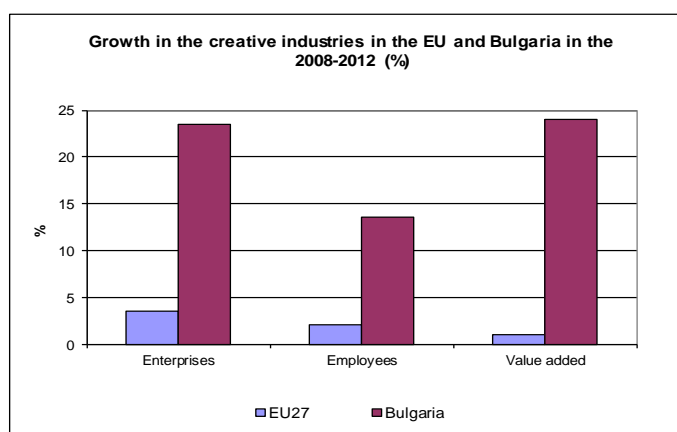
Creative industries in Bulgaria cover 21,812 enterprises (7.1% of all businesses in 2012, the share in 2008 was 6.3%). Creative industries employ 88,700 people, or 5 percent of the labour force, while in 2008 their share was 3.9%. Added value of businesses in the creative industries was equal to 1,340mn. Euro or 7.6% of the added value created by all enterprises. Its share in 2008 was 6.2%. It is obvious those creative industries are gaining a stronger position in Bulgarian economy and that their contribution is growing dynamically. These shares can grow further as they still lag behind by 1-2% compared to the EU average.



Source: SME Performance Review, NSI and own calculations

European trends in the field of creative industries stand in a similar way, albeit with a slightly less pronounced pace compared to European economy. The number of businesses in the creative industries in the EU for the period 2008-2012 increased by 3.8%, while for all sectors it was only 0.5%. Employment in creative industries increased by 1.6%, while overall employment fell by 1.5%. Added value of creative industries has a minimal growth of 0.9%, which seems optimistic amid a 3% decline in the value added in European companies in all sectors.

Compared to the EU sector of creative industries, in Bulgaria the sector is developing dynamically and as stated above, it has more potential for growth. While the number of businesses in the creative industries in the EU for the period 2008-2012 increased by 3.8%, in Bulgaria it increased by 23.5%. Employment growth in the EU was 1.6% and 13.7% in Bulgaria. The added value of creative enterprises in Bulgaria increased by 23.5% and that of the EU by 0.9%.



Source: SME Performance Review, NSI and own calculations

## 10 facts about creative industries in Bulgaria

1. In the period 2008-2012 only four sectors showed growth in both the number of enterprises, employment and value added. Three of them were from the creative industries: film industry, information technology and research and development, if it attributable to creative industries
2. IT is the second highest labour productivity sector in Bulgaria following companies from

research and development.

3. In the top 10 most productive sectors in Bulgaria there are 5 sectors of the creative industries: information technology; Film industry; Architectural activities; Advertising; Research and Development
4. Value added per employee in IT in Bulgaria was equal to two employed in the automotive industry and in the manufacture of metal products
5. In the film industry for the past four years the number of companies increased by 50%, the value added by 40% and employment by 25%.
6. The four highest grossing feature films produced in Bulgaria for the last three years have brought to its producers worldwide revenues of 900 million dollars.
7. Information technologies employ half the number of employed in construction; however their productivity is three times higher.
8. The profit per employee in the film industry is equal the profit of three employees in the clothing industry, courier services and retail combined.
9. Creative industries in Bulgaria employ about 88,700 people. This is equivalent to the entire population of the district centres of Razgrad and Lovech together.

Companies from the creative industries in Bulgaria have a total annual turnover of 6.2 billion lev. This is equal to the budget expenditures of all municipalities in Bulgaria.

### ***Organic Products (Bio Products)***

**In Bulgaria**, the number of organic food producers is over 1 000 and according to preliminary data, the number of organic producers, processors and traders has increased significantly - from 2,016 in 2012 they have reached 3,157 in 2013. The upward trend was also observed in the area in the control system, which in 2013 were 79,709 ha, and in 2012 they were 40,378 ha. Driven by global trends, Bulgarian producers seek to increase their areas and products. The dynamic development of the market for organic products is creating a shortage of raw materials for the production of bio products. This is to the apparent benefit of Bulgarian organic producers who export more than 90% of their produce, mostly to Germany. Exports are mainly from farmers' organizations such as the cooperative "Bio Bulgaria - Oil" (production and export of organic essential oils and derivatives - lavender oil, rose oil, peppermint oil and others with a market; rose water and lavender water, dried organic herbs, some cultivated, like mint and lavender and some wild like lime, nettle and chamomile; organic plants – roses, lavender and mint). The produce of the Cooperative "Bio Oil Bulgaria" is certified by the Swiss organization IMO, which is represented in Bulgaria by "Balkan Biocert "LTD.

At present there are already manufacturers in the Bulgarian market that offer quality and wholesome children's foods (for children aged 1 to 3 years). One of them is the organic food company for children's meals KIC Group Co. Ltd.

Bulgaria has a long tradition in agriculture and many reserved areas rich in biodiversity, important prerequisites for the development of organic farming. Therefore, it is a **major policy priority for the Ministry of Agriculture and Food in the new programming period 2014-2020**. The new CAP will introduce the component "Green payments" as part of the direct payments to Bulgarian farmers. The overall resource for the farmers amounts to 240 million. Euros per year. The Programme for Rural Development provides for the establishment of a separate instrument "Organic Farming" with financial resources of 110 million. Euros. The ambition of the MAF is organic products to be included in the menu

of all Bulgarians - an achievable goal due to the constantly growing number of manufacturers switching from conventional to organic farming.

Under OPIC 2007-2013 the project **"Cluster for development and promotion of organic foods and their consumption in Bulgaria"**, which is being implemented until April 2015, on the territory of Southwest and South Central Bulgaria, the establishment of an administrative body is planned as well as participation and organization of conferences, round tables, seminars on the problems of organic products and many others. Disbursements are currently 246 thousand lev (126 thousand Euros), which is about 50% of the total budget of the project.

### 1.5 Export / import and trade by sectors<sup>7</sup>

Bulgaria's membership in the EU has led to the orientation of trade towards Europe. Trade with member states now accounts for about 60% of the turnover of the country. Over the period 2008-2013, Bulgaria's trade increased from 40.3 to 48.1 billion. Euros (19.3% growth), including exports reaching 22.2 billion. Euros (up by 46.2%), while imports reached 25.9 billion. Euros (up by 3.0%). Despite the rapid growth of exports, the trade balance continues to be negative.

The fastest growing export sector is in agricultural products (almost 2-fold increase), food (almost 2-fold increase), machinery (up by 50%), etc. High-tech exports amounted to 6%, but there is significant growth in the exports of computer, electronic and optical products which have increased by 37%, while that of medicinal substances and products almost 3 times. Imports of food products mark the biggest increase (by 42%), followed by chemicals (30%), while import of machineries has shrunk by 14%.

High-tech products are increasingly dominating exports (computers and communication equipment, electronic and optical products, medicinal substances and products) resulting from the existing and increasing capacity, which is the basis for sectoral specialization of the country. Organic products (mainly in the sector of agriculture and food) have a direct contribution to the significant increase in exports of these product groups. Traditions in manufacturing and export of various products in the field of machine building, cosmetics, textiles and clothing, etc. are the required field for nanotechnology development=

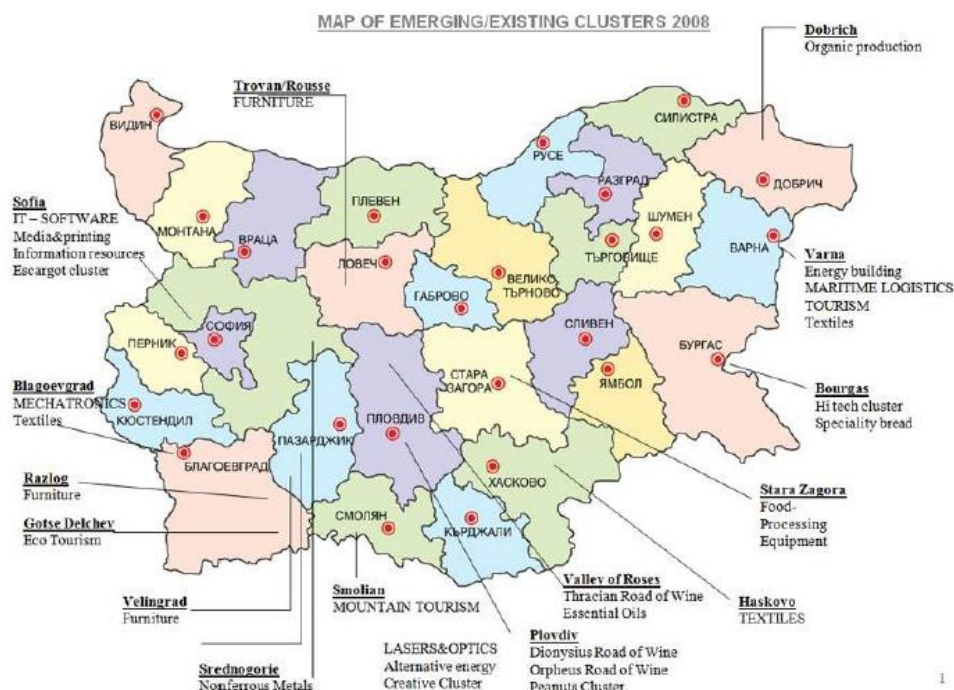
### 1.5 Established and emerging clusters

Development and implementation of cluster policy in the world is a proven way to increase productivity, competitiveness and internationalization. There are a number of good practices in this regard. Bulgaria has financially supported this process within OP Competitiveness 2007-2013 with a concrete procedure, "Support for cluster development in Bulgaria" for the total amount of 15.1 million Euros.

---

<sup>7</sup> NSI, MEE calculations





Project proposals submitted by new or existing clusters include over 1 000 members, including companies, NGOs, almost all accredited universities in Bulgaria, and a large number of municipalities. Beneficiaries' registered offices are in Sofia and major cities. Their business is carried out throughout the country and cannot be divided on a regional basis.

Existing industrial clusters concentrate on technological activities related to the adaptation and use of already known technologies in their field of business. In respect of the degree of development of Bulgarian industry, it is quite common for them to seek options for competitive advantages, based primarily on adaptation and application of already known technologies rather than investing in expensive projects for research and development. Potential and existing clusters at different stages of their life cycle will need assistance in various areas, including enhancing managerial and entrepreneurial skills and investment support. If not, most of them will not be able to attain the level of development, efficiency and innovation of the EU-15 clusters.

The total number of existing clusters in Bulgaria at present is 190 (according to CIELA<sup>8</sup>). For the new programming period it is planned that the measures for support of clusters to be specific for start-ups and for existing ones by supporting their development.

Classification of clusters in Bulgaria will help improve coordination on macro-regional level. As inherently clusters do not respect regional boundaries, improving coordination and strategic planning are key to establishing conditions for generating innovative dynamics in Bulgarian clusters.

In the strategic analysis of AT Kearney were identified key industries and industrial clusters with growth potential based on the comparative local advantages, including agricultural-foods and health care, transport and logistics, transport equipment and machine building, IT and outsourcing, chemical industry, electronics and electrical engineering. This assessment corresponds to the analysis of exports noted

<sup>8</sup> CIELA is the main informational system used in Bulgaria

above. Estimates of Development Programme Bulgaria 2020 show that investments in priority areas could generate up to 33% growth by 2020.

The Operational Programme "Innovation and Competitiveness" 2014-2020 provides support for sustainable clusters and specific activities to support clusters will be determined on the classification of existing clusters into different categories, depending on the stage of development (developed, developing and new). For each category concrete measures and an indicative allocation of the dedicated financial resource will be proposed. Successful clusters need to achieve further growth and scale to become the basis for attracting FDI, interregional cooperation, added value and competitive advantages.

The Association of clusters<sup>9</sup> have identified the following clusters as the most active members:

- Automotive Cluster Bulgaria, South-West Region - Sofia
- Bulgarian Cluster "Telecommunications" South-West Region - Sofia
- EVIC - Industrial Cluster "Electric" (awarded the Bronze label) South-West Region - Sofia
- ICT Cluster Plovdiv (won bronze label) Southern Central Region - Plovdiv
- Microelectronics and Embedded Systems Cluster South-West Region - Sofia
- "Mechatronics and Automation" Cluster (awarded the Bronze label) South-West Region - Sofia
- "Bulgarian Industrial Cluster" Association SER - Varna
- Srednogie Med Industrial Cluster (won bronze label) SCR - Srednogie
- Foundation ICT Cluster, SWR - Sofia
- Specialized Institute for Apparel and Textile Cluster (SCIAT) - Danube (won bronze label) SWR - Sofia
- Bulgarian Furniture Cluster (won bronze label) SWR - Sofia
- Marine Cluster Bulgaria, SER - Varna
- Association "Cluster for Health Tourism - Bulgaria" SWR - Sofia

Business clusters can be used as engines for regional smart specialization in Bulgaria because they include elements of innovation infrastructure existing in the various regions. Moreover, the development and creation of new clusters is a prerequisite for the development of links between education, training and business. Clusters can contribute to setting standards of competence required by the various professions. Location of vocational schools and relevant university programs can play an important role in the creation of clusters.

Potential for future development and support can be found in clusters with a typical "Bulgarian characteristics" - cluster "Bulgarian yogurt" - export of technologies, equipment and services for the production of yogurt; cluster "Bulgarian rose oil" - the development of Cosmetic perfume industry based on efficient production of rose oil; cluster "electricity production from biomass" - the development of technology and production equipment for the generation of electricity from various biomasses.

Within the implementation of cluster policy Bulgaria has participated in the cluster platform SEENECO, whose main purpose is to promote professionalism of the managers of clusters in Southeast Europe through the application of tools developed by the European Cluster Excellence Initiative (ECEI), which will subsequently be employed at regional level.<sup>10</sup>

---

<sup>9</sup> The Association represents the interests of over 250 companies employing between 18-20,000 people.

<sup>10</sup> The project focuses on increasing the competitiveness and sustainability of clusters, primarily at the organizational level.



## 1.7. Regional specialization <sup>11</sup>.

Bulgaria is traditionally a highly centralized country. . After study of the state structure and governance of regions NUTS-2 it was adopted instead of the concept "Regional specialization" to be used the concept "Geographical specialization". During the past programming period all regions in Bulgaria have developed Regional Innovation Strategies (RIS) under the auspices of the European Commission initiative "Innovative Regions in Europe." A limited part of the measures provided for in these strategies have been implemented due to the high centralization of decision-making and management. All measures related to innovation and support programs are coordinated centrally.

The number of employed in Bulgaria is just less than 3 million. Around one third of them are engaged in various economic activities in the territory of the South-West Region, where the capital is located. Another third of all employed are concentrated in two other southern regions of the country - the south-central and southeast and the rest in the three northern regions. Therefore, one third of all employed are in the three northern regions and the other two thirds are in the territory of Southern Bulgaria.

From the analysis of **economic activities that generate maximum employment in the areas of planning** it can be concluded that with the exception of the North West and North Central regions in all other areas the potential for specialization is a fact. With the exception of architectural, engineering, and activities in the field of information technologies that are among the leading innovative activities, specialisation in low-innovation activities prevails: **food industry and related activities, as well as the production of clothing and furniture.**

The analysis of the **leading innovative economic activities** shows that specialization is concentrated in the Southwest region, but there is potential for specialization in other regions too - production of medicines (NWR), production of medicinal products (NCR) and information services (SER). Regional potential for innovation specialization is observed in the production of pesticides (SCR), production of measuring equipment (NWR, NER SCR), aircraft and spacecraft (SCR, SER), chemicals, cosmetics and toiletries (NER, SCR), electronic components and printed circuits (NCR, SCR), production of general purpose machinery (NWR, NCR, SER) and others.

Employment in activities in the field of information technology and architectural and engineering activities stands out. Scientific research in technical sciences combined with production of software, production of computers and equipment for measurement, electronics, optical equipment,

---

Partners are representatives of national and regional authorities and cluster initiatives, focusing on the following areas: • Transfer of knowledge, materials and methodologies developed by ECEI • The development of sustainable training structures. • Contributing to the development of European portfolio of "excellent" clusters. • Supporting cooperation between international clusters, including through direct interaction between cluster managers in SEE and experienced ones in other countries.

<sup>11</sup> Regional specialization of regions is calculated on the basis of data on employment in the economic activities of the area (third level of aggregation as per KID2008) using the formula

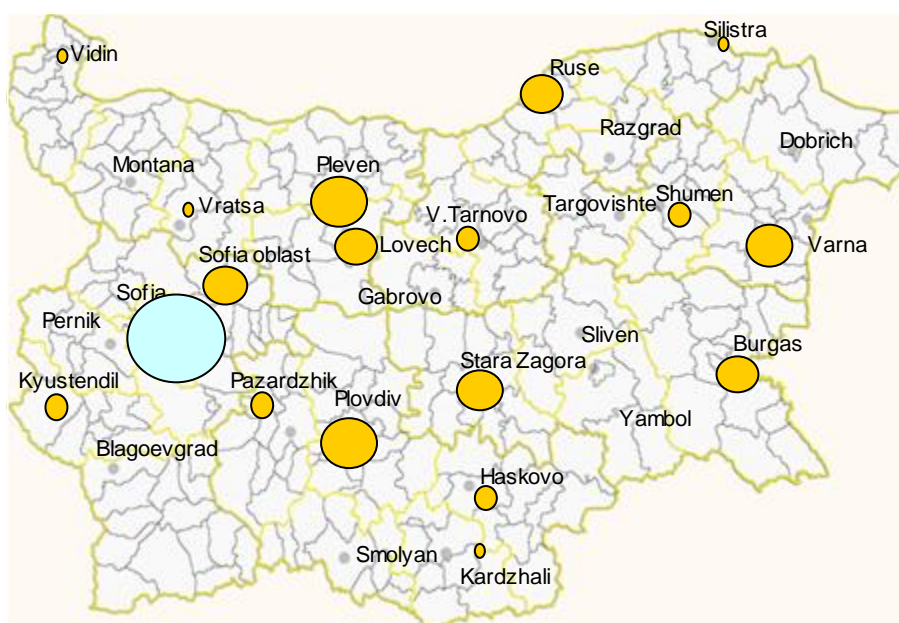
$$RS = \frac{\sum_i^R Empl}{\sum_i^{BG} Empl} \bigg/ \frac{\sum_i^R Empl}{\sum_i^{BG} Empl}, \text{ where } Empl - \text{number of employed, } i - \text{economic activity, } R - \text{Region, } BG - \text{Bulgaria. If the}$$

obtained result is bigger than one, we conclude there is specialization in the area of the respective business. Aggregating data to the second level of classification of economic activities provides an opportunity to see where and to what extent the specialization of each region is concentrated.

telecommunications, consultancy in the field of management and others are the basis of the development of information and communication technologies and mechatronics. Despite the concentration of these activities in The South West Region (mainly in Sofia), there is a potential for future regional specialization. Another innovative area that concentrates employment is the manufacturing of medicinal products. Along with research in medicinal science it forms the existing and future potential for regional specialization in the field of **pharmacy**. Last but not least we can reference engineering and in particular the potential for specialization in **electric car production**.

**From geographical point of view**, the existing potential for regional specialization in leading innovation is located diagonally from Southwest Bulgaria through central Bulgaria to Northeast Bulgaria

Here is how the regional specialization<sup>12</sup> of the **leading innovative activity, namely research in the natural, medical and technical sciences**, looks like. Estimates show that 73% of employment in this economic activity is concentrated in Sofia, but the map shows that there is potential for specialization in other areas and cities. Thus, the potential of Plovdiv and Stara Zagora is approximately equal to that in Pleven and Varna, followed by Burgas and Ruse. Regional concentration of companies, meaning institutes and research centres, is similar.



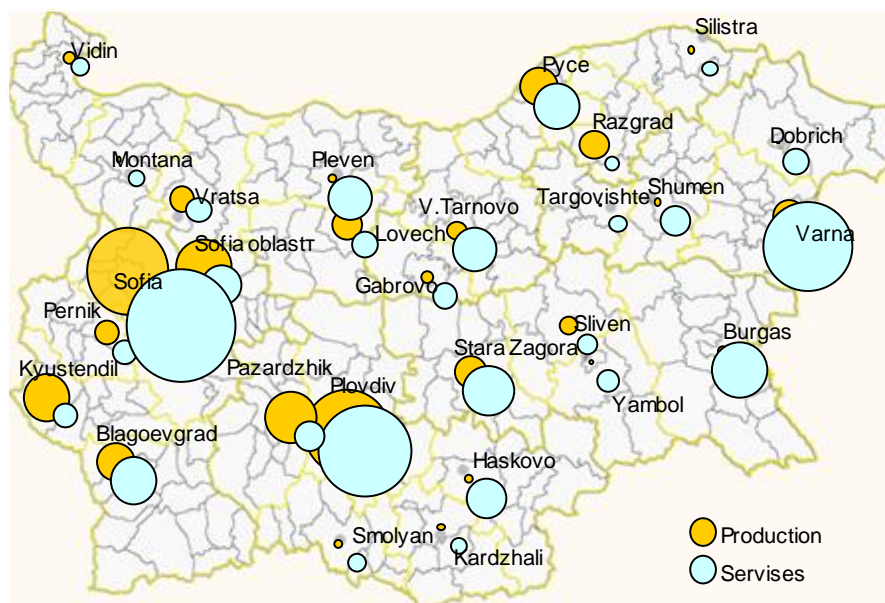
Source: DB Amadeus, own calculations

- **High-tech industries and knowledge-intensive services.**

The group of high-tech industries and high-tech knowledge-intensive services includes production of medicinal substances and products, the production of computers, electronics and optics, services in the

<sup>12</sup> Calculations are based on data on employment. On this chart Sofia has been deliberately reduced in scale and other areas have been enlarged for better representation of the regional potential.

production of movies and TV shows, sound recording and music publishing, radio and television activities, telecommunications, information technology, information services and research and development.



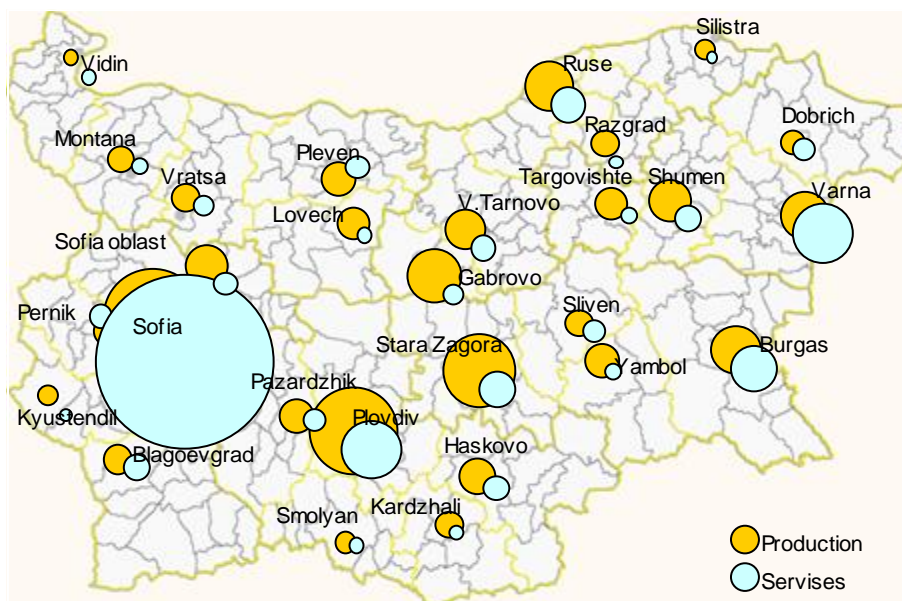
Source: DB Amadeus, own calculations

This group employs a total of more than 120 000. All activities of the group are characterized by a high degree of specialization in regional cities. Except for the production of medicinal substances and products, all other activities are characterized by medium and high share of SMEs. Activities are highly concentrated in Sofia with more than 80% of employees in industry and services operating in the capital. Specialization of the workforce combined with the density of enterprises is a prerequisite for the implementation of a cluster policy.

- **Medium-high and medium-low tech industries and market services (financial intermediation not included).**

The group of medium-high and medium-low technology industries<sup>13</sup> covers economic activities from C19 to C30 under the Classification of Economic Activities (KID-2008) - refined petroleum products, chemicals, machinery, vehicles, rubber and plastics, metals and others and knowledge-intensive market services - legal, accounting, managerial, technical testing and analysis, market research, providing manpower and others.

<sup>13</sup> BSMEPA 2014-2020 and ISSS-related analyzes



Source: DB Amadeus, own calculations

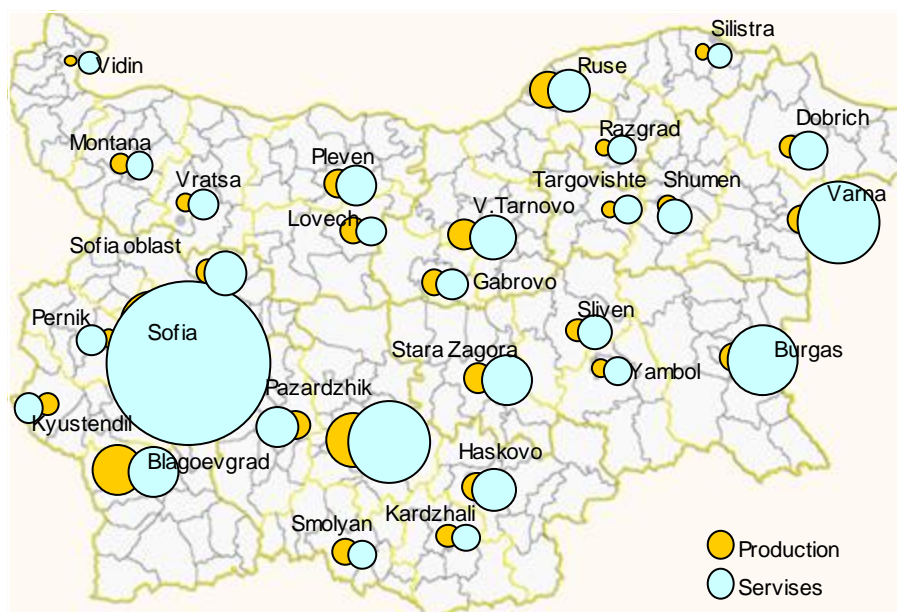
This group employs nearly 230 000, almost equally divided between manufacturing and services. With the exception of Sofia, the highest concentration of medium-tech production and market services is located in the central regions of the country - the regions of Plovdiv, Stara Zagora, Gabrovo and Veliko Tarnovo, as well as in the East of the country - Varna, Bourgas, Rouse and Shumen.

- **Low-Tech industries and less knowledge-intensive market services**

The Low-Tech group includes economic activities related to the production of food, beverages, tobacco, textiles, clothing, leather, wood, furniture, and services such as retail, transportation, hotels, restaurants, real estate, leasing, tour operators, reservations, computer repairs and others.

The group employs around 1.5 million, approximately 350 thousand in production and just over 1 million in services. This is the group of economic activities and services that generates maximum employment and is characterized by a relatively good regional specialization in the food industry, wood processing, furniture, textiles and clothing.





*Source: DB Amadeus, own calculations*

In addition to the analytical material developed by the team of the Ministry of Economy, during the period from December 2014 to July 2015 were held series of meetings and discussions. In the period December 2014 and February 2015 there were meetings with stakeholders in the six regions. The purpose of these meetings has been to reveal regional capacity RIS3 in identified thematic areas of ISSS. Furthermore, through the regional partnership network and the regional development councils was organized the obtaining of analytical materials from all six regions (including review of the 28 areas) in which thematic areas are sorted by relevance in terms of available regional capacity. This approach enabled the thematic areas to be focused on regions, where projects under the first two thematic areas will be underpinned by bonus points when applying under priority axis 1 of the operational program “Innovation and competitiveness” and the priority axis 1 of the operational program “Science and education for smart growth”, specific objective 2: Improve the territorial and thematic distribution of research infrastructures in order to develop regional smart specialization. The bonus system aims to introduce a methodology that is based not on the exclusion but on the possibilities of gradual prioritization by means of the ESIF.

This way regional capacity will be gradually build on regional specialization through European support and will be created conditions for natural clustering which could lead to regional smart specialization strategies in Bulgaria in the future:

## Regional Bonus System

North West Region	North Central Region	North East Region
<i>Mechatronics and CleanTech</i>	<i>Mechatronics and CleanTech</i>	<i>Mechatronics and CleanTech</i>
	<i>Industry for Healthy lifestyle and BioTech</i>	<i>Industry for Healthy lifestyle and BioTech</i>
<i>Industry for Healthy lifestyle and BioTech</i>	<i>Informatics and ICT</i>	<i>New Technologies in the Creative and Recreative Industries</i>
<i>New Technologies in the Creative and Recreative Industries</i>		

<b>South West Region</b>	<b>South Central Region</b>	<b>South East Region</b>
<i>Informatics and ICT</i>	<i>Informatics and ICT</i>	<i>New Technologies in the Creative and Recreative Industries</i>
<i>New Technologies in the Creative and Recreative Industries</i>	<i>Mechatronics and CleanTech</i>	<i>Mechatronics and CleanTech</i>
<i>Industry for Healthy lifestyle and BioTech</i>	<i>Industry for Healthy lifestyle and BioTech</i>	<i>Industry for Healthy lifestyle and BioTech</i>

- **Brief information on regions and areas**
- **(a database of the ME and regional partner network)**
  - 
  - **North-Western Region**
    - The region includes the districts of Vidin, Vratsa, Montana, Lovetch and Pleven. According to a deliberate policy of the government to support the development of the North-West region (with the lowest GDP/capita in the whole EU) will be encouraged RISs3 capacity in the three thematic areas of ISSS: *Mechatronics and CleanTech, New Technologies in the Creative and Recreative Industries, Industry for Healthy lifestyle and BioTech*
    - 
    - **North Central region,**
    - **Veliko Turnovo.** Given the specificity, the existing infrastructure, types and forms of scientific and business development, personnel and administrative capacity, smart specialization in Veliko Tarnovo should evolve priority in the thematic areas “Informatics and ICT” and “Industry for Healthy lifestyle and BioTech”.
    - 
    - **Gabrovo.** The RIS3 Capacity of Gabrovo is concentrated in the thematic area “Informatics and ICT” and “Mechatronics and clean technologies”. The area is an established industrial center with a stable group of SMEs. Industry development enablers are traditions, constructed facilities, availability of professional technical colleges, technical university. The university plans the creation of innovative Center of competence “Eco and energy-saving technologies”, with the following directions: Electro mobiles, laser technologies, systems for environment and material recognition, power electronics design in engineering, photovoltaic systems, energy-efficient lighting systems.
    - 
    - **Razgrad.** Industrial strengths of the area are in the field of pharmaceuticals, biotechnology, and manufacturing of preparations for veterinary medicine and in ceramics. There is a thriving food-processing industry; resources; the leading companies actively implement new products and technologies. Vocational education corresponds to the specialization of the economy, the well-functioning Branch of Ruse University — has 3 specialties, chemical technology, food technology and biotechnology. There are cultural objects from regional and national importance (including archaeological reserve ‘Sborjanovo’ under the protection of UNESCO). These strengths address available RIS3 capacity on the areas “Industry for Healthy lifestyle and BioTech” and “New Technologies in the Creative and Recreative Industries”.
    - 
    - **Rousse.** The sectorial composition of the area is relatively stable and is driven primarily by economic activities in the metallurgy, engineering and metal processing — river and sea ships, hydraulic equipment, agricultural machines, units and components. Chemical industry has emerged in the production of motor and industrial oils, paints and varnishes, foiled plastic products, products of expanded polystyrene insulation materials. Textiles and clothing are among the most relevant for industrial development. Among the food and beverage products are mainly produced and processed meat and fish, canned vegetables, vegetable and animal fats, dairy products, milling products, prepared animal feeds, bakery products, food preparations, sugar, coffee, tea, pastry and drinks. Ruse region occupies a special position in the Bulgarian national history and has a rich cultural and historical heritage, including monuments of global importance as the Ivanovo rock churches. The area has unique landscapes such as the Danube coast, the natural park “Ruse Lom”, etc. In close proximity are favoured reserve “Srebarna”, included in the list of the UNESCO World Heritage, Thrace tomb near the town of Ispirih, also an UNESCO object, Veliko Tarnovo and Arbanasi. Based on landscapes, traditions and strengths of the area, the capacity for smart specialization should be directed to the thematic areas of ISSS “Informatics and ICT” and “New Technologies in the Creative and Recreative Industries”.
    - 
    - **Silistra.** There is capacity in the development of food-processing, clothing, mechanical engineering and metal processing industries, forest-based industries, construction, construction materials, less developed are electronics and alternative sources of electrical energy. Clean technologies are at the heart of regional development. As a whole, the capacity for smart specialization is in “Mechatronics and clean technologies” and “Industry for Healthy lifestyle and BioTech”.
    - 
    - **North-Eastern Region**

- **Varna.** The economic structure of the area is varied. This relates primarily to port operations, shipping, shipbuilding, ship repair, tourism, chemical industry, engineering, textile production, food processing, furniture manufacturing, construction and agriculture. The available scientific potential for innovation is focused on the maritime industry, information technology, tourism, services and energy. It is in these economic activities are developed new high-tech industries creating high added value, attracting investments in IP-intensive production activities. At the territory of the area operates 'Maritime Cluster'. This available innovation capacity directs the smart specialization in the area to two of the thematic areas of ISSS — "Industry for Healthy lifestyle and BioTech" and "New Technologies in the Creative and Recreative Industries".

- 

- **Dobrich.** The available capacity for RIS3 leads to the thematic area "Industry for Healthy lifestyle and BioTech" and "New Technologies in the Creative and Recreative Industries"— Dobrudja Agricultural Institute, producing conventional seeds for cereals, valued high in many countries (lavender for the purposes of pharmaceutical and cosmetics), an international college, which prepares high skilled personnel for tourism, etc.

- 

- **Targovishte.** The summarized opinion of stakeholders on the available capacity for RIS3 determines the thematic area "Mechatronics and clean technologies" and "Industry for Healthy lifestyle and BioTech". Furthermore, there is available capacity and in other thematic areas, primarily in the field of alternative tourism, cultural tourism, wine tourism, spa, etc.

- 

- **Shumen.** The summarized opinion of stakeholders on the available capacity for RIS3 determines the thematic area 'Industry for Healthy lifestyle and BioTech" and "New Technologies in the Creative and Recreative Industries — capacity for alternative sport and tourism, rich biodiversity, all levels of education, scientific institutes in the field of agro-business, cultural heritage, etc.

- 

- **South Western Region**

- **Blagoevgrad.** The industry is a highly polarized in municipalities. For example, in the municipality of Blagoevgrad are concentrated over 50 % of manufacturing industry leaded by engineering and electronics. The textile, knitwear and clothing industry has traditionally been one of the main and most relevant sectors for industrial development with export orientation. Food processing industry is highly developed, including activities relating to the production and processing of meat, processing and preserving of fruit and vegetables, producing of vegetable and animal fats, dairy products, milling products, prepared animal feeds, bakery products, food preparations, pasta, soft drinks and alcohol. In the Municipality of Gotse Delchev local economy is specialized in the manufacturing industry (manufacture of textile, underwear, shoes), the food processing industry and construction. Municipality of Bansko and Sandanski have highly developed tourism and construction sectors. The favourable climatic conditions determine the development of agriculture.

In the county center — Blagoevgrad are operating two higher education institutions of national importance: South-west university "Neofit Rilski" — Blagoevgrad and the American University in Bulgaria -Blagoevgrad. The universities emit high skilled labour force in the fields of social sciences and humanities, law, economics and business administration. There are also several Colleges — Medical College in the structure of Medical University — Sofia as a separate legal entity, Technical College in the structure of South-west university "Neofit Rilski" without legal entity separation and the private College of Tourism — Blagoevgrad. This capacity directs smart specialization of the area to two of the thematic areas of ISSS, namely "Informatics and ICT" and "New Technologies in the Creative and Recreative Industries".

- 

- **Kyustendil.** The RIS3 Capacity of the area is concentrated in the thematic area "Industry for Healthy lifestyle and BioTech" (availability of resources and capacity for the development of organic farming, processing industry, bio products, including forestry, development of SPA & wellness) and "New Technologies in the Creative and Recreative Industries" (exclusive intensity of historical and cultural monuments, traditions in arts and music school, eminent artists, cultural institutions, creative unions of architect, artists, writers, inventors, etc.).

-



- **Pernik.** The strengths of the area are linked to its strategic location and proximity to Sofia and to the key transport arteries to two external markets. There is a developed industrial center, deposits of minerals, resources for RES, well-developed heritage infrastructure, active sport clubs. 2010 opened the European Institute of Technology. The academic profile of the university bachelor's and Master's courses is in advanced informatics and computer science, communication and computer networks and systems architecture and urban management, civil engineering and innovative entrepreneurship. This training in all disciplines is provided in the Bulgarian and English language. These characteristics define the thematic areas of ISSS — i.e. "Informatics and ICT" and "New Technologies in the Creative and Recreative Industries."

- 

- **Sofia.** In the capital the RIS3 capacity covers all thematic areas of ISSS. Therefore, the choice of two of them complies with capacity of the other areas of the South-West region. Such additional support will receive the thematic areas "Information technology and ICT" and "New Technologies in the Creative and Recreative Industries." In addition, Sofia city is in the process of finalising its own strategy for smart specialization.

- 

- **Sofia District.** The proximity to the capital leads to a steady trend of relocation of industrial production and defines the great diversity in its structure. At the same time, proximity allows the use of science and innovation infrastructure of the capital. At the territory of the area operates actively cluster "Srednogorie med industrial cluster" — which includes companies from the extraction and processing of copper and copper concentrate, gold ores, high-tech companies, optical and optoelectronic devices and systems, research and educational organizations. The RIS3 capacity is concentrated in the thematic area "informatics and ICT" and "Mechatronics and clean technologies"

- 

- **South Central Region**

- **Kardzhali.** RIS3 capacity is linked to the thematic areas "Industry for Healthy lifestyle and BioTech" and "New Technologies in the Creative and Recreative Industries, production and processing of herbs, bio food, cultural — historical heritage, natural phenomena. The subsidiary of University of mining and geology "St. Ivan Rilski" prepares qualified staff both in the field of clean technology and ICT related to the three thematic areas of ISSS.

**Plovdiv.** The RIS3 capacity of the area is concentrated in the thematic area "Informatics and ICT" and "Industry for Healthy lifestyle and BioTech". Crucial to the development of the area are the food industries, which have extensive production specialization (fresh meat, milk processing, flour-milling, confectionery, drinks, etc.). Under fast pace development is the industry for a healthy life and biotechnology in the field of plant science. For example approved is a project "PlantaSyst" under Horizon 2020 with the coordinator: Institute of Molecular Biology and Biotechnology — Plovdiv. Through the integration of molecular biology, functional genomics, metabolomics, bioinformatics and agricultural sciences with a long-standing expertise in practical plant genetics and selections, such center and other developments of similar thematics would put Plovdiv Region at the forefront of this field. Highly developed is the processing industry for aromatics and spices raw materials. The cluster 'Information and Communication Technologies' is constantly expanding. The area has rich heritage features (Plovdiv was chosen as European Capital of Culture for the year 2019), which can be developed rapidly based on ICT.

- 

- **Pazardjik.** The summarized opinion of the stakeholders is indicating available RIS3 capacity in the thematic area "Mechatronics and clean technologies" and "Industry for Healthy lifestyle and BioTech". There is presence of traditions and long-standing experience in integrating mechanics and electronics with a focus on design and manufacturing of high-tech products, automotive equipment, parts, components, systems. Experience in the production of medicinal products and food supplements for veterinary and human medicine and natural features and conditions for organic agriculture and stockbreeding puts focus on medicinal products and pharmaceutical forms, medical and spa tourism, clean manufacturing processes, storage and processing of Bulgarian specific food and cosmetics.

- 

- **Smolyan.** The RIS3 capacity of the Smolyan region is concentrated in the thematic area "Industry for Healthy lifestyle and BioTech" and "Mechatronics and clean technologies". Larger companies have research and development units that develop and deploy new products and technologies. In the area of

light industry capacity is in the field of cosmetic, clothing, food, textile industry. Educational structure offers all level skill levels. In the area operates the National Astronomic Observatory (the largest in the Balkans), which has a rich cultural and historical heritage.

- 
- **Haskovo.** In the regional economy has the highest relative share of services, followed by industry and the agricultural sector that is second higher than that for the country. Tourism has a great potential. Improving the quality of life in the area is linked with the support of the strengths of the area of deployment of innovations, the balanced development of towns and rural areas, environmental protection. The capacity of the area concerning development of bio-agriculture, and alternative tourism remains unused. The above points towards smart specialization in the areas: “Industry for Healthy lifestyle and BioTech” and “New Technologies in the Creative and Recreative Industries”.

- 
- **South East Region**

- **Bourgas.** RIS3 capacity of the region is in product and technology niches such as tourism (environmental, health, cultural, etc.) and wellness; Chemical products and technologies; Information and communication technologies, services and telecommunications; Marine biology, aquaculture and fish farming; Biotechnology, organic food and bio-based products; Manufacture of motor vehicles and electric cars; Energetic technologies and biofuels; Processing and light industries. The Office for transfer of innovative technologies in businesses of South-Eastern region assists to improving innovation infrastructure, industrial capacity, export profile and competitiveness of enterprises in the south-eastern region of Bulgaria, supporting them in search process and introduction of new services and innovative solutions in the field of information technologies and their applications. Priorities are information technologies, environmental and energy-saving technologies and economic analyses and assessments. As an University and Research Center interests are focused on ICT, materials and material sciences, environmental protection and water, RES, biomedicine, molecular modeling linked to eco- toxicology. As a result, the priority thematic areas for RIS3 are “Mechatronics and clean technologies” and “Industry for Healthy lifestyle and BioTech”.

- 
- **Sliven.** The available RIS3 capacity is concentrated in the thematic area “Mechatronics and clean technologies” (capacity in the field of automotive — prototypes with electrical and hybrid propulsion, network and innovative technology for an accelerated battery charging with electricity, availability of critical mass for development of design center focusing transportation, textiles and design and Cluster Mechatronics and clean technologies”, developed ICT sector fostering mechanical engineering) and “New Technologies in the Creative and Recreative Industries (focus on developing smartphone apps and digital guides for advertising and visits to objects related to cultural, historical and alternative tourism in the region, electronic platforms for advertising and promotion of alternative tourism in the region).

- 
- **Stara Zagora.** The analysis of strengths addressed the available RIS3 capacity of the area to the thematic area “Mechatronics and clean technologies” (“Research and Development” in engineering and technology, medical sciences, agricultural sciences — mechanics, electronics, nanotechnologies, management systems, software to clean technologies (eco mobility) storage and energy saving; Architectural and engineering activities; Consultancy in the field of management; Manufacture of instruments and appliances for measuring, testing and navigation, Manufacture of radio, television and communication equipment and appliances) and “Industry for Healthy lifestyle and BioTech” (“R & D on clean manufacturing processes, technologies at the service of medicine, medical and spa tourism; Business practices for clean production, storage and processing of specific food and cosmetics (bio-) products, medicines, substances and products and competitive bio-based products with curative medical effects, organic farming, production of food and non-food bio-based products, including for therapeutic and cosmetic properties (hip, rose etc.), export orientation of biological and pharmaceutical products, certification and development laboratories.

**Yambol.** Yambol Region has the potential to attract investors in the manufacturing industry and particularly in the processing of fruit and vegetables. The territory of the area has the potential for exploitation of energy from air currents. Favourable geographic location, high proportion of arable agricultural land and green clean environment are a prerequisite for the development of a prosperous farming. The existence of large cultivated agricultural areas, traditional cereal production, vegetable and

animal husbandry outline potential which should be exploited. The development of efficient agriculture is one of the main possibilities for improving the labour market, supporting and encouraging businesses and enhancing investment. It is these circumstances justify the choice for the thematic areas "Industry for a healthy life and biotechnology and "new technologies in creative and recreational industries.

The existence of regional specialization and the density of enterprises is the basis for the implementation of a cluster policy in the various economic activities.

In the programming period 2014-2020, the European Union emphasizes its **Territorial Agenda**, which focuses on the territorial dimension of European cohesion policy and strategy "Europe 2020". The following challenges and threats for regions are identified:

- Increasing globalization: structural changes after the global economic crisis;
- Changes to the integration of the European Union and growing interdependencies between regions;
- The demographic situation in different areas. Challenges and social isolation of vulnerable groups;
- Climate change and risks to the environment: the effects in the various geographical areas;
- The increasing energy challenges that threaten regional competitiveness;
- Loss of biodiversity, endangered species, risks to the landscape and cultural heritage.

**The National Concept for Spatial Development 2025** takes into account these challenges and emphasizes the role of urban centres as a key factor for sustainable economic growth. Integrated plans for urban regeneration and development have been developed, with identified areas for economic development. The idea is that in the future these areas would become an attractive feature for foreign investors in industrial development and for clusters and innovation cooperation. Some of these cities have the potential to become "smart cities", including in the European Innovation Partnership on Smart Cities and Communities (EIP-SCC).

### 1.8. Quantitative analysis for identifying potential areas for intensive innovation development

#### 1.8.1. Methodological Approach

This analysis focuses on economic activities (second level of aggregation under KID 2008), distributed by level of technological intensity, according to the classification of the OECD and Eurostat. Such clustering allows obtaining a clearer assessment of the status and potential development of medium and high-technology sectors. The classification does not include activities in mining industries and agriculture. Thus, the analysis includes 82 activities in the field of industry and services. **Identifying the potential** of each economic activity is carried out by using various indicators grouped into two factors - internal (production volume, turnover, added value - as a share of total value added and as a share of the total output, labour productivity, number of employed, number of enterprises and investments in long-term fixed assets) and external factors (export, import and availability of competitive advantages, production and export specialization<sup>14</sup>). The values of all indicators are adjusted according to the overall assessments of industry and services. Thus they are comparable and allow aggregation and the obtaining of estimates for the internal and external factors. In turn, the sum of these two factors gives the final assessment for each economic activity.

---

<sup>14</sup> Balassa methodology is used.

Identifying the potential of the economic activities can be done using the final assessment, but in our opinion it narrows down the basis for subsequent cross-analysis (combining these results with those of the qualitative analysis). Therefore, the first step in identifying the economic activities is as follows: including all medium-high and high-tech activities and knowledge-intensive high-tech services (as recommended by the European Commission to move towards activities with a higher degree of processing to the final product). From the remaining economic activities groups the three top rated ones are selected. This highlights the strengths of the economy and shows the location of high-tech knowledge-intensive activities and services.

### 1.8.2 Results

The initial sample of 82 economic activities is synthesized to 33, which on the one hand shape the image of Bulgarian economy, and on the other hand have the potential to transform it into a knowledge-based economy (see Appendix 3). The industry classification is headed by medium and low-tech activities (refining of petroleum products, tobacco and manufacture of basic metals), followed by medium and high-tech activities (chemicals, medicinal substances and products, ICT, electronic and optical products, etc.). Except for retail, services are headed by a group of high-tech knowledge-intensive services (telecommunications services, IT, research and development), a fact proving the capacity for innovation and technological development.

## 1.9. SWOT analysis of the socio-economic conditions

<p style="text-align: center;"><b>Strengths</b></p> <ul style="list-style-type: none"> <li>• Macroeconomic stability and low taxes;</li> <li>• Well-developed distribution network and good relations with neighbouring countries;</li> <li>• Well-developed telecommunications services such in IT, research and development;</li> <li>• High share of population with secondary and higher education;</li> <li>• Rich cultural and historical cultural and historical heritage;</li> <li>• Increasing exports and FDI.</li> </ul>	<p style="text-align: center;"><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>• Aging population;</li> <li>• Small and not sophisticated national market;</li> <li>• Specialisation in low-tech sectors</li> <li>• Low labour productivity;</li> <li>• Relatively low economic activity of the population of working age;</li> <li>• High share of youth unemployment and long-term unemployment;</li> <li>• High dependence of the economy on imported resources and energy;</li> <li>• Low energy efficiency;</li> <li>• High share of informal sector;</li> <li>• Bureaucracy for investments (licenses and permits).</li> </ul>
<p style="text-align: center;"><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Act as gateway to the EU for global FDI flows</li> <li>• Access to EU markets,</li> <li>• Access to non-EU markets such as Russia, CIS and the Middle East</li> <li>• New electronic administrative services</li> </ul>	<p style="text-align: center;"><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Slow-down of economic growth of trading partners</li> <li>• Rapidly increasing competitiveness of current competitors</li> <li>• Increasing negative demographic trend</li> <li>• Ineffective absorption of EU structural and national funds and other financial</li> </ul>

- Potential of cluster externalities

instruments

- Increasing competition from third world countries in the Balkans and Asia
- Economic sanctions on Russia

Macro-economic and structural policies are needed to exploit opportunities and prepare to face threats or at least mitigate their damage, if they occur. In that sense policies need to:

- Exploit strengths by focusing on ICT and cultural heritage, as well as give opportunities to the well-educated to remain in the country
- Address weaknesses through focusing on clean energy and again improve the opportunities to the labour force
- Exploit opportunities by supporting competitiveness (through innovation as low labour cost is not ensuring quality of life) to exploit global market opportunities and attract FDI
- Prepare for potentially higher global competition by support competitiveness in areas where the Bulgarian economy is strong.

## 2. Capacity for innovation and research performance

### 2.10. Innovation capacity of the firms

The entrepreneurship in Bulgaria looks quite dynamic from view point of the number of new firms, mostly before the crisis from 2008. Irrespective of that, the entrepreneurship is limited with regard to the innovation activities in the new firms. The small and medium enterprises (SMEs) are not often among the innovators: only 16% of the Bulgarian SMEs have had innovation activities for the period 2004-2008, which represents the lowest percentage within EU. It seems that the innovation activity is limited most of all to the big companies, while the small and medium enterprises are to a high extent the traditional firms on fully developed markets in a standstill. The innovative SMEs are most frequently "lonely riders" – i.e. they develop innovations for themselves, but do not collaborate with external partners. Their innovations focus on labour cost reduction and not on technology improvements.

Additionally, big Bulgarian firms have poor organizational capacity and no competitive advantage on the export markets. They need improvements of the production potential and are cut off from the regional and global value chains.

In Bulgaria, as well as in the other EU member countries, SMEs are of structural importance for the economy and main driver for economic growth. In 2011, there were 365 484 SMEs in total in Bulgaria, which was by 0.2% less than in 2010. For the period 2008-2011, the number of the enterprises has increased by slightly more than 27 000 (10%). The entrepreneurial sector in Bulgaria is dominated by micro enterprises with less than 10 employees. These enterprises represent 91% of all companies and provide employment to 29% of the work force during the period 2008-2010. 75.5% employees in the country are working in SMEs (defined by EU as companies with less than 250 employees). A study, carried out under the Seventh Framework Programme has established that SMEs contribute for 37.8% of the total value added in the economy and 31% of GDP. Moreover, micro enterprises incur the smallest R&D costs and generate the lowest levels of the value added. Although the high levels of new firms registration during the period 2004 -2009 may be an indicator for dynamic entrepreneurship (7.09 new firms per 1000 people in active age created compared with an average value of 4.86 for EU), company behavioural indicators show that the Bulgarian SMEs are much less dealing with innovation activity than the companies in the remaining part of Europe. The sectoral distribution of SMEs shows a clearly expressed concentration of enterprises mostly in the retail trade. In the R&D field, where the labour productivity is nearest to the average labour productivity levels in EU, the number of SMEs is three times higher than the one in countries like Slovakia, Hungary, Austria and Denmark, in which the size of the labour force is comparable with the one in Bulgaria.

**The small and medium enterprises (SMEs)** in Bulgaria have a serious contribution to the development of the economy – i.e. they generate more than 60% of the value added, 67% of the turnover, and 75% of the employment among all of the enterprises. The Bulgarian SMEs are not frequently among the innovators. During the recent years (2006-2010), the innovative enterprises with a number of employees 10-49 is about 20%. Only 14% of them have technological innovations, around 5% of them have sold new or improved products on the market, whose turnover is only 1.5% of the total, and 18% of them have accomplished innovative collaboration. Slightly better look the things in the group of the enterprises with a number of employees 50-249. On the average the innovative enterprises are 33%, out of which 29% with technological innovations, 10% of them have sold new or improved products on the market, whose turnover is only 3.2% of the total, and 20% of them have accomplished innovative collaboration.<sup>15</sup> In one

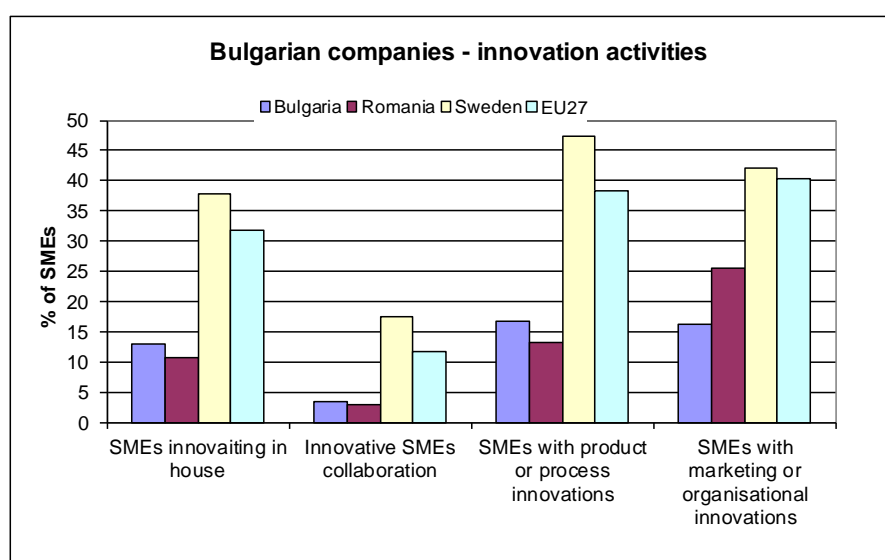
---

<sup>15</sup> National Statistical Institute



way or another, these data are among the lowest in the European Union. To a high extent the Bulgarian SMEs introduce innovations related to cost reduction and to a much smaller degree innovations related to new products and processes. 2/3 of the medium enterprises and about 1/3 of the micro and small enterprises have performed similar activities. The least frequently met innovation activities are the ones related to the implementation of joint educational projects involving the business and the academic communities – only about 9% of SMEs have participated in such projects.<sup>16</sup>

SMEs are facing a series of impediments to become innovative. These impediments have a negative effect on their growth potential and in many cases on their survival. Therefore, main aim of the policy is the overcoming of these obstacles in order to provide an opportunity to the small companies with a limited impact on the economy to become innovators with a high impact, actively involved in the development of new products and processes.



Source: Innovation Union Scoreboard 2014

Although the innovation capacity of the Bulgarian companies has been improved after the accession of Bulgaria to the European Union and the start of OP “Competitiveness”, the whole picture in this field nowadays shows achievements, which are significantly below the capacity. The Bulgarian companies are spending 0.39 % of GDP for R&D, compared with 1.31% in EU – i.e. the percentage is about 3 times lower. The ratio is analogical for the public expenditures. The Bulgarian companies occupy 105 and 106 place in the world with regard to innovation and business complexity<sup>17</sup>.

The studies show that the aptitude for innovations of the Bulgarian companies is positive and considerably correlates to their R&D costs and the connected with that investments in technological infrastructure, as well as that their production is increasing together with their innovation efforts, no matter whether the company is new on the market or not.<sup>18</sup>

As has been mentioned, Bulgaria is one of the countries, which are modest innovators. It occupies the last place in the ranking of the member states. In one and the same spheres Bulgaria is simultaneously

<sup>16</sup> Analysis of the situation and Factors for Development of SMEs in Bulgaria: 2011-2012 – BSMEPA and NOEMA

<sup>17</sup> The Global Competitiveness Report 2013-2014

<sup>18</sup> World Bank Report, Input to Bulgaria’s Research and Innovation Strategy for Smart Specialization

showing strengths and weaknesses – a fact, which defines the innovation system of our country as imbalanced. The practice of the innovation leaders shows that the balanced innovation system is a precondition for success.

With view of RIS3 logics, the strategy focuses on the identification of the strengths and the thematic fields with growth potential. The approach is complex and the Strategy will also address the main reasons for the unused potential of the country in the innovation field – i.e. low volume of public and private investments in research, “brain drain”, insufficient mutual interrelation between the scientific achievements and the needs of the industry, restructuring of the research financing from institutional into project and programme financing, need for clear vision and priorities.

ICT plays the leading role regarding the determination of the innovativeness level; on the second place is the implementation of business and marketing strategies in the management; on the third place is the human resource development. Wider implementation of good practices results in higher innovativeness. The second important factor, determining the innovativeness level, is the access to financing. On the third place, regarding the determination of the innovativeness level, are the internationalization and activity related to the intellectual property.

According to the conducted SME surveys in the beginning of 2013, 30% of the entrepreneurs in the industry have declared availability of sufficient financial resources for intellectual property registration. The share of the industrial SMEs with own registered trademark in Bulgaria or abroad is 42%. The share of the micro enterprises with such registration is 27%, of the small — 47%, and of the medium — 61%. The enterprises which own national patents are 20%. Registered patent have 12% of the micro enterprises, this share for the small companies being 21% and for the medium ones — 32%. The share of the micro enterprises, which have declared that they have financial resources to register intellectual property, is 20%. This share of the small companies is 31%, and of the medium — 43%.

Every three of four industrial SMEs have a company web page. 78% of the enterprises have electronic signature of the managers. 45% of the companies have possibilities for on-line orders and sales and 40% provide possibility for on-line payments. Customer Relationships Management (CRM) system have 18% of SMEs. The same is the share of these, which have introduced Supplier Relationship Management (SRM) System and approximately this (17%) is the share of the companies, which have used integrated management system for almost all processes.

The prevailing part of the managers of industrial enterprises thinks that their employees are sufficiently well qualified (80%), and familiarized with the good practices in the sector (81%). More than the half of the SMEs have ensured trainings of their employees and/or managers during the last year — 53%. External specialized sale management trainings have been attended by 17% of the companies – trainings related to the company professional field - 22% and trainings related to ICT applications — 10%.

More than half of the enterprises in the industry use developed short-term business plans with 1-2 year horizon - 57%. A significantly lower share — 17% have mid-term plans, while only 8% of the SMEs<sup>19</sup> develop long-term plans.

---

<sup>19</sup> A Study of Entrepreneurship and Prospects for Innovations Development in SMEs (2012—2013)



<b>Degree of deviation of the innovation spheres<sup>20</sup> from the European level (Innovation Union Scoreboard 2014)</b>			
	<b>EU</b>	<b>BG</b>	<b>EU=100</b>
Human resources	0.583	0.440	75.5
Research systems	0.539	0.133	24.7
<b>Finance &amp; support</b>	<b>0.558</b>	<b>0.057</b>	<b>10.2</b>
Firm investment	0.417	0.133	31.9
Linkages & entrepreneurship	0.550	0.121	22.0
Intellectual assets	0.564	0.255	45.2
<b>Innovators</b>	<b>0.549</b>	<b>0.047</b>	<b>8.6</b>
Economic effects	0.595	0.216	36.3

Irrespective of the outlined strengths, the deviation from the best world achievements remains significant, especially in the field of investments, basic infrastructure, knowledge creation, dissemination and acquisition, creative goods and services, scientific research and ICT.

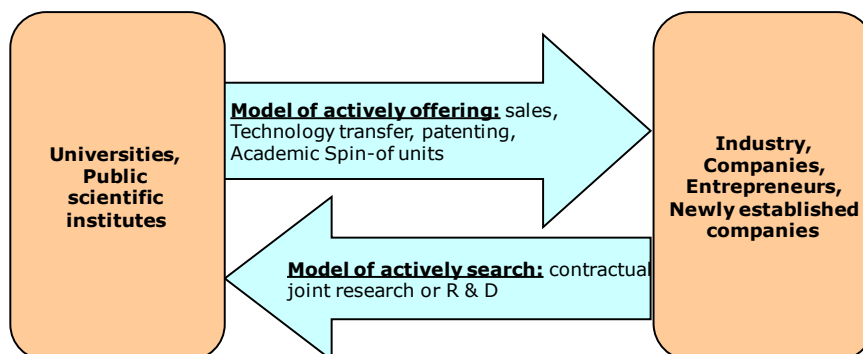
### 2.11. Research performance

Innovation, generated on the base of research, is an important factor for public progress and economic growth. Science is the main factor, pushing forward the boundaries of technological development. Fundamental scientific discoveries, which fully renew the set of tools for mankind development, create new technological platforms, such as the revolution in the field of genetics and the subsequent development of the biotechnologies, resulting in improvements in the areas of health care and agriculture. The scientific research and development generate new products and technologies, business models through the successful application of new knowledge.

The commercialization of the results of the scientific research is a guarantee for a wholesomely implemented potential of the state system for scientific research. The knowledge transfer is bidirectional. The model of “active supply” refers to commercial application of the knowledge, acquired by the scientific research system through the rules for intellectual property, technological transfer and the so-called spin-off companies, while the model of “active demand” refers to the cases, when the companies receive support from the researchers, because they have signed collaboration/partnership contracts. The knowledge generated by the scientific research institutes is disseminated via different channels –academic

<sup>20</sup> These are the innovation spheres, which measure the favourable factors for making investments, the company activity and the results from the innovation activity in each country. They are used for calculating the Summary innovation index in the annual editions of the Innovation Scoreboard. In this case, the deviation (lagging behind) of Bulgaria compared to the average EU levels has been calculated.

staff mobility, scientific publications, conferences, studies under contracts with the industry and patenting discoveries and inventions<sup>21</sup> of the universities.



The research activity is becoming ever more multidisciplinary on a global level. Modern researches have complex and interdisciplinary nature. Some spheres, such as mathematics, are so interwoven with the research system, that they have no separate label<sup>22</sup>. One of the consequences is that innovation is usually happening at the border or in the crossing zone of the different subjects. Bulgaria should strengthen the interactions between the scientists, working in different fields in order to benefit from this trend.

The creation of knowledge is developing ever faster, and the scientific horizon is displaced ever farther. These circumstances create competitive pressure - in fact the competition is so strenuous, that the states are obliged to invest and move ahead just to avoid lagging behind their relative position. Countries like Bulgaria need a viable scientific-research system, which is internationally connected, in order to absorb and economically benefit from the knowledge generated worldwide<sup>23</sup>.

The structure of the patents of the Bulgarian patent holders shows the highest activity of the group of the physical persons, who own 765 patents (68.3 %), followed by the business sector with 276 patents (23.3 %), state sector - 89 patents (6.8%) and "Tertiary Education" sector - 18 patents (1.6 %). The share of the Bulgarian Academy of Science (BAS) in the total number of Bulgarian patents amounts to 5.2 % and is 3.5 times higher than the share of the "Tertiary Education" sector. BAS owns almost 81 % of the patents in the state sector. The analysis of the structure during the last decade shows increase in the shares of the business and the state, which shapes a trend towards overcoming the low degree of institutionalization of the patent activity in Bulgaria.

The analysis of the Bulgarian patent activity in front of the European Patent Office (EPO) shows that during the last decade the yearly average has been equal to the issuance of 4-5 patents to Bulgarian applicants. Approximately 40% of the issued patents are concentrated in 5 technological areas - mechanics, lighting, heating, motors and pumps (10 patents), special machines (4 patents), pharmacy (4 patents) and medical equipment (3 patents)

The Bulgarian patent activity in front of the US Patent and Trade Mark Office is significantly higher due to the big interest on the part of the Bulgarian companies to enter the American market and the facilitated administrative procedures. During the period 2000 - 2012, 208 American patents were issued (compared

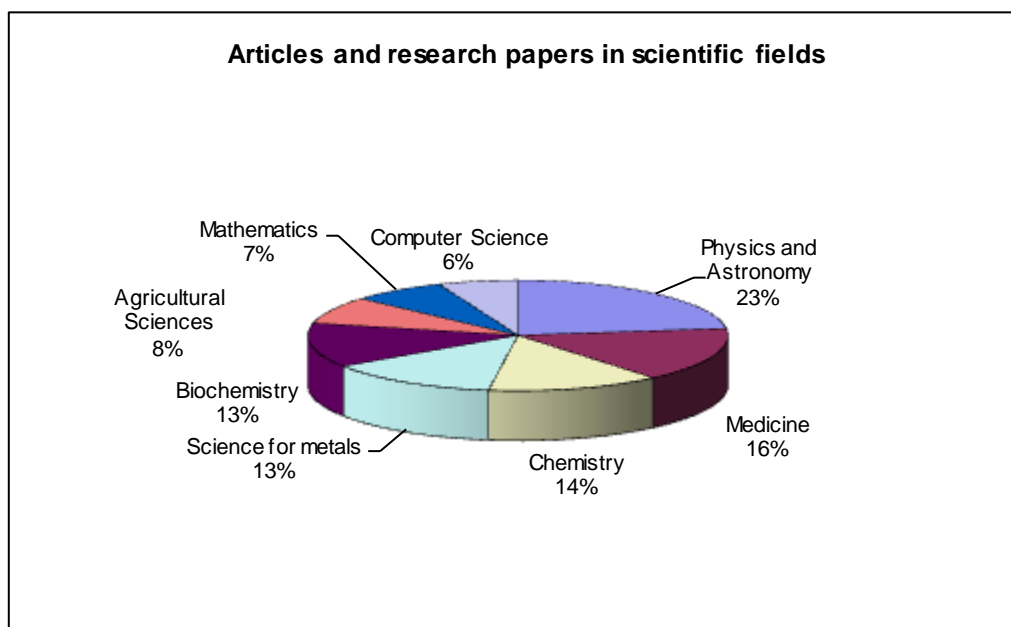
<sup>21</sup> Innovations.bg, Foundation "Applied Research and Communications", 2013

<sup>22</sup> Rafols, Porter, Leydersdorff (2009). Science Overlay Maps: A New Tool for Research Policy and Library Management, SPRU Electronic Working Paper Series No 179.

<sup>23</sup> World Bank Report, Input to Bulgaria's Research and Innovation Strategy for Smart Specialization

with submitted 744 applications). This is an evidence for the increased interest of Bulgarian applicants towards patenting and economic realization of their technological products on USA territory – computer systems for data transfer and processing (19%), management of data bases or data structures (18%), software development, installation and management (14%), etc.

The scientific productivity, measured with regard to the volume of the scientific publications, has slightly improved during the period of the Lisbon strategy (2000-2010). Within the period 1990 – 2012 the total number of articles and scientific reports (published in Scopus referenced editions), is 43 478. 44% of them belong to the Bulgarian Academy of Science (BAS) and 52% to the “Tertiary Education” sector. They are mainly divided among 8 leading universities in Bulgaria – Sofia University, Medical University - Sofia, Technical University - Sofia, University of Chemical Technology - Sofia, University of Plovdiv, Medical University - Varna, Medical University - Plovdiv, University of Ruse and several other universities with weaker publication activity. From all 51 higher educational institutions in the country only 17 (one third) are included in the database with published articles and scientific reports. The national research units in the field of medicine are registering serious participation.

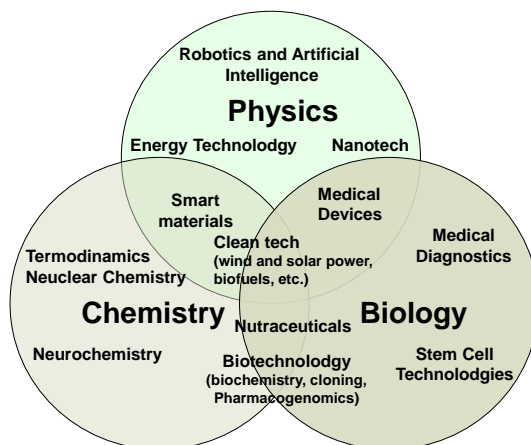


Source: Innovation BG

The changes in the global trends suggest the occurrence of new high impact technologies through convergence of scientific subjects. According to studies<sup>24</sup>, the biotechnologies, nanotechnologies and clean technologies will be of highest interest for the investors. Nowadays investment agencies in some European countries are already promoting these new industries. The investments in industries with high value added are encouraged and the attention is focused on the leading industries - ICT, pharmacy and electronics, as well as on clean technologies, life sciences, automobile building, machine building and instrument making, health care, chemical industry, logistics, tourism & wellness (in descending order).

<sup>24</sup> A.T.Kearney

### Industries with high investor interest in the future



The Bulgarian scientists are represented in all 26 scientific fields, which are included in the international database. Leading for the country are the directions “Physics and Astronomy” (17 % of all publications); “Chemistry” (12 %); “Material Science” (11 %); “Biochemistry, genetics and molecular biology” (10 %); “Medicine” (9 %); “Engineering Science” (8 %). The most frequently quoted Bulgarian articles are from the field of the biochemistry and molecular biology (12.3 times), physics (11.2 times), chemistry (10.8 times), polymer science (10.5 times), pharmacology and pharmaceutics (10 times), material sciences (9.4 times), etc.

According to the data bases of Scopus and Web of Science (bibliometric and science metric bases for the publications of leading scientific publishing houses), the included documents originating from Bulgaria are 864, almost all of them being quoted. The average number of the quotations positions Bulgaria on the 50<sup>th</sup> place among 238 states. Lithuania, Estonia, Cyprus, Latvia, Luxemburg and Malta come after us.

The joint international scientific research activity of the Bulgarian scientific community is accomplished together with research units from 144 states, most of all with Germany in the fields of mutual interest – “Physics and Astronomy”, “Chemistry”, “Material Sciences”, “Biochemistry, Genetics and Molecular Biology”, “Medicine”.

### 2.12. Human capital in research and innovations

Human capital is in the foundation of the competitiveness of the economies and the innovation potential.

Education is one of the most important factors, which directly influence the human capital. The actual competitive advantage of a nation consists in its capacity for continuous provision of highly qualified human resources. This process requires a long-term vision and careful planning, since well-trained cadres needed by the economy (especially in the industries with high value added), cannot be provided easily and quickly.

In the Global Competitiveness Report 2013-2014, Bulgaria is ranked in 90<sup>th</sup> place regarding the quality of the educational system among a total of 148 countries, in 44<sup>th</sup> place regarding the quality of primary education, in 74<sup>th</sup> place regarding secondary education enrolment and in 44<sup>th</sup> place regarding tertiary education enrolment.

According to a study of the Programme for International Student Assessment (PISA) on the degree of using scientific knowledge by the 15-year old students, Bulgaria occupies 28<sup>th</sup> place among 29 studied European countries. The number of the students graduating secondary education in the country is decreasing because of the low intake and the early dropout from school – 12.5 %. In parallel with that, Bulgaria owns one of the most challenging demographic profiles in the EU and the world. The population in the country is expected to decrease by 27 percent within the period 2010 and 2060, which will exercise a direct impact on the tertiary education sector. Nowadays, the interest of the young people towards the natural and engineering sciences is low – according to NSI data only 24% of the students choose to study natural sciences, mathematics, technical sciences and architecture.

Following the accession of Bulgaria to the EU in 2007, the tertiary education system helped the country to strengthen its social and economic cohesion with the remaining part of Europe. But irrespective of the achievements from the last two decades, the tertiary education continues to face the challenges, related to quality, efficiency and reliability of the results.

At present, Bulgaria relies on indirect indicators for the skills, acquired during the tertiary education, (direct indicators from studies like PIAAC <sup>25</sup> or STEP <sup>26</sup> are still not offered). One such set of indicators is the realization of the university graduates on the labour market.

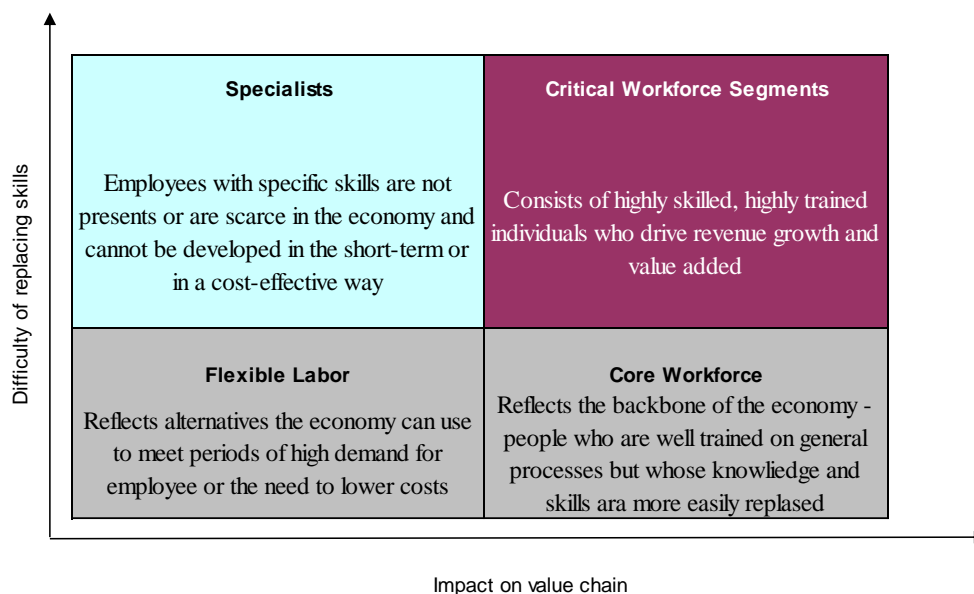
The completion of educational-qualification degree bachelor, master or educational and scientific doctoral degree (PhD) does not result in a higher remuneration on the labour market. Moreover, the persons, who have acquired PhD, earn less compared with their colleagues in all European countries with the exception of Romania. This difference in the remunerations and the limited possibilities for a scientific carrier forces the young talents go to other European countries or USA. The loss of a viable talent is one of the most sensitive problems in the Bulgarian scientific environment, since it leads to a dramatic ageing of the scientific community.

The building of highly qualified and trained cadres is of key importance for improving the economy competitiveness, increasing the potential for realization of innovations and making the country more attractive for investments.

---

<sup>25</sup> PIAAC is based on interviews with people aged 16-65, which take place in their homes – 5 000 in each of the participating countries. PIAAC evaluates the skills for reading, writing and calculation of the participants and their ability to solve problems in environment equipped with technologies; collects a wide range of information from the participants, in this number how their skills find implementation in their work and other types of context such as their home or local community. For more information see <http://www.oecd.org/site/piaac/surveyofadultskills.htm>

<sup>26</sup> The World Bank STEP study assesses cognitive, technical and non-cognitive skills. Its implementation started in 2012 with studies among individuals and employers. It will be possible to make comparison between the data for different countries, and the first set of results for the different countries is expected in the beginning of 2013. For more information see the World Bank (2012) brochure “STEP Skills Measurement Study”.



Source: A.T. Kearney analysis

The survey of the personnel, occupied with scientific research, with regard to the educational degree reveals increase in the number of PhD holders, which may be explained with the ever bigger number of young research cadres in the tertiary education and their strive for carrier promotion, as well as with the relevant legislative requirements. The trend is explicitly ascending after 2000. Compared with the previous 2012/2013, the number of the PhD students is increasing by 684 persons, or by 12.7%.

The distribution by age shows that the relative share of the PhD students aged 25 - 29 (35.7%), is the biggest, followed by these aged 40+ (24.5%) and by these aged 30 - 34, who represent 21.8% of all PhD students.

NSI data show that the research cadres in the natural sciences continue to prevail followed by the research cadres in the technical and agricultural sciences.

The private sector plays an important role for the quality education. The state should encourage the collaboration between the business and the educational institutions. It is necessary to ensure conditions for adequate preparation of the students for work in a real working environment. The introduction of a dual training system will guarantee the smooth transition from training to work.

It is necessary to increase the entrepreneurial orientation among the young people. The entrepreneurship training should become an inseparable part of the school curricula. The art schools (23 schools in total in 15 settlements in the country) do not provide entrepreneurship training and the students in these schools are the future of the creative industries in the country. The pilot project "Starts" has been initiated, under which the students will pass through entrepreneurship training and tuition, as well as intellectual property protection and will create their own training enterprise, which will operate within the framework of the school year.

The conducting of ICT training in the higher educational institutions cannot fully meet the requirements of the industry related to the human capital. One of the reasons is the lack of ICT focus in the secondary education. The sector is lacking experts, and despite the big number of graduates from the ICT specialties in the higher schools (about 3 thousand per year), the quality of ICT education is not improving in the majority of the higher schools.

The small and medium enterprises continue to be leading with regard to the employed research staff<sup>27</sup>. This conclusion synchronizes with conclusions made in analyses of the European Commission (EC) - small and medium enterprises are often more innovative, especially in the ICT sector, since they are small and flexible, prone to risk and experiment. In other sectors though (e.g. pharmaceuticals and the foodstuff industry) serious investments are needed, which the small enterprises can hardly afford.

Small number of the entrepreneurs is paying special attention to the quality of the work force, which is noticeable from the limited investments of the enterprises in continuous vocational training (CVT). Only 22% of the employees are involved with CVT, which links to 1.1% of the total labour costs. This places Bulgaria in the lower end of the scale in Europe and speaks about potential problems referring to the possibilities for acquiring new knowledge and technologies.

Percentage of the employees (all enterprises) participating in CVT courses and costs for CVT courses as a percentage of the total labour costs (all enterprises)

All types of enterprises	Percentage of the employees, participating in CVT courses		Share of the costs for CVT courses as a % of all labour costs	
	2005	2010	2005	2010
Total for all companies	15	22	1.1	1.1
With 10 to 49 employees	6	8	0.8	0.8
With 50 to 249 employees	12	16	1.3	1.2
With more than 250 employees	23	44	1.1	1.3

Source: EUROSTAT 2014

Leading enterprises from the high-tech sectors have started own initiatives for cadre training. An interesting revolution in the ICT sector represents the wide-scale initiative of the Telerik Company. Through its Academy for Software Engineers the company provides quality, free and affordable training for all young people, which ensures successful carrier start in the dynamically developing software industry. Only during 2012-2013 academic year, more than 12 000 persons have participated (attending or as distant learners) in the trainings of the Academy. The company was elected the best employer in Bulgaria during 2007, 2010 and 2012. It is regularly awarded as one of the best employers in Central and Eastern Europe.

### 2.13. National funding in technology and innovation

- **Infrastructure**

During September 2010, the government approved "National Roadmap for Research Infrastructures" with Decision No 692 of the Council of Ministers. The approval of the Roadmap gives priority to seven national research infrastructures in specific scientific areas and encourages the inter-sectoral and cross-border collaboration. These infrastructures received national financing to perform feasibility studies on the

---

<sup>27</sup> Innovations.bg 2013



readiness of the consortiums for building the facilities and on the legal aspects for regulating the maintenance activities and developing free access rights.

In 2013 the Ministry of Education and Science published an invitation for submitting offers for updating of the National Roadmap, comprising also basic criteria for their evaluation.

The process of updating passed a preliminary survey for correspondence of the offers with the basic criteria and international expert evaluation and verification with the assistance of experts of the European strategic forum for research infrastructure (EESFRI). On national level the preliminary survey was conducted by an interinstitutional working group with representatives of the Bulgarian Academy of Science, universities, NGOs and ministries.

The elaborated Roadmap is one of the factors in the process of defining the Thematic areas in the ISSS

The assessment methodology in respect of proposals for national roadmap updates comprises the following main criteria:

### 1. Scientific and technological quality of the research infrastructure

- significance of the infrastructure for the respective scientific areas in national, regional and European terms;
- identification of the strong and weak aspects, opportunities and threats;
- degree of integration in the international initiatives of the European Strategy Forum on Research Infrastructures;
- degree of interdisciplinary nature, including the effect of the infrastructure for consolidation of interdisciplinary research in Bulgaria;
- assessment of the results from the conducted activities for training of researchers and young scientists.

### 2. Management capacity

- assessment of the managing structure in respect of the proposed scientific objectives;
- performance of the envisaged action plan as regards the distribution of responsibilities, experience and capacity;
- contribution to increasing the access to knowledge, resources and research capacity in the field of operation of the infrastructure;
- assessment of the available equipment and the improvements of the existing one, as well as the acquisition of new equipment;
- assessment of the access policy and of the data management plan;
- assessment of the preparedness for development of the infrastructure;
- analysis of the risk, including the risk for the infrastructure itself generated by particular geographic, geological or meteorological conditions; risk factors related to the security of the region; risks related to the insufficient resource availability – physical, capital and human.

### 3. Budget and sustainability

- technical feasibility, expenses for human resources and cost efficiency of the proposed infrastructure (based on the adequacy of the requested financing and the envisaged sources of funding, multiannual budget plan with financing sources, investment sustainability);
- risk assessment.

With a decision of the Council of Ministers No 569 of 2014 the Roadmap, which accounts for the progress related to the development of the existing infrastructures and for validation of new project proposals, was updated. Based on the preliminary evaluations, four groups of projects were outlined:

### **In the field of biology and medicine:**

- Infrastructure for genome, proteome and metabolome studies (with potential for accession to BBMRI-ERIC. Accession to EuroBioImaging-ERIC and EATRIS is under consideration)
- National Centre for Biological Microscopy and Biomedical Imaging Methods (potential for accession to EuroBioImaging-ERIC)
- Research infrastructure for applied genomics, pharmacogenomics and development of anti-infection agents (for the phase of feasibility study)

### **In the field of material science:**

- Distributed infrastructure for sustainable development in the field of maritime studies (bound to the participation of Bulgaria in the European infrastructure EURO-ARGO)
- Regional Centre for Astronomical Research and Education (RCARE)
- National infrastructure for energy conservation and hydrogen energy production (for feasibility study phase)

### **In the field of the natural and engineering sciences:**

- High-tech infrastructure for computer modelling, simulations and implementation in the industry, medicine, pharmacy, energy production, transport, etc. (member of EGI.eu and PRACE)
- Infrastructure for development and transfer of micro and nanotechnologies in the electronics and product development based on such technologies
- Searching for opportunities, after mandatory dialogue with representatives of the education, science and business, for joint activity with leading institutions and organizations in EU for CEE Regional Centre for Transferring Micro- and Nanotechnologies into Market Products

### **In the field of the social sciences:**

- Distributed infrastructure – National interdisciplinary electronic infrastructure for culture, humanitaristics, integration and development of the electronic resources for Bulgarian language (ClaDa)
- Balkan Sociological Survey – network in the field of the social studies with regional importance (ESS)

The timely implementation is considered particularly important with view of expanding the boundaries of the knowledge in the respective fields. Two groups of projects are planned.

**The first group** contains nine projects, which have building readiness and are of strategic importance for Bulgaria. Based on the performed international expert evaluation according to established criteria, Nine national infrastructure complexes of national importance have been suggested. Six out of them have potential to participate in Pan-European scientific infrastructures.

The suggested infrastructure complexes are as follows:

1. National University Complex for Biomedical and Applied Research (BBMRI)

2. Centre for Modern Microscopy for Fundamental and Applied Research in Biology, Medicine and Biotechnologies (EuroBioImaging);
3. Infrastructure for Sustainable Marine Research Development, linked also to the participation of Bulgaria in the European Infrastructure Euro-Argo;
4. Scientific infrastructure “Energy Conservation and Hydrogen Energy Production”;
5. European Social Survey for Bulgaria (ESS);
6. National Centre for Highly Productive and Distributed Calculations (EGI and PRACE);
7. National Interdisciplinary Research E-Infrastructure for Resources and Technologies for the Bulgarian Language and Cultural Heritage, integrated in the frameworks of the European Infrastructures CLARIN and DARIAH (CLADA-BG);
8. Regional Centre for Astronomical Research and Education (RCARE);
9. National Cyclotron Centre – infrastructure for applied research and innovations with educational functions in the fields of nuclear medicine, nuclear physics, nuclear energy, radiochemistry, radiopharmacy, accelerating equipment, and centralized radiopharmacy for production of PET radiopharmaceuticals for the needs of the nuclear medicine.

The second group contains five additional projects: Distributed infrastructure of centres for production and research of new materials and their applications for conservation, access and e-storage of artefacts (INFRAMAT); Research and innovations in the agriculture and foods; Alliance for Cell Technologies – ACT; National Geo-Information Centre; Eco and Energy Saving Technologies). These projects have potential to reach stage of implementation readiness by 2015-2016 and will receive support for feasibility studies.

Based on regular international assessment, new national infrastructures and/or building-on existing scientific complexes with regional and European importance can be suggested. The modernization of the scientific infrastructure needs combined financing for the different components of the scientific complexes, and more especially: target financing from the state budget; programme-competition financing through the National Science and Research Fund (NSR Fund) and Operational Programme “Science and Education for Smart Growth” (OP SESG); financing through the EU Framework Programmes and other financial instruments.

During the programming period 2007-2013, OP “Competitiveness” (OPC) supported the creation and strengthening of Technology Transfer Offices and Technology Centres in different economic activities:

- Research and development activity (72) – 7 centres, of which 4 in Sofia and one in each of the cities Plovdiv, Dobrich and Kazanlak;
- Education (85)– 4 centres, one in each of the cities Sofia, Plovdiv, Varna and Burgas
- Activities of non-governmental organizations (94) – 4 centres, of which 3 in Sofia and one in Plovdiv;
- Central office activities (70) – 1 in Sofia;
- Professional activities in the field of design, photography, translation, etc. (74) – 2 centres in Sofia;
- Human health care (86) – 5 centres, 3 of which in Plovdiv and 2 in Sofia;
- Architectural and engineering activities, technical tests and analyses – one centre in Pernik, and
- Construction of facilities (42) – one centre in Kazanlak.

Bulgaria received support during the creation of Technology Transfer Centres also through PHARE programme with negotiated funds amounting to BGN 495 259.35 (grant – BGN 371 048.00 and co-financing – BGN 124 211,34). With the financial support of public and private organizations 9 centres were created, mainly in higher educational institutions in the cities Sofia, Ruse, Varna, Burgas, Plovdiv, Gabrovo, Veliko Tarnovo, Pleven and Lovech.

**Sofia Tech Park** is the first scientific and technological park in Bulgaria, that will be established within the next 3 years. The main task of the Park is the implementation of projects, whose immediate objective is to facilitate the development of the research, innovation and technological capacity of Republic of Bulgaria, which should turn into a prestigious location for the world, regional and national research and innovative companies, giving example for economy of knowledge in Bulgaria and on the Balkans Region.

For this purpose, Sofia Tech Park AD is partnering with private and public clients to create and manage unique innovation environment, set up and implement educational programmes, and simultaneously provide supporting services regarding the commercialization of new technologies, products and services. Sofia Tech Park AD is partnering with leading universities, the Bulgarian Academy of Science (BAS), business clusters, big international companies, Sofia Municipality, MES, MLSP, non-governmental organizations, etc. during the implementation of the project, and simultaneously will be responsible for the overall organization for its implementation, accompanying marketing activity, financing, rental, construction and other activities.

As a project output, within the framework of the next three years a scientific infrastructure for over than BGN 20 million should be put into operation, which will support the Bulgarian innovative business. About 40 000 sq. m. new and renovated building premises should be created, which will accommodate applied science laboratories, common incubator, innovative lecture /educational/ discussion forums, space for demonstration of new technologies, office areas and a parking lot.

- **Programmes for scientific research activity support**

**The National Science and Research Fund** is a legal entity to the Ministry of Education and Science. It promotes the research initiatives at national, regional and international level. Six standing expert committees are operating at the NSR Fund, reflecting the priority research areas: mathematics and informatics, natural sciences, biology and medical sciences, agricultural sciences, technical sciences, public sciences and humanitarian sciences. The standing commissions take decisions for the funds allocation by the submitted projects in compliance with the rules, included in the Research Promotion Act and in the NSR Fund statute. The key programme, in which NSR Fund is currently participating, is called "Scientific Research Potential Development". It is operating under three strategic priority modules: improvement of the scientific research infrastructures in the universities and research institutes; modernization of the scientific research equipment in the universities, specialized laboratories and research institutes.

NS fund is promoting the scientific research in the priority directions of the National Research Development Strategy through:

- financial support to the scientific organizations and the higher educational institutions based on project-programme financing;
- financing of projects, developments and demonstration projects in scientific directions, determined by the Fund;
- financing of projects, developments and demonstration projects of young scientists.

The priority directions of the National Research Development Strategy 2020 are:

1. Energy, energy efficiency and transport. Development of green and eco technologies;
2. Health and life quality, biotechnologies and ecologically clean foods;
3. New materials and technologies;
4. Cultural and historical heritage, socio-economic development and management;
5. Information and communication technologies.

**The National Innovation Fund (NIF)** has been operating at the Ministry of Economy and Energy since 2005, promoting the private investments in the development of competitive and knowledge based industry in Bulgaria. The Bulgarian Small and Medium Enterprises Promotion Agency is administering the

Fund. The direct objective of the fund is to encourage the implementation of scientific research and development projects and technical feasibility study projects with the aim to create new or develop existing products, processes or services for increasing the economic efficiency, improving the innovative potential and enterprise technological level, and promoting the dynamics of the innovative processes. The interest towards this financial instrument has remained unchanged throughout the years.

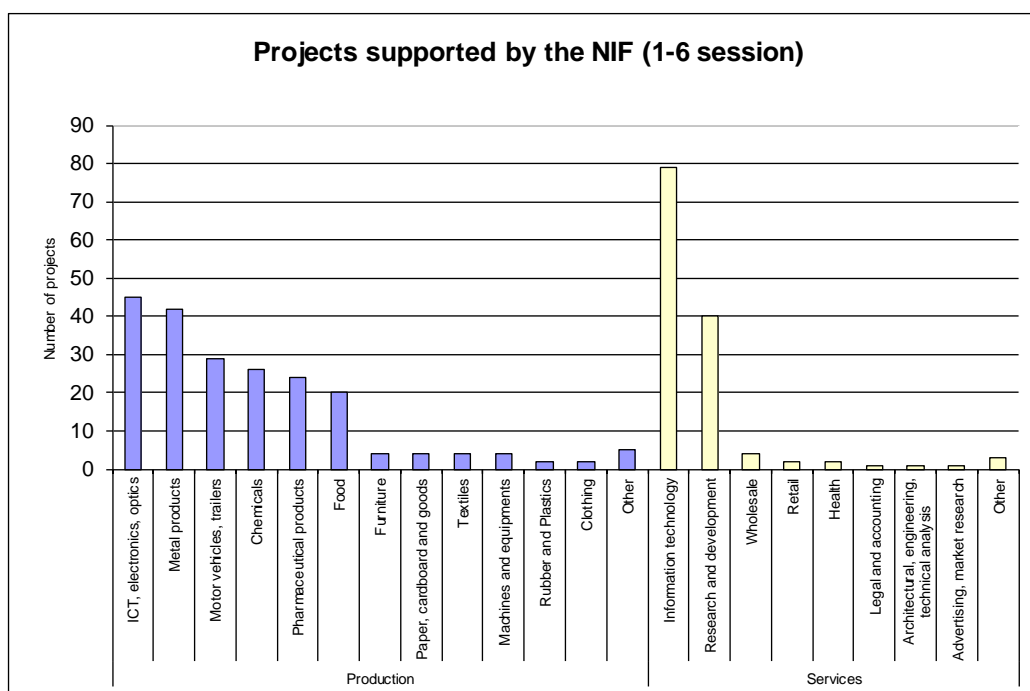
NIF session	Submitted project proposals	Signed contracts	% signed contracts	Negotiated subsidy (BGN)
<b>I (2005)</b>	118	43	36	6 700 000
<b>II (2005)</b>	120	67	56	8 300 000
<b>III (2006)</b>	146	108	74	16 600 000
<b>IV (2006)</b>	168	91	54	16 900 000
<b>V (2008)</b>	123	60	49	12 000 000
<b>VI (2012)</b>	67	36	54	9 110 000
<b>VII (2014)</b>	152	52	34	9 980 098
<b>Total</b>	<b>742</b>	<b>457</b>	<b>47</b>	<b>79 590 098</b>

During 2013 the evaluation performed by an independent organization was completed. It analysed the results achieved by the enterprises for a period up to three years after completion of projects, financed by NIF. These enterprises show improvement in a series of indicators, such as:

- 79,3% of the firms have introduced new products to the market
- 38,5 % of the firms have increased their staff number
- 65,5% have entered new markets
- 68% have increased their profit
- 71,4% have increased their net sales revenue, etc.

The data from the analysis provide convincing evidences for the need for this financial scheme and the serious interest on the part of the business is a ground for continuation and expansion of the NIF activity.

Priority directions for support have been determined for each NIF competitive procedure. The biggest is the activity of the companies, operating in the sectors of ICT, metal products and R&D. The percentage of projects in the sphere of chemical products, medicinal substances and food products is high.



Source: The Bulgarian Small and Medium Enterprises Promotion Agency,

The discussions held with the business on the effect of the implemented financial instruments (the competitive procedures of OPC, NIF) imposed the understanding of the need for a change in the enterprise support model. The evaluations of the projects and the assessment of the implementation of the signed contracts should concentrate on the actual outputs of the enterprises (productivity increase, introduction of new energy efficient, resource efficient, environmentally friendly technologies, etc.) and not on the number of invoices and the reporting of accomplished activities.

- **Financing the innovation activity of the enterprises**

The access to financing is one of the most serious limitations for the growth and the entrepreneurial initiative. The entrepreneurs are facing special difficulties to raise funds at the early stages of their economic activity, particularly under the current crisis. Therefore, the widening and strengthening of the financial instruments for entrepreneurs is a key element of the support to the entrepreneurs. SMEs depend largely on bank loans for their external financing and practically they have very small number of alternatives.

Among the state programmes supporting small and medium enterprises is the Bulgarian Development Bank AD (BDB AD). The institution is using its position on the Bulgarian bank market during the implementation of the state economic policy. The main focus of BDB is on: SMEs, project financing for export oriented enterprises, investment banking and public projects of national importance. BDB has its own banking group for implementing its objectives:

- Bulgarian Development Bank AD (BDB AD)
- National Guarantee Fund (NGF)
- Capital Investments Fund (CIF)

### JEREMIE

In Bulgaria, the JEREMIE Holding Fund (JHF) is financed by the European Regional Development Fund and co-financed 15% by the state budget under OPC. The budget amounts to EUR 199 million. The main objective is the improvement of SMEs access to financing through different financial engineering instruments. JEREMIE initiative in Bulgaria envisions a balanced combination of debt instruments, as well

as share capital instruments, which should address the existing big differences between the supply and demand of financial engineering instruments in Bulgaria. Among the various financial instruments are:

“Loan Portfolio Loss Guarantees” for providing preferential conditions under the credits, drawn by SMEs, and in the same time providing opportunity for the banks to finance more and riskier SMEs, which without the availability of the guarantees they would not have financed. As of 31.12.2012, 1 478 credits have been issued to SMEs amounting in total to BGN 174 million.

“Instrument for entrepreneurship promotion and initial financing provision” - the objective of the instrument is to provide support to innovative starting businesses under the form of share investments. The instrument is characterized by two financing phases, compliant with the development of the enterprise and opportunity for consultations by a group of professionals in different business sectors (mentors). The total instrument budget is EUR 21.21 million, out of which EUR 0.21 million is private financing.

Two funds have been created: Eleven and LAUNCHub. Eleven manages a fund with EUR 12 million capital, aiming at accomplishing about 200 investments in innovative starting businesses. The investment in one company from the fund’s portfolio is between EUR 25 000 and EUR 200 000. The other selected manager - LAUNCHub manages a fund with capital EUR 9 million, focused on the information and communication technologies. The objective is this fund to make approximately 120 investments during the next four years. Each one of the investments is expected to be within EUR 30 000 and EUR 200 000 and to be made in starting companies from Bulgaria and the region. During the last two years, the Starting Business Funds Eleven and LAUNCHub have invested about EUR 6 million in 92 companies. Eleven already has 57 projects and 150 founders, financed with its resources, and LAUNCHub has invested in 35 projects in total.

Risk Capital Fund under OPC - the main objective of the instrument is to make investments at initial development stage in SMEs, registered and having main position in the economic activity in Bulgaria. The total budget of the instrument is EUR 30 million, out of which EUR 9 million – private financing.

Mezzanine Fund – with budget under OPC of EUR 60 million, out of which EUR 30 million private financing. The aim of the instrument is to make investments mainly in enterprises, which are registered and have main place of their economic activity in Bulgaria. The instrument is combined – i.e. for share investments and loans.

Instrument, providing financing through risk sharing - the objective of the instrument is to support SMEs, providing loans at lower than 50% efficient interest rate reduction for the issued loan and reduction of the fees, commissions and collaterals related to the credits. The total instrument budget is EUR 300 million, out of which EUR 150 million is private financing.

### 2.14. International research collaboration

- **Participation of the business sector (SMEs in particular) in EU programmes**

The participation of the Bulgarian enterprises in international programmes is gaining speed. Since 2011, Bulgaria has become an effective member of the European EUREKA initiative. Administrative capacity for popularizing the opportunities of the initiative and the multiple programmes implemented by it was built during the last years. Since 2013, our country has also become a member of Eureka-Tourism – i.e. one of the so-called umbrella-initiatives. Since 2011, Bulgaria has become a full member of the joint European EUROSTARS Programme. A massive information campaign on the application rules and the opportunities under this programme was launched during 2011 and 2012. As a result of that, during the second competitive session in 2012, 8 Bulgarian enterprises were applying and in 2014 a contract was signed with the first firm with a rated project – i.e. IMG Technology.



Bulgaria is planning to sign a collaboration agreement with the European Space Agency (ESA) in order to create an opportunity for the Bulgarian SMEs and research organizations to participate in projects for introduction of high-tech products and services. In 2014, BGN 2 600 000 national funds have been put aside for this purpose.

Since 2014, Bulgaria has also undertaken the initiative for participation in three of the Joint European Enterprises – ECSEL (Electronic Components and Systems for European Leadership), Biotechnological Productions and Fuel Cells and Hydrogen.

- **Participation of the business sector in Global innovation networks and technological platforms**

Enterprise Europe Network. In Bulgaria, the network unites 14 organizations, localized in Sofia, Plovdiv, Sandanski, Stara Zagora, Vratsa, Yambol, Dobrich and Rouse.

- **Participation of the scientific organizations in European programmes and Global innovation networks and technological platforms**

**7<sup>th</sup> framework programme.** The participation in the framework programmes as a whole, in this number the success levels, are determined by the number of the researchers in the relevant national innovation system. Five of the EU-10 member states from CEE (Bulgaria, Estonia, Hungary, Latvia and Slovenia) are reporting one of the highest success levels according to the available human resources in the field of research. 20 participations on the part of 1 000 researchers have been registered on the average for EU-10, which is slightly below the level for EU-27 (22 participants). For comparison, in the EU-10 countries the number of the researchers is 245 per 100 000 persons of the population, while in the EU-15 countries this ratio is 560 per 100 000 persons of the population. In practice, the new member states have enormous potential to improve their participation in the European framework programmes and to increase the attracted financing, if they implement sustainable policy for creating and attracting quality human resources to the science.

As of the beginning of March 2013, the summarized data show that under a total of 381 open invitations for participation in the Seventh Framework Programme the received project proposals with Bulgarian participation are 2811, or 0.86 % within EU-27 framework amounting to a total value of EUR 804.6 million (0.53 %). For the whole period of effectiveness of the Seventh Framework Programme, 465 projects with Bulgarian participants have been approved for financing. They include 589 participants from Bulgaria and use a grant under the Framework Programme to the total amount of EUR 82.73 million.

441 projects with a total number of the participants 6683 are negotiated, out of which 585 from Bulgaria. The total amount of the signed contracts is EUR 1510.45 million, out of which EUR 78.52 million for the Bulgarian participants.

The number of SMEs from the country, which have applied with projects in the Seventh Framework Programme, is 1220 and out of which just 183 have a successful project. 42 Bulgarian researchers have successful project under the “Marie Curie” activity with a total budget of EUR 6.65 million.

Under the Seventh Framework Programme, the biggest is the number of the partnerships of Bulgarian organizations within EU (88 %), in this number with the United Kingdom (825 projects), Germany (702), Italy (693), Spain (601) and France (528). Equal shares are distributed among the candidate member states (mainly Serbia and Croatia - respectively 67 and 66 projects) and the associated countries (Switzerland and Norway - respectively 156 and 130 projects). The partnerships between Bulgarian organizations under projects, financed through the Seventh Framework Programme are just 292. Bulgaria has registered the biggest number of joint projects with CEE partners with Romania (284), Poland (213) and Hungary (166).

In the institutional distribution of the Bulgarian participation in the Seventh Framework Programme the higher educational institutions play the leading role (32 %), followed by the research units (26 %), business organizations (22 %), public organizations (about 10 %) and other organizations with the same share. The Technical University – Sofia (19 won projects) and SU St. Kliment Ohridski (18 won projects) occupy respectively first and second place with regard to success rate within the Tertiary Education sector. BAS through all its institutions is the Bulgarian institution with the highest number of won projects – 73. The picture at the European level looks similar. Most important is the role of the higher educational institutions in the attracted financing under projects of the Seventh Framework Programme (45 %), followed by the research organizations.

- **Bilateral agreements in the field of research and innovations**

The stepwise expansion of the partner states on European and world scale is important during the forming of big interdisciplinary scientific networks and consortia. Nowadays, MES has more than 15 current agreements for bilateral scientific and technical collaboration with a wide geographic coverage. Bilateral collaboration programmes in the field of scientific research with **China, India, Ukraine, Germany, Austria, France, Slovenia, Slovakia, Russia, Romania and FYR of Macedonia** have been implemented during the last years.

In 2011 started the implementation of **Bulgarian – Swiss Programme to Reduce the Economic and Social Disparities in the Enlarged EU**, based on which two funds with national co-financing have been created – Science Exchange Fund and National Science Fund with a period of effectiveness 2011-2016. Bulgaria is also participating in the European Organization for Nuclear Research (CERN), European Science Foundation (ESF), International Thermonuclear Experimental Reactor (ITER), European Molecular Biology Organization (EMBO), and the European Organisation for Exploitation of Meteorological Satellites (EUMETSAT). It is also a member of the Convention for Creation of European Centre for Medium Range Weather Forecasts.

### 2.15. Quality analysis for identification of potential spheres for intensive innovation development

#### 2.15.1 Methodological Approach:

Subject of the analysis are the economic activities (second level of aggregation according to the Classification of Economic Activities (CEA 2008), assigned by level of technological intensity, according to the OECD classification and EUROSTAT. Similar grouping allows the obtaining of a clearer assessment of the condition and possibilities for development of medium and high-tech sectors. The classification does not include the activities of the mining industry and the agrarian sector. In this manner the analysis includes 82 activities from the spheres of industry and of services. **The identification of the potential** of each economic activity is performed with the help of different indicators. They measure the attitude of the state and the business activity related to the quality development of the economic activities and services: state support for creation and development of technology transfer offices and centres; financed projects under NIF; financed projects under OP “Competitiveness of the Bulgarian Economy” 2007-2013; number of patent holding firms, number of trademark owning firms. The value of all indicators has been recalculated with regard to the total scores for the industry and the sphere of the services. Thus, they become comparable and allow their summing and obtaining of aggregated score for each economic activity.

The identification of the potential of the economic activities is accomplished in the manner used for the quantitative analysis – all medium and high-tech activities and the science consuming high-tech services are included (pursuant to the EC requirement for orientation towards activities with a higher degree of

reprocessing of the end product). From the remaining groups of economic activities and services the three ones, which have the maximum scores, are selected.

### **2.15.2 Results**

The initial sample of 82 economic activities and services is narrowed to 31, on which the state support and the business activity is concentrated. The state support is expressed in allocation of financial resources based on project proposals – i.e. underlying is the entrepreneurship activity of the business and the research units, oriented towards raising the scientific and technological level and acceleration of the innovation processes.

Within the framework of the industry, the ranking is headed by low and medium-tech activities such as food products and metal items. But after that there is a whole group of medium and high-tech activities (ICT, electronic and optical products, chemical products, machines and equipment, electrical facilities, medicinal substances and products). This in practice is a trend towards a high-tech change in the economy.

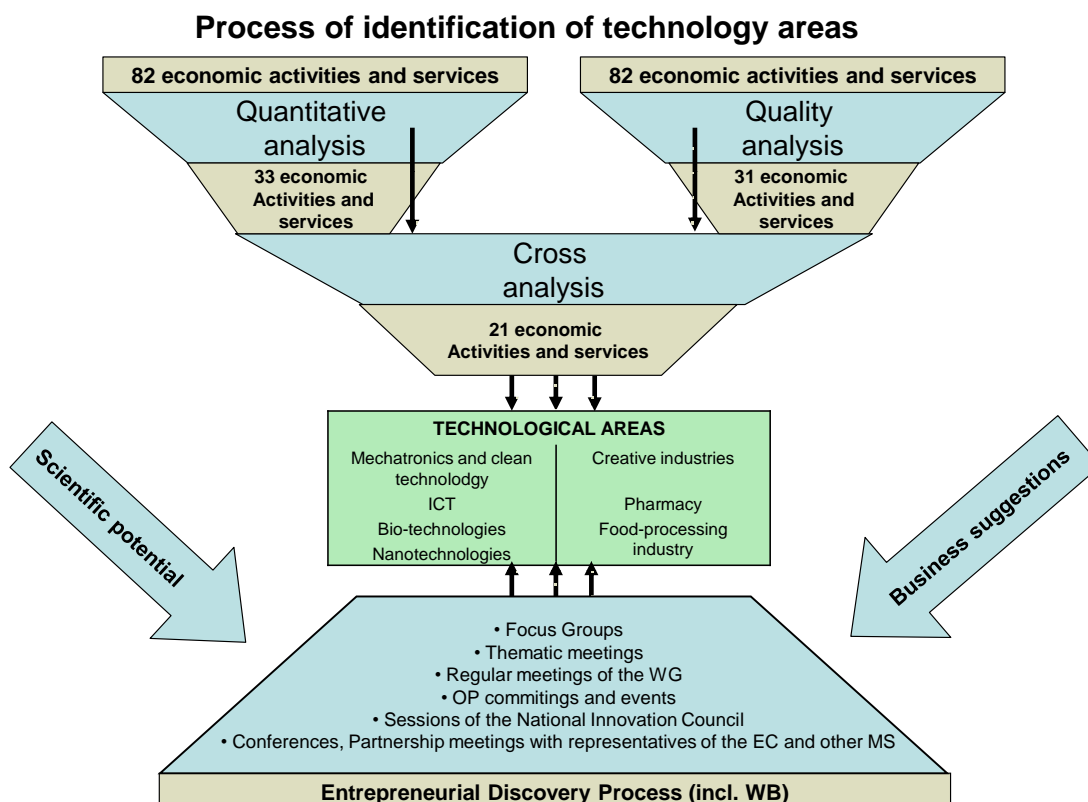
If we shall again exclude the commercial services and the services of the non-governmental organizations (outside the clusters registered as such), it will appear that the sphere of the services is oriented towards science-consuming high-tech and market services. These include information technologies, scientific studies and experimental developments, human health care, architectural and engineering services and technical tests and analyses, educational services, etc. – i.e. the sphere of the services follows the established trend towards a high-tech change of the economy.

## **2.16. Cross analysis for identifying potential technological spheres for intensive innovation development (specialization)**

### **2.16.1 Methodological Approach:**

The results from the quantitative and the qualitative analysis, made in the previous items, are subject of this analysis. The objective is to outline the economic activities and services for which the quantitative assessment is supplemented by a qualitative one and vice versa. This is interpreted as a strength, which creates capacity and future potential for accelerated technological and innovation development. And the opposite – these activities and services, which have only one of the two assessments, are eliminated from the identification process. In this manner, 21 economic activities and services (Annex 3) have been identified, which are considered as a reference point for identifying technological areas for smart specialization. The identification logic is to find cross points between economic activities and services and scientific fields, in which the costs of the state and of the business for research and innovation activities are concentrated.

### **2.16.2 Results**



The approach allows the identification of the following technological fields with potential for innovation specialization:

## 1. Identification of technological field “Mechatronics and Clean Technologies”

		R & D expenditure by field of science during the 2008-2012					
		Medical sciences (31.1%)	Technical sciences (25.1%)	Natural sciences, mathematics and informatics (24.6%)	Agricultural sciences (11.0%)	Humanities (5.1%)	Social Sciences (3.0%)
	Economic activities						
26	Manufacture of computer, electronic and optical products	<p style="text-align: center;"><b>Technological area</b> <b>Mechatronics and clean technologies</b></p> <p>Mechatronics (<i>mechanics, electronics, software, management systems</i>)</p> <p>Clean technologies (<i>electric vehicles, fuel cells, hydrogen society</i>)</p>					
28	Manufacture of machinery and equipment n.e.c.						
27	Manufacture of electrical equipment						
29	Manufacture of motor vehicles, trailers and semi-trailers						
	Services						
62	Computer programming, consultancy and related activities						
72	Scientific research and development						
71	Architectural and engineering activities; technical testing and analysis						

## 2. Identification of technological field “ICT”

		R & D expenditure by field of science during the 2008-2012					
		Medical sciences (31.1%)	Technical sciences (25.1%)	Natural sciences, mathematics and informatics (24.6%)	Agricultural sciences (11.0%)	Humanities (5.1%)	Social Sciences (3.0%)
	<b>Economic activities</b>						
26	Manufacture of computer, electronic and optical products	<b>Technological area</b> <b>Information and communication technologies</b>  <i>Applied Informatics (software)</i>					
	<b>Services</b>						
61	Telecommunications						
62	Computer programming, consultancy and related activities						
72	Scientific research and development						
63	Information service activities						

### 3. Identification of technological field “Biotechnologies”

		R & D expenditure by field of science during the 2008-2012					
		Medical sciences (31.1%)	Technical sciences (25.1%)	Natural sciences, mathematics and informatics (24.6%)	Agricultural sciences (11.0%)	Humanities (5.1%)	Social Sciences (3.0%)
	<b>Economic activities</b>						
26	Manufacture of computer, electronic and optical products	<b>Technological area</b> <b>Biotechnology</b>  <i>(food, cosmetics, paper, packaging)</i>					
10	Manufacture of food products						
	<b>Services</b>						
62	Computer programming, consultancy and related activities						
72	Scientific research and development						

### 4. Identification of technological field “Nanotechnologies”

		R & D expenditure by field of science during the 2008-2012					
		Medical sciences (31.1%)	Technical sciences (25.1%)	Natural sciences, mathematics and informatics (24.6%)	Agricultural sciences (11.0%)	Humanities (5.1%)	Social Sciences (3.0%)
	<b>Economic activities</b>						
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	<b>Technological area</b> <b>Nanotechnology</b>  <i>(medicine, electronics, new products, textiles and clothing, cosmetics)</i>					
26	Manufacture of computer, electronic and optical products						
20	Manufacture of chemicals and chemical products						
25	Manufacture of fabricated metal products, except machinery and equipment						
23	Manufacture of other non-metallic mineral products						
14	Manufacture of wearing apparel						
	<b>Services</b>						
62	Computer programming, consultancy and related activities						
72	Scientific research and development						
71	Architectural and engineering activities; technical testing and analysis						

### 5. Identification of technological field “Creative Industries”, including cultural industries

		R & D expenditure by field of science during the 2008-2012					
		Medical sciences (31.1%)	Technical sciences (25.1%)	Natural sciences, mathematics and informatics (24.6%)	Agricultural sciences (11.0%)	Humanities (5.1%)	Social Sciences (3.0%)
	<b>Economic activities</b>						
26	Manufacture of computer, electronic and optical products	<p>Technological area</p> <p><b>Creative Industries, including cultural</b></p> <p><i>(Production of movies and TV shows, and broadcasting radio and television programs, sound recording and music publishing)</i></p>					
	<b>Services</b>						
62	Computer programming, consultancy and related activities						
72	Scientific research and development						
63	Information service activities						
59	Motion picture, video and television programme production, sound recording and music publishing activities						
60	Programming and broadcasting activities						

## 6. Identification of technological field “Pharmacy”

		R & D expenditure by field of science during the 2008-2012					
		Medical sciences (31.1%)	Technical sciences (25.1%)	Natural sciences, mathematics and informatics (24.6%)	Agricultural sciences (11.0%)	Humanities (5.1%)	Social Sciences (3.0%)
	<b>Economic activities</b>						
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	<p>Technological area</p> <p><b>Pharmacy</b></p>					
	<b>Services</b>						
62	Computer programming, consultancy and related activities						
72	Scientific research and development						

## 7. Identification of technological field “Foodstuff Industry”

		R & D expenditure by field of science during the 2008-2012					
		Medical sciences (31.1%)	Technical sciences (25.1%)	Natural sciences, mathematics and informatics (24.6%)	Agricultural sciences (11.0%)	Humanities (5.1%)	Social Sciences (3.0%)
	<b>Economic activities</b>						
10	Manufacture of food products	<p>Technological area</p> <p><b>Food Industry</b></p> <p><i>(ecologically clean products)</i></p>					
28	Manufacture of machinery and equipment n.e.c.						
	<b>Services</b>						
62	Computer programming, consultancy and related activities						
72	Scientific research and development						
46	Wholesale trade, except of motor vehicles and motorcycles						

The identified technological areas as result of this analysis are as follows: Mechatronics and clean technologies, ICT, Biotechnology, Nanotechnology, Creative industries, Pharmacy, Food industry. With reference to the existing and expected tendencies these technological areas are summarized in four

thematic fields (Mechatronics and clean technologies, Informatics and ICT, Industry for health life and biotechnology, New technologies in creative and recreation industry) that clearer reflect the existing potential and future opportunities for smart specialization of the country.

### 2.17. SWOT analysis of the innovation and scientific research potential

<p style="text-align: center;"><b>Strengths</b></p> <ul style="list-style-type: none"> <li>• Availability of a few enterprises with high growth;</li> <li>• accumulated experience and investments in mechatronics-related industries;</li> <li>• High share of the university graduates;</li> <li>• Tradition in the fundamental research including biotechnology;</li> <li>• Highly qualified researchers in the field of physics, chemistry, computer technologies and biotechnologies;</li> <li>• High growth in the cultural and creative industries.</li> </ul>	<p style="text-align: center;"><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>• Limited innovation dynamics as demonstrated by global patenting and high-tech exports ;</li> <li>• Inefficient educational system and shortage of qualified work force (despite the high share of graduates);</li> <li>• Low share of GERD/GDP;</li> <li>• Low share of BERD/GDP;</li> <li>• Low propensity of SMEs to network for innovation activities;</li> <li>• Limited business-academia cooperation;</li> <li>• “Brain drain”;</li> <li>• Low entrepreneurial and innovation culture.</li> </ul>
<p style="text-align: center;"><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Emerging strengths can attract investments in leading high-tech sectors;</li> <li>• Availability of EU competitive funds and performance reserve towards improving the innovation;</li> <li>• Innovation and entrepreneurial culture of the young generation;</li> <li>• Bulgarian Diaspora scientists and potential of brain circulation;</li> <li>• Increasing global research collaboration trends.</li> </ul>	<p style="text-align: center;"><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Aging of highly qualified professors and researchers;</li> <li>• Opportunities for qualified researchers to work abroad with better conditions;</li> <li>• Rapidly changing environment.</li> </ul>

Policies need to:

- Build on strengths hence invest in mechatronics and bio-tech related sectors and nurture fundamental research that can harness entrepreneurial discovery;
- Eliminate weaknesses by improving the quality to the educated labour force rather than limit success in high shares of educated labour force;
- Exploit opportunities by addressing competitive funding of the EU through support to excellence, take advantage of the existence of the Bulgarian Diaspora by helping researchers to repatriate provisionally or permanently and share their knowledge, give the young generation better opportunities to enterprise, focus on few clusters with potential to attract investors;



- Mitigate the effect of threats by training and hiring new researchers to make up for the aging qualified personnel and compete with other countries attracting them, as well as exploit flexibility and SS to adapt to changing global competitive pressures.

## 3. ICT and ICT potential

Information and communication technologies (ICT) are one of the key drivers for building a competitive economy based on knowledge and innovation. The ICT sector policy is a sectoral horizontal policy with an impact on all social and economic sectors, and as such it can be performed only through concerted and coordinated efforts of all state institutions and with the participation of the representative organizations of the business and civil society. This policy should contribute to significant, smart, sustainable and inclusive digital growth to ensure maximum use of the innovative economic and social potential of ICT.

### 3.18. Review of the existing infrastructure and existing services

#### ✓ *Broadband infrastructure / access*

The Digital Agenda for Europe highlights the need to ensure the development and deployment of high-speed broadband access for all and to facilitate investment in the new very fast open and competitive Internet networks that will be the arteries of a future economy and an essential prerequisite for widespread use of ICT-based e-services for citizens, businesses and government.

Bulgaria has uneven broadband coverage. For example, the capital Sofia, lags behind the leading areas with standard coverage but is first in terms of NGA coverage. Tourist areas, such as the coastal areas, are among the leading with 100% standard fixed broadband coverage. The coverage in most of the regions is 80% and 94%. Those in northwestern Bulgaria have the lowest coverage values starting below 50% and reaching only up to 70%. Most of the regions in the country have coverage of above 50%.

With the penetration of broadband access Bulgaria falls further behind and the country is on one of the lowest ranking in EU with only 19%, mostly due to the situation in the remote, sparsely populated and rural areas. Although with regard to the penetration of broadband access of at least 30 Mbps, Bulgaria is among the leaders in Europe with 39%, it falls behind as regarding access to super-high-speed (> 100 Mbps) - 1.2% at average values for Europe of 3.4% of all the subscriptions.

Total for Bulgaria, 90% of the population has access to broadband Internet, but the difference between the regions is significant - less than 60% of the rural population have access to this service, while the average for all rural areas in the EU is just under 85 %. According to data from the National Statistical Institute (NSI) in 2013, 53.7% of households have Internet access, and by development regions, these data are respectively SWR - 64.3%; SCR - 52.7%; SER - 46.5%; NER - 51.5%; NCR - 49.6%; and NWR - 42.8%.

Electronic exclusion of rural areas in Bulgaria (nearly 4 000 villages) makes them less dynamic, with reduced competitiveness and less attractive to investors and citizens.

Due to the presence of "market failure" in the most underdeveloped regions, a state intervention is needed to ensure broadband access in these areas. Simultaneously, it is necessary to support the increase of digital literacy of citizens, the development of e-government services. Deployment of ICT in enterprises to satisfy the demand of broadband Internet and ICT-based applications and services to bridge the digital divide and stimulate digital growth primarily in lagging regions.

#### ✓ *e-Government*

Electronic delivery of public services is a key driver for improving the business environment and is particularly important in times of austerity, in which there is pressure on government finances. According to an analysis of the Ministry of Economy and Energy, the administrative burden on businesses in 2011 amounted to more than BGN 2 (two) billion per year. In a coordinated, standardized and practical development of e-government, precious resources shall be freed up (time, people and finances) that are currently used inefficiently for administrative services. Investments in setting up e-government shall stimulate further growth of the ICT sector in Bulgaria as they are implemented on the basis of contracts

and various forms of public-private partnerships. Although, significant progress in the development of e-government is reported in the last four years, there are still many obstacles for the realization of its full potential.

According to the latest 2013 Report of the Council of Ministers on the state of the administration, only 101 (17%) out of 586 administrations provide electronic administrative services – 30 central administrations and 71 local administrations. In 2012, the Bulgarian authorities have provided a total of 1 231 electronic services out of which 1 913 are primary, and only 57 are complex services. Here it should be taken into account that a lot of services are offered by a variety local administrations; these services as well as the number of administrations offering them are not to be found in the summarized information by the administration.

According to the summarized information in the Report for the state in administration for 2013 the offered services (e-services) by the administration are as follows:

- 838 pcs. e-services like: applications and documents could be filled and submitted on the internet-site (third level services);
- 569 pcs. e-services like: filling documents, submitting of applications, payment of fees and issuance and receiving of relative documents is performed on internet (fourth level services).

The services of 90 administrations (89% of administration offering e-administrative services) are accessible on internet portal, developed specially for the relative administration, 10% of the administrations have reported offering services through the Single e-government portal, 7% - through portal, developed for a group of administrations, and 3% - through portal, developed for other administration, 9% reported services offered are accessible on two portals.

The connection of all structures in a single public communication infrastructure is essential for the development of e-governance. Since 2012, Bulgaria has a Single Electronic Communications Network of the State Administration and the Needs of National Security (SECNSANNS) that provides connectivity for voice, data and video sharing between the central and local executive authorities in the regional cities and is the main e-government infrastructure. In 2013, 91 (15.53%) of the administrations - central (ministries, agencies, regulatory bodies etc.), regional and local (municipalities) authorities, are connected to SECNSANNS, while 495 (84.47%) are not connected and use alternative Internet providers.

The main problems for the development of e-government are the following:

- The Single Electronic Communications Network of the State Administration does not provide fibre optic connectivity to all public administrative structures.
- Full integration of the administration data and full interoperability between existing and building systems is not yet achieved Small part of the registers of the state administration are connected.
- Cross border interoperability within the EU of the information infrastructure for services with major economic and social importance is not ensured.
- The systems ensuring data security are not yet built. This includes; identification and authentication, data protection, cybercrime protection, consumer protection etc.
- Complete provision of administrative e-services, including delivery and payment, as is the ideology of e-government, is not yet provided. The fact that part of the services require personal presence and / or submission of original documents is one of the main reasons for the Bulgarian consumers to not use them.

## ✓ *Education, research and innovation infrastructure*

### **Education, research and innovation e-infrastructure**

ICT infrastructure (communication infrastructure, equipment and specialized software applications) in the system of education and science is largely physically and morally outdated. Although, upgrading of computers in schools began in 2012, terminal jobs were equipped only in 500 schools out of more than 2300 schools in the education system. There have been no serious efforts to create a modern cloud infrastructure based on which to set up conditions for the creation of and access to modern educational content thus creating a student-oriented learning environment.

An important part of research infrastructure is the electronic research infrastructure (e-Infrastructure), which is a new research environment in which all researchers - whether working within their organization or in national or multinational scientific initiatives have shared remote access to unique or distributed scientific equipment and research data, regardless of their type and location in the world. The Bulgarian Research and Education Network (BREN), which provides access of universities and research organizations to the European and global research networks, the GRID infrastructure of the Bulgarian Academy of Sciences and the National Centre for Supercomputing Applications (NCSA ) and other that are included in the Roadmap for National Scientific Infrastructure and need investment support for further modernization and integration with the European research infrastructures act as elements of the European research e-infrastructures in Bulgaria

### **ICT clusters**

Innovation infrastructure in ICT is offered by the established ICT clusters that act as platforms for the development of innovative companies and innovative ideas and catalyse the process of commercialization of research:

The "**Cluster information and communication technologies**" foundation is a cluster initiative supporting and encouraging the creation and development of clusters in the field of information and communication technologies in Bulgaria and has established itself as a centre of cluster knowledge in Bulgaria. The organization is a member of several European cluster platforms and networks and maintains very good relations with many European and global partners. The main objective of the organization is to increase the competitiveness of the small and medium-size enterprises in the ICT sector by promoting cooperation and creating new business opportunities the foundation is particularly effective in its support for small and medium-size enterprises in the ICT sector with regard to technology, research and development and the creation of management skills.

"**ICT Cluster Plovdiv**" encourages, fosters, and develops the collaboration and cooperation of private companies, educational institutions and state institutions in the area of ICT, creating favourable conditions for their development and enhancing their competitiveness at national and international level.

A targeted support is needed for the development of ICT clusters to take advantage of their potential to enhance the competitiveness of science and entrepreneurship in Bulgaria by improving the exchange of knowledge between academia and the business community. They can be used as locomotives for regional smart specialization in Bulgaria.

### **3.19. Review of the expansion / development of the infrastructure**

Bulgaria is among the most advanced Member States in terms of the speed of the provided broadband access - more than 98.1% of the lines have speed above 2 Mbps, and over 74.1% have speed between 10 and 30 Mbps, which makes them ready for future Internet applications, such as high definition television and high quality video calls. This is largely due to the fact that the share of inherited outdated infrastructure is too small and much of the newly built fixed broadband lines are FTTx technology-based i.e. based on optical fibres. This creates a good basis for the forthcoming widespread deployment of Next

Generation Access networks (NGA - Next Generation Access). MTITC drafted a National Plan for building Next Generation Access Networks, which target is to achieve full coverage throughout the country by 2020 at a speed exceeding 30 Mb/s and 90% access with a speed above 100 Mb/s and to increase the share of the population that uses Internet and electronic services to 75%. It is pending adoption by the Council of Ministers. In a nutshell, the draft National Plan for Next Generation Access Networks (NGN) includes:

- Investment projects for building broadband access in remote, sparsely populated and rural areas, financed by the new operational programs, the state budget and public-private partnerships in the period 2014-2020.
- Technological renovation and upgrade of existing broadband networks aiming at achieving necessary parameters ensuring possibilities for provision of new, modern electronic services with considerably higher speed in the period 2014-2020.
- Step by step building of Next Generation Access networks (NGA) in the period 2015-2020.

The activities under the Plan shall be financed by the new operational programs and various public-private partnerships.

Meanwhile, the first project for setting up broadband infrastructure in rural areas has been launched, funded with EUR 20 million through OP Regional Development.<sup>28</sup> This is the largest project in this area for the whole programming period 2007-2013. Within the frames of the Single Electronic Communications Network of State Administration, the project shall provide high speed NGA Internet to 29 municipal centres and 24 small settlements located on an area of 7 919 square kilometres (7% of the territory of the country), with population of 277 765 (4% of the entire population of the country), which will create prerequisites for e-Government development in these regions. Part of the newly built infrastructure under the project will be available for use by the business for the development of the telecommunication market and it will be provided to telecommunication operators by tender procedures.

### 3.20. Expenditures and investments in ICT by enterprises

According to the latest data of the NSI, ICT expenditures incurred by enterprises in Bulgaria in 2011 were BGN 2 575 858 thousand which was by 30.21% more than the ICT expenditures in 2009 amounting to BGN 1 978 225 thousand. Interestingly, small enterprises (with an average headcount of less than 50 people) have incurred most of the ICT costs in 2011 - BGN 935 930 thousand, while the larger enterprises with average headcount of more than 250 people have incurred less ICT costs - BGN 744 547 thousand. In 2009, the situation is completely different - ICT costs incurred by large enterprises (BGN 1 481 526 thousand) exceed several times those incurred by small (BGN 291 165 thousand.) and medium-size (BGN 205 534 thousand) enterprises. **Overall expenditures and investments that businesses make for ICT products and services are still low, indicating a low level of implementation of ICT.**

In 2011, most of the companies' expenditures have been for IT services (BGN 1 305 296 thousand), while in 2009 most of the expenditures have been for IT and telecommunications goods (BGN 1 078 890 thousand). The trend from 2009 is maintained in 2011 and least costs by the enterprises are made for ICT leases - BGN 18 416 thousand in 2011 and BGN 17 706 thousand in 2009.

In 2011 the largest expenditures for ICT are made by the economic activity "Wholesale and retail trade; repair of motor vehicles and motorcycles" - BGN 1 385 705 thousand, followed by the ICT sector - BGN 661 674 thousand and economic activity "Production and distribution of information and creative

<sup>28</sup> Project BG161PO001 / 2.2-01 / 2011 "Support for the development of critical, secure, safe and reliable public ICT infrastructure" with beneficiary EA "Electronic Communications Networks and information Systems."

products; telecommunications" - BGN 609 289 thousand. The least expenditures made are under economic activity "Real estate activities" - BGN 6 508 thousand.

<b>ICT expenditure</b>								
Types of goods	2009				2011			
	Groups of enterprises by number of employees				Groups of enterprises by number of employees			
	Общо	10-49	50 - 249	250 +	Общо	10-49	50 - 249	250 +
Leasing of ICT	17706	8548	5926	3232	18416	4937	2159	11321
IT services	623490	164248	100549	358692	1305296	442885	579348	283063
Software produced for own account	20071	9923	6204	3944	32862	22564	4091	6207
Software package or manufactured on demand	201499	23762	26186	151551	292317	169987	19441	102888
Consumer electronic equipment and other ICT goods	36569	6922	8302	21345	69894	43279	6079	20536
IT and telecommunications goods	1078890	77762	58367	942762	857073	252278	284263	320532
<i>Source: NSI, 13/12/2012</i>								

**Investments** made by enterprises in Bulgaria in 2011 amount to BGN 389 799 thousand and are comparable to those made in 2009 - BGN 388 198 thousand. In 2011, investments in ICT by small enterprises (with an average headcount of less than 50 people) amount to BGN 154 747 thousand and are comparable to those of large enterprises with average headcount of more than 250 - BGN 174 111 thousand. In 2009 ICT investments made by large enterprises (BGN 350 540 thousand) are 17 times more than those made by small enterprises - BGN 20 489 thousand.

In 2011 and in 2009 the most investments made are for IT and communications goods. In 2009 those investments made by the enterprises amount to BGN 282 598 thousand while in 2011 there is a decrease by 44.39% and the investments amount to BGN 195 709 thousand. Both in 2011 and 2009 the least investments made are for consumer electronic equipment and other ICT goods and in 2011 the investments amount to BGN 21 087 thousand while in 2009 they are BGN 6 827 thousand.

In 2011 the biggest ICT investments are made in the ICT sector - BGN 175 445 thousand, followed by expenditures by economic activity "Production and distribution of information and creative products; telecommunications" - BGN 172 098 thousand and "Wholesale and retail trade; repair of motor vehicles and motorcycles" - BGN 104 959 thousand. The least investments made are under economic activity "Real estate activities" - only BGN 747 thousand.

<b>Capitalized ICT expenditures (investments)</b>								
Types of goods	2009				2011			
	Groups of enterprises by number of employees				Groups of enterprises by number of employees			
	Общо	10-49	50 - 249	250 +	Общо	10-49	50 - 249	250 +
IT services	50942	6927	2624	41391	58159	26987	4330	26843
Software package or manufactured on demand	47831	3499	3260	41072	114844	46467	8515	59862
Consumer electronic equipment and other ICT goods	6827	1173	3315	2340	21087	12008	1286	7793
IT and telecommunications goods	282598	8890	7971	265737	195709	69285	46812	79613
<i>Source: NSI, 13/12/2012</i>								

### 3.21. Mapping the ICT sector

The ICT sector includes sub-sectors like: production of computer hardware, software developers; software integrators, telecom services (Internet and telephone services) and IT consultants. As per the National Statistical Institute data for 2011, the ICT sector in the country includes little more than 9 000 businesses and for the last three years prevailing among them are the small enterprises with up to 10 people (about 89%) while the medium-size enterprises with more than 50 people are only 11%. ICT sector disposes of 1% of the employees in the national economy and accounts for 3% of GDP. Telecommunications companies are responsible for 73% of the GDP of the Bulgarian ICT sector, estimated at more than EUR 2.13 billion. Sofia is the centre of the ICT sector where more than 85% of the employed are concentrated.

The ICT sector in Bulgaria is very viable and it has demonstrated steady growth even during the global economic crisis and for the last five years it has continued to create new jobs and the average wages continuously increase by 36% on average per annum. The sector has significant potential for innovation and export-oriented growth and in the last five years it is characterized by steady growth in terms of revenues (14%), profits (83%) and exports of ICT products and services, which has reached EUR 2 billion in 2011 (47% of total exports of business services).<sup>29</sup> Value added generated in the ICT sector has also increased by 10.1% in 2011 in comparison to 2008, and the major contributor are the enterprises in the sub-sector "Activities in the field of IT", where growth is the highest (39.8%). The sector has a high R&D intensity and as per the MTITC data, the expenditures for R&D in the ICT sector account for 11% of the total R & D expenditures in the economy. The R&D and innovations potential of the ICT sector is confirmed by its successful participation in the Seventh Framework Program of the EU. Based on the MTITC data, at the end of 2013 the ICT financing received amounts to EUR 16 707 261 million and out of 52 participants the largest is the share of the high-tech SMEs - 50.56%. The main problems faced by the sector are the shortage of ICT specialists, as the tertiary and secondary education cannot meet the human capital requirements, and the existing regulatory and administrative barriers.

**Foreign investments** in the ICT sector are considerable. Among the largest sources of foreign direct investments in the sphere of information and communications technologies in Bulgaria are the mobile operators, which are owned by foreign giants<sup>30</sup>. - "M-Tel" is part of Telekom Austria Group, "Globule" - part of the Norwegian Telenor / OTE, and "Viacom" is owned by foreign investment funds. Apart from the information infrastructure, investments in Bulgaria are made in much "smarter" IT activities. Over the past decade Bulgaria and the ICT sector have established as a successful model not only for external centres for customer service and manufacturing software and hardware at low prices, but also for providing conditions for research and innovation, satisfying the high demands of multinational companies. This led to an increase in foreign investments, especially in the sub-sector "Activities in the field of IT", which covers most of the knowledge-intensive and innovative companies. In many cases, foreign investments and the establishment of global companies in the Bulgarian ICT sector followed the pattern of acquisition of Bulgarian companies with which the foreign companies have had partnership relations. The presence of R&D units of large ICT companies (SAP Labs, Siemens, Johnson Controls, VMware, Nemetschek, Sitel, Codix, Epic Electronics and more.) and the presence of Bulgarian companies creating innovative products and services for large multinational companies or in partnership with them (Sirma Solutions, Fadata, Interconsult Bulgaria, TechnoLogica, Datex, Telerik, MusalaSoft, Bianor,

---

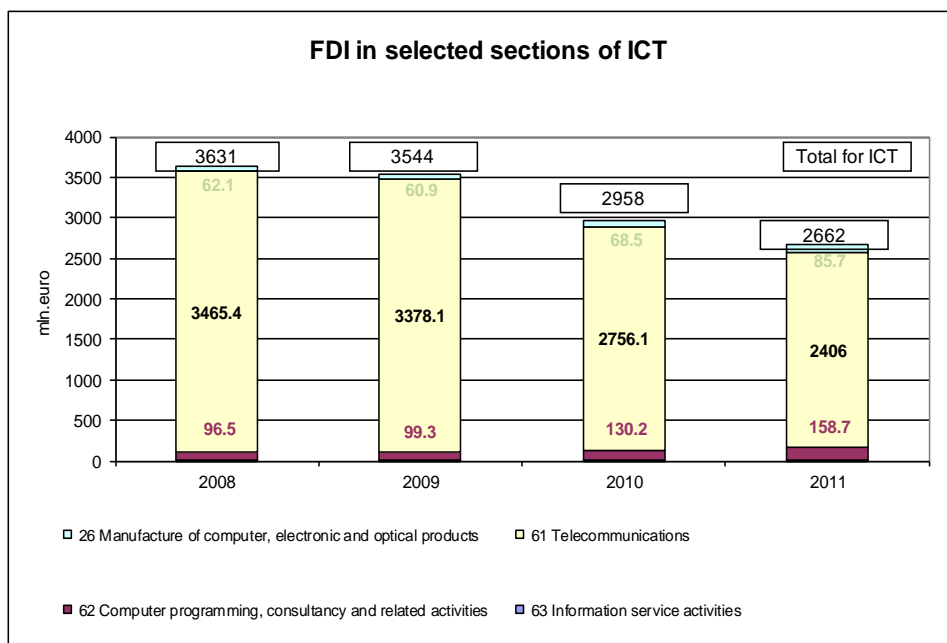
<sup>29</sup> Report of the World Bank

<sup>30</sup> "M-Tel" is part of Telekom Austria Group, "Globul" - part of the Norwegian Telenor / OTE, and "Vivacom" is owned by foreign investment funds.



Hemimont, Telelink, Chaos Group, Rila Solutions, AMK Drives and Controls, Optics, Samel-90, Daisy Technology etc. ), creates conditions for the growing visibility of the country internationally and for establishing it as a destination for outsourcing services and high-tech innovative developments.

### Foreign direct investments in selected sub-sectors of the ICT sector (in EUR million)



Source: NSI, 2013 (NACE 2008)

The Digital landscape is complex as it is highly volatile with important local weaknesses but rapid progress in both technological opportunities and funding schemes supported by the EU. In that sense policies can make a rapid contribution to growth or fail. What is needed in particular is speed in the:

- Modernization and development of research e-infrastructure - an opportunity for scientific excellence and utilization in the economy and social sectors;
- Development of centres of excellence in key ICT areas - an opportunity to enhance the competitiveness of research organizations and innovative companies on a global level;
- Selection and focus on niches in ICT requiring specific knowledge and higher skills;
- Expanding the scope of services offered ranging from outsourcing to developing their own software products, R&D activities and sale of own brands hardware.

### 3.22. Social factors / penetration of ICT and compliance with European Digital Agenda

A review of the data relating to Bulgaria's progress towards the objectives of the Digital Agenda for Europe at the end of 2013 (Digital Agenda for Europe) shows the following:

Purpose	Term	EU progress %	Bulgaria progress %
Basic broadband access for 100% of the population	2013	95.5	90
Broadband at 30 Mbps and more for 100% of the population	2020	18	39

Broadband at above 100 Mbps for 50% of the population	2020	3.4	1.2
33% of SMEs sell online	2015	13	4
50% of the population buy online	2015	45	6
20% of the population buy online cross-border	2015	11	<3
75% of the population use the Internet regularly	2015	72	51
60% of disadvantaged people use the Internet regularly	2015	57	31
15% of the population have never used the Internet	2015	20	41
50% of the population use e-Government services	2015	41	23
25% of the population use e-Government services provided entirely online.	2015	22	11
100% increase in public spending on research and technological development	2020		

*Source: Digital Agenda Scoreboard.*

Some of these results are excellent, but others raise concern and need adequate measures to address the lagging.

- **Digital literacy**

Adequate computer and Internet skills (digital literacy) are essential for the expansion of demand and use of ICT and ICT-based services and the development of economic sectors with high innovation potential.

In terms of computer skills, the country performs poorly compared to the European average levels. According to data from the Digital Agenda Scoreboard in 2012 over 40% of Bulgarian households do not use the Internet because of lack of necessary skills. This important barrier is particularly common among older people in rural areas and among ethnic minorities. Only 42% of the population have some computer skills which are well below the EU average of 67%. In 2013, people with medium or high Internet skills are 37% compared to the average for the EU of 47%. Interventions are needed at all levels of the education system and the system of training and retraining of employed, unemployed and disadvantaged people and groups to increase the digital literacy of citizens and avoid the so-called. Digital exclusion.

- **Use of the Internet by the population**

According to the performance of the Member States for 2013 in the Digital Agenda for Europe, Bulgaria is on one of the last places with regard to consumers who regularly and consistently use the Internet. 51% of the population in 2013 use the Internet regularly, at least once a week. Notwithstanding the growth of 5% compared to 2011 (46.4%), Bulgaria remains below the average level for Europe - 70%. Consumers between the age of 16 and 74 that regularly use the Internet in 2013 are 43% of the population of the country. People that have never used the Internet in Bulgaria in 2013 are 41%, and this is a decrease of 4% from the level in 2011, but remains well below the EU average of 22% (Country Fact Sheet).

- **Use of the Internet and ICT by enterprises**

In 2013, based on the NSI data, the percentage of enterprises with fixed broadband Internet is 77.9% while the total number of enterprises having access to the Internet is 89.1%. According to the Digital

Agenda for Europe in 2013, enterprises with fixed broadband Internet access are 78%, an increase of 9% compared to 2011, at EU average level of 90%.

According to the National Statistical Institute, in 2012, 49.5% of enterprises use automated data exchange with external ICT systems and 31.5 percent have automated business processes related to those of their suppliers and / or customers, but only 19.7% use enterprise resource planning (ERP) and only 15.1% - applications for managing information about clients (Customer Relationship Management -CRM). The low usage data is due to the fact that only every fourth enterprise uses ICT. Among the main reasons for this shortcoming is the lack of sufficient knowledge and skills of employees for work with ICT.

- **E-commerce**

Development of electronic commerce also lags behind the average in the EU27. In 2013, only 8% of the large and 5% of the small and medium-size enterprises buy online and there is a gradual increase of this indicator in the last two years by 2%. The share of the online purchases of the large enterprises is 4% and of the SMEs - 3%. In 2013, the online sales of large enterprises as a percentage of their turnover is 4% at 19% for EU27. SME online sales as a percentage of their turnover is within 1% at EU average of 8%. The share of individuals that have ordered goods and services online in 2013 is 12%, at EU average of 47%. Among the main reasons for the low usage of ICT in enterprises is the lack of sufficient knowledge and skills of employees for work with ICT.

- **Use of public e-services by citizens and enterprises**

Based on NSI data, in 2013, 22.6% of individuals have used the global network for interacting with the government or local authorities compared to 27% in 2012, while 8.5% have sent filled in forms (11% in 2011), at average values for EU respectively 44% in 2013 have interacted electronically with public authorities and 22% have sent filled in forms. Enterprises interact online more actively with public authorities compared to citizens - 83%, which is near the average for EU of 87%. In 2013, based on NSI data, enterprises use the global network to interact with public institutions for: receipt of information - 82.5%, downloading forms like tax return forms - 86.4%, sending filled in forms (like submission of statistical data) - 89.0%, sending tenders via the e-procurement system (e-procurement) (via the system itself not via e-mail) - 11.1%.

Significant progress is reported in the implementation of e-services where the growth for the last five years is 30% - in 2012 73% of the enterprises in Bulgaria have used e-services entirely in electronic format. Prevailing number of the local administrations offer a wide range of e-services to citizens and businesses, including financing under OPAC 2007-2013. Additional efforts will be made, as envisaged in the Strategy for the Development of Public Administration to 2020, in the field of complex administrative services where the compatibility of the used platforms is key as well as the interconnection and access to the records of public institutions. Despite positive developments in this area, it is important to note that Bulgaria does not report any progress with regard to sending electronically tender documents for public procurement. Only 10% of the companies make use of this type of service, the same as for 2008 as well. This means that e-government does not report progress as regards public procurement, but also has a negative effect on the improvement of transparency in this area of the public sector. The National Strategy for the Development of the Public Procurement Sector by 2020, adopted by the Council of Minister on 09.07.2014, offers a set of possible solutions in this particular direction.

The main challenge for the government is to stimulate significantly broader search of e-government services.

### 3.23. SWOT and ICT potential

## Strengths

- High level of broadband coverage and high-speed broadband;
- High penetration of broadband access of at least 30 Mbps;
- High level of Internet access for the households on a national scale;
- High level of broadband Internet access of enterprises;
- Accelerated pace of development of e-governance;
- 100% connectivity of all schools in Bulgaria to the Internet;
- High level of usage of public e-services by businesses;
- Steady growth in the ICT sector (including exports);
- Higher wages in the ICT sector much above other sectors;
- High potential for research and innovation in the ICT sector;
- Active presence of leading multinational companies, with research centres and BPO centres in the country;
- Positioning the country as location for the detection of near-shore centres;
- Traditionally good educational system in the field;
- Availability of local investment funds with a focus on ICT;
- Interaction with the big international companies;
- Availability of ICT clusters in the regions will lead to higher smart growth at regional level.

## Weaknesses

- Uneven broadband coverage (regional imbalances) with low penetration of broadband access in remote, sparsely populated and rural areas;
- The Single Electronic Communications Network of the State Administration does not provide fibre optic connectivity to all public administrative structures;
- Small number of public e-services that are offered only online;
- Lack of cross border interoperability of the information infrastructure for services with major economic and social importance;
- Falling behind in the implementation of e-procurement;
- Falling behind in the modernization of the ICT infrastructure for education and research and declining quality of education in ICT;
- Low level of digital literacy of the population compared to the average for EU;
- Low level of usage of the Internet and Internet-based services by the population, 41% of the population have never used the Internet;
- Low level of usage of the Internet by disadvantaged people;
- Low level of implementation and use of ICT by SMEs in other industrial sectors;
- Low level of digital literacy of the population;
- Low level of investments in ICT by enterprises;
- Low level of development of e-commerce compared to the average for EU;
- Falling behind in the modernization of the ICT infrastructure in education and science;
- Shortage of ICT specialists "Brain drain" in the ICT sector increases;
- Strong concentration of the ICT business in Sofia;
- Small local market, limiting the opportunities for demand growth.

Opportunities	Threats
<ul style="list-style-type: none"> <li>• Next-Generation Access networks(NGA)</li> <li>• Potential of e-governance and mainstreaming ICT in enterprises</li> <li>• Increased demand of software products and services in the world</li> <li>• Penetration of the markets in the region</li> <li>• Development of the industry in the towns outside Sofia</li> <li>• Increasing multinational investments in ICT sector.</li> </ul>	<ul style="list-style-type: none"> <li>• Digital "exclusion" of remote, sparsely populated and rural areas and disadvantaged people;</li> <li>• Stagnation in the development of ICT infrastructure and e-governance;</li> <li>• The dysfunctional ecosystem for innovations (science-education-innovations);</li> <li>• Without large scale implementation and usage of ICT in the industrial sectors and especially by SMEs, their growth and export potential shall be limited;</li> <li>• Inability of the education and training system to cover the needs of the ICT. industry for qualified staff;</li> <li>• Impossibility for retaining of highly qualified experts;</li> <li>• Failure to stimulate demand in the public sector.</li> </ul>

As a result of the analyses the following priority areas of activity are highlighted to achieve smart, sustainable and inclusive digital growth in 2014-2020. They are selected in a way to secure balanced support for demand and supply of ICT and to achieve sustainable economic and social benefits from their broad implementation.

- Securement of high speed and ultra-high speed broadband access all over the country by development and modernizing of the broadband infrastructure;
- Accelerated development of e-governance and public e-services, including trans-border e-services of high economic and society interest;
- Development of balanced innovative eco system in the area of ICT through support of research and innovations and growth of ICT sector;
- Promotion of broad use of ICT by the enterprises, particularly SME's, citizens and public sector to cope with main economic and social challenges.

## 4. Summarized SWOT analysis

Conclusions for further necessary action are based on summarized SWOT analysis.

Macro-economic and structural policies are needed to exploit opportunities and prepare to face threats or at least mitigate their damage, if they occur. In that sense policies need to:

- Exploit strengths by focusing on ICT and cultural heritage, as well as give opportunities to the well-educated to remain in the country
- Address weaknesses through focusing on clean energy and again improve the opportunities to the labour force
- Exploit opportunities by supporting competitiveness (through innovation as low labour cost is not ensuring quality of life) to exploit global market opportunities and attract FDI

Prepare for potentially higher global competition by support competitiveness in areas where the Bulgarian economy is strong.

Policies need to:

- Build on strengths hence invest in mechatronics and bio-tech related sectors and nurture fundamental research that can harness entrepreneurial discovery;
- Eliminate weaknesses by improving the quality to the educated labour force rather than limit success in high shares of educated labour force;
- Exploit opportunities by addressing competitive funding of the EU through support to excellence, take advantage of the existence of the Bulgarian Diaspora by helping researchers to repatriate provisionally or permanently and share their knowledge, give the young generation better opportunities to enterprise, focus on few clusters with potential to attract investors;

Mitigate the effect of threats by training and hiring new researchers to make up for the aging qualified personnel and compete with other countries attracting them, as well as exploit flexibility and SS to adapt to changing global competitive pressures.

As a result of the analyses the following priority areas of activity are highlighted to achieve smart, sustainable and inclusive digital growth in 2014-2020. They are selected in a way to secure balanced support for demand and supply of ICT and to achieve sustainable economic and social benefits from their broad implementation.

- Securement of high speed and ultra-high speed broadband access all over the country by development and modernizing of the broadband infrastructure;
- Accelerated development of e-governance and public e-services, including trans-border e-services of high economic and society interest;
- Development of balanced innovative eco system in the area of ICT through support of research and innovations and growth of ICT sector;
- Promotion of broad use of ICT by the enterprises, particularly SME's, citizens and public sector to cope with main economic and social challenges.

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Macroeconomic stability and low taxes;</li> <li>• Well-developed distribution network and good relations with neighbouring countries;</li> </ul>	<ul style="list-style-type: none"> <li>• Aging population;</li> <li>• Small and not sophisticated national market;</li> <li>• Specialisation in low-tech sectors</li> </ul>

- Well-developed telecommunications services such in IT, research and development;
- High share of population with secondary and higher education;
- Rich cultural and historical cultural and historical heritage;
- Increasing exports and FDI;
- Availability of a few enterprises with high growth;
- accumulated experience and investments in mechatronics-related industries;
- High share of the university graduates;
- Tradition in the fundamental research including biotechnology;
- Highly qualified researchers in the field of physics, chemistry, computer technologies and biotechnologies;
- High growth in the cultural and creative industries;
- High level of broadband coverage and high-speed broadband;
- High penetration of broadband access of at least 30 Mbps;
- High level of Internet access for the households on a national scale;
- High level of broadband Internet access of enterprises;
- Accelerated pace of development of e-governance;
- 100% connectivity of all schools in Bulgaria to the Internet;
- High level of usage of public e-services by businesses;
- Steady growth in the ICT sector (including exports);
- Higher wages in the ICT sector much above other sectors;
- High potential for research and innovation in the ICT sector;
- Active presence of leading multinational companies, with research centres and BPO centres in the country;
- Positioning the country as location for the detection of near-shore centres;
- Traditionally good educational system in the field;
- Availability of local investment

- Low labour productivity;
- Relatively low economic activity of the population of working age;
- High share of youth unemployment and long-term unemployment;
- High dependence of the economy on imported resources and energy;
- Low energy efficiency;
- High share of informal sector;
- Bureaucracy for investments (licenses and permits);
- Limited innovation dynamics as demonstrated by global patenting and high-tech exports ;
- Inefficient educational system and shortage of qualified work force (despite the high share of graduates);
- Low share of GERD/GDP;
- Low share of BERD/GDP;
- Low propensity of SMEs to network for innovation activities;
- Limited business-academia cooperation;
- “Brain drain”;
- Low entrepreneurial and innovation culture;
- Uneven broadband coverage (regional imbalances) with low penetration of broadband access in remote, sparsely populated and rural areas;
- The Single Electronic Communications Network of the State Administration does not provide fibre optic connectivity to all public administrative structures;
- Small number of public e-services that are offered only online;
- Lack of cross border interoperability of the information infrastructure for services with major economic and social importance;
- Falling behind in the implementation of e-procurement;
- Falling behind in the modernization of the ICT infrastructure for education and research and declining quality of education in ICT;
- Low level of digital literacy of the population compared to the average for EU;
- Low level of usage of the Internet and Internet-based services by the population, 41% of the population have never used the Internet;



funds with a focus on ICT;

- Interaction with the big international companies;
- Availability of ICT clusters in the regions will lead to higher smart growth at regional level.

- Low level of usage of the Internet by disadvantaged people;
- Low level of implementation and use of ICT by SMEs in other industrial sectors;
- Low level of digital literacy of the population;
- Low level of investments in ICT by enterprises;
- Low level of development of e-commerce compared to the average for EU;
- Falling behind in the modernization of the ICT infrastructure in education and science;
- Shortage of ICT specialists "Brain drain" in the ICT sector increases;
- Strong concentration of the ICT business in Sofia;
- Small local market, limiting the opportunities for demand growth.

## Opportunities

- Act as gateway to the EU for global FDI flows;
- Access to EU markets;
- Access to non-EU markets such as Russia, CIS and the Middle East;
- New electronic administrative services;
- Potential of cluster externalities;
- Emerging strengths can attract investments in leading high-tech sectors;
- Availability of EU competitive funds and performance reserve towards improving the innovation;
- Innovation and entrepreneurial culture of the young generation;
- Bulgarian Diaspora scientists and potential of brain circulation;
- Increasing global research collaboration trends;
- Next-Generation Access networks(NGA)
- Potential of e-governance and mainstreaming ICT in enterprises
- Increased demand of software products and services in the world
- Penetration of the markets in the region
- Development of the industry in the towns outside Sofia

## Threats

- Slow-down of economic growth of trading partners;
- Rapidly increasing competitiveness of current competitors;
- Increasing negative demographic trend;
- Ineffective absorption of EU structural and national funds and other financial instruments;
- Increasing competition from third world countries in the Balkans and Asia;
- Economic sanctions on Russia;
- Aging of highly qualified professors and researchers;
- Opportunities for qualified researchers to work abroad with better conditions;
- Rapidly changing environment.
- Digital "exclusion" of remote, sparsely populated and rural areas and disadvantaged people;
- Stagnation in the development of ICT infrastructure and e-governance;
- The dysfunctional ecosystem for innovations (science-education-innovations);
- Without large scale implementation and usage of ICT in the industrial sectors and especially by SMEs, their growth and export potential shall be limited;
- Inability of the education and training

- Increasing multinational investments in ICT sector.

system to cover the needs of the ICT.

- Impossibility for retaining of highly qualified experts;
- Failure to stimulate demand in the public sector.

## 5. Innovation Strategy for Smart Specialization 2014-2020

### 5.24. Vision

**Vision:** By 2020 Bulgaria must make a qualitative leap in its innovation performance at EU level to tackle public challenges in the field of demography (reverse brain drain and youth entrepreneurship), sustainable development, intellectual capital and the nation's health.

**Strategic Goal:** By 2020, Bulgaria will move from the group of "modest innovators"<sup>31</sup> to the "moderate innovators" group.

Each year the European Commission published an Innovations Score board where based on integrated methodology each EU country is assessed and compared in terms of its performance. Trends and progress of each Member State are evaluated. Evaluation is made by using a set of indicators that allow assessing human resources, funding and support for businesses, corporate investment, networks and entrepreneurship, intellectual property, innovators and economic effects. Tracking changes in the value of these indicators will allow taking effective management decisions. The required growth rate and the values which the country should reach are described in Section 8 of the Strategy. Take change in the value of indicators in practice is the external measurement of innovation policy.

In practice, this change in the indicators will be implemented in an effective policy to promote:

- Innovation, research and development of human capital,
- Investment in high-tech areas in which Bulgaria has traditions, good professionals and successfully competes in the international market,
- Emerging export-oriented industries.

Development of areas with growth potential will attract young people and reduce the "brain drain." It will improve living conditions and nutrition of the population and many other factors which affect the life of people, including general labour conditions.

Innovation strategy for smart specialization is a new approach to economic development, which is based on targeted support for identified technological niches that are promising and where business is interested to invest, and where human potential is available.

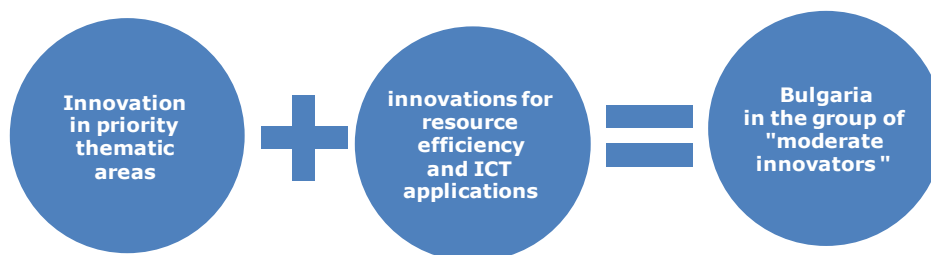
**The strategic goal** will be realized by achieving two operational objectives:

**Objective 1:** Focus the investment for the development of innovation potential in the smart thematic areas (for creation and development of new technologies leading to competitive advantages and increase in the added value of domestic products and services).

---

<sup>31</sup> IU Scoreboard – Innovation Scoreboard

**Objective 2:** Support for accelerated absorption of technologies, methods and others. Improving resource efficiency and application of ICT in enterprises from all industries



For the purposes of monitoring and evaluating the implementation of the strategy relies on the use of performance indicators of Bulgaria, according to the EU Innovation Scoreboard<sup>32</sup>. In respect of objective 1, sector-specific indicators of development are used. With regard to Objective 2, the approach of indicators from the Score board for resource-efficiency in EU is used (Resource Efficiency Scoreboard, excluding the "Nature and Eco-systems") and a panel of EU digital agenda (Digital Agenda Scoreboard) for businesses (% SMEs using ICT based applications, % SMEs selling online).

The Innovation strategy for smart specialization will mainly be implemented through the operational programs financed by EU funds. Individual operational programs are developed with specific monitoring procedures and indicators, so they are not considered here. These indicators are agreed with the EC.

Achieving these objectives will be realized through the development of "the entrepreneurial discovery process"

### 5.25. Description of Objectives

#### 5.25.1. Wide consultation procedure

Shaping the vision, strategic objectives and operational objectives, as well as identification of technology areas is realized based on in-depth analyses (Appendix 3), continuous communications - meetings, focus groups (under the guidance of experts from the World Bank), thematic meetings to identify potential in specific research areas, business areas, inquiries and e-mail responses. (Appendix 2). Any suggestions, comments and opinions are summarized and carefully considered and accordingly incorporated in the strategy texts. Only on the topic of clusters there is a feedback from representatives of more than 230 enterprises. For two years and a half, all versions of the strategy have been communicated to all employers' organizations and the majority of professional organizations covering over 70 000 businesses and organizations. The draft strategy was presented at various forums and events, including meetings of the Regional Development Councils - either initiated by the leading ministry or at the initiative of the Councils themselves. As a result of the discussions, we have received feedback expressing the opinion of the relevant local authorities with suggestions for the potential of businesses and universities (Regional Administrations of Burgas, Ruse, Stara Zagora, Smolyan and others). When starting the process of developing the strategy, the representatives of the central authorities and their regional representatives were more active<sup>33</sup>. With the expansion of the discussions on Operational Programmes and on the

<sup>32</sup> Innovation Union Scoreboard

<sup>33</sup> Many of the regional administrations organized a consultation with the general public or the scientific community and sent us feedback on the discussed issues and text of the Strategy.

Partnership Agreement, businesses and the academia became more involved and actively participated in the discussion of the text of the document. The team developing the document was provided with detailed analytical materials for the global trends, the capacity of scientific and research organizations, the capacity of enterprises, evidence of successfully completed projects. An Annex 1 to IS3 describes in detail the process of developing the strategy and "the entrepreneurial discovery process", where the information and the communication with stakeholders are systematized chronologically.

During the development of the Strategy on the website of the Ministry of Economy and Energy all versions of the strategy were published chronologically and the whole process of development of the document can be traced<sup>34</sup>

Under the support and advice of EC consultants the current version of the document was prepared. It was presented jointly to the public along with the goals, objectives of smart specialization and Technology areas were formulated and discussed in order to:

- Secure ownership of the vision by all key stakeholders;
- Identify and developed specific potential and strengths;
- Develop more adequate goal setting and basis for the monitoring and evaluation
- Share opportunities that did not exist at individual enterprise level or for a scientific institution;
- Identify emerging areas and niches;
- Focus national and European funds in the areas of comparative advantages on regional and national level.

This document does not represent the end of a 3-year labour, but the beginning of a longer-term partnership process. The very concept implies that entrepreneurs, representatives of science and the NGO sector, universities and others, namely all stakeholders will continue to discover, to experiment and learn new ways to promote and develop comparative advantages and to exploit niche markets both for research-based innovation and for non-technological and other types of innovation.

The identification of strengths and weaknesses of the innovation system started with the signing of an agreement for the provision of consultancy services by the World Bank. As a result, a team of experts from the World Bank and world-renowned capacities was formed and a report was produced<sup>35</sup>. A group with representatives from concerned ministries developed a draft document under the guidance of the Ministry of Economy, which includes the strategic documents of concerned topic. The strategy summarizes the lessons learned in the basic analytical instruments developed in relation with the preparation of the new programming period 2014-2020

Based on quantitative analysis (Section 1.7) and qualitative analysis (Section 2.15) we sought for a cross intersection analysis (Section 2.16) where the quantitative assessment of the potential of each business and the quality assessment cross. Quantitative assessment identifies the strengths of the economy. Qualitative analysis summarizes the state support of economic activities, either through the National Innovation Fund, OPC, NSF and other public instruments. The cross analysis gives a full assessment of how quantitative advantages are complemented by quality, which determines the future potential for accelerated technological development.

---

<sup>34</sup> <http://www.mi.government.bg/bg/themes/inovacionna-strategiya-za-inteligentna-specializaciya-1193-287.html>

<sup>35</sup> <http://www.mi.government.bg/files/useruploads/files/innovations/ris3reportaug2013bg.pdf>

### 5.25.2. From technology areas to thematic areas

The logic of identification is finding the intersection between the group of economic activities and services and areas of science, in which business expenditure is focused and the state for scientific research and development. Based on this analysis, the following technology areas were identified:

- Mechatronics and clean technologies
- Information and communication technologies
- Biotechnology
- Nanotechnology
- Creative industries, including cultural
- Pharmacy
- Food industry.

After discussions with the scientific community, meetings, interest claimed by business, opinions received on specific thematic areas.

In addition, it is imperative to take into account internationalisation, both upstream (research and education), and downstream (services, value generating activities). The question “how to mobilise limited internal sources through various forms of international research, technology and innovation partnership and how to integrate the country into the supply chains at international and global level” is among the key objectives of the process of Innovation Strategy for Smart Specialization.

Extremely important is the role of internationalisation of the innovation process in Bulgaria and integration of Bulgarian research and innovation in the overall framework for successful entrepreneurship in the EU. This is certainly the most difficult and lengthy process that leads however to real advances in research and innovation, and also to sustainable competitiveness of the country.

Taking into account European and world trends, the support of the consultants appointed by the EC, talks with leading exports of the Platform during the peer review, a number of product and technology niches have been identified, all parties agreeing on them. These issues will be discussed again at a later stage.

#### Process of identifying product and technology niches

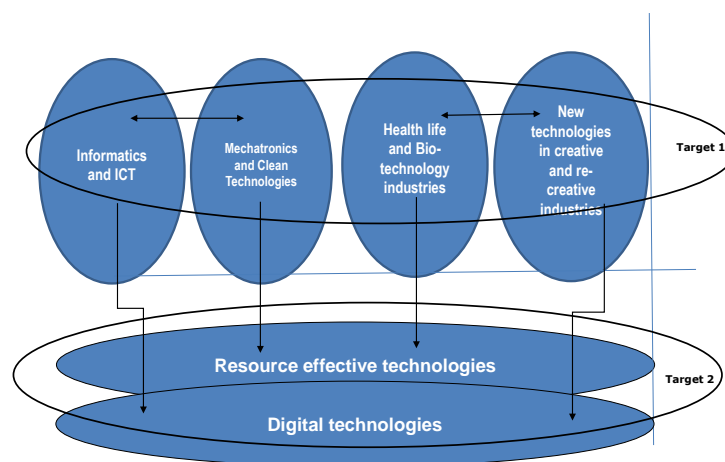


The broad public debate on the subject conducted over the past two years is an expression of the will to find common ground between the participants in the innovation system so that they can be united around a common vision for the future and paths of realisation can be chosen. The main activity carried out within the strategy in the European sense was to identify the unique characteristics and potential of the country to develop in “smart” areas where there are competitive advantages, and create new domain to identify/find entrepreneurial opportunities and ensure effective process of entrepreneurial discovery in

the future. The approach adopted for the analysis of the innovation system in Bulgaria and consultations is combined – vertical and horizontal.

**Objective 1:** Concentrating investments on the development of innovation potential in the identified thematic areas (for creation and development of new technologies, leading to competitive advantages and increasing the added value of domestic products and services)

**Objective 2:** Supporting the accelerated absorption of technologies, methods and others. Improving resource efficiency and application of ICT in enterprises from all industries



### 5.25.3 Objectives and development of Bulgaria

Scientific research is most useful as a source of new knowledge provided to industrial sectors, many of which can also be low-tech, which is the main source of added value, exports and employment creation. Analysis and in-depth discussions with entrepreneurs and other business representatives suggest that the criteria for smart specialization and a comprehensive approach focused only on research-based on growth will not be efficient enough for Bulgaria. Scientific research is rarely a direct source of growth. The share of sectors based on research or high-tech industries in the economy is usually quite small.

The main driver of productivity in Bulgaria is the so called production capacity or ability to produce on the basis of leading international quality standards with widely available, i.e. standard technologies. This does not mean that investments in scientific research are not important. The scope of necessary activities exceeds stimulating research only and should include the promotion of investment in the development of human capacity and promoting technological development and modernization of enterprises in order to improve the ability for technological change and innovation (R.Sollow theory). Support for scientific research in specific areas, ignoring the needs of industry (analysis and public consensus show so) would result in biased policies. Stimulation of innovation activity in certain areas of technology should lead to a reduction in resources used to increase productivity, will ensure consistent quality of production and achieve introduction and development of software and engineering activities to attract foreign investment from leading companies as well as strengthen cooperation and internationalization of the industry..

Focusing the Strategy on scientific research only as a direct source of growth will ignore major drivers of growth in the Bulgarian economy - now and in the near future, which will limit the effect of this strategy.

The conventional approach would be to support scientific research within the thematic areas, ignoring processes of constantly catching up by sectors and companies. Analysis and public consensus suggests that this will lead to distorted policies that do not relate to the areas of real demand for technological support in the local economy and society.

Bulgaria should focus on industrial and technological modernization, with a complementary focus on research-based growth. Industry is a term used broadly to refer to the entire industry, including the cross-cutting services sector. Also, the term "technology" does not refer only to equipment but covers a wider range of options, many of which are intangible in nature and which are necessary for the production of competitive products and services and to respond to other socio-economic challenges. Industrial modernization is best described as a process specific to the sector. Modernization processes are diverse and cannot easily be covered by common factors. However, it is possible to select a combination of common and sector-specific criteria. The final result cannot be a not so elegant matrix on the basis of readily available statistical data, but the aim is mainly applicability, not accuracy and inapplicability.

Industrial and technological modernization cannot be an isolated sole process, i.e. based only on internal resources, without the participation of foreign partners and participants. Catching up done by Bulgaria to reach average levels of income in the EU requires catching up in terms of productivity, which in the medium term is not possible without ICT solutions, both innovative for the country and resource-efficient. This modernization occurs largely through improvements in production potential and on the basis of imported equipment and raw materials rather than through scientific research. To become competitive, Bulgaria must build capacity to absorb and adapt foreign technologies and knowledge. This will require innovative policies, or rather there is a need to make a mix of technologies and introduce elements such as non-waste technology and ICT approaches in traditional industries.

Measures for the implementation of the Innovative smart-growth strategy will be provided and implemented mainly by the Operational Program „Innovation and Competitiveness" and the Operational Programme "Science and Education for Smart Growth."

### 5.26. Description of background of the Thematic areas

**Objective 1:** Focus the investment for the development of innovation potential in the smart thematic areas (for creation and development of new technologies leading to competitive advantages and increase in the added value of domestic products and services).

#### 5.26.1. Objective 1 – Vertical dimension

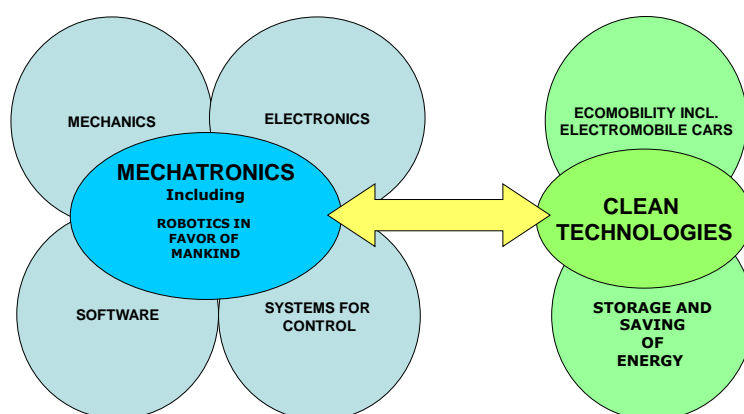
The vertical activities under Strategic Objective 1 are determined by the identified country-specific thematic areas in which Bulgaria has a competitive advantage at the present moment. Thus defined, they will be subject to change, given a proven interest and capacity both by industry and academia and non-governmental organizations. The public, lead by the political authorities should be united around a common vision and actions for the prosperity of society to solve the socio-economic challenges.

As a part of the implementation of the action plan (Appendix 1) specific activities may be devised for each thematic area.



### 5.26.1.1. "Mechatronics and clean technologies"

#### MECHATRONICS AND CLEAN TECHNOLOGIES



Mechatronics is registered as Trade Mark by Yaskawa Electric Corporation in Japan under Reg. No. "46-32714" in 1971. Afterwards the company releases on the market the right for using the term worldwide. In the EU countries exists French standard NF E 01-010 for mechatronics, which gives the following definition: "approach, aiming synergic integration of mechanics, electronics and electro technics, theory (systems) of management, as computer sciences in planning and production, in order to improve and/or optimizing functionality".

Mechatronics is a strong side of Bulgaria, in compliance with the world trends in development of the most perspective and innovative areas of the engineering sciences, combining expertise and traditions with concrete European and international interest. The thematic area enables the country to directly join the global value chains. Projecting, production and using of mechatronic systems requires new engineering approach due to the common functioning of components of mechanics, optics, optic-electronics, electro technics and electronics. Mechatronics is not simply a combination of comprising key components, but it is mutual penetration and/or merging of mechanical, electronic and computer structures for realizing of a total, functionally of full value product, named "mechatronic product" or "mechatronic fabric". It is not less important, that Bulgaria has a specific capacity as regards robotics, artificial intellect and intelligent devices and contemporary/intelligent production systems. Bulgaria could also specialize in limited series with high added value.

The automatized machines and systems for automation in the country are typical examples for mechatronic approach with proved potential in the country.

The sustainable mobility is of key importance for the development of low carbon and resource effective economy and for the implementation of "Europe 2020" strategy. As a result of the discussion within the High Level Group CARS 21 the vision on the automobile branch development was consolidated. On this base was elaborated an Action plan for competitive and sustainable automobile sector, that together with other EU strategic documents in the package "climate-energy" defines trends and priorities in the future development. At the same time Europe urgently needs decarbonizing and invasion of

alternative fuels in transport in order to decrease its dependency on petrol. At present this dependency amounts to 94%, within 84% of the petrol is imported, and this is connected with a huge financial resource and increase in expenditures for environment. On this base the package was adopted: Clean energy for transport. In the frame of this process Bulgaria is one of the nine EU members, that have supported the priority development of electro mobility with a common declaration. The technology is innovative and will give impetus in development in other sectors, that bring higher added value to the economy of the country. At the same time the electric mobility will contribute to achieving the objectives in the area of energy efficiency and renewable energy sources and will have positive influence on work and management of the energy system. From another side prerequisites are established for sustainable future of the transport, decreasing it's dependency on petrol and substantial decrease of greenhouse emissions, a great part of them due to this sector, as well as to improve air quality in inhabited places and thus the health risks quality of life for the future generations. As a relatively new industry, that will develop in Europe and worldwide, there is potential for new subjects on the market. Bulgaria possesses expertise and traditions in this area, and thus opportunities to find it's deserving place in this process.

Within the frame in the thematic area "Mechatronics and CleanTech" the following priority directions were identified:

- Production of basic elements, details, components and supply, part or wholly constituting mechatronic aggregate
- Maching building and appliance building, incl. parts, components and systems, with focus on transport and energy sector
- Engineering, re-engineering and prolongation of the life-cycle of industrial machines, appliances and systems
- Robotics and process automation
- Design and construction of hi-tech products and/or participation in supra-national production chain, incl. in aero-space industry
- Bio-mechtronics
- Intelligent systems and appliances, intelligent homes – intelligent -cities
- CleanTech with focus on transport and energy sector (storing, saving, effective distribution of energy, electric vehicles and eco-mobility, hydrogen-based models and technologies, no-pollution technologies, technologies and methods for inclusion of waste products and materials in other production)

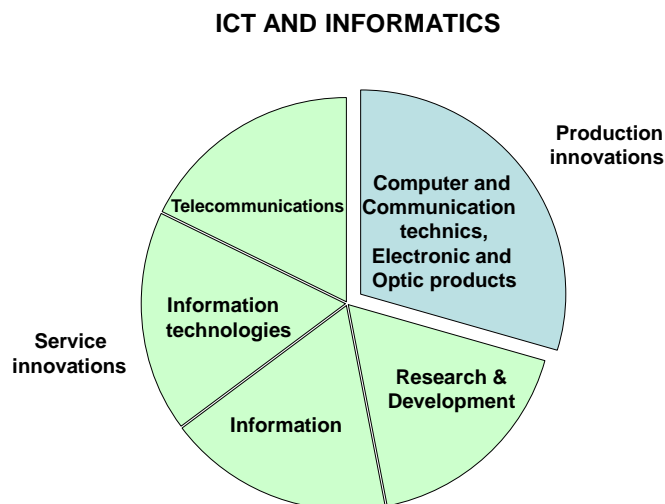
The following challenges were discussed with the participants at the thematic meetings:

- Incentives for cooperation and establishment of cooperation along the whole value chain, as well as creating completed and complex products;
- Need of additional cooperation science-business, cluster support, support for TTO's and other good practices of EU;
- Shortage of technical and engineering human resources;
- Adequate support to guarantee the quality;
- Internationalization, modern marketing methods, advertising and attracting investors, incl. additional development of management capacity and business models.

The following models for financing were defined as eventually applicable:

- Grant schemes/vouchers for cooperation science-business;
- Support for educational institutions in the field of technical sciences, for example vouchers for attracting specialists and/or online and distance education;
- Grant schemes, incl. specialized/and instrument/ to improve access to bridge financing;
- Scheme/instrument for covering short term trade risks, investment risk and risk for issuing bank guarantees under and for implementation of projects;
- Support for clusters and Technology Transfer Offices;
- Support for establishment of certified laboratories;
- Support for marketing and export activities.

## 5.26.1.2. "Informatics and information and communication technologies"



Bulgaria is well known as an ICT oriented country. Some of the activities and facts that characterize the past of the industry in the country are: the first electronic digital device Atanasoff - Berry; the largest production of personal computers (Pravets, IMCO) in Eastern Europe; the production of IBM compatible mainframe computers; design and prototype of the first digital watch and the first digital calculator; highly educated and qualified human resources and others. Until 1990, Bulgaria has specialized in manufacturing computer hardware and software development and production within the Council for Mutual Economic Assistance.

Over the past two decades, ICT activities in Bulgaria are mainly oriented towards the development of software and information systems. Bulgaria is still one of the major ICT outsourcing destinations. (Hewlett Packard, IBM, VMware, SAP NetWeaver, Software AG Development Centre Bulgaria, Coca-Cola Hellenic Centre for IT services in Sofia, Johnson Control Technology Centre Sofia.) Other ICT leaders present in Bulgaria with development activities and services are Microsoft, Cisco, EMC, Experian, Xerox, Ericsson and others.

This trend helps to increase and diversify the international skills to develop software and build international recognition. Moreover, the trend of outsourcing should support the development of Bulgarian software production. Telecommunications companies operating on Bulgarian territory introduce new voice and image convergence technologies as well as data transmission technologies via mobile devices.

New and emerging trends in ICT- cloud computing, mobile computing, social computing etc., are introduced in Bulgaria quickly but carefully. The attitude of the participants in this process is positive, with a critical assessment of the positive and negative sides, but generally open for acceptance. Data centres appear - both independent (with open access) and private or specialized. Social networks are widely used by public institutions, private companies, and the media and by a considerable part of the

citizens with warnings about security. Internet banking is gaining acceptance. The success of ELEVEN AND LAUNCHUB (financed by JEREMIE Bulgaria) turned Bulgaria into a regional leader.

A major challenge for ICT is effective implementation of public-private partnership. The possibility of public-private partnership is inherently important incentive to attract investments to provide specialized services to the population.

Many Bulgarian professional associations are active in the field of ICT: Bulgarian Association of Information Technologies, Bulgarian Association of Software Companies, Bulgarian Web Association, Bulgarian ICT Cluster, Bulgarian Branch Association of Electronic Industry and Informatics, Telecommunications Association, Internet Society Bulgaria, Project Management Institute - Bulgaria Chapter, International Institute of Business Analysis, Sofia, Bulgaria Chapter, and others. These organizations are actively involved in a dialogue with the institutions for improving the sector.

Regional Software Engineering Excellence Centre of the European Software Institute - ESI Centre Bulgaria (ESI Centre Eastern Europe) implemented large-scale projects at national and regional level in more than 12 countries. The Centre implemented leading strategic methodologies in the area of management and software engineering to increase the maturity of the sector in Eastern Europe.

National Centre for Supercomputing Applications (NCSA)<sup>1</sup> is an important element of research infrastructure in the field of ICT in Bulgaria and the region. NCSA is a member of PRACE (Partnership for Advanced Computing in Europe), a research infrastructure with its own supercomputing resources (IBM Blue Gene / P supercomputer). Strong Bulgarian companies in the ICT sector exist mainly in the area of development and integration of software products, but also in communications, embedded systems and microelectronics with highly qualified specialists. Some of these companies are represented internationally on several continents. The success of these companies is also a result of good management and implementation of international standards.

Bulgaria attracted funding under a special initiative of the Bill and Melinda Gates Foundation (for libraries and community centres) as well as for the Support of the e-Government Initiative based on free and open source software (FOSS) at local (municipal) level in Southeast Europe : the first e-government project in the region that uses free software and open source software (FOSS) to improve transparency in governance and public access to municipal services; Entrepreneurship Support (Job Opportunities through Business Support - Project JOBS): In Bulgaria, 43 business centres and business incubators support the development of micro and small businesses. However, the sector is facing many difficulties and challenges.

The following priority directions were identified within the framework of the thematic area "Informatics and ICT":

- production, especially Fabless and new approaches for design and/or assembling;
- ICT approaches in machine-building, medicine and cultural industries (in relation to the other three thematic areas), incl. digitalization of the cultural and historical heritage, entertaining and educational games;
- 3D digitalization, vizualization and prototyping;
- Big Data, Grid and Cloud Technologies;
- wireless sensor networks and wireless communication/management;
- linguistic technologies;
- web-, hybrid and "native" applications, web-based applications for creating and commercializing of new services and products;
- exploiting new possibilities in relation to outsourcing and ICT-based services and systems

The following challenges were mentioned among the participants at the thematic area meetings:

- Necessity of establishment of lasting and sustainable relations between science – education - business;
- Shortage of qualified HR, that limits the growth even available interest and FDI flow;

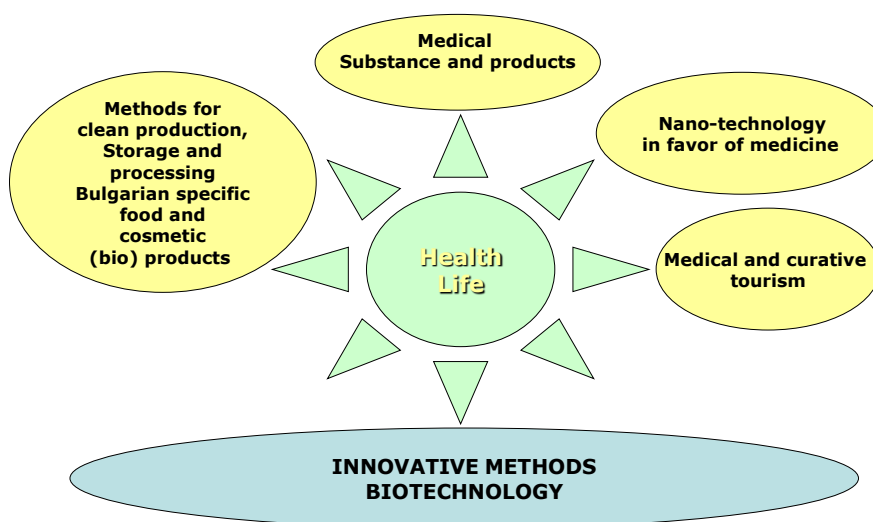
- Relatively adequate infrastructure with the exception of laboratories for testing and certifying, etc.;
- Creating and development of data base or a network scientific elaborations, waiting for market realization, as well as dissemination results of scientific projects;
- Internationalization, modern methods for marketing, advertisement and attracting of investors, including additional development of management capacity and business models;
- Development of PPP in Bulgaria and EU;
- Additional capacity of Patent Office, which has to accelerate the time for patent registration.

The following models of financing were identified as eventually applicable:

- Grant schemes for collaboration science - business;
- Financial instruments, incl. Venture capital funds;
- Support for educational institutions in ICT area, for instance vouchers for attracting specialists and/or online and distance education;
- Support for governance and entrepreneurial capacity, for instance vouchers for participation in internationally recognizable accelerators;
- Support for certifying and other laboratories.

### 5.26.1.3. „Industry for a healthy life and bio-technology“

#### HEALTH LIFE AND BIOTECHNOLOGY INDUSTRIES



IS3 promotes innovative methods for clean production, preservation and processing, incl. packaging and accessibility of these products with focus on production applications:

- Technology of the fermenting food products – shaping, optimization and management of fermentation process. Beer production, as a major substance are used grown barley seeds (barley malt), and as biological agents to accelerate alcohol fermentation – yeast cultures of the family *Saccharomyces*.
- Bio-technology of the enzymes – production and use of leaven. In production of bread – adding of enzymes, increasing its durability.
- Production of yoghurts. Sour milk bacteria are used in these productions and enzymes for production of nutritive products like yoghurt and different types of cheese. Technologies on the base of biological processes in cheese production, for example, production of the needed yeast

enzymes from bacteria cultures, instead of traditional methods for their extraction from animal's stomach.

- Production of wine and high alcoholic concentrates. Products containing carbohydrates are used as substance, that with the help of high productive cultures of the family *Saccharomyces are transforming into alcohol*.
- Production of vinegar. This production is based on the use of alcohol-containing substance, on which selected sour vinegar bacteria are activated.
- Production of natural aromatic products – etheric oils, natural distilled waters (*rose, lavender, chamomile, balm, sage, etc.*) and extraction products.

- **Medicines, substance and products**

Personalized medicine can offer a lot of opportunities for better treatment. For instance, if we give a patient the proper medicines, they would cause less side effects. This will diminish the suffering, as well as expenditure of resources. In other words – it will secure diagnostic and treatment of the proper patient in the proper time. Modern methods for treatment combine achievements in treatment of diseases, where informed decision for therapy is undertaken, taking into consideration individual characteristics of every separate patient. The target is to create a technology for better access of patients to treatment. There is a conceptual difference between mass used approach choosing the treatment and the approach, adopted by the personalized medicine: „The proper treatment for the proper patient in the proper time“. The advantages are focus on the right diagnosis, more effective and safe treatment, shorter time, needed for choosing the proper treatment, and at the end more rational use of financial resources.

Choosing this type of treatment needed medicines are diminished, due to the more precise prescription of doses, side reactions are less, and the opportunities to diagnose earlier the disease. As a major contribution on the side of the personalized medicine is the opportunity to focus on the prevention instead on the treatment and thus to increase the effectiveness of the health system as a whole, as well as to improve the quality and the access to the treatment.

A telling example for personalization in the medicine is the so called “pursuing diagnosis”, that has the aim to „select“ patients, who could benefit from a given treatment. In most cases this diagnosis explores the DNA of the patient after taking a test piece from the damaged tissue.

In the world practice the more popular are practices, allowing the decoding of the whole genom of the patient, i.e. the full genetic information of every individual human being. This information enables a lot of diseases to be guessed, whose mechanism and reasons up to this moment had been unknown (for example, neuro-degenerative diseases, Alzheimer disease), as well as to identify new, unknown up today pathologic conditions.

- **Nano-technologies in favor of medicine**

The nanotechnology is a set of technologies that enable manipulation, exploration or using of very small (usually less than 100 nanometer) structures and systems. Nano-sciences and nano-technological achievements have potential to influence practically all areas of economic activities and aspects of every-day life, but IS3 is focused on innovation (new materials, devices and products) to improve health and long life.

- **Medical and healing tourism**

The Strategy for sustainable development of the tourism in Bulgaria 2014-2030 enables development of re-creative, medical and healing tourism, as a tourism type with specific characteristics and good results in Bulgaria and as an additional element to thematic area „Industry for healthy life-style and bio-technologies“. Bulgarian territory is rich in (geo-) thermal and mineral waters with temperature between 20°C up to 100°C. Water temperature does not exceed 50°C in about 72% of the sources in public property, and their capacity varies between 1 и 20 l/s for 75% of them. Their total dynamic resource amounts at about 4600 l/s. Bulgaria is one of the most rich countries in Europe in mineral waters, enabling different, mainly healing application.

The offered products in medical and healing tourism activity are not mass and unified. There are possibilities for their personalization in accordance with the needs of every separate tourist. According to



the available sources by regions, there is an option to address different needs (mud baths, types of mineral water). Orientation could be directed in accordance with the available medical centers, in order to cover medical standards for physiotherapy and rehabilitation, i.e. a complex service to be offered. This type of tourism is of special importance, taking into consideration the aging of the population in EU and the expected demand on similar activities in Europe.

- **Bio-technologies**

Bio-technologies offer science and technology application on live beings, biological systems or their derivatives for creation or modifying with a defined aim of products, services or processes. The focus of IS3 is on the aim healthy life-style (healing aims, healthy eating, natural cosmetics).

List-based definition:

- Proteins and other molecules: *synthesis /engineering of proteins and peptides (incl. big molecules hormones); improved methods for delivery of big molecules medicines, isolation of protein and purifying, signal, identification of cell receptors.*
- Technological bio-technological methods: *fermentation with the help of bio-reactors, Bioprocessing, bio-pulping, bio-bleaching, bio-desulphurization, bioremediation, bio-filtration, phytoremediation.*
- Bio-informatics: *Creating data bases of genomes, protein consistencies, shaping of sophisticated bio-logical processes, incl. biology of systems.*
- Nano-biotechnology: *it concerns the instruments and processes of nano- / micro-production for building of devices for learning of the bio-systems and applications in delivery of healing and medicines, diagnostics, etc.*
- Bio-photonics: *new contactless methods for diagnostics of diseases (for instance, oncological) , laser methods, photodynamic therapy, production of medical instruments.*

In the frame of thematic area „Industry for healthy life-style and bio-technologies" the following priority directions were identified:

- Methods for clean production, conservation and reaching the final consumer of specific Bulgarian products and elements (yogurt, honey, breads, milk products, etheric oils, herbal products, bio-cosmetics and bio-products)
- Production of specialized food and drink (baby, children, "astronaut")
- Production of instruments, equipment and consumables for medical and dental diagnostics and treatment and therapy and/or participation in supra-national production chain
- Personal medicine, diagnostics and individual therapy, healing forms and substances
- Medical and healing tourism with accent on personalization possibilities (personal tourism)
- Nano-technologies in medicine
- Bio-technologies serving the needs of healthy life and aging
- "blue" technologies and application of new methods and technologies in sustainable use of sea and river resources
- Production plants for the extraction of clean electricity and industrial water
- Green Economy

The following challenges were discussed with the participants at the thematic meetings:

- Need of establishment of durable and sustainable relations among science-education-business;
- Incentives to retain the available and attracting foreign HR;
- Additional reforms in the areas of high and higher education for strengthening the practical focus and covering needs of the labor market;
- Support for adoption of good EU practices, especially management capacity;
- Creation and development of a data base or a network of scientific elaborations, waiting for market realization, as well as dissemination of results of science projects;
- Internationalization and advertisement with focus on guarantee and durable quality.

The following models of financing were identified as eventually applicable:

- Grant schemes/vouchers for cooperation science-business;

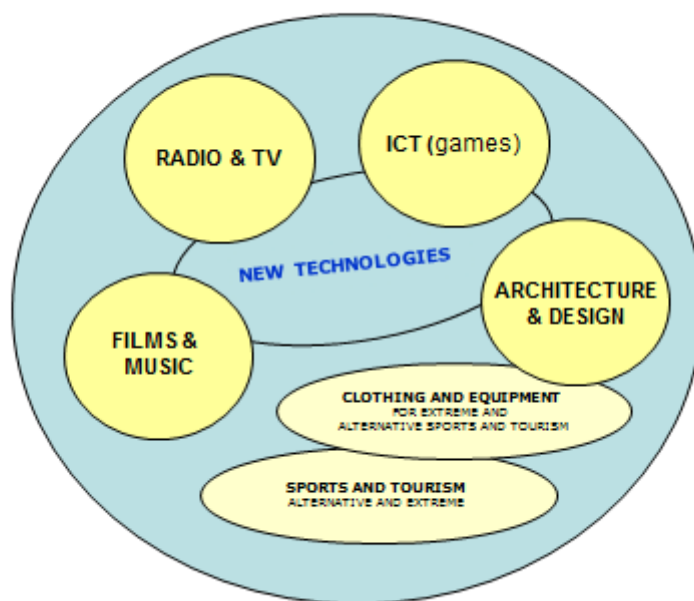


- Support for marketing and export activities;
- Support for governance/management capacity;
- Certification, quality control.

*It has to be taken into consideration that innovations are a horizontal priority within Rural Development Programme 2014-2020. Concerning the food industry RDP 2014-2020 encompasses a larger spectrum of possibilities for financing, i.e. in all RDP chosen sectors (1. Milk and dairy products, including bird eggs; 2. Meat and meat products; 3. Fruit and vegetables, including mushrooms; 4. Bee honey; 5. Grain, flour and farina products; 6. Plant and animal oils and butter; 7. Technical and medical crops, incl. rose and herbs; 8. Ready-made food for agricultural animals; 9. Grape must, wine and vinegar; 10. Production of energy through the use of plant and animal products with the exception of bio-mass from fish products.)*

### 5.26.1.4. „New technologies in creative and recreational industries”<sup>36</sup>

#### NEW TECHNOLOGIES IN CREATIVE AND RECREATIONAL INDUSTRIES



#### Europe 2020

In accordance with the strategy Europe 2020 the role of EC and member-states in general is to ensure opportunities for the creative and recreative industries to contribute to the growth and employment in Europe. In details it means direct finance and technical support as in the form of grants and financial instruments as well as through creating networks, platforms and other systematic approaches promoting these industries.

#### General Regulations and OPIC

Paragraph (8) in the Regulations (EU) № 1301/2013 of the European Parliament and of the Council of the December 17<sup>th</sup>, 2013 concerning the European Development and Regional Fund Development and special orders in relation to objective “Investments in growth and employment” and for the cancelling of Regulation (EU) № 1080/2006 orders: „It is necessary to promote innovation and development of SME’s in new emerging areas, connected with the European and regional challenges, for instance creative and culture sector and innovation services, reflecting new societal requirements, or with products and services, linked with the aging of the population, taking care and public health, innovation in environment, low-carbon economy and effectiveness of the resources.”

<sup>36</sup>The definition of creative industries states 12 industries, namely: advertising, architecture, arts and antique markets, crafts, design (including communication design), fashion design, film, video and photography, software, computer games and electronic publishing, music, visual and performing arts, publishing, television, radio

Through OPIC Priority Ax 1 will finance projects in the thematic areas of IS3. In addition, in OPIC Priority Ax 2 it is envisaged: „In view of the essential significance of definite specific areas, connected with the European and regional challenges, support will be given to enterprises in specific areas, for instance creative and cultural industries, enterprises developing new products and services, linked with the aging of the population, taking care and public health, incl. social entrepreneurship.”

The European Commission has highlighted the role of the cultural and creative industries and the sustainable forms of tourism in the following documents:

- EC Green Book of the 27<sup>th</sup> of April, 2010, named “Unlocking the potential of the cultural and creative industries” (COM(2010)0183);
- EC Communication to the European Parliament, Council, European Economic and Social Committee and Committee of the Regions of the 30<sup>th</sup> of June, 2010 named „Europe, world touristic destination Number 1 – new policy framework for tourism in Europe “ (COM(2010)0352);
- Communication of EC to the European Parliament, Council, European Economic and Social Committee and Committee of the Regions of the 26<sup>th</sup> of September, 2012, named “Promoting of cultural and creative sectors for growth and employment in EC” (COM(2012)0537).

The European Parliament also highlighted the importance of the cultural and creative sectors in the Resolution of the 12<sup>th</sup> of September, 2013, concerning promoting of the European cultural and creative sectors as a source of economic growth and employment (2012/2302(INI)). The Resolution focuses on the following issues:

- Conditions needed for development of cultural and creative sectors
- Work conditions for specialists in cultural and creative sectors
- Education and training
- Financing of cultural and creative sectors
- Opportunities and challenges of the digitalization, globalization and access to international markets
- Local and regional development.

### Strategy for sustainable development of tourism in Bulgaria 2014-2030

The strategy has the task to ensure sustainable competitiveness of Bulgaria as a touristic destination, to support sustainable development of the touristic industry, to rely mostly on the information, selected in market studies, reports, analysis and forecasts, i.e. international sources like UN World Touristic Organization, European Touristic Commission, World Tourism & Travel Council, Euromonitor, Eurostat, etc., to take account of expectations and intentions of all stakeholders, to be adapted with the requirements to establish right, realistic and stable positioning of Bulgaria on the target markets and to be flexible. The strategy gives „accent in development of specialized touristic products, having potential to overcome the season dependency and establishing special emotional connection with Bulgaria.”

The following priority directions were identified within the thematic area „New technologies in creative and recreative industries ”:

- Cultural and creative industries (as defined by European Commission)
- Computer and mobile applications and games with tuitional, marketing or entertaining character
- Alternative tourism (rural, eco-, cultural and festival) and extreme tourism and sports (niche tourism)
- Production of goods and products with direct application in these spheres (mountain bike, costumes, climbing walls, equipment, print materials and specialized costumes, dress, etc.)

The following challenges were discussed with the participants at the thematic area meetings:

- New financial instruments, especially with quicker effect more flexible in planning the expenditures;
- Specifics in identifying the participants in schemes for financing and non-distinction the belonging in defined economic categories /activities;
- Capacity for developing and management projects with external financing;
- Digitalization of available resources;
- Incentives for international presence, marketing and advertisement;
- Promoting Public Private Partnership (PPP).

The following models for financing were identified as eventually applicable:

- Grant schemes/vouchers for innovative technologies, business models and cooperation;
- Digitalization of the cultural historic inheritance;
- Support for marketing and export activities;
- Media Technology Park.

### 5.26.2. Horizontal activities under Objective 1

Creation of innovative strategies for smart specialisation with clear objectives is a necessary but not a sufficient condition for the promotion of innovation. The ability of science to produce a sought after quality product and entrepreneurs' predisposition to experiment and to bear the associated risks depend largely on the availability of financial and other supportive environment. For the purpose of creating conditions that foster innovation, the Strategy includes activities that meet the need of: a) closer links between research and business; b) a stronger focus on creating, attracting and retaining high quality human resource; c) an operating comprehensive environment and infrastructure conducive to innovation. Implementation of activities requires a clear source of funding.



#### 5.26.2.1. Activities leading to an effective research and business partnership

- 1) Promotion of partnerships on the demand side and on the supply side
- 2) Targeted efforts to promote partnerships through the establishment of centres of excellence and centres of competence

##### 1) Promotion of partnerships on the demand side and on the supply side

To improve partnerships between research institutes and entrepreneurs requires a combination of approaches for “active demand” and “high quality (research) supply”.

##### • On the demand side

It is envisaged to support (mainly through OPIC) innovation in enterprises, including development and introduction of new products, processes and business models, adoption of best practices in the field of innovation. It is also possible to provide investment and consultancy support to the development of applicable business research/innovation in enterprises, technology transfer in the country, implementation of innovation in enterprises.

It is of key importance the development partnership for innovation between enterprises, between businesses and academia, and between businesses and other carriers of innovation potential. Partnership

in the field of scientific research and technological development will be promoted between businesses and academia, and between enterprises, including clustering and participation in networks and platforms. Opportunities will be sought for partnership between enterprises and leading national academic and research groups, leading to the creation/development of innovative capacity and sharing of resources for development and implementation of innovative processes and products, copyright and license royalties, commercialisation, increasing the volume of exports. Vouchers are an appropriate tool by which businesses can be encouraged to collaborate with academia and other carriers of innovative potential. It is also important to improve access to financing for the implementation of close-to-market investments, such as pilot lines, validation activities, advanced manufacturing capabilities.

The EU Strategy for the Danube Region also contains a priority in the development of the “knowledge-based society” (research, innovation, education and ICT). Examples of activities in this regard include the creation of living labs for development, validation and implementation of new products and services through joint participation of consumers, academia and businesses in the innovation process (according to the Danube Strategy, Action Plan for the Danube Strategy, Priority Area 7) and facilitation of creative knowledge transfer through setting up new design centres and knowledge transfer schemes from the creative industries to the traditional enterprises (according to the Danube Strategy, Action Plan for the Danube strategy, Priority Area 8).

- **On the supply side**

The main element to stimulate research- business partnerships on the supply side is improving the quality of the research product and its conformity with the needs of the market and society. Directing the activities of research organisations to solving the problems of industry not only generates revenue for research institutes but also increases the market potential for doctoral students engaged in similar research. It is necessary to strike a balance between research with potential for patents, other forms of protection of intellectual property and licensing, and those that are a direct result of demand (contract research).

On the supply side, it is important to find common ground that will promote both agreements for research and identification and protection of the rights of intellectual property during the commercialization of research.

Promotion of transfer, exploitation and commercialisation of the results of public research is crucial for the ability of research in Bulgaria to generate a significant economic impact. Knowledge and research generated by the public research system are disseminated through various channels – mobility of faculty, scientific publications, conferences, contract research with industry, “spin-off” and licensing of university innovation. These channels are crucial for turning research into commercial applications that bring in patent royalties for the establishment of entrepreneurial start-ups that create jobs for highly skilled professionals, and the development of new products and processes in established companies competitive on world markets.

Quality of supply is of key significance. Concrete steps in this direction are preparing an independent assessment of all research organisations with public funding (IOPF) and discussing and reaching an agreement on the road map. An important focus of the policy of developing and increasing the efficiency of research and innovation is to create sufficient incentives for the consolidation of research structures and research potential. By pooling financial resources, infrastructure and research staff the goal is to build and establish strong research units that can conduct high quality research and compete at European and

global level. Also, in this way it will be possible to retain and attract leading scientists and young researchers with potential, based on regular independent assessments. 37..

The implementation of an effective system for assessing research activities is a component of any modern policy in the field of science. This system allows for monitoring the process of absorption of funds, the level of implementation of the research objectives and the results of the research. The assessment is important because it allows the state to analyse how effective research policy is and to outline measures for its improvement based on comparability and benchmarking the quality of research with international and European standards.

Moreover, enterprises could use the results of this assessment and seek forms of partnership with certain research structures. The assessment allows research organisations in their turn to formulate future research objectives and optimize their activities. By assessing the quality of research it is guaranteed openness and transparency in the spending of public funds and the possibility of conducting a targeted public debate on key issues of the national research policy.

## **2) Targeted efforts to promote partnerships through the establishment of centres of excellence and centres of competence**

The development of research infrastructure is an important element of the Europe 2020 Strategy. Research infrastructure occupies a central place in the “knowledge triangle” and is a binding element of the three components of this triangle. Construction, maintenance and access to modern research infrastructures ensures high quality of research, modern learning process and a possibility to attract intellectual potential, promote entrepreneurship through the generation of new knowledge and its transfer to the country’s economy. Research infrastructure creates solid prerequisites for the establishment of regional research centres performing specific regional tasks. Research infrastructure is a natural place for the construction and development of public-private partnerships and maintenance of sustainable relationships between participants. It is a foundation for the construction and development of traditional infrastructure and offering of new jobs requiring specific competences. Research infrastructure promotes *inter alia* international research partnership, thus enriching and expanding the experience and knowledge accumulated by various research groups. A modern framework creates favourable conditions for scientists and their families, guaranteeing their free movement, not loss of intellectual potential.

Given the assessment of the research base and potential, OP Science and Education for Smart Growth envisages the identification of the best research fields, groups and institutions to be support in the long term and be able to develop as centres of excellence and centres of competence. This is necessary to keep the high quality scientific resources in Bulgaria, to attract new people to making scientific careers and to keep the best scientific schools. It is even more important that Bulgarian and European businesses can turn to these centres and rely on high quality results.

Decision No 569 of 2014 of the Council of Ministers has updated the Roadmap that takes into account the progress of the construction of the existing infrastructures and validated new project proposals. Based on the preliminary assessments, four groups of projects have been identified:

### **In the field of biology and medicine:**

- Infrastructure for genomic, proteomic and metabolic studies (with the potential to join BBMRI-ERIC. Joining EuroBioImaging-ERIC and EATRIS is being considered);

---

<sup>37</sup> At the proposal of BAS

- National Centre for Biological Microscopy and Biomedical Imaging Methods (with the potential to join EuroBioImaging-ERIC);
- Research Infrastructure for Applied Genomics, Pharmacogenomics, and Development of Anti-infective Agents. (for the phase of feasibility studies)

### **In the field of materials science:**

- A distributed infrastructure for sustainable development in the field of marine research (bound by the participation of Bulgaria in the EURO-ARGO European infrastructure)
- Regional centre for astronomical research and education (RATIO).
- National infrastructure for energy storage and hydrogen energy sector (for the phase of feasibility studies)

### **In the field of natural sciences and engineering:**

- High-performance infrastructure for computer modelling, simulation and application in industry, medicine, pharmaceuticals, energy, transport and others. (member of EGI.eu and PRACE);
- Infrastructure for developing and transferring micro and nano-technology in electronics and developing products based on such technologies;
- Searching for opportunities, after a mandatory dialogue with representatives of education, science and businesses, to work together with leading institutes and organizations in the EU for establishing a CEE regional centre for the transfer of micro- and nano-technologies into marketable products;

### **In the field of social sciences:**

- Distributed infrastructure – National interdisciplinary research e-infrastructure for culture, humanitaristics and integration and development of electronic resources for the Bulgarian language. (ClaDa);
- Balkan Social Survey – a network in the field of social studies of regional significance (ESS);

Timely implementation is considered particularly important for extending the limits of knowledge in the relevant fields. Two groups of projects have been identified.

**In the first group** there are nine projects, which are ready for implementation and have a strategic importance for Bulgaria. On the basis of international expertise according to specified criteria 9 national infrastructure complexes have been offered as nationally significant infrastructures. Of these, six have the potential to participate in the pan-European research infrastructures.

These infrastructure complexes are as follows:

1. National university complex for biomedical and applied research (BBMRI)
2. Centre for contemporary microscopy for fundamental and applied Research in the field of biology, medicine and biotechnology (EuroBioImaging);
3. Infrastructure for sustainable development in the field of marine research, linked to the participation of Bulgaria in the Euro-Argo European infrastructure;
4. Research Infrastructure “Energy storage and hydrogen energy sector”;
5. European Social Survey for Bulgaria (ESS);
6. National Centre for high-performance and distributed computing (EGI and PRACE);
7. National interdisciplinary research e-infrastructure for resources and technologies for the Bulgarian language and cultural heritage, integrated within the European CLARIN and DARIAH infrastructures (КЛaДA-БГ);
8. Regional centre for astronomical research and education (RATIO);



9. National cyclotron centre – infrastructure for applied research and innovation with educational functions in the areas of nuclear medicine, nuclear physics, nuclear energy, radiochemistry, radiopharmacy, accelerator technology, and centralized radiopharmacy for the production of PET radiopharmaceuticals for the needs of nuclear medicine.

In the **second group** five additional project have been identified (Distributed infrastructure of centres for production and research of new materials and their applications for conservation, access and e-storage of artefacts) (INFRAMAT); Research and innovation in agriculture and foods; Cell Technology Alliance – CTA; National Geoinformation Centre; Eco and energy saving technologies that have the potential to reach a stage of readiness for implementation by 2015-2016, for which support will be provided for feasibility studies.

### 5.26.2.2. Activities leading to the improvement of human resources

- 1) Strengthening the link between higher education and the requirements of the labour market; stimulating the training in technical and engineering specialties; enhancing the practical application of higher education;
- 2) Reforming vocational education and promoting lifelong learning.
- 3) Internationalisation of innovation to further improve the quality of research and management of the phenomenon of “brain drain”

#### **1) Strengthening the link between higher education and the requirements of the labour market; stimulating the training in technical and engineering specialties; enhancing the practical application of higher education**

A realistic picture of the realisation of graduates in various professional fields is provided by the Rating System of Higher Schools in the Republic of Bulgaria, developed by the Ministry of Education through an OPHRD 2007-2013 project in 52 professional branches according to 47 criteria – learning process, research, learning environment, social and administrative services, prestige, realisation and links to the labour market. Before applying everyone can find the latest information available at <http://rsvu.mon.bg>

Efforts in this direction are continuing mainly under OP Science and Education for Smart Growth by providing incentives for partnerships between higher schools and businesses, including joint development of curricula and programmes and offering of targeted scholarships for students.

To avoid the discrepancy between supply and demand, a generally accessible information system has been created; it contains information about sought after specialists in each municipality, region, planning area and persons who have attained education in certain specialties but have not been realized the labour market again by municipality, region and planning area. Based on this information it is necessary to periodically analyse the labour market and on this basis plan the admission of undergraduate and graduate students at higher schools and research organisations.

Engineering education should be encouraged and improved. The share of employed workers in the engineering industry is relatively low compared with those of the EU Member States. On the other hand, enterprises will be encouraged to recruit highly qualified personnel for the purpose of implementing innovation, take on internship or specialisation pupils and students, and stimulated later (after graduation) to take them to work. The target group includes enterprises, higher schools and research centres, as well as scientists, consultants, pupils and students.

It is important to strengthen partnerships between research organizations, higher schools and businesses in the training of students, graduate students, PhD students, recognizing the specialisation of students for time of service. Introduction of vouchers for education and training at the request of the business is a key element to providing the labour market not only with highly qualified specialists but also with those who

will have the potential for realization<sup>38</sup>. It is necessary to improve the regulatory environment so as to enable graduate students set up start-ups with the higher schools under the auspices of lecturers and mentors for their development.

Many of the existing SMEs do not have highly qualified personnel for the development and implementation of new technologies and therefore do not use their potential for innovation. To this end, operating companies will be subsidised to hire PhD students and young and highly qualified specialists. This is part of the policy to enhance the innovativeness of small firms that do not have the financial and human resources to carry out research and development.

### **2) Reforming vocational education and promoting lifelong learning**

Not only higher, but also secondary /especially vocational/ education should be aimed at developing attitudes and skills of young people to work in a real market environment. Training should focus most on the attainment of professional knowledge and skills that are directly oriented to the business needs – current and future ones. For this purpose it is important that during training students apply what they have learned “on the ground”, i.e. in a real working environment. Thus, the opportunities for them to adapt quickly and be realised after graduation are increased. Preparation of curricula and programmes should be tailored to the real needs of the labour market of professions and specialties, and the commitment of businesses should be to provide a platform for the realisation of young people.

Location of vocational schools can play an important role in the creation of clusters. A special programme for the modernisation of vocational schools could be considered thus supporting vocational schools in areas where there have been a significant Bulgarian (or foreign) private investment in the relevant sectors or such investment has been planned.

It is also necessary to make amendments to specific legislation governing vocational schools and there is a need for new flexible curricula based on modular training that provides a basis for long-term and short-term training; as well as creating more learning opportunities that are well focused on the content and are shorter than traditional formal courses. Pathways to education and qualifications need to be diversified and to create high-quality short (from a few months to two years) trainings in the segments with diverse skills.

It is necessary to improve the capacity of organisations providing services in career guidance and training of professionals. Graduates of secondary education and higher education applicants must have reliable information about existing and potential career opportunities, should be able to make informed choices when choosing a specialty to ensure their realisation in the future. The transition from education to work should become smoother. The “Quick Start” Programme offered by the Employment Agency is a good example. It was developed based on the Quick Start Programme in the USA. The system for validation of non-formal qualifications would be highly beneficial. This system could be also used for validation of specialized skills, including for example programming skills.

OPHRD provides further strengthening of the system of lifelong learning. The goal is maximum convergence of education and labour market needs, and using the potential for economic activity of an increasing segment of the population.

### **3) Internationalisation of innovation to further improve the quality of research and management of the phenomenon of “brain drain”**

---

<sup>38</sup> Ministry of Education and Science

Globalization of the economy and scientific knowledge support the integration between subjects of business and science internationally. The growing dynamism of the single market for innovation and the promotion of openness will stimulate the innovative progress of the countries as long as competition is fair. It is a priority at European level to reduce inter-regional disparities in all spheres, making integration and cooperation a mandatory prerequisite. The establishment of national and transnational clusters will be beneficial for the economic environment in the individual countries. In the foreseeable future it would be good practice if to these clusters /parallel with the implementation of innovative policies and diversification of production/ a kind of schools are created preparing the future staff adequately to their needs. During their training the staff could be useful in the process of developing new productions through fieldwork.

It is envisaged to support the wider opportunities for inclusion in Horizon 2020 of Bulgarian research units and enterprises, and potentially ECSEL Joint Undertaking; Bulgaria's membership in CERN, ESA, joint technological initiatives such as: BBI (bio-based industries) and FCH 2, to develop commercially viable, clean solutions that use hydrogen as an energy carrier and fuel cells as energy converters. It is imperative to stimulate the participation of enterprises and research organisations in European initiatives, networks and platforms, and programmes in the field of research and innovation. The target group must include enterprises and research organisations. The expected result is to strengthen the role of international research projects, accelerate the transfer of new knowledge and increase the intensity of the innovation process, and retain and attract high quality researchers.

The quality of research in universities should be further supported if we expect universities to play a significant role in innovation. It may be needed to restructure teaching hours to release more time for research done by scholars, especially young ones. Senior scholars must be also involved in these efforts and the emphasis should be placed on attracting young people who study abroad.

### ***5.26.2.3. Activities leading to an adequate environment and infrastructure including e-governance***

- 1). Developing an adequate and secure environment for the creation and dissemination of innovations
- 2). Broadband infrastructure and e-governance

#### **1). Developing an adequate and secure environment for the creation and dissemination of innovations**

Mutual cooperation between research and businesses largely depends on the development of a balanced ecosystem of innovation – technology parks, business incubators, clusters, and a system for the protection of intellectual property, including copyrights of Bulgarian patent holders abroad.

It is necessary to support the development of technology transfer offices and technology centres. Support will focus on increasing the capacity to identify studies of interest to the industry, management of the relationship between science and the business, patents and intellectual property rights, commercialisation through licenses and start-ups, awareness of researchers concerning intellectual property rights and commercialisation.

The support provided by OPIC for the development of environment and infrastructure for innovation and research includes the following:

- creation, development and accreditation of laboratories thematically focused on certification, testing and proof of concepts of experimental models and utility models, and other shared infrastructure to support development and innovation of enterprises, including Phase 2 of the project for Sofia Tech Park;

Supported laboratories will be thematically focused laboratories and high-tech laboratories for testing and technology verification, which provide open public access by sector to technological capabilities and tools, education and training and mentoring for prototyping of innovative ideas and products. This will reduce the risk associated with the launch of new products and ideas in the market, before their returns is proven. Targeted support for Sofia Tech Park aims to create the first completely new innovative scientific and technological eco-system of advanced level where innovative ideas and projects can be identified, promoted and developed; to create a focal point for co-active interaction of international and Bulgarian partners; to support connections between the existing knowledge-based institutions and the private sector to improve the commercialisation of research. A national innovation environment on a global level will be established in order to stimulate the development of sectors with significant added value.

- support to the development of modern and new for the country business services related to the management of the intellectual property system, the Bulgarian standardisation system and the system for accreditation of laboratories and new products;

The OPRD support includes specific measures for the development of areas with economic potential which are part of the integrated plans for urban rehabilitation and development. These industrial areas with their entire supporting infrastructure are a significant prerequisite for promoting innovative entrepreneurship activities along with the forms such as technology parks, laboratories and others. This approach may become a sound basis for the development of the concept of “smart cities”.

### **2). Broadband infrastructure and e-governance**

An important part of research infrastructure is the electronic research infrastructure (e-infrastructure). As elements of the European research infrastructures the following are operating in Bulgaria: The Bulgarian Research and Education Network (BREN), which provides access for universities and research organisations to European and global research networks, the GRID infrastructure of the Bulgarian Academy of Sciences and the National Centre for Supercomputing Applications (NCSA) with the Executive Agency “Electronic communications networks and information systems” of the Ministry of Transport, Information Technology and Communications which provides computing resources and services for scientific research in various fields. These e-infrastructures are included in the Roadmap for the national scientific infrastructure and need investment support for further modernisation and integration with the European research infrastructures. They are a very important technological prerequisite for the successful participation of Bulgarian research institutes, universities and high-tech companies in the new EU Programme for Research, Technological Development and Innovation “Horizon 2020”, which started in 2014, and their integration into the European Research Area.

The “Digital Agenda for Europe” highlights the need to ensure the deployment and development of the networks for access to high-speed and ultra-high-speed Internet, which is the fundamental key prerequisite for achieving digital growth and providing modern electronic services to businesses and citizens through the development of e-governance. Broadband infrastructure plays an important role in the economic recovery and in providing a platform to support innovation in all economic sectors. Imbalances in terms of broadband penetration lead to lower demand and use of Internet and electronic services. It is a fact that regions that are lagging behind in digital development are also lagging behind in socio-economic development. There is a risk that they remain “informationally disconnected” which will deepen the other differences. Development and modernisation of broadband infrastructure in the period

2014-2020 will be carried out in accordance with the National Plan for Next Generation Access Infrastructure<sup>39</sup>, within two priorities:

- **On the supply side** – ensuring equal access to high-speed and ultra-high-speed Internet through the development of broadband infrastructure to achieve full coverage of the country with access speeds higher than 30+ Mb/s;
- **On the demand side** - encouraging the use of services on broadband access networks so that at least 50% of households and 80% of businesses can subscribe to broadband access of over 100 Mb/s; opportunities to increase the digital literacy of citizens and their digital competences as part of the educational process and the general public and enhancing public awareness.

### The plan includes:

- A plan of infrastructure investments based on economic analysis that takes into account the existing infrastructure and the published plans for private investment;
- Sustainable investment models that enhance competition and provide access to infrastructure and services;
- Defined goals related to the penetration and use of broadband Internet;
- Measures to encourage private investment;
- Measures to promote the use of broadband services.

Financing of the measures will be achieved through implementation of effective models for public-private partnership and the Rural Development Programme.

The Digital Agenda for Europe envisages special measures in the Single Digital Market calling for increasing by 80% the use of e-governance services by the enterprises in the EU by 2015. The E-Governance Development Strategy 2014 – 2020 adopted by Decision No 163 of 21.03.2014 of the Council of Ministers<sup>40</sup> and the Roadmap<sup>41</sup> for its implementation provide for legal, institutional and investment measures in three main areas:

**On the supply side** – providing high quality, efficient and accessible electronic services; and transformation of the administration into digital administration through the integration of information processes.

**On the demand side** - Promoting e-governance services, facilitating access to them and providing free access to public information.

The main expected results of the implementation of the Strategy and the Roadmap are as follows:

- Building ultra-high-speed communication connectivity for next-generation access (NGA) to 264 municipality centres as well as to the buildings of public institutions in them (judiciary, prosecution, police, schools, hospitals);
- Connecting up to 200 registers of key importance in order to provide complex electronic services and 100% electronic document turnover between administrations;
- Providing a convenient mechanism for electronic identification of individuals in the electronic world;

<sup>39</sup> National Plan for Next Generation Access Infrastructure

[http://www.mtict.government.bg/upload/docs/Bulgarian\\_Plan\\_for\\_NGA\\_2013\\_Final.pdf](http://www.mtict.government.bg/upload/docs/Bulgarian_Plan_for_NGA_2013_Final.pdf)

<sup>40</sup> Strategy for eGovernment Development 2014-20120 [http://www.mtict.government.bg/upload/docs/2014-03/1\\_StrategiaRazvitieEU\\_RBulgaria\\_2014\\_2020.pdf](http://www.mtict.government.bg/upload/docs/2014-03/1_StrategiaRazvitieEU_RBulgaria_2014_2020.pdf)

<sup>41</sup> Roadmap for the implementation of the Strategy for eGovernment

[http://www.mtict.government.bg/upload/docs/MapRoad\\_eGov\\_2014\\_2020\\_FINAL.pdf](http://www.mtict.government.bg/upload/docs/MapRoad_eGov_2014_2020_FINAL.pdf)

- Achieving a high degree of interoperability and network and information security at all levels, which are fundamental prerequisites for building trust in the public services;
- Providing a priority portfolio of complex electronic services of high economic and public interest available through a single portal for access to e-government services (SPAEGS);
- Making a transition to fully electronic public procurement – 50 % of the procedures in state and municipal administrations should become electronic (by 2017) and 100% of the procedures in state and municipal administration should become electronic (by 2020);
- Providing e-Justice services to ensure high efficiency of the judicial authorities and their administrations<sup>42</sup>;
- Providing cross-border interoperability of public e-services of high economic and societal interest enabling entrepreneurs to start and run a business anywhere in Europe irrespective of their location. This is a necessary condition for the development of a digital single market within the EU.

Financing of measures will be implemented through the budgets of the central and local administrations, through the Operational Programme “Good Governance” and the Connecting Europe Facility.

### 5.26.3. Activities under Objective 2

#### 5.26.3.1. Resource efficiency activities under Objective 2

Bulgaria’s backwardness in the field of “green markets” (energy efficiency technologies, technologies for recycling and treatment of waste, mobility and transport technologies, water supply and sewerage technologies, environmental and systems engineering, life sciences, nanotechnology, eco-design, etc.) should be assessed as an opportunity to participate in a relatively broader market. Because of the huge gap in this field, fast and efficient utilization of technology and knowledge is required and support for creation and implementation of own technologies and knowledge in the field of resource effectiveness in order to achieve a degree of integration in this market. A key role is played by the state, which should, especially through public procurement under OPRD and OPE 2014-2020, provide opportunities for the businesses to implement innovative solutions in the sectors of waste, water, energy efficiency and energy technologies.

To promote the implementation of sustainable production models it is necessary to show their economic effect (i.e. again measures for promotion, demonstration and visualisation). To stimulate consumption, it is necessary to implement measures to promote and make pilot testing of new resource-efficient technologies and products. In many countries pilot and demonstration initiatives concerning resource-efficient technologies for the industry and households bringing these innovations closer to the business and society are popular.

Direct environmental aspects have been largely covered by the polluter pays principle, especially regarding effects on air, soil and water. However, the indirect aspects of the “green economy” have been

---

<sup>42</sup> Including the provision of links to the web-pages of the judicial authorities; and the information system of the electronic register of the judicial authorities; ensuring interoperability of the different systems used by the judicial authorities to set up a link among them and to the information system of the Unified Information System for Combating Crime (UISCC); connecting the information systems of the judiciary authorities and the integrated environment for the exchange of electronic documents and pilot implementation of cross-border public e-services of high economic and societal interest with respect to their integration into the digital single market of the EU.



poorly addressed in the country's economy, especially the intensive use of resources such as land, energy, water, forest areas, biodiversity, coastal zone and etc. or the generation of waste which can be avoided or waste can be reused.

What is needed is an adequate set of incentives that allows the private sector to invest more so as to achieve greater resource efficiency. On the one hand, boosting the demand for products and services with good resource characteristics will stimulate innovation through the development of markets. But at the same time clear framework conditions are necessary to increase investor confidence, where such investments are made as they are considered riskier and have a longer return period.

The main challenge faced by the policy of promoting resource-efficient productions is the formation of public consciousness and culture regarding the issues of sustainability through information campaigns and education. Thus, sustainable patterns of behaviour aimed at saving resources and energy, using renewables, recycling of waste, etc. "Green" demand for products and services, which is an incentive for businesses to invest in their production, has been generated. Such a demand needs to be supported by creating conditions for market equality of resource-efficient products and services and their equivalents through an effective tax and revenue policy, and targeted subsidies and opportunities for project financing.

### **Developing an adequate to the market and global trends framework for "green jobs" and measures to promote their development**

Measures can be included to demonstrate to the business the economic benefits from the introduction of innovation associated with a more rational use of resources, energy efficiency (related to oil and gas dependence), reuse of waste and materials, etc.

Key is the significance of management of specific waste streams – recycling, reuse and/or recovery of raw materials and energy from agricultural waste (fruit-growing, floriculture and horticulture), waste from wood processing and the production of panels and furniture, sludge from wastewater treatment, end-of-life electrical and electronic equipment, batteries and accumulators, biodegradable waste, etc. It is particularly important to stimulate waste-free technologies and those for waste recovery and reuse.

**To establish and manage all these technologies it is needed to build new skills in managers and specialists.**

### **Innovation for resource efficiency in the water sector**

Promoting the development of innovative solutions to tackle the challenges facing the water sector and supporting their market realisation will create significant economic opportunities. Innovation must lead either to new products or services or improve the existing models of managing water resources at a lower price or at the same price but with high quality.

Innovation in the water sector can be achieved through the interaction between water users, research and technological development, and legal requirements and implemented as part of the initiative "European Innovation Partnership" which will directly benefit the activities of existing initiatives such as 7 Framework Programme (FP7), Horizon 2020, joint planning initiative (JPI) on water as well as other European and national activities such as technology platforms.

In the forthcoming programming period measures should be realized in the following areas:

- I. Water re-use and recovery (especially in areas with water shortages and drought)
- II. Water and wastewater treatment, including resource recovery
- III. Intelligent monitoring systems



Intelligent systems for water management with potential for export based on platforms for data from various sources, including monitoring of quantity and quality, data management and modelling; Platforms should include data sources from the water cycle and data sources from other related fields;

### **Innovation for resource efficiency in the waste sector**

In the waste sector there are a number of challenges in terms of improving the separate collection and recycling, the processes of management of recycling and recovery of a number of waste streams, as well as awareness and motivation of enterprises. On the one hand, attention should be paid to the replacement of conventional – exhaustible resources by new technological solutions or the use of recycled materials, and on the other hand, re-use and alternative use should be encouraged. Modern technologies provide a variety of opportunities in product design and in using waste as raw materials in previously unknown alternative applications and productions.

Measures are to be taken in the following areas:

- I. Waste generation prevention.
- II. Improve the processes of waste collection and separate collection, recycling and recovery.
- III. Implement high-tech information and communication systems for reporting quantities of waste collected by the population.

### **5.26.3.2. Activities for ICT applications in the industrial sector**

It is necessary to support the investments for use of ICT solutions, software applications and systems: Application software, System software, Development software (computer programming tools), designed specifically for the needs of the enterprise, as well as ready-made solutions that can be adapted in order to raise productivity.

Extensive use of ICT in the industry includes introduction of ICT applications, optimisation of management, production processes, e-commerce and e-business, the provision of affordable interactive on-line services, better opportunities for flexible, distance and part-time work (including mothers), expanded use of ICT in the resource management activities, energy management, tracing of environmental characteristics and effects on climate change, environmental protection and monitoring in general, participation in international platforms, distance and online trainings for companies and employees, environmentally-friendly and energy-efficient transport and improved mobility by implementing smart transport systems, etc.

Development of ICT solutions on market principles depends entirely on the willingness of customers to use them, and this is determined by their access to new, previously unknown services at reasonable prices. Since the development and deployment of such services would be possible only when there is sufficient personnel in the ICT sector, and digital competence of the whole society – thus a closed circle is obtained, which will eventually hinder the development of the two key factors for building digital society.

It is in the untying of this closed circle where the state should play its role and through a well-targeted intervention give an impetus, leaving the further development to the market mechanisms. Furthermore, public institutions can become a generator of innovation and sustainable growth based on providing open access to digitized information – “open data” and services<sup>43</sup>. Efforts should be directed simultaneously at the two interrelated key factors. This will be achieved through concerted political, regulatory, economic and other measures of all institutions involved in the process.

---

<sup>43</sup> <http://s3platform.jrc.ec.europa.eu/open-data>

## 6. Financial plan

The financial plan defines and guarantees the ways in which IS3 and its objectives will be implemented. On the one hand, the activities receive a financial expression and a clear time schedule, the stakeholders in the innovation process being able to plan the rules that will have to be complied with in the implementation of their innovative projects and ideas. On the other hand, financing is in line with the objective that Bulgaria has set in the Europe 2020 Strategy and the National Reform Programme in terms of R & D expenditure: reaching 1.5 percent of the GDP by 2020. The Strategy will be implemented through co-financing by the Operational Programmes and the state budget at the amount not exceeding the allocated resources for innovation under the law for the state budget for every year of the planning period till 2020.

The financial plan is developed based on a simulation model and the following assumptions for the period 2014-2020:

- Changes in GDP in the period until 2020 – MF forecast, “Economic and Financial Policy Directorate”;
- Full absorption of the EU funds for innovation in the amount of 1 billion EUR – average annual increase over the period 2014-2020 by 10%;
- Increase in public R & D expenditure in the period 2014-2020 – average annual increase by 15%;
- Increase in R & D expenditure in higher education in the period 2014-2020 – average annual increase by 16%;
- Increase in R & D expenditures of the business in the period 2014-2020 – average annual increase by 16%;
- Increase in public R & D expenditure in the period 2014-2020 – average annual increase for not-for-profit organisations by 10%;

The model allows monitoring of the implementation of the national target (R & D expenditure equal to 1.5% of GDP in 2020) and adoption of different options to increase the types of costs depending on the current performance.

R & D expenditure by source of funds and sectors										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Public expenditure, thousand levs</b>										
Government	153 942	148 962	148 962	171 306	197 002	226 553	260 535	299 616	344 558	396 242
Higher Education	43 996	39 866	39 866	46 245	53 644	62 227	72 183	83 732	97 129	112 670
European funds, incl. national co-financing	-	-	-	250 000	275 000	302 500	332 750	366 025	402 628	442 890
<b>Total public expenditure</b>	<b>197 938</b>	<b>188 828</b>	<b>188 828</b>	<b>467 551</b>	<b>525 646</b>	<b>591 279</b>	<b>665 468</b>	<b>749 373</b>	<b>844 315</b>	<b>951 802</b>
% Of GDP (including funds from OP)	0.26	0.24	0.24	0.57	0.61	0.65	0.7	0.68	0.73	0.79
% Of GDP (excluding funds from OP)	0.26	0.24	0.24	0.27	0.29	0.32	0.35	0.35	0.38	0.42
% Of total R & D expenditure	46.08	38.07	38.07	56.78	56.04	55.31	54.59	53.87	53.17	52.48
<b>Private expenditure, thousand levs</b>										
R & D expenditure of companies	228 691	300 067	300 067	348 078	403 770	468 373	543 313	630 243	731 082	848 055
Non-profit organizations	2 937	7 043	7 043	7 747	8 522	9 374	10 312	11 343	12 477	13 725
<b>Total private expenditure</b>	<b>231 629</b>	<b>307 110</b>	<b>307 110</b>	<b>355 825</b>	<b>412 292</b>	<b>477 748</b>	<b>553 625</b>	<b>641 586</b>	<b>743 559</b>	<b>861 780</b>
% Of GDP (for businesses)	0.30	0.39	0.38	0.43	0.47	0.52	0.57	0.57	0.63	0.7
% Of total R & D expenditure	53.92	61.93	61.93	43.22	43.96	44.69	45.41	46.13	46.83	47.52
<b>Total R &amp; D expenditure in thousand levs</b>	<b>429 566</b>	<b>495 938</b>	<b>495 938</b>	<b>823 376</b>	<b>937 938</b>	<b>1 069 027</b>	<b>1 219 093</b>	<b>1 390 959</b>	<b>1 587 874</b>	<b>1 813 582</b>
<b>Total R &amp; D expenditure (% of GDP)</b>	<b>0.57</b>	<b>0.64</b>	<b>0.63</b>	<b>1.01</b>	<b>1.09</b>	<b>1.18</b>	<b>1.28</b>	<b>1.27</b>	<b>1.38</b>	<b>1.5</b>
<b>including</b>										
Government spending	0.2	0.19	0.19	0.21	0.23	0.25	0.27	0.27	0.3	0.33
Private expenditure	0.3	0.39	0.38	0.43	0.47	0.52	0.57	0.57	0.63	0.7
Higher Education	0.06	0.05	0.05	0.06	0.06	0.07	0.08	0.08	0.08	0.09
EU funds with nationwide co-financing (% of GDP)				0.31	0.32	0.33	0.35	0.33	0.35	0.37

### Sources of funding of the activities in the thematic areas

Objective	Activity	Source of funding
Objective 1 (vertically)	Activities for thematic area 1.	OPIC, OPSESG
Objective 1 (vertically)	Activities for thematic area 2.	OPIC, OPSESG
Objective 1 (vertically)	Activities for thematic area 3.	OPIC, OPSESG
Objective 1 (vertically)	Activities for thematic area 4.	OPIC, OPSESG
Objective 1 (horizontally)	Activities leading to an effective research and business partnership	OPIC, OPSESG, NIF, NSRF
Objective 1 (horizontally)	Activities leading to high quality human resources	OPHR, OPSESG
Objective 1 (horizontally)	Activities leading to an adequate environment and infrastructure for innovation, including digital growth and electronic governance	OPIC, OPSESG, OPGG, RDP, CEF
Objective 2 (horizontally only for Resource Efficiency technologies)	Innovation for resource efficiency	OPIC, Norwegian programme, NIF
Objective 2 (horizontally only for ICT applications)	Innovation for implementing ICT applications	OPIC, Horizon 2020, NIF, NSRF

### 7. Effective and coordinated governance of IS3

The process of innovation is complex and systemic and involves many participants and a long maturation period. Innovation-related policies require horizontal, vertical and temporal coordination in order to be effective. Achieving such coordination faces important challenges, the first of which is to achieve a national consensus on innovation as the correct path to economic growth. Then, the government should have a broad and long-term vision to be able to guide the development of an innovation system through the joint efforts of the public and private sectors where the business is responsible for turning knowledge into innovation and wealth, and the government – for creating an environment that is conducive to long-term investment.

The main innovation-related difficulty is in its complexity, in the fact that innovation is an organic, non-linear phenomenon which depends on the merger of many factors and actors and their linkages. The role of the government to promote smart specialisation is not limited to the support and dissemination of new products, processes and scientific achievements. The government plays an equally important role in the development of the human capital and knowledge, in promoting organizational improvements that are a basic prerequisite for innovation, in prioritising the development of opportunities for research, and in considering the formation of human resources and needs for knowledge in the key sectors. Achieving these conditions is expensive and slow, with uncertain results, and the government should maintain a balance between strategic investments in the development of scientific discoveries and human capital formation in the long run, while also responding to the demand from the business for innovative products and processes in the short run. Sectoral specificities and long lag times require an effective coordination of these two important pillars.

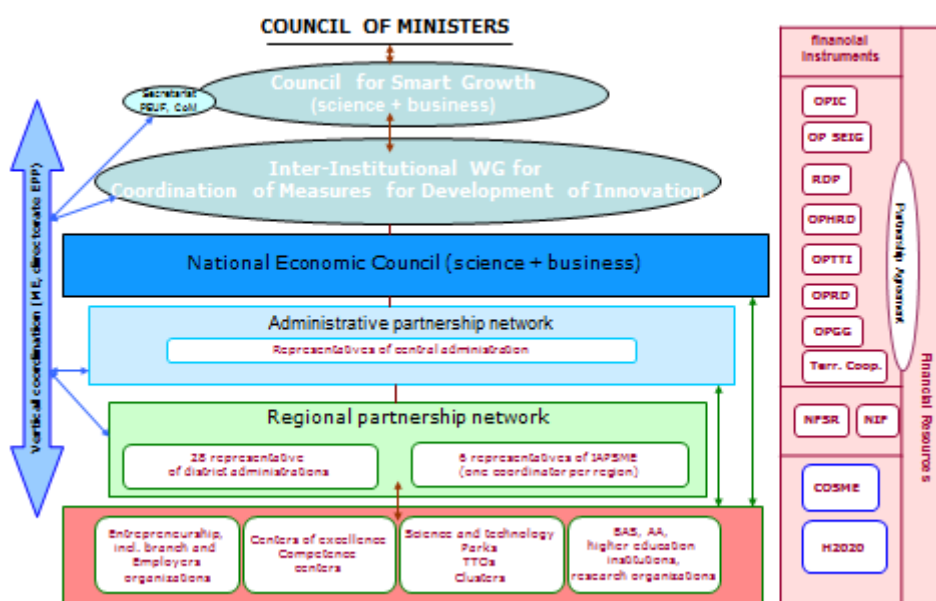
The fulfilment of the responsibilities of the Bulgarian government is based on the Division of Labour Model<sup>44</sup> (like Germany, Norway, Finland, Chile and the Netherlands), which clearly defines the responsibilities of the Ministry of Economy and Energy for industrial innovation and technology, the Ministry of Education and Science for the responsibility of human resources and research, the Ministry of Transport, Information Technology and Communications – for ICT, etc. The danger in this model (which has been observed so far) is remoteness of education and research policies from the businesses and limited innovation policy.

For sustainable and efficient governance of the implementation of the Innovation Strategy for Smart Specialisation, the following structure has been proposed:

---

<sup>44</sup> Input for Bulgaria's Research and Innovation Strategies for Smart Specialization, World Bank

## ORGANIZATIONAL STRUCTURE + DIALOGUE WITH PARTNERS



### Council of Ministers

Approves IS3, updates it if necessary, coordinates the annual budget;

### Council for Smart Growth

With a Decree of the Council of Ministers № 116 of May 12, 2015, a Council for smart growth was established as an advisory body to the Council of Ministers, which determines the development trends of the thematic areas of smart specialization, the vision, the strategic objectives, coordination and monitoring of the implementation of the Innovation Strategy for Smart Specialization of Bulgaria 2014-2020, (IS3). The Decree was adopted under Art. 21 and Art. 22a, Paragraph. 1 of the Law on Administration. The Council for Smart Growth shall:

- Determine the priorities in education, science, innovation, ICT;
- Coordinate the implementation of IS3;
- Review the annual reports on the implementation of IS3 under the monitoring mechanism;
- Propose changes in the priority technology areas of IS3, if necessary. Proposals for changes/supplements shall be submitted by the leading ministry which is responsible for the issue under consideration;
- Adopt the activities to ensure the implementation of IS3. This set of activities shall be based on the three-year budget forecast and in accordance with the proposals of the business, science and academia. They will form the budget forecast for the next financial year;
- coordinate policy management functions of the National Innovation Fund and the Fund "Scientific Research".

The Council shall consist of a chairman and members.

- President of the Council is the Prime Minister of the Republic of Bulgaria.
- Members of this Council are the ministers or their deputies of the leading ministries responsible for policy making in the field of education and science – Ministry of Science and Education, industrial innovation – Ministry of Economy and Energy, information and communication technologies – Ministry of Transport, Information Technology and Communications, innovation in agriculture – Ministry of Agriculture and Food. In the Council there are four industry representatives – prominent businessmen from the priority technological sectors of the economy and four representatives of the academia.

- The members of the CSG are determined by order of the Prime Minister of the Republic of Bulgaria on the proposal of the Minister of Economy, who consults with stakeholders. In order to determine Deputy Prime Minister and Deputy Ministers who participate in the Council's work as substitutes respectively Prime Minister and the Ministers.

In accordance with Order № H-121 of May the 2nd, 2015 the Prime Minister has determined the list of members of the CSG. CSG may decide on specific meetings invite other persons and institutions.

Council holds regular meetings at least once in six months.

- At least once a year, the Council holds an open meeting at which a wide range of representatives of business, labor organizations, professional organizations, research, scientific, academic organizations and other stakeholders are invited.
- President of the Council sets the agenda and the date of the next meeting, based on proposals by the Council members from previous meeting. Materials for the sessions must include a draft decision and the reasons for each question.
- The agenda and materials for the regular meetings shall be sent to the Council Secretariat at least seven days before the meeting date.

Extraordinary meetings of the Council are organized by a proposal of the President of the Council or at the request of more than half of its members. The agenda and materials for extraordinary meetings shall be prepared by persons, initiating their implementation, and sent to the Secretariat for consideration of the meeting no later than two working days before the meeting.

If necessary, the Council may establish working groups on specific issues related to the direct fulfillment of its functions. Working group members are not allowed to be members of the Council.

The Council shall adopt decisions by consensus. Members of the Board may apply dissenting opinion to the decisions. The minutes of the meeting shall be prepared by the record keeper of the secretariat of the Council, signed by the President of the Council and sent by the secretariat to its members within two days of the date of the session.

At the beginning of each meeting, the Chairman of the Board or appointed by him member report on the implementation of decisions of the previous meeting.

Directorate "Programming of EU funds" in the administration of the Council of Ministers shall provide administrative and organizational maintenance of the Council.

The Council Secretariat:

- organizes the preparation and conduct of Council sessions;
- defines recorder for keeping the minutes of the regular and extraordinary meetings of the Council;
- prepares the minutes of Council meetings;
- Keep records of meetings and accompanying materials;
- assist the President of the Council in its work;
- Performs other tasks assigned by the President of the Council.

The Ministry of Economy creates an operational unit, that supports the Secretariat under Art. 11 and performs operational and expert tasks related to the implementation of ISIS. The members of the operational unit are determined by the Minister of Economy.

With Ordinance P-70 dated 19 March 2015 it is created an inter-institutional Working Group for the coordination of the measures for the development of innovations, applied research and research and development activities. Members are representatives from CoM Administration, MES (MA and directorate "Science"), Ministry of Economy (MA and directorate "Economic Policies for Promotion"), MAF (RDP).

With the Statutory Act of the Ministry of Economy, adopted by Decree № 447 from 23.12.2014, the "Economic policies for promotion" directorate is set to "coordinate and participate in the implementation of the "entrepreneurial discovery", associated with the development and implementation of the Innovation Strategy for Smart Specialization of the Republic of Bulgaria 2014 - 2020"

Decree № 74 of March 27, 2015 created the National Economic Council (NEC) as an advisory body to the Council of Ministers with Decree was adopted pursuant to Art. 21 and Art. 22a para. 1 of the Law on Administration.

The Council, NEC:

1. analyzes and proposes measures to support innovation and investment activities to increase the competitiveness of the economy;
2. draw recommendations and advise the Government on issues of general economic development of the country;
3. develops and offers economic and legal regulators to encourage investment in the country;
4. organize analyze and control the interaction between the executive authorities, other public bodies and businesses.

The Council shall consist of a chairman and members.

Chair of the Council is the Minister of Economy

-Members of the Council entitled with a right to vote are: Deputy Minister of Economy; Deputy Minister of Labor and Social Policy; Deputy Minister of Finance; Deputy Minister of Regional Development and Public Works; Deputy Minister of Foreign Affairs; Deputy Minister of Education and Science; Deputy Minister of Energy; Deputy Minister of Tourism; Deputy Minister of Environment and Water; Deputy Minister of Transport, Information Technology and Communications; Deputy Minister of Agriculture and Food; President of the Bulgarian Chamber of Commerce; President of the Bulgarian Industrial Association; Chairman of the Confederation of Employers and Industrialists in Bulgaria (CEIB); Chairman of the Board of the Association of Industrial Capital in Bulgaria

-representatives of the political cabinet of the Deputy Prime Ministers participate in the work of the Council with an advisory vote

- representative of the Bulgarian Academy of Sciences

-Other (according to the theme, incl. representatives of the Legislature).

NEC may establish working groups on specific issues related to the direct fulfillment of its functions. Working group members may not be members of the council.

At the beginning of each meeting, the Chairman of the Board reports on the implementation of the decisions of the previous meeting. Every six months, at a regular meeting, the council reports on the implementation of decisions taken. On the website of the Ministry of Economy an information is published about Council meetings, the contacts of the Secretariat, a report on the work of the council and the decisions of its meetings.

The members of the Council are available on the website of the Ministry of Economy - <http://www.mi.government.bg/bg/news/s-p-i-s-a-k-na-postoyannite-uchastnici-v-nacionalniya-ikonomicheski-savet-sazdaden-s-pms-74-27-03-201-2164.html>.

The coordination of the policies of the responsible ministries shall be carried out by a **peer network at the central level** under the auspices of the Minister of Economy and Energy. (In Decision No 668/2012, as last amended in 2014, MEE is defined as the leading ministry for the development of IS3 – a mandatory precondition for the new programming period). An expert in the field of the policies within the competences of each ministry, which are relevant to the implementation of IS3, shall be determined. In this way the administrative capacity for in-depth knowledge of the topic will be built and an effective coordination of the issues and topics for consideration as set by the Council for Smart Growth will be carried out. The Peer Network at central level will participate in the preparation and provision of information on the implementation of IS3 and information related to the preparation of the annual report on the implementation of IS3.

The Peer Network at central level will participate in the Drafting of regular annual monitoring reports on the implementation of IS3, summarizing the information from all financial instruments of the leading ministries financed by national and EU funds.



A time schedule of the planned activities for the implementation of IS3 will be developed for each calendar year and an annual report on the review of implementation of IS3 will be prepared.

The documentation for each point of the agenda of the meetings of the Council for Smart Growth will be prepared by the relevant responsible ministry (**MEE, MES, MTITC, and MAF**). Each ministry, according to the time schedule for the preparation of the three-year budget process, shall include in the draft budget for the next year a set of measures to be implemented during the next calendar/fiscal year with national and European funding.

Financial instruments for the realization of IS3 are OPIC, SEIG and PDHR - with European funds and from the state budget in amounts not exceeding allocations for innovation with the laws of the state budget for each year of the forecast period to 2020.

Ensuring transparency of the management process of realization of IS3 will be guaranteed by the regular publication of information on meetings, actions, publication of analytical materials, related to summarizing and analyzing the bids, publication of minutes of meetings of CSG and NEC.

With an order RD-16-521 / 26.06.2015 of the Minister of Economy a list of members is nominated of the operational unit under Art. 12 of the Decree № 116/2015 for the establishment of a Council for Smart Growth. Operational Unit will assist the Secretariat under Art. 11 and will perform operational and expert tasks related to the implementation of IS3.

Policy coordination at regional level (NUTS III) will be carried out by a partnership network at regional level under the auspices of the Minister of Economy and Energy. With an Order of the Minister of Economy experts from all 28 regions of Bulgaria are appointed in the field of policies that relate to the implementation of IS3. Thus build administrative capacity for understanding in depth the themes and will be implemented effective coordination raised by the Council for smart growth issues and topics for consideration. Regional Partnership Network already participates in continuing the process of entrepreneurial discovery, as well as in the formulation of guidelines for regional specialization.

Peer network at regional level will be involved in the preparation and provision of information on the implementation IS3 focusing on regional issues. Partner Network will also support reporting and monitoring the implementation of ISIS. Schedule will be developed for each year of planned activities on the realization of IS3. It will be built on the administrative capacity to implement effective feedback from stakeholders at local level about the effects of the activities and policies. The information from this network will also form the annual monitoring report on the implementation of IS3.

## 8. Monitoring and evaluation of IS3

In its development the Innovation system develops from the linear to the organisational model. At the same time, it has a horizontal expression, which today more than ever requires a well-coordinated mechanism for monitoring and evaluation of policies among all stakeholders in the system, and adaptation of the institutions of the innovation system to the changing environment.

There is no standardized approach to the development of a system for monitoring and evaluation of the Innovation strategy for smart specialization. It is country-/ region -specific. In general, indicators should measure the change or development of activities that are globally competitive and have a bigger potential for creating added value. When the expected results are long-term, progress in the achievement of the objectives can be also measured by intermediate indicators.

Monitoring and evaluation of IS3 are two logically interrelated activities. **Monitoring tracks the progress of planned strategic objectives** – it provides quantitative and qualitative information on the progress of a particular policy compared to set up baseline data or goals. Monitoring seeks to prove that the activities are performed; the money is spent for the intended purpose and the results are developing in the desired direction.

**The evaluation provides a reasoned explanation of whether interventions achieve the desired result.** The evaluation aims to assess also why and how desired results are achieved (or not achieved). It analyses the mechanisms leading to the result and takes into account the effects that are not planned.

Given these postulates, IS3 objectives and that the financial instruments for the implementation of IS3 are OPIC and OPSESG, OPGG and RDP – for ICT, the following indicators for monitoring and evaluation of policy have been determined:

Indicators for assessing progress IS3					
	Indicators	State of 2013	State of 2014	Progress (+,-)	Source
<b>Strategic objective</b>		2020 Bulgaria to pass the group of "modest innovators" in the "moderate innovators"			
<b>Operational objective 1</b>		<b>Focusing on investment for the development of innovation potential in the identified thematic areas (for creation and development of new technologies, leading to competitive advantage and increase added value to national products and services)</b>			
<b>Horizontal activities</b>					
	<b>Effective science-business cooperation</b>				
	513 R&D performed by business	0.3	0.4	+	Global Innovation Index 2013
	514 R&D financed by business	30.2	60.5	+	Global Innovation Index 2013
	52 Innovation linkages	19.9	33.6	+	Global Innovation Index 2013
	521 University/industry research collaborati	33.4	34	+	Global Innovation Index 2013
	522 State of cluster development	41.2	38.8	-	Global Innovation Index 2013
	University-industry collaboration in R&I	3			Global Competitiveness Report 2013-2014
	PCT patents, applications/million pop.*	3.7			Global Competitiveness Report 2013-2014
<b>Quality human resources</b>					
	51 Knowledge workers	45.2	46.6	+	Global Innovation Index 2013
	511 Knowledge-intensive employment, %	23.5	29.6	+	Global Innovation Index 2013
	512 Firms offering formal trainingq % firms	30.7	30.8	+	Global Innovation Index 2013
	614 Scientific & technical articles	20.5	19.9	-	Global Innovation Index 2013
	Citable documents H index	129	138	+	Global Innovation Index 2013
	Availability of scientists and engineers	3.7			Global Competitiveness Report 2013-2014
<b>Right environment, infrastructure, digital growth, eGovernment</b>					
	313 Government's online service	49	49	+	Global Innovation Index 2013
	314 E-participation	2.6	2.6	+	Global Innovation Index 2013
	31 ICT	35.5	39.2	+	Global Innovation Index 2013
	Quality of scientific research institutions	3.7			Global Competitiveness Report 2013-2014
	Gov't procurement of advanced tech products	3.3			Global Competitiveness Report 2013-2014

Indicators for assessing progress IS3					
	Indicators	State of 2013	State of 2014	Progress (+,-)	Source
<b>Strategic objective</b>		2020 Bulgaria to pass the group of "modest innovators" in the "moderate innovators"			
<b>Operational objective 1</b>		Focusing on investment for the development of innovation potential in the identified thematic areas (for creation and development of new technologies, leading to competitive advantage and increase added value to national products and services)			
<b>Vertical activities</b>					
<b>Technological field MECHATRONICS AND CLEAN TECHNOLOGIES</b>					
322	Electricity consumption, kwh/cap	4471.3	4.6	-	Global Innovation Index 2013
331	GDP/unit of energy use, 2000 PPP\$/kg oil e	4.9	64	+	Global Innovation Index 2013
332	Environmental performance	56.3	13.6	-	Global Innovation Index 2013
333	ISO 14001 environmental certificates	9.2			Global Innovation Index 2013
	from new passenger cars, Gram of CO2/km	141.7			Resource Efficiency Scoreboard
	Manufacture of computer, electronic and optical products (26 NACE), VA in production ( % )	34			Eurostat (DataBase for SME)
	Manufacture of electrical equipment (27 NACE), VA in production ( % )	23			Eurostat (DataBase for SME)
	Manufacture of motor vehicles, trailers and semi-trailers (29 NACE), VA in production ( % )	20			Eurostat (DataBase for SME)
	Computer programming, consultancy and related activities (62 NACE), VA in production ( % )	58			Eurostat (DataBase for SME)
	Scientific research and development (72 NACE), VA in production ( % )	40			Eurostat (DataBase for SME)
	Architectural and engineering activities; technical testing and analysis (71 NACE), VA in production ( % )	42			Eurostat (DataBase for SME)
<b>R &amp; D expenditure by field of science during the 2008-2012</b>					
	Technical sciences (25.1%), million euro	261			NSI Bulgaria
	Natural sciences, mathematics and informatics (24.6%), million euro	256.1			NSI Bulgaria
<b>Technological field ICT, INFORMATICS</b>					
713	ICT & business model creation	51.1	48.5	-	Global Innovation Index 2013
714	ICT & organizational model creation	46.5	45.3	-	Global Innovation Index 2013
311	ICT access	59.7	63.3	+	Global Innovation Index 2013
312	ICT use	30.4	42	+	Global Innovation Index 2013
623	Computer software spending, % GDP	0.3	0.3	+	Global Innovation Index 2013
625	High- & medium-high-tech manufacture, %	15.6	18.4	+	Global Innovation Index 2013
	Company spending on R&D	2.8			Global Competitiveness Report 2013-2014
	Manufacture of computer, electronic and optical products (26 NACE), VA in production ( % )	34			Eurostat (DataBase for SME)
	Telecommunications (61 NACE), VA in production ( % )	52			Eurostat (DataBase for SME)
	Computer programming, consultancy and related activities (62 NACE), VA in production ( % )	58			Eurostat (DataBase for SME)
	Scientific research and development (72 NACE), VA in production ( % )	40			Eurostat (DataBase for SME)
	Information service activities (63 NACE), VA in production ( % )	51			Eurostat (DataBase for SME)
<b>R &amp; D expenditure by field of science during the 2008-2012</b>					
	Technical sciences (25.1%), million euro	261			NSI Bulgaria
	Natural sciences, mathematics and informatics (24.6%), million euro	256.1			NSI Bulgaria

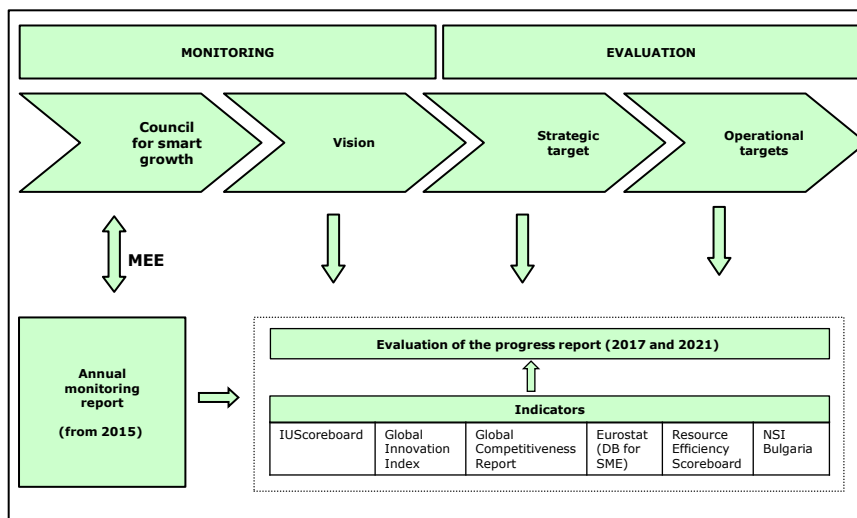
Indicators for assessing progress IS3						
		Indicators	State of 2013	State of 2014	Progress (+,-)	Source
Strategic objective			2020 Bulgaria to pass the group of "modest innovators" in the "moderate innovators"			
Operational objective 1			Focusing on investment for the development of innovation potential in the identified thematic areas (for creation and development of new technologies, leading to competitive advantage and increase added value to national products and services)			
Vertical activities						
	Technological field HEALTHY LIVING AND BIOTECHNOLOGY INDUSTRIES					
		Area under organic farming, %	0.8			Resource Efficiency Scoreboard
		Manufacture of food products (10 NACE), VA in production ( % )	19			Eurostat (DataBase for SME)
		Manufacture of wearing apparel (14 NACE),VA in production ( % )	40			Eurostat (DataBase for SME)
		Manufacture of chemicals and chemical products (20 NACE),VA in production ( % )	18			Eurostat (DataBase for SME)
		Manufacture of basic pharmaceutical products and pharmaceutical preparations (21 NACE),VA in production ( % )	35			Eurostat (DataBase for SME)
		Manufacture of other non-metallic mineral products (23 NACE),VA in production ( % )	30			Eurostat (DataBase for SME)
		Manufacture of fabricated metal products, except machinery and equipment (25 NACE),VA in production ( % )	30			Eurostat (DataBase for SME)
		Manufacture of computer, electronic and optical products (26 NACE),VA in production ( % )	40			Eurostat (DataBase for SME)
		Computer programming, consultancy and related activities (62 NACE),VA in production ( % )	58			Eurostat (DataBase for SME)
		Scientific research and development (72 NACE),VA in production ( % )	40			Eurostat (DataBase for SME)
		Architectural and engineering activities; technical testing and analysis (71 NACE),VA in production ( % )	42			Eurostat (DataBase for SME)
		R & D expenditure by field of science during the 2008-2012				
		Medical sciences (31.1%), million euro	323			NSI Bulgaria
		Technical sciences (25.1%), million euro	261			NSI Bulgaria
		Natural sciences, mathematics and informatics (24.6%), million euro	256			NSI Bulgaria
		Agricultural sciences (11.0%), million euro	115			NSI Bulgaria
	Technological field NEW TECHNOLOGIES IN CREATIVE AND RECREATIVE INDUSTRIES					
	721	Audio-visual & related services export	0.5	0.8	+	Global Innovation Index 2013
	722	National feature films	2.7	2.8	+	Global Innovation Index 2013
	723	Paid-for dailies, circulation	19.9	промяна	+	Global Innovation Index 2013
	724	Printing & publishing manufacture	1.5	0	-	Global Innovation Index 2013
	725	Creative goods export	1.4	0.9	-	Global Innovation Index 2013
		Manufacture of computer, electronic and optical products (26 NACE),VA in production ( % )	40			Eurostat (DataBase for SME)
		Motion picture, video and television programme production, sound recording and music publishing activities (59 NACE),VA in production ( % )	29			Eurostat (DataBase for SME)
		Programming and broadcasting activities (60 NACE),VA in production ( % )	26			Eurostat (DataBase for SME)
		Computer programming, consultancy and related activities (62 NACE),VA in production ( % )	58			Eurostat (DataBase for SME)
		Information service activities (63 NACE),VA in production ( % )	51			
		Scientific research and development (72 NACE),VA in production ( % )	40			Eurostat (DataBase for SME)
		Medical sciences (31.1%), million euro	323			NSI Bulgaria
		Technical sciences (25.1%), million euro	261			NSI Bulgaria
		Natural sciences, mathematics and informatics (24.6%), million euro	256			NSI Bulgaria
		Agricultural sciences (11.0%), million euro	115			NSI Bulgaria
		Humanities (5.1%), million euro	53			NSI Bulgaria
		Social Sciences (3.0%), million euro	32			NSI Bulgaria

Indicators for assessing progress IS3					
	Indicators	State of 2013	State of 2014	Progress (+,-)	Source
Operational objective 2		Support for accelerated utilization of technologies, methods and others, improving resource efficiency and application of ICT in enterprises from all industries			
Activities for resource efficiency					
	Resource productivity, EUR per kg	0.21			Resource Efficiency Scoreboard
	Resource productivity (index, 2000=100)	117.29			Resource Efficiency Scoreboard
	Domestic material consumption, tonnes per capita	18.01			Resource Efficiency Scoreboard
	Productivity of built-up areas, Millions PPS per km <sup>2</sup>	85.4			Resource Efficiency Scoreboard
	Built-up areas, km <sup>2</sup>	1037			Resource Efficiency Scoreboard
	Built-up areas as a share of total land, %	0.9			Resource Efficiency Scoreboard
	Water exploitation index	6			Resource Efficiency Scoreboard
	Water productivity, EUR per m <sup>3</sup>	4.2			Resource Efficiency Scoreboard
	Greenhouse gas emissions per capita, tonnes of CO <sub>2</sub> equivalent	8.97			Resource Efficiency Scoreboard
	Energy productivity, EUR per kg of oil equivalent	1.5			Resource Efficiency Scoreboard
	Energy dependence, %	36.1			Resource Efficiency Scoreboard
	Share of renewable energy in gross final energy consumption, %	16.3			Resource Efficiency Scoreboard
Turning waste into a resource					
	Generation of waste excluding major minerals	2002			Resource Efficiency Scoreboard
	Recycling rate of municipal waste, %	25			Resource Efficiency Scoreboard
Supporting research and innovation					
	Eco-innovation index, EU27=100	79.61			Resource Efficiency Scoreboard
Getting the prices right					
	Total environmental tax revenues as a share of GDP	10.11			Resource Efficiency Scoreboard
	Energy taxes by paying sectors - Household consumption	30			Resource Efficiency Scoreboard
Safeguarding clean air					
	Urban population exposure to air pollution	58			Resource Efficiency Scoreboard
	EU urban population exposed to PM10 concentration	100			Resource Efficiency Scoreboard
Activities for ICT applications in the whole industry					
	Availability of latest technologies	4.4			Global Competitiveness Report 2013-2014
	Firm-level technology absorption	4.2			Global Competitiveness Report 2013-2014
	FDI and technology transfer	4.1			Global Competitiveness Report 2013-2014
	Individuals using Internet, %*	55.1			Global Competitiveness Report 2013-2014
	Fixed broadband Internet subscriptions/100 pop.*	17.6			Global Competitiveness Report 2013-2014
	Int'l Internet bandwidth, kb/s per user*.	54.4			Global Competitiveness Report 2013-2014
	Mobile broadband subscriptions/100 pop.*	40.3			Global Competitiveness Report 2013-2014
	Capacity for innovation	3.2			Global Competitiveness Report 2013-2014

Internationally recognized indicators have been selected, based on which the country can compare its position to that of other countries, either in the EU or in the world market. Baseline and average values for the EU (where available) are given and the growth rate, which must be achieved (where this can be specified) is determined.

For the purposes of monitoring, it is envisaged to conduct the monitoring using a report summarised by MEE each year, together with peer networks at central and regional level and summarized information from the proposals received from stakeholders related to IS3. Initially, the report shall be submitted to the National Innovation Council and the National Research and Innovation Council for discussion by all stakeholders. After discussion and clarification of the need for changes in IS3, the Minister of Economy and Energy shall submit the report to the Council for Smart Growth.

## System for monitoring and evaluation of IS3



*The annual report includes the following:*

- Report on the implementation of the activities of the previous year, financed by the national budget and EU funds;
- Monitoring the implementation of the set indicators based on a comparative analysis of the innovation system in Bulgaria with the EU Member States<sup>45</sup>;
- Review the on-going innovation policy in Bulgaria and making proposals for policy changes, if necessary.

For the purposes of monitoring and evaluation of implementation, the first partnership meetings in the recent year and a half have been planned (Annex 1.)

<sup>45</sup> IUScoreboard

## Annexes

### 1. Action plan

#### *1.1 Actions completed before September 2014*

The Innovation strategy for smart specialisation is a pre-condition under Regulation 1303/2013 for the new programming period.

This document provides an overview of the actions taken to date and an action plan to be implemented in the coming years to meet the mandatory preconditions.

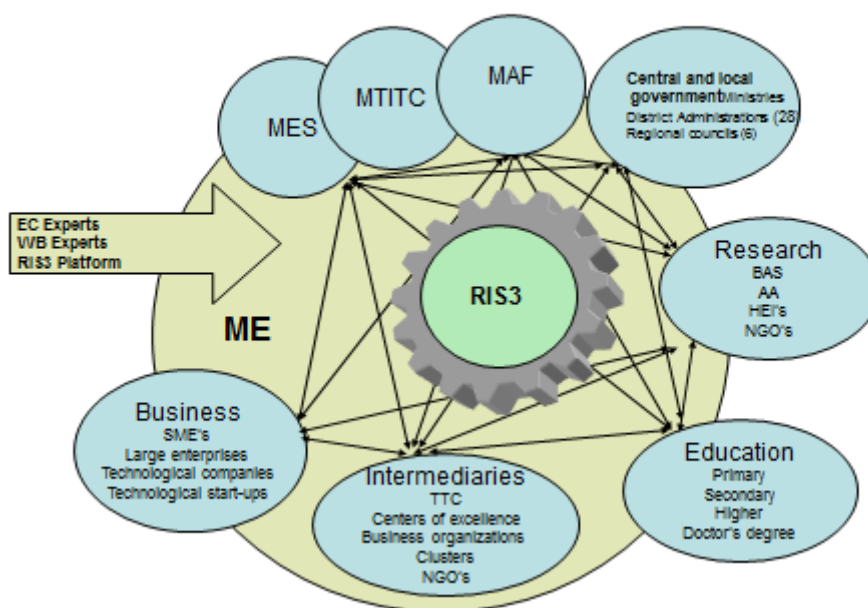
Actions taken – Planning and coordination of the process – to meet the requirements of thematic objective 1 of RE (EC) 1303/2013

1. **An organisational structure for the development of the document has been built.** The Ministry of Economy and Energy has been determined leading ministry by Decision No 668/2012 of the Council of Ministers (as last amendment Decision No116 of 5 March 2014 of the Council of Ministers). By a decision of the Minister of Economy and Energy a three-tier organisational structure was established:
  - Head – Minister of Economy and Energy
  - Managing Authority – National Innovation Council
  - Working group, chaired by the Minister of Economy and Energy. Members of the WG are representatives of the state administration – partner ministries in the development of IS3 (MES, MTITC, MAF, MEW, MRD, MF, etc.), representatives of the employers' organizations, businesses, professional organisations, research organisations – BAS, HEIs, AA, the Council of Rectors, NGOs, representatives of local authorities and regional administrations. The National Innovation Council, whose members are senior representatives of the ministries, BAS, HEIs, labour organisations, NGOs is the designated Managing Authority

The established organisational structure provides for the involvement of a wide range of stakeholders and exchange of information at national and regional level, improving the dialogue, creating conditions for increasing stakeholders' participation in the system for implementation, monitoring and updating of smart specialisations, determining the forms of partnership, and preparing for their participation in the process of determining the national smart specialisation. The principles of the organisation of work of the working group have been adopted.



## RIS3 STAKEHOLDERS



At the extended sessions of the Managing Authority experts of the World Bank have presented good practices from Austria, the Netherlands, Israel, Chile and some other countries. Successful examples of national and European projects presenting the competitiveness and innovativeness of the Bulgarian economy, a confirmation of its potential for growth, have been considered.

### 2. The following activities have been undertaken:

- Organizing an **introductory Seminar on “Smart specialisation”, 10-11 May 2012**, Sofia, where representatives of the European Commission presented the idea of IS3 to the general public.
- Signing an **agreement on technical assistance with the World Bank**, the World Bank team developed the following analytical materials:
  - Report: Contribution to the Strategy for Smart Specialization in the Field of Research and Innovation in Bulgaria, August 2013 - 26.07.2012;
  - Report on leading innovative infrastructure projects: Guidelines for preliminary investigation, December 2013;
  - Contribution to the programme for services for the commercialisation of innovation in Bulgaria, Analysis of the current infrastructure, organisations and picture of PIS; solutions for a more effective ecosystem for commercialization of innovation, September 2013;
  - Contribution to the Strategy for Smart Specialisation in the field of research and innovation: developing the digital agenda, August 2013;
  - Action Plan for services related to the commercialisation of innovation, December 2013;

- Management and institutional development of the innovation system in Bulgaria in the context of the Strategy for Smart Specialisation, Proposal to reform the management of the innovation system, December 2013;
- Management and institutional development of the public innovation system - 2
- Support to innovation through the Operational Programme “Competitiveness” 2007-2013, Overview and opportunities to improve performance in the period 2014-2020;
- How research and innovation can work for Bulgaria, January 2012;
- An overview of all generally available analysis has been made:
  - Global Innovation Index 2011, 2012, 2013;
  - Innovation Indicator Europe 2020;
  - Ranking of the Innovation Union - 2011, 2012, 2013, 2014;
  - Innovation System of Bulgaria (as part of Global Competitiveness 2012-2013, 2013-2014, 2014-2015);
- The following analyses have been made:
  - Competitive advantages of Bulgarian export industries in 2013, 2014 – Part One, Part Two;
  - Regional specialisation of the leading innovative activities (according to Europe 2020 Innovation Indicator);
  - Quantitative Analysis;
  - Qualitative analysis;
  - Cross analysis to determine the specific product and technology niches in which Bulgaria has the opportunity for growth;
- The information from all analytical materials developed in connection with the new programming period which are relevant to the Innovation Strategy for Smart Specialization has been summarized:
  - National Reform Programme and Recommendations of the Council of the European Union;
  - National Development Programme: Bulgaria 2020;
  - Analytical materials prepared in connection with the Partnership Agreement and the Operational Programmes;
  - National Scientific Research Strategy of the Republic of Bulgaria to 2020;
  - National Spatial Development Concept for the period 2013-2025;
  - National Programme “Digital Bulgaria”;
  - Strategy for the development of e-Government in the Republic of Bulgaria;
  - National Strategy for Development of Broadband Access;
  - Analyses of the Bulgarian Industrial Association – <http://www.bia-bg.com/analysis/>
  - *Doing Business, World Bank*, <http://www.doingbusiness.org/data/exploreeconomies/bulgaria/2013;>
  - Innovation 2012 [www.innovation.bg](http://www.innovation.bg)

### 3. Determining the thematic areas of the Strategy

The data from the report of the World Bank Were have been reviewed and summarized – the sectors with potential for growth, export competitiveness, the sectors in which Bulgaria has a competitive advantage in

the global and regional markets, the experience from the policy pursued in the past period; the pros and cons and the relevant recommendations of the World Bank experts.

At an extended meeting of the Managing Authority, chaired by the Minister of Economy and Energy it was decided that in the Strategy priority should be given to export-oriented industrial areas and those in which this country has a long tradition and is well known on the European and international market.

- Regular meetings in **focus groups** have been organised together with experts from the World Bank to discuss the development potential, problems related to the human factor (lack of workforce trained in accordance with the needs of the economy), links between science and the business, challenges facing the relevant sectors of the economy:
  - 23.10.2012 – ICT focus group;
  - 07.11.2012 – Pharmaceuticals focus group;
  - 08.11.2012 – Mechatronics focus group;
  - 19.11.2012 – Food industry focus group, Plovdiv;
  - 26.02.2013 – Protection and commercialisation of intellectual property focus group;
  - 26.02.2013 – ICT focus group;
  - 27.02.2013 – Innovation ecosystem and leading innovative projects focus group;
  - 27.02.2013 – Creative industries focus group;
- To define the challenges facing the different groups of society **thematic meetings** have been organised where the potential of research units and how the links between research and business should be activated were discussed:
  - 06.11.2012 – meeting with representatives of the ICT Cluster;
  - 04.2013 – meeting with representatives of the Information and Communication Technology sector;
  - 05.2013 – meeting with representatives of the financing institutions – LAUNCHub, Eleven, Bulgarian Development Bank;
  - 28.05.2013 – meeting with the Applied Research and Communications Fund;
  - 03.09.2013 – meeting with representatives of the non-governmental sector;
  - 04.09.2013 – meeting with representatives of the employers' organisations and entrepreneurs;
  - 05.09.2013 – meeting with representatives of the academia;
  - 18.10.2012 – Workshop;
  - 28.10.2013 – meeting with representatives of the National Representation of Students Councils in the Republic of Bulgaria;
  - 28.11.2013 – presentation of the Strategy at the International Conference "Industry and Innovation 2013";
  - 09.06.2014 – Financing innovation in SMEs, R & D and research in scientific and educational institutions, as well as their joint projects (of SMEs with research institutes and universities) under OP "Competitiveness and Innovation"; OP "Science and education for smart growth" and through other programmes administered by the BSMEPA with MEE, etc.
- The Innovation Strategy for Smart Specialisation has been independently developed by the working group, but during the process of development of the individual elements of the Strategy regular **partnership meetings** with the World Bank experts were held
  - 19.10.2012 – the World Bank team presents Inception report identifying the stages of joint activities, MEE

- 21.02.2013 - meeting with representatives of the World Bank;
- 26.02.2013 - presentation of the draft report at the meeting of the extended working group;
- 28.02.2013 – meeting with representatives of the World Bank and representatives of the WG;
- 08.04.2013 – meeting with representatives of the World Bank;
- 15.05.2013 – meeting with representatives of the World Bank;
- 02.08.2013 – meeting with representatives of the World Bank;
- 06.08.2013 – meeting with representatives of the World Bank;
- 10.09.2013 – meeting with representatives of the World Bank;
- 18.09.2013 – meeting with representatives of the World Bank;
- 02.10.2013 – meeting with representatives of the World Bank;
- 30.10.2013 – meeting with representatives of the World Bank;
- 19.11.2013 – meeting with representatives of the World Bank

The first version of the Strategy was published in May 2013. This version was presented to the Managing Authority, and the proposals received from the business, academia, NGOs, prominent businessmen and scholars were reported. The vision, the strategic and operational objectives and other key points of the document were approved. As a result, the proposals to be considered in the further elaboration of the document were identified.

Based on the discussions and debates the thematic areas of the Strategy have been identified, the product and technological niches in which our country has an advantage and which will enable to solve major challenges faced by the society being discussed. The participants recognized the need to prepare:

- a current “snapshot” of the innovation potential of the planning regions/districts and;
- technological roadmaps as to more accurately determine the most promising product and technology niches;

**4. During the development of the document there were regular communications between the team of the Strategy and the Operational Programmes the official events being held on the following dates:**

- Meeting of the Thematic Working Group under Operational Programme “Competitiveness and Innovation”
- **27.05.2013** – first meeting of the Thematic Working Group;
- **11.07.2013** – second meeting of the Thematic Working Group
- **24.04.2014** – third meeting of the Thematic Working Group
  - Meeting of the Thematic Working Group under OPSESG:
- **14.03.2013** – first meeting of the Thematic Working Group
- **22.03.2013** – second meeting of the Thematic Working Group
- **29.01.2013** – third meeting of the Thematic Working Group
- **18.04.2013** – fourth meeting of the Thematic Working Group
- **22.05.2013** – public hearing of
- **26.07.2013** – fifth meeting of the Thematic Working Group
- **30.09.2013** – sixth meeting of the Thematic Working Group
- **16.05.2014** – seventh meeting of the Thematic Working Group
- **23.09.2014** – eighth meeting of the Thematic Working Group

At the end of 2013 the draft version of the Strategy for Smart Specialisation was prepared and forwarded to the DG “Regional and Urban Policy”.

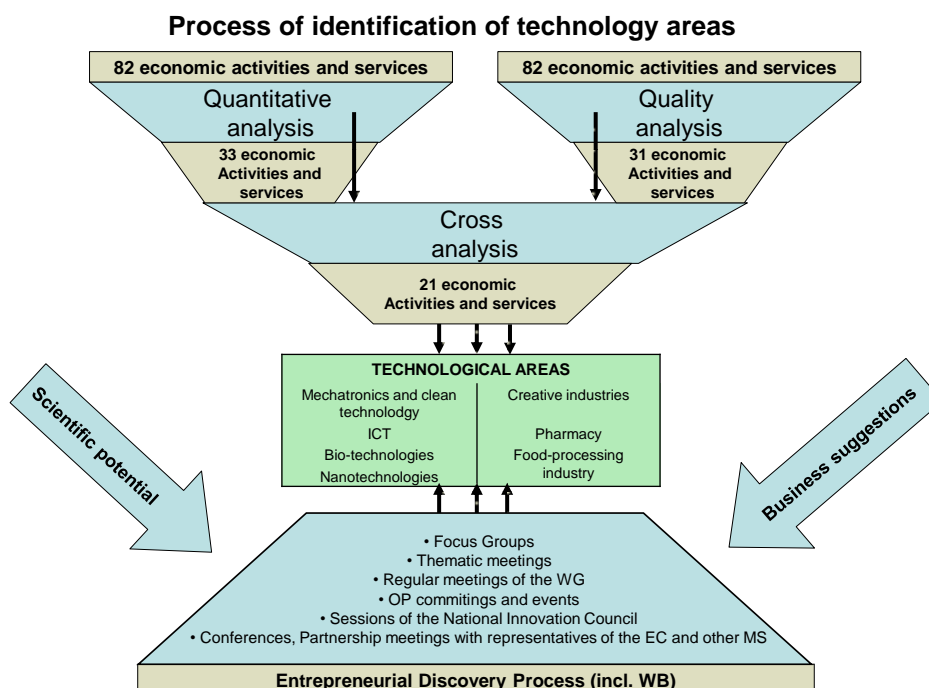
**5. Partnership meetings with the European Commission, DG “Regional and Urban Policy” and the consultants designated by the EC**

- **17.01.2014** – workshop to present the draft version of the Innovation Strategy for Smart Specialisation in Brussels, where we received instructions and recommendations;
- **3.04.2014** – involvement of consultants in the presentation of the IS3 vision at a meeting of the National Innovation Council – LT, GStr;
- **14-15.04.2014** – meeting with the consultants from the EC – LT, GStr;
- **14.05.2014** – meeting with the consultants from the EC;
- **23.05.2014** – workshop with the EC on the guidelines for improving the Innovation Strategy for Smart Specialization in Brussels, an expert team;
- **13.06.2014** – workshop with representatives of the EC to present progress on TL1.1, meeting with consultants of the EC;
- **16.07.2014** – meeting with consultants of the EC – LT;
- **23.07.2014** – meeting with consultants of the EC – GSt;
- **24.07.2014** – meeting with consultants of the EC – GSt;
- **19.09.2014** – meeting with consultants of the EC;

Under the guidance of the consultants of the EC a new document was developed based on the existing draft version of the Strategy, which summarized all present information and presents it in the manner specified by the consultants.

a) **Socio-economic analysis** with conclusions about the strengths of the Bulgarian economy and the challenges facing it, including a quantitative analysis identifying the potential of each business activity based on assessment of internal (volume of production, turnover, added value – as a share of total added value and as a share of the output, labour productivity, employed persons, number of enterprises and investments in fixed assets) and external (export, import and availability of competitive advantages, production and export specialisation) factors. (See p. 1.7 of the Strategy). The section ends with a SWOT analysis.

b) **Capacity for innovation and research potential**, ending with SWOT analysis, including qualitative analysis to identify potential areas for intensive innovation development. The results of quantitative and qualitative analysis serve as a basis for Cross analysis identifying potential areas for intensive technological innovation development (specialisation) (see p. 2.15 and 2.16).



c) Taking into account the World Bank Report, focus group meetings conducted together with experts from the World Bank, thematic meetings with representatives of the business, academia, NGOs, correspondence and meetings with regional administrations, public administration experts – a wide range of stakeholders, seven technology areas have been identified. Cross-analysis is the starting point for identifying technology areas for smart specialization, and the logic of identification is to locate the intersection point between the strong areas of scientific and technological development and of entrepreneurship.

d) At the proposal of the business the **Vision** for Bulgaria in the period **until 2020** has been defined.

**Vision:** (about which all agreed) **By 2020 Bulgaria must make a qualitative leap in its innovation performance at EU level to tackle public challenges in the field of demography (reverse brain drain and youth entrepreneurship), sustainable development, intellectual capital and the nation's health.**

**Strategic Goal:** By 2020, Bulgaria will move from the group of “modest innovators”<sup>46</sup> into the group of “moderate innovators”, which will be implemented by achieving two operational objectives:

**Objective 1:** Focus the investment for the development of innovation potential in the smart thematic areas (for creation and development of new technologies leading to competitive advantages and increase in the added value of domestic products and services).

**Objective 2:** Support for accelerated implementation of technologies, methods, etc. improving resource efficiency and application of ICT in the enterprises in all industries.

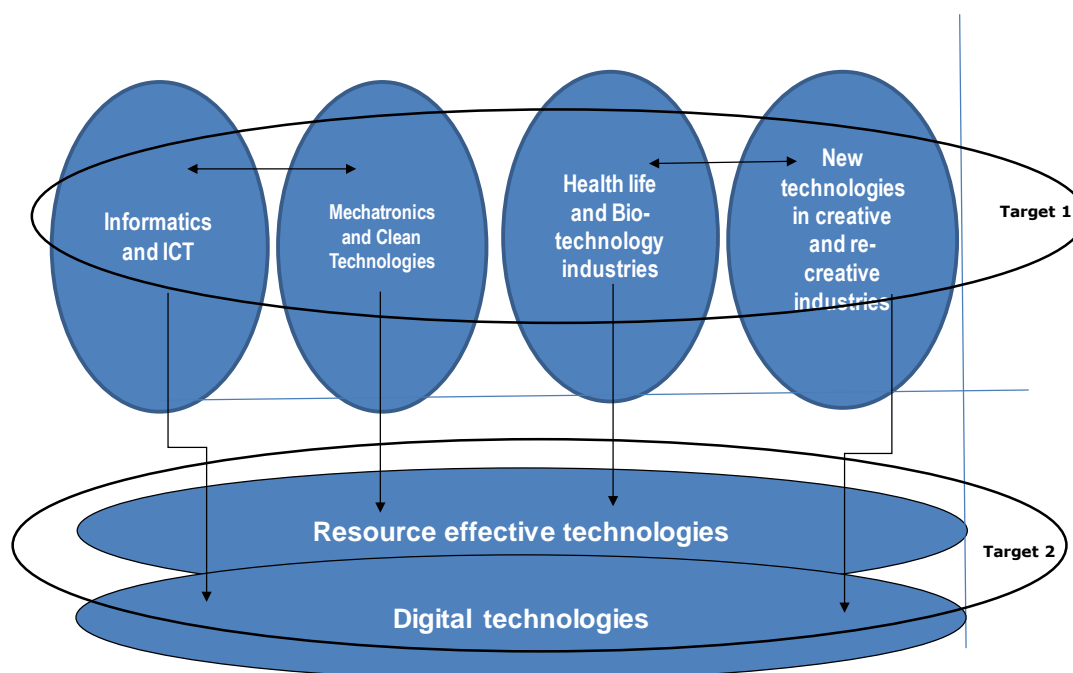
<sup>46</sup> IU Scoreboard

The broad public debate on this topic conducted over the past two years is an expression of the will to find common ground among the participants in the innovation system so that they can unite around a common vision for the future and paths of realisation can be chosen. The main task of the strategy in the European sense is to identify the unique characteristics and potential of the country to develop in areas where it has competitive advantages. The approach adopted for the analysis of the innovation system in Bulgaria is a combined one.

Analysing the results of Cross analysis in terms of market demand and positioning of the country in the European and world market the areas in which Bulgaria has growth potential have been specified.



After the approval of the Strategy, the partnership among all stakeholders in the innovation process must become a part of a clear framework that multiplies opportunities for success. Based on the initial and additional analyses and the wide range of discussions over the past two years – part of the process of entrepreneurial discovery – the identified thematic areas are as follows:



In the draft version of the Strategy each thematic area is specified to strictly defined technologies or products, productions or services. The implementation of the “process of entrepreneurial discovery” will



continue in order to focus resources in areas where the country has the greatest potential for participation in the global value chain.

## 1.2 Potential actions to be considered

On 3 and 4 July in Dublin, Ireland, the Bulgarian delegation participated in the peer review organized by the Platform in Seville. As a result of the discussions, and the recommendations and lessons learned from representatives of other member states, the indicative activities, measures/schemes that will ensure the fulfilment of the objectives and the sources of funding were systematised.

IS3	Indicative activities under IS3	Indicative measures/schemes	Funding source (including European, national)
Potential development of clean technologies and mechatronics	Incentives for cooperation and setting up of partnerships throughout the value chain Access to finance Project financing for internationalisation Strong focus on further development of organisational and management capacity Support to the adoption of good practices from the EU		OPIC, OPSESG, state budget
Potential development of IC technology and informatics	Initiate discussion forums and make proposals for improving the institutional and regulatory framework Trainings, mentoring Additional incentives for foreign investors in the sector and outsourcing A new strategy for public procurement to reduce the administrative burden under OP, PPP		OPIC, OPSESG, State budget
Potential development of the industry for a healthy life and bio technology	Support for quality assurance Funding of specialized equipment for laboratories Incentives to restructure the product portfolio Help clusters and others. forms of cooperation Support for information networks, websites, European forms of cooperation		OPIC, OPSESG, State budget
Potential development of new technologies in creative and recreational industries	New financial instruments Education and training Mentoring Project financing for the creation of a digital archive Stimulation of FDI		OPIC, OPSESG, state budget
Effective research-business partnerships	a) Promotion of partnerships on both the demand side and the supply side	Innovation vouchers, capacity vouchers of firms in the field of innovation	OPIC
		Support to clusters, technology transfer offices and technology centres, innovation clusters and "living" laboratories	OPIC, Horizon 2020
		Grants schemes for joint projects, contracts	OPIC, state budget

		between companies and research organisations	
		Stimulate the supply of high quality research	state budget, Horizon 2020
	b) Targeted efforts to promote partnerships through the establishment of centres of excellence and centres of excellence	Centres of Competence and Centres of Excellence	OPSESG
High quality human resources	a) Strengthening the link between higher education and the requirements of the labour market; stimulating training in technical and engineering; specialties; enhancing the practical application of higher education	Mobility schemes, schemes to enhance the knowledge, skills and competencies, internships, support to PhD students and post-doctorants, scholarships and awards	OPHRD, OPSESG, other EU programmes
	b) Reform of vocational education and training and promotion of lifelong learning	Schemes for vocational education and training and promotion of lifelong learning, recognition of informally acquired knowledge and skills	OPHRD, OPSESG, other EU programmes
	c) Internationalisation of innovation to further improve the quality of research and management and coping of the phenomenon of "brain drain"	Synergy between ESIF and Horizon 2020, implementing the practice for involving international participants in the evaluation of projects in the field of innovation	OPIC, OPSESG, other EU programmes
Adequate environment and infrastructure for innovation, incl. digital growth and electronic governance	a) Development of adequate and secure environment for the creation and dissemination of innovations	Support to Sofia Tech Park, support to the Patent Office, support to smart specialisation,	OPIC
		Thematically focused laboratories and other services for business in the field of innovation	OPIC
	b) E-Infrastructure and e-Governance	E-governance and e-Justice	OPGG
Innovation for resource efficiency	In the field of water, in the field of waste, information and publicity	Schemes for partnerships and demonstration projects	OPIC, Norwegian programme, NIF, Horizon 2020
Innovation for the implementation of ICT applications	ICT applications in the entire industry (software: : Application software, System software, Development software (computer programming tools)	Schemes for joint projects	OPIC, Horizon 2020, state budget

In view of compliance with ex-ante conditionality pursuant to Article 19(2) of Regulation (EU) 1303/2013 for Thematic Objective 1, the following activities have been planned:

### 1.3 Future Actions to be completed until June 2015 for compliance with EAC 1.1 and 1.2

No	Activity	Leading institution	Partner institution	Activities to be undertaken	Expected results	Dependence on other activities	Deadline
<b>Objective: Improving the organizational structure for the governance of implementation of IS3 and coordination with the OPs</b>							
1.	Decision Draft of the Council of Ministers (CoM) on the activities and functions of the Council for Smart Growth (CSG)	ME	CoM	Clarification of the functions of the Secretariat with the CoM	Adoption of Decision of CoM for the establishment of CSG	Clarification of the responsibilities of ME in connection with the new structure of the government	March, 2015
2.	Preparing the Rules of Procedure Draft of the activities of the Council for Smart Growth	ME	CoM, MES,	Elaboration of mechanism for identification of authoritative representatives of business and science-members of CSG	Clear rules on responsibilities and tasks for CSG	Clarification of responsibilities of ME in connection with the new structure of the government	March, 2015
3.	Determination of "SME's and Innovation" Directorate for Secretariat of IS3	ME	CoM	Preparation of Order of the Minister of Economy	Written and affirmed responsibilities of the Secretariat for IS3 implementation	Structuring of the government, nomination of policy management of ME	December, 2014
4.	Identification of stakeholders for participation in the activities of the National Council on Innovation and	ME, MES, MAF	Ministries, BIA, BCCI, CEIB, AIC, HEIs, BAS, CA,	Sending letters for nomination of respective	Order for approval of council's staff	-	May, 2015

	the National Council on Science and Innovation(NCSI) with the Ministry on Agriculture and Food (MAF)		NGOs	representatives			
5.	Identification of authoritative representatives of business and science to participate in the activities of NCI and NSCI with MAF as private persons	ME, MES, MAF	Media, BIA, BCCI, CEIB, AIC, HEIs, BAS, AA, NGOs	Consideration of the nominated representatives with an wide circle of stakeholders	Determination of leaders of the working groups with representatives of science and business to the Councils after their establishment	P. 4	June, 2015
6.	Regular meetings of NCI and NSCI for handling incoming suggestions from business, science and all stakeholders	ME	MES	Updating Council's staff	Conducting effective Entrepreneurial Discovery Process (EDP)	After composing of the government and P.4	continuous
7.	Detailed structure of the monitoring and evaluation process	ME	MES, MTITC	Introduction of single accounting form. For OP – in accordance with the OP rules. For national resources – in accordance with the adopted budget procedures.	Introduction of clear, realizable rules for monitoring and evaluation	Elaborated single rules for accounting under Ops	June, 2015
8.	Coordinated management of OP IC and OP SESG	ME/MES		Setting-up of Inter-institutional working group (IIWG) with clear mandate to ensuring a close coordination	Adoption of Decision of CoM for the establishment of IIWG and corresponding	Adoption of OPIC and OP SESG	February, 2015

				in the management of both OPs with a view (i) to increase synergies and (ii) avoid duplications and overlaps	rules of procedure		
9.	Adoption of Statutes for monitoring and evaluation of R&D activities conducted by HEIs and science organizations and NFSR activities	MES	Representatives of science community	Finalizing Statutes' texts	Introduction of regular evaluation of research activities of science organizations		June, 2015
<b>Objective: Promotion of private investments in R&amp;D</b>							
10.	Elaboration of multiannual plan with indicative budget of the measures for IS3 implementation	MES, MTITC, MAF	Regional Partner's network	Organizing consecutive expert meetings of the responsible institutions for clarification of time frame for future activities	Survey and tracking for achievement of the IS3 objectives	Structuring of the new government and clarifying of the new structure of ME	June, 2015
11.	Support of innovative companies for development of new products and technologies with the resources of the National Innovation Fund	ME	Authoritative scientists and businessmen	Harmonizing the rules of NIF with the Ministry of Finance	Opening the next NIF procedure, Attracting private investments in R&D in favor of quickly developing enterprises	Ensuring national resources for the activities of NIF	June, 2015

<b>Objective: Aligning research infrastructure and scientific priorities with economic priority areas identified in IS3</b>							
12.	Mapping of the research infrastructure capacity in Bulgaria	MES		Survey on research capacity and recommendations for prioritisation in IS3 Thematic areas			June 2015
13.	Update of Research Infrastructure roadmap	MES		Alignment of the Research Infrastructure roadmap with the IS3 that:  (i) gives priority to the RI involved in IS3 Thematic areas  (ii) defines the role to be played by RI for IS3 at regional level	Approval by Decision of CoM on the updated roadmap	Setting-up of the CSG	July 2015
14.	Update of the National Strategy of Scientific Research			Bring the National Strategy of Scientific research in line with the IS3	Approval by Decision of CoM on the updated national strategy of Scientific research	Setting-up of the CSG	July 2015
<b>Objective : Ensuring synergy to solve national and regional challenges – identifying the mechanism of implementation of horizontal and vertical links in the implementation of IS3</b>							
15.	Establishing a regional partnership network	ME	District administration	Identifying of district administration	List with nominated district administration	Changes in the District Administration	October, 2014

				representatives	representatives	Structure, Changes in the structure of ME	
16.	Statutes for the activities of the Regional Partnership Network (RPN)	ME/MES	District administration	Meeting of District administration nominees for presentation of the objectives and tasks of the RPN	Order of the Minister for approval of the Statutes for the activities of the RPN	Nominating District administration representative for RPN	February, 2015
17.	Organizing a regional partnership event to discuss IS3 (North-East region)	ME	MES	Identifying local stakeholder to be invited to discussions	Realizing the "Entrepreneurial Discovery Process"		December, 2014
18.	Organizing a regional partnership event to discuss IS3 (North-West region)	ME	MES	Identifying local stakeholders to be invited to discussions	Realizing the "Entrepreneurial Discovery Process"		December, 2014
19.	Organizing a regional partnership event to discuss IS3 ( North-Central region)	ME	MES	Identifying local stakeholders to be invited to discussions	Realizing the "Entrepreneurial Discovery Process"		December, 2014
20.	Organizing a regional partnership event to discuss IS3 ( South Central region)	ME	MES	Identifying local stakeholders to be invited to discussions	Realizing the "Entrepreneurial Discovery Process"		January, 2015
21.	Organizing a regional partnership event to discuss IS3 (South East region)	ME	MES	Identifying local stakeholders to be invited to	Realizing the "Entrepreneurial Discovery		January, 2015



	region)			discussions	Process"		
22.	Organizing a regional partnership event to discuss IS3 (South West region)	ME	MES	Identifying local stakeholders to be invited to discussions	Realizing the "Entrepreneurial Discovery Process"		January, 2015
23.	Actual picture of the innovation potential of regions NUTs 2 /Districts	ME/MES	Local and municipal authorities, employers' organizations, academia at local level	Opening Public procurement order	Identifying potential for development in the defined thematic areas and assessing the necessity for change/in details	Securing resources for Public procurement order	<b>October, 2015</b>
<b>Objective: Intensifying the Entrepreneurial Discovery process, activating the links between science and business by identifying the specific challenges and the ways to overcome them</b>							
24.	Thematic event „Informatics and ICT“	ME	Cluster, branch organizations	Identifying stakeholders from business, academia, NGOs	Realizing the "Entrepreneurial Discovery Process" by Thematic areas		February, 2015
25.	Thematic event „New technologies in creative and recreational industries“	ME	Representatives of the business, academia, NGOs	Identifying stakeholders from business, academia, NGOs	Realizing the "Entrepreneurial Discovery Process" by Thematic areas		March, 2015
26.	Annual meeting of science circles with entrepreneurs and investors	ME	MES, BAS, HEIs, Employers' organizations	Identifying stakeholders from business, academia, NGOs	Realizing the "Entrepreneurial Discovery Process"		May, 2015

27.	Thematic event „Mechatronics and clean technologies“	ME	MES, clusters, branch organizations	Identifying stakeholders from business, academia, NGOs	Realizing the “Entrepreneurial Discovery Process” by Thematic areas		May, 2015
28.	Thematic event „Healthy life and Bio-technology“	MES	ME, clusters, branch organizations	Identifying stakeholders from business, academia, NGOs	Realizing the “Entrepreneurial Discovery Process” by Thematic areas		May, 2015
29.	Elaborating Technology roadmaps related to Thematic areas	ME	Industry, science circles	Opening Public procurement order	Elaborating product and technology niches with growth potential	Securing resources for the Public procurement order	October, 2015
30.	Summary and taking notes of the received comments and remarks	ME	MES, MAF, MTITC	Creating strict organization	Finalizing of IS3 text		May, 2015
31.	Approval of IS3 by CoM	ME	MoF, CoM				June, 2015

The coordination and management structure of IS3 is shown in p. 7 of the Strategy.

## 2. Main sources and documents used for the development of the Strategy

- NSIs and Eurostat, the World Bank
- Country Fact Sheet for Bulgaria of the European Commission of July 2012
- Innovation Union Scoreboard 2014
- Global Competitiveness Report of the World Economic Forum
- Reports prepared by the World Bank in the implementation of the Agreement on technical assistance, etc.
  - Contribution to the Strategy for Smart Specialization in the field of research and innovation in Bulgaria, August 2013
  - Report on leading innovative infrastructure projects: Guidelines for feasibility study, December 2013
  - Contribution to the programme for services for the commercialisation of innovation in Bulgaria, Analysis of the current infrastructure, organisations and the picture of IPR; solutions for a more effective ecosystem for commercialisation of innovation, September 2013
  - Contribution to the Strategy for Smart Specialization in the field of research and innovation: developing the digital agenda, August 2013
  - Action Plan for services related to the commercialisation of innovation, December 2013
  - Management and institutional development of the innovation system in Bulgaria in the context of the Strategy for Smart Specialization, Proposal to reform the management of the innovation system, December 2013
  - Management and institutional development of the public innovation system - 2
  - Support to innovation through the Operational Programme Competitiveness 2007-2013, Overview and opportunities to improve performance in the period 2014-2020
  - How research and innovation can work for Bulgaria, January 2012
- National Reform Programme and Recommendations of the Council of the European Union;
- National Development Programme: Bulgaria 2020;
- Analytical materials prepared in connection with the Partnership Agreement and the Operational Programmes;
- National Scientific Research Strategy of the Republic of Bulgaria to 2020;
- National Spatial Development Concept for the period 2013-2025;
- National Programme “Digital Bulgaria”;
- Strategy for the development of e-Government in the Republic of Bulgaria;
- National Strategy for Development of Broadband Access;
- Analyses of the Bulgarian Industrial Association – <http://www.bia-bg.com/analysis/>
- *Doing Business, World Bank*,  
<http://www.doingbusiness.org/data/exploreeconomies/bulgaria/2013;>
- Innovation 2012 [www.innovation.bg](http://www.innovation.bg)
- Opinions, recommendations and suggestions received within the National Innovation Council
- Analyses related to the development of the draft version of the Law on Innovation, Applied Research and Communications Foundation

- Innovations BG
- Analytical materials provided to us by the MES, MEW, MTITC, MAF, NAFA
- National Strategy for Regional Development of the Republic of Bulgaria in the period 2012-2020
- National Strategy for population demographic development in Bulgaria (2012-2030)
- National Concept for promotion of active life among old people (2012-2030).
- Analysis of Territorial Tourism Development, Strategy for Sustainable Tourism Development
- Data and analysis from the Investment, Innovation and Entrepreneurship Directorate, Department of Innovation and Entrepreneurship MEE  
<http://www.mi.government.bg/bg/themes/inovacionna-strategiya-za-inteligentna-specializaciya-1193-287.html>
  - Competitive advantages of Bulgarian export industries in 2013, 2014 – Part One, Part Two;
  - Regional specialisation of the leading innovative activities (according to Europe 2020 Innovation Indicator);
  - Global Innovation Index 2011, 2012, 2013;
  - Innovation Indicator Europe 2020;
  - Ranking of the Innovation Union - 2011, 2012, 2013, 2014;
  - Innovation System of Bulgaria (as part of Global Competitiveness 2012-2013, 2013-2014, 2014-2015);
  - Innovation and competitiveness of luxury goods consumers -oriented European industries
- <http://www.mi.government.bg/bg/themes/inovacionna-strategiya-za-inteligentna-specializaciya-1193-287.html>

## 3. Tables and Statistics

Quantitative assessment of the innovation performance						
Indicators	Bulgaria	EU	Modest innovators	Moderate innovators	Innovators followers	Innovators leaders
	2013	2013	Average	Average	Average	Average
Human resources	0.440	0.583	0.527	0.492	0.657	0.728
Open, excellent research systems	0.133	0.539	0.111	0.280	0.606	0.638
Finance and support	0.057	0.558	0.332	0.348	0.552	0.755
Firm investments	0.133	0.417	0.192	0.290	0.437	0.591
Linkages & entrepreneurship	0.121	0.550	0.126	0.362	0.693	0.740
Intellectual assets	0.255	0.564	0.200	0.287	0.556	0.716
Innovators	0.047	0.549	0.152	0.398	0.561	0.659
Economic effects	0.216	0.595	0.321	0.433	0.558	0.576

Goal for Bulgaria in 2020 - average index of the Moderate innovators			
Indicators	Moderate innovators	Annual growth rate (%)	Required annual growth rate (%)
	Average	2006-2013	2014-2020
Human resources	0.492	2.3	1.9
Open, excellent research systems	0.280	4.5	13.2
Finance and support	0.348	-0.5	35.2
Firm investments	0.290	1.4	13.9
Linkages & entrepreneurship	0.362	1.7	20.0
Intellectual assets	0.287	2.1	2.0
Innovators	0.398	0.7	42.8
Economic effects	0.433	1.2	12.3

It is envisaged to use the Summary Innovation Index, published annually in the IUScoreboard of the Innovation Union, for the quantitative evaluation of the innovation performance of Bulgaria. The eight innovation spheres representing the state of the enabling factors for the implementation of innovation, the companies' activities and innovation outcomes are a convenient starting point because their indices are calculated based on uniform methodology and allow comparing the results achieved by Bulgaria with the results of all the other EU Member States and others included in the study.

Bulgaria is currently in the group of modest innovators and its aim is in 2020 to find a place in the upper group, that of moderate innovators. For this purpose, the average values and growth rate of "moderate innovators" in the period 2006-2013 were calculated for all innovation areas

Furthermore, the necessary growth rates of the indices of the innovation areas to achieve the target in 2020 are calculated.

Of course, the process is dynamic, and these rates have to be considered as minimum.

Results of quantitative analysis					
Quantitative factor					
Identified economic activities			Internal factors	External factors	Overall assessment
	Nace 2008	Production			
1	19	Manufacture of coke and refined petroleum products	500	27	526
2	12	Manufacture of tobacco products	389	4	393
3	24	Manufacture of basic metals	356	36	392
4	20	Manufacture of chemicals and chemical products	235	20	255
5	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	243	10	253
6	10	Manufacture of food products	197	37	235
7	23	Manufacture of other non-metallic mineral products	212	14	226
8	26	Manufacture of computer, electronic and optical products	205	12	217
9	11	Manufacture of beverages	207	2	209
10	28	Manufacture of machinery and equipment n.e.c.	180	28	208
11	27	Manufacture of electrical equipment	178	18	196
12	25	Manufacture of fabricated metal products, except machinery and equipment	164	15	179
13	14	Manufacture of wearing apparel	142	17	160
14	29	Manufacture of motor vehicles, trailers and semi-trailers	142	7	148
15	30	Manufacture of other transport equipment	130	4	134
16	13	Manufacture of tobacco products	130	4	131
Services					
17	61	Telecommunications	481	0	481
18	46	Wholesale trade, except of motor vehicles and motorcycles	349	6	354
19	45	Wholesale and retail trade and repair of motor vehicles and motorcycles	150	156	306
20	62	Computer programming, consultancy and related activities	304	0	304
21	72	Scientific research and development	285	0	285
22	68	Real estate activities	246	0	246
23	52	Warehousing and support activities for transportation	234	0	234
24	70	Activities of head offices; management consultancy activities	224	0	224
25	50	Water transport	214	0	214
26	71	Architectural and engineering activities; technical testing and analysis	203	0	203
27	63	Information service activities	195	0	195
28	59	Motion picture, video and television programme production, sound recording and music publishing activities	173	7	180
29	58	Publishing activities	131	30	162
30	74	Other professional, scientific and technical activities	141	0	141
31	60	Programming and broadcasting activities	141	0	141
32	53	Postal and courier activities	114	0	114
33	75	Veterinary activities	89	0	89

The quantitative analysis has been made using multiple indicators and related data over the past five years for each economic activity in terms of internal factors (number of enterprises, employed persons, volume of production/services provided, turnover, added value - as share of the added value generated in the industry and services, and as share of the production/services, labour productivity, investment in fixed assets) and in terms of external factors (export, import, trade balance, realized competitive advantages – production and export specialisation). The sum total of the assessment of internal and external factors gives the overall assessment of the quantitative factor. In turn, economic activities are grouped in terms of their technological intensity in high-, medium high-, medium low- and low-tech activities in the field of industry, and in knowledge-intensive market services, knowledge-intensive high-

tech services, other knowledge-intensive services, low knowledge-intensive market services and other low knowledge-intensive services.

Results of the qualitative analysis			
Qualitative factor			
Identified economic activities			Overall assessment
	Nace 2008	Production	
1	10	Manufacture of food products	59.4
2	25	Manufacture of fabricated metal products, except machinery and equipment	50.5
3	26	Manufacture of computer, electronic and optical products	34.7
4	20	Manufacture of chemicals and chemical products	34.0
5	28	Manufacture of machinery and equipment n.e.c.	28.1
6	27	Manufacture of electrical equipment	24.3
7	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	22.3
8	22	Manufacture of rubber and plastic products	20.2
9	14	Manufacture of wearing apparel	17.7
10	31	Manufacture of furniture	16.0
11	29	Manufacture of motor vehicles, trailers and semi-trailers	15.4
12	23	Manufacture of other non-metallic mineral products	13.8
13	30	Manufacture of other transport equipment	1.5
Services			
14	62	Computer programming, consultancy and related activities	94.6
15	46	Wholesale trade, except of motor vehicles and motorcycles	90.6
16	72	Scientific research and development	64.9
17	86	Human health services	26.7
18	47	Retail trade, except of motor vehicles and motorcycles	25.9
19	94	Services of NPOs	22.8
20	71	Architectural and engineering activities; technical testing and analysis	19.3
21	85	Educational services	18.6
22	70	Activities of head offices; management consultancy activities	14.6
23	74	Other professional, scientific and technical activities	13.5
24	63	Information service activities	5.9
25	61	Telecommunications	5.6
26	55	Accommodation	5.0
27	77	Rental and leasing activities	4.0
28	59	Motion picture, video and television programme production, sound recording and music publishing activities	2.8
29	60	Programming and broadcasting activities	0.8
30	53	Postal and courier activities	0.8
31	96	Other personal services	0.7

The qualitative analysis has been made using the indicators and related data over the past five years for each economic activity such as: state support to offices and centres for technology transfer, projects funded by the National Innovation Fund (session 1-6), support to projects under OP CBI 2007-2013,



number of companies holding patents, number of companies holding trademarks. Together, these indicators measure the attitude of the state and the business activity in terms of the qualitative development of economic activities and services.

Results of cross analysis (quantitative + qualitative analysis)			
Quantitative factor + Quality factor			
Identified economic activities			Overall assessment
	Nace	Production	
1	10	Manufacture of food products	294
2	20	Manufacture of chemicals and chemical products	289
3	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	276
4	26	Manufacture of computer, electronic and optical products	251
5	23	Manufacture of other non-metallic mineral products	239
6	28	Manufacture of machinery and equipment n.e.c.	236
7	25	Manufacture of fabricated metal products, except machinery and equipment	229
8	27	Manufacture of electrical equipment	220
9	14	Manufacture of wearing apparel	178
10	29	Manufacture of motor vehicles, trailers and semi-trailers	164
Services			
11	61	Telecommunications	487
12	46	Wholesale trade, except of motor vehicles and motorcycles	445
13	62	Computer programming, consultancy and related activities	398
14	72	Scientific research and development	349
15	70	Activities of head offices; management consultancy activities	239
16	71	Architectural and engineering activities; technical testing and analysis	223
17	63	Information service activities	201
18	59	Motion picture, video and television programme production, sound recording and music publishing activities	182
19	74	Other professional, scientific and technical activities	155
20	60	Programming and broadcasting activities	142
21	53	Postal and courier activities	115

Subject of this analysis is the reconciliation of the results of the quantitative and qualitative analysis. The aim is to identify economic activities and services for which quantitative evaluation is supplemented by a qualitative one and vice versa. This is interpreted as a strength that forms the capacity and future potential for accelerated technological innovation and development. Thus, 21 economic activities and services have been identified which are considered a starting point for identifying technology areas for smart specialisation. The logic of identification is to locate the intersection point between the group of economic activities and services and the areas of science, where government and businesses expenditures for research and development are concentrated. Thus, seven technology areas have been identified: Mechatronics and clean technologies, ICT, Bio-technology, Nanotechnology, Creative Industries, Pharmaceuticals, and Food Industry. In view of the existing and expected market trends these technology areas have been summarised in four thematic areas (Mechatronics and clean technologies, Information and IC Technology, Industry for healthy life and bio-technology, new technologies in creative and recreational industries), which clearly reflect the existing potential and future opportunities for smart specialisation of the country.