



# GOVERNMENT OF THE REPUBLIC OF LITHUANIA

## RESOLUTION

### ON THE AMENDMENT OF THE RESOLUTION NO 411 OF THE GOVERNMENT OF THE REPUBLIC OF LITHUANIA OF 30 APRIL 2014 “ON THE APPROVAL OF THE PROGRAMME ON THE IMPLEMENTATION OF THE PRIORITY AREAS OF RESEARCH AND (SOCIO-CULTURAL) DEVELOPMENT AND INNOVATION (SMART SPECIALISATION) AND THEIR PRIORITIES”

24 July 2019 No. 760

Vilnius

The Government of the Republic of Lithuania hereby *r e s o l v e s*:

1. to amend the Resolution No 411 of the Government of the Republic of Lithuania of 30 April 2014 “On the Approval of the Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities” to read as follows:

#### “GOVERNMENT OF THE REPUBLIC OF LITHUANIA

#### RESOLUTION ON THE APPROVAL OF THE PROGRAMME ON THE IMPLEMENTATION OF THE PRIORITY AREAS OF RESEARCH AND (SOCIO-CULTURAL) DEVELOPMENT AND INNOVATION (SMART SPECIALISATION) AND THEIR PRIORITIES

The Government of the Republic of Lithuania hereby *r e s o l v e s*:

To approve the Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities (appended).”

2. To establish that the published calls for applications for financing, except for projects selected by way of continuous project selection, shall be subject to provisions of the Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities valid at the moment of their publication.

Prime Minister

Saulius Skvernelis

Acting Minister of Education, Science and Sport

Algirdas Monkevičius

APPROVED

by Resolution No 411 of the Government of the Republic of Lithuania of 30 April 2014 (version of Resolution No. 760 of the Government of the Republic of Lithuania of 24 July 2019)

**PROGRAMME ON THE IMPLEMENTATION OF THE PRIORITY AREAS OF RESEARCH AND (SOCIO-CULTURAL) DEVELOPMENT AND INNOVATION (SMART SPECIALISATION) AND THEIR PRIORITIES**

**CHAPTER I  
GENERAL PROVISIONS**

1. The Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities (hereinafter - the Programme) has been prepared in the implementation of clause 4.3.1 of the Schedule of Progress in the Implementation of Priorities of the Government of the Republic of Lithuania for 2013 approved by Resolution No 318 of the Government of the Republic of Lithuania of 10 April 2013 “Regarding Priority Activities of the Government of the Republic of Lithuania for 2013” and the Concept of the Establishment and Development of Integrated Science, Studies and Business Centres (Valleys) approved by Resolution No 321 of the Government of the Republic of Lithuania of 21 March 2007 “Regarding the Approval of the Concept of the Establishment and Development of Integrated Science, Studies and Business Centres (Valleys)”, having regard to the National Progress Strategy “Lithuania 2030” approved by Resolution No XI-2015 of the Seimas of the Republic of Lithuania of 15 May 2012 “Regarding the Approval of the National Progress Strategy “LITHUANIA 2030”, the National Reform Programme for 2019 approved by Resolution No 461 of the Government of the Republic of Lithuania of 8 May 2019 “Regarding the Approval of the National Reform Programme for 2019”, the State Programme on the Development of Studies, Research and Experimental (Socio-Cultural) Development for 2013–2020 approved by Resolution No 1494 of the Government of the Republic of Lithuania of 5 December 2012 “Regarding the Approval of the National Reform Programme for 2019”, the State Programme on the Development of Studies, Research and Experimental (Socio-Cultural) Development for 2013–2020”, the National Programme on the Development of Innovation for 2014– 2020 approved by Resolution No 1281 of the Government of the Republic of Lithuania of 18 December 2013 “Regarding the Approval of the National Programme on the Development of Innovation for 2014–2020”, and other legal acts relevant to the development of priority areas in research, experimental development and innovation (hereinafter – RDI) (Smart Specialisation) and the implementation of their priorities (hereinafter all together referred to as RDI Priority Areas.

2. The Programme has been prepared in order to identify RDI Priority Areas and their implementation provisions.

3. The Programme implementation period is 2014–2020.

4. The following terms have been used in the Programme:

4.1. **Study and RDI Policy Measures** – measures which are managed by different ministries and other institutions and which are financed on a planned or competition basis, and include the following:

4.1.1. creation of research and development (hereinafter - R&D)-based knowledge by enhancing and pooling RDI intellectual potential;

4.1.2. development of knowledge-intensive sectors of the economy, training of highly qualified specialists, development, appropriate use and commercialisation of innovative products, services, technologies and/or methods enabling higher education and research institutions, economic

entities and other public and private sector entities to effectively collaborate in the RDI area, developing the activities of knowledge and technology development and transfer, promoting the innovation supply and demand, networking, clusterisation and national/international cooperation of higher education and research institutions, economic entities and other entities, also implementing other measures;

4.1.3. pooling and modernisation of RDI-, innovation-, study- and knowledge-intensive business infrastructure and enabling the effective use of such infrastructure.

4.2. **Action Plan** – an interinstitutional planning document that provides for study and RDI Policy Measures for implementing RDI Priority Areas.

5. Other terms used in this Programme have the same meanings as the analogous terms used in the Law on Higher Education and Research of the Republic of Lithuania and the Law on Technology and Innovation of the Republic of Lithuania.

## **CHAPTER II ANALYSIS OF THE ENVIRONMENT**

6. R&D is one of the priority areas identified in Commission Communication No COM-(2010) 2020 of 3 March 2010 “Europe 2020. A strategy for smart, sustainable and inclusive growth”. Although expenditure on R&D activities has been growing in Lithuania (according to the data of Statistics Lithuania, the total expenditure on R&D activities in Lithuania increased by 60% compared to 2007 and totalled EUR 371 million in 2017), this growth is not fast enough compared to the growth of the gross domestic product (hereinafter – GDP). For example, according to the data of Statistics Lithuania, total expenditure on R&D accounted for 0.8% of GDP, and in 2017, expenditure on R&D totalled 0.89%, thus in 2007–2017, the ratio of expenditure on R&D in Lithuania remained almost unchanged. The data of Statistics Lithuania revealed that the business sector expenditure on R&D to GDP ratio also increased very slightly, from 0.23% of GDP in 2007 to 0.32% of GDP in 2017. Compared to other European Union Member States (hereinafter – the EU), Lithuania ranks 21<sup>st</sup> in terms of its expenditure on R&D to GDP ratio. According to Eurostat data, Lithuania ranks 25<sup>th</sup> in the EU in terms of the business sector expenditure on R&D to GDP ratio. Lithuania is still highly dependent on EU structural funds for R&D (0.22% of GDP): the share of state budget funds for R&D was 0.33 percent GDP, although in 2007 it was 0.38% of GDP, while EU Member States spend almost twice as much on R&D from their state budget. Expenditure of the private sector as a source of financing R&D in Lithuania was 0.31% GDP in 2017, which is still almost four times less than the EU average.

7. Lithuania still lags behind the EU average in terms of important innovation performance indicators. The annual European Innovation Index calculated by the European Commission shows that, according to the overall level of development of the science and innovation ecosystem, Lithuania ranked 21<sup>st</sup> across the EU in 2019, falling within the “moderate innovators” subgroup, while Lithuania’s cumulative innovation index was 74.5% of the EU average of 2018 and 81.1% of the EU average of 2011. The results of the European Innovation Index show that Lithuania ranked second to last in the EU in terms of the export of knowledge-based services (10.7% of the EU average); the value of the indicator of export of medium and high-tech goods of Lithuania is about 48.3% of the EU average. Results of the European Innovation Index show that even though the number of foreign doctoral students has increased 9-fold since 2011 compared to the total number of doctoral students in the country, the number of publications co-written with foreign authors has doubled and the share of publications with the highest impact factor in the world has increased 1.5 times, but such research and innovation performance indicators as new doctoral graduates (35.2% of the EU average), lifelong learning (49% of the EU average), scientific publications with the highest impact factor (35% of the EU average), foreign doctoral students (21.9% of the EU average), venture capital expenditure (29% of the EU average), ICT training by companies (26.3% of the EU average), joint public-private research publications (17.4% of the EU average), patent applications (16% of the EU average) and design applications (38.9% of the EU average), employment in knowledge-based sectors (47% of the

EU average) and employment in high growth companies (38.9% percent of the EU average) still are weak links in the Lithuanian innovation ecosystem.

8. Even though Lithuania lags behind the EU average, the value of the Lithuania's innovation index increased the fastest among all EU Member States in 2011-2018. The results of the European Innovation Index show that compared to 2011, the value of the Lithuanian Innovation Index increased by 25.7% in 2018. Compared to 2011, 23 out of 27 indicators of the EU Innovation Scoreboard improved in Lithuania. The broadband Internet penetration rate improved the most in Lithuania (+166.6 percentage points) compared to 2011. However, such important innovation indicators as non-R&D innovation expenditure of firms (+99.4 percentage points), cooperation of innovative small and medium-sized enterprises (hereinafter - SMEs) in the field of innovation (+87.1 percentage points); SMEs innovating in-house (+ 62.9 percentage points); SMEs introducing product or process innovations (+58.3 percentage points); applications for trademark registration (+ 57.6 percentage points); the share of new or significantly improved products in the sales structure of enterprises (+ 50.7 percentage points); SMEs having submitted marketing or organizational innovation proposals (+40.7 percentage points) are among the indicators improving in Lithuania the fastest.

According to the results of the European Innovation Scoreboard, such criteria as the share of population with some form of post-secondary education (196% of the EU average), broadband Internet penetration (172% of the EU average), non-R&D innovation expenditure by firms (176% of the EU average), small and medium-sized enterprises (SMEs) innovating in-house (125.9% of the EU average), innovative SMEs collaborating with others (145% of the EU average) and private co-funding of public R&D expenditures (122% of the EU average) can be considered strengths of the Lithuanian science and innovation ecosystem. Lithuania also achieved the EU average in terms of such indicators as SMEs introducing product or process innovations (113% of the EU average), trademark applications (100.2% of the EU average) and sales of new-to-market and new-to-firm product innovations (117.9% of the EU average). Lithuania has almost caught up with the EU average in terms of SMEs introducing marketing or organisational innovations: the value of this indicator in Lithuania already accounts for 91% of the EU average of 2018.

9. According to the report on innovation activities of enterprises drafted by the Statistics Lithuania, Lithuanian business has been increasingly focusing on investment in innovation. In 2014-2016, the share of innovating enterprises accounted for 46.6%, while in 2004-2006, it was 34.8% only. Data of Statistics Lithuania show that the share of technologically innovating enterprises in Lithuania increased from 18.4% to 36.8% in 2006–2016, and in 2016, 68.4% of all employees in Lithuania were employed in innovating enterprises, which generated 77% of turnover of all Lithuanian companies. Compared to 2006, only 47% of all employees in Lithuania worked in innovating enterprises, while their generated turnover accounted for 57%.

10. Assessing progress of structural reforms in Lithuania, the European Commission emphasized in the country's report for 2018 (2018 European Semester: assessment of progress on structural reforms, prevention and correction of macroeconomic imbalances, and results of in-depth reviews under Regulation (EU) No 1176/2011 of the European Parliament and of the Council of 16 November 2011 on the prevention and correction of macroeconomic imbalances (OJ L 306, p. 25) that Lithuania has been observed to be making progress in pursuit of the national goals under the "Europe 2020" Strategy. However, according to the European Commission, more efforts are needed to increase R&D expenditure, especially in the private sector. The European Commission believes that salaries may soon grow faster than productivity in Lithuania as a result of a growing shortage of workforce, thus increasing productivity will be crucial in order to stay competitive, which will require the use of modern technology and innovation.

11. During the implementation of the Programme, Lithuania started using a number of measures to promote RDI activities in enterprises, research and higher education institutions, strengthening cooperation between business and science. According to the European Commission, in order to strengthen relations between business and academia, to attract private investment and thus develop and maintain the country's competitive advantage, resuming the dialogue on the search for entrepreneurship opportunities will be of key importance.

12. Smart specialization has a significant impact on the Lithuanian economy both in terms of GDP and employment. According to the data of Statistics Lithuania, in 2017, the sectors corresponding to the areas of smart specialization generated a total of EUR 8.9 billion in value added, which accounts for a quarter (24.8%) of Lithuania's total GDP. Compared to 2016, the value added of smart specialization sectors increased by 8.6 % in 2017, which is nearly twice faster than the total GDP growth in Lithuania (+ 4.1% in 2017). Data of Statistics Lithuania revealed that companies in the smart specialization sector employ 390 000 people, which is 41.6% of the total number of the employed in Lithuania. Thus, somewhat less than half of all employees in Lithuania are employed in smart specialization sectors. The number of employees in smart specialization sectors increased by 1.8% during the year (i.e. in 2017 compared to 2016).

13. Structural changes in the economy or its segments that can significantly enhance the country's international competitiveness based on innovation and the commercialization of knowledge are likely to occur only in case of the strengthening of those sectors or segments of the economy that are capable of generating an increasingly higher value added by growing rapidly. With limited human, financial, material and other resources, a sustainable growth of the country's innovative potential and economy can be achieved by promoting the sectors of economy with strong research potential, i.e. where companies invest in research themselves and use and/or apply their results in the development of technologies, innovative services and new products. The source of profit of companies in these sectors is new knowledge that gives companies a competitive advantage and a rapid growth in value added, also a possibility to access new export markets rather than natural resources or cheap labour. These companies have an enormous potential to implement and commercialize science and technology knowledge generated in the Lithuanian public sector, and to employ highly qualified university and college professionals. Even though, according to Eurostat, high-tech sectors currently account for about 1.2% of the total value added created by business entities, this level was reached in a relatively short period of time – in 2013, high-tech sectors created 0.87% of the total value added created by business entities. The potential of the high-tech industry is also reflected in the growth rates of value added generated by individual groups of economic entities. For example, in 2014-2016, the average growth rate of Lithuanian molecular biotechnology companies exceeded 20 % per year, while some companies in this group have been the largest corporate tax payers in Lithuania for several years now (e.g. Thermo Fisher, Scientific Baltic in 2018).

14. Having regard to provisions of Article 19 of the Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006 (OJ 2013 L 347, p. 320), in 2012, the Ministry of Education, Science and Sport of the Republic of Lithuania together with the Ministry of Economy and Innovation of the Republic of Lithuania initiated the process of identification of priority R&D development directions and the setting of their priorities, which was coordinated by the Research and Higher Education Monitoring and Analysis Centre (hereinafter – MOSTA). An international team of independent experts was set up to carry out the works of the smart specialization process, which based its activities on the Description of Priority Research and (Socio-Cultural) Development and Innovation Development Directions and their Specific Priorities approved by the Minister of Education and Science and the Minister of Economy of the Republic of Lithuania.

15. The outcome of the work of the international team of independent experts was a report of 27 June 2013 “Proposals on Priorities for Smart Specialization in Lithuania”, which presents priority RDI development directions offered for Lithuania (groups of scientific solutions, technologies, products, processes and / or methods that accept global or national challenges, and the opportunities that the Lithuanian RDI system can best use) and the substantiation of their choice. The setting of priority areas for R&D and innovation development mainly focuses on the current and competitive

scientific potential of R&D and innovation, the potential of knowledge-based business innovation activities, and the ability of this potential to offer solutions to tackling national or global challenges.

16. In July – September 2018, in the implementation of the provisions enshrined in the Description of Priority Research and Innovation Development Directions and their Specific Priorities, the Ministry of Economy and Innovation and MOSTA performed an interim evaluation of the progress made in the implementation of the Programme and the Action Plans launched in 2014 in three aspects, namely, the appropriateness, effectiveness and efficiency, and drafted a report on the basis of the analysis. The report consists of four parts: a macroeconomic analysis, an overall evaluation of the Programme and its policy mix, and the analysis of the appropriateness (potential) of the Programme priorities and their effectiveness. The evaluation covered not only statistical macroeconomic analysis of performance assessment criteria, but also the results of the entrepreneurial discovery process held in Half 1 of 2018, where 130 business and science representatives shared their expert knowledge. The report presents conclusions and recommendations of the evaluation. The results of the evaluation were presented at the meeting of the Coordination Group for the Implementation of Research and (Socio-Cultural) Development and Innovation Priorities (hereinafter - the Coordination Group) brought together by a joint order of the Minister of Education, Science and Sport and the Minister of Economy and Innovation of representatives of the Office of the Government of the Republic of Lithuania, the Ministry of Education, Science and Sport, the Ministry of Economy and Innovation, the Ministry of Finance of the Republic of Lithuania, other public institutions and socio-economic partners.

17. In the evaluation of Programme directions and priorities in terms of appropriateness (potential and relevance) and effectiveness, the experts concluded that priorities of new production processes, materials and technologies, health technologies and biotechnologies were of the highest appropriateness (potential, relevance) because they are known for high public and private investments, and their implementation relies on abundant infrastructure and human resources. These priorities are also characterized by higher efficiency: a higher number of RDI projects carried out by enterprises in cooperation with research and higher education institutions, and the number of new RDI employees (researchers) planned according to projects (in the public health direction in particular). A relatively higher return on investment is expected for the projects being implemented.

18. 7 RDI priorities have been identified based on the interim evaluation of the progress of the implementation of the Programme and the Action Plans:

18.1. Energy and sustainable environment. The selection of this priority was determined by the wish to provide consumers with clean, reliable and intelligently used energy. The European Union's energy and climate change policy is aimed at increasing energy efficiency by providing consumers with the right solutions and making Europe a leader in renewable energy sources. Rapid development of alternative energy sources, alternative fuels and energy efficient technologies would help mitigate the effects of climate change and increase energy end-use efficiency, first of all reducing energy consumption in buildings. Lithuania, like other EU Member States, has to rationally contribute to the implementation of the Directive 2009/28 /EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (OJ 2009 L 140, p. 16) providing for a 20% reduction in greenhouse gas emissions, a 20% increase in the share of energy from alternative sources and a 20% increase in energy efficiency by 2020 compared to 1990. RDI is an important element of this priority that would boost Lithuania's competitiveness in the field of clean energy technologies and unlock the potential for growth and the creation of jobs. The following are the directions of the implementation of the priority "Energy and Sustainable Environment":

18.1.1. enhancing interoperability between distributed and district generation, network and efficient energy consumption systems;

18.1.2. meeting the needs of the existing and new end-users, strengthening energy consumption efficiency and awareness;

18.1.3. use of renewable biomass and solar energy resources and development of waste processing to generate energy.

18.2. Health technologies and biotechnologies. This priority has been chosen to deal with the challenges posed by an aging population and to encourage business and science collaboration in the life sciences industry, establishment and development of value networks, and commercialization of research results. In 2017, almost one in five residents (19%) in the EU Member States was elderly (above 65 years of age), and the share of older people is projected to increase steadily. Thus, the need for health care in this group will also increase. This creates preconditions for implementing new diagnostic and therapeutic technology solutions, expanding the fields of use of produce, demand, as well as market and export segments. The penetration of information technology into the medical sector has been booming in the world, creating opportunities for the development of new technologies. There is an exceptional need for the development of medical lasers and nanomedicine technologies, which may become an important object of Lithuanian research and development. The increasing importance of information technology opens up opportunities for collaboration of companies developing medical technology and creating information technologies, and for the implementation of different technologies. The dynamics of the health technology and biotechnology sector has been remarkable in the last 5 years. Advanced technologies, such as gene editing, microfluidic technology, epigenetics research and biosensors, have been rapidly developing. The development of genome technologies is associated with global markets of a very wide scope, and one of the major steps in the development of this technology, i.e. the creation of the latest CRISPR-Cas9 methodology, has been implemented in Lithuania. The following are the directions of the implementation of the priority “Health Technology and Biotechnology”:

18.2.1. molecular technologies for medicine and biopharmaceutics;

18.2.2. advanced applied technologies for individual and public health;

18.2.3. advanced medical engineering for early diagnostics and treatment.

18.3. Agricultural innovation and food technologies. This priority has been chosen to ensure a sustainable and safe food chain providing consumers with healthier food. The continuously increasing demand for food products in the world encourages the development of agriculture and food production sector in Lithuania. The expanding geography of exports is a challenge to the supply of corporate products, because products must be healthy and safe, yet having the longest possible shelf life. It is therefore necessary to develop technologies of agri-biological resources, safer food raw materials, food ingredients and products, food additives, innovative food packaging and storage. The technological changes in pursuit of the sustainability of agri-biological resource production and a safer food production that have taken place in recent years have steadily increased the opportunities for further technological development. Due to the increasing incidence of cardiovascular diseases, diabetes and obesity in the population, a greater focus has been placed on nutrition, which in turn increases the demand for functional food in the world. The growing popularity of functional food is also driving the need for ingredients for the preparation of such food that contain biologically active components that have a positive effect on health, leading to even more opportunities for the development of functional components and functional food technologies in Lithuania as well as the increase of export volume of such products both in Europe and in non-traditional markets. The following are the directions of the implementation of the priority “Agricultural Innovation and Food Technologies”:

18.3.1. sustainable agri-biological resources and safe food;

18.3.2. waste recycling of bio-raw materials into valuable components.

18.4. New production processes, materials and technologies. This priority has been chosen to ensure efficient and sustainable business development and the deployment of digital solutions and new technologies in the industrial area, thus increasing productivity and added value. The world market for photonics has been expanding rapidly. Lithuanian scientists have been recognized internationally in this sector, and business can be characterized by a high added value. The interaction between science and business is intensive, stimulating the development, and there is great potential for establishing new companies, leading to opportunities for creating next-generation laser-based industry and increasing the potential for better integrated solutions. More stringent energy efficiency, safety, durability and other requirements for materials and structures around the world constantly

increase the need for RDI activities and enable businesses to engage in innovative activities. The size of the sector also allows increasing international competitiveness significantly not only by achieving certain physical or mechanical properties of composite materials and structures, but also by reducing their production costs. The priority being implemented is particularly relevant in the context of industrial digitization (Industry 4.0). The productivity of the Lithuanian industry has been growing slowly. In the last 5 years, it increased by 14%, but the breakthrough was observed in 2017 only, while in 2012-2016, the productivity of Lithuania's industry remained unchanged. The productivity growth was mainly driven by investments in processes, but with nearly no investment in automation and robotization. In order to further increase productivity, businesses need to increase their investment in smart equipment and automation. Increasing labour costs force automating production and increasing the quality of products and services, leading to an increasing number of companies investing in technology systems for flexible product development and manufacturing. Businesses are increasingly focused on the introduction of new technologies and the use of information technologies, which would allow developing and fabricating new products efficiently. The following are the directions of the implementation of the priority "New Production Processes, Materials and Technologies":

18.4.1. photonic and laser technologies;

18.4.2. advanced materials and structures;

18.4.3. flexible technological systems for product development and fabrication.

18.5. Smart, clean and integrated transport. This priority has been chosen to create an inter-related, intermodal system where people, vehicles and transport infrastructure are constantly interacting, eliminating boundaries between different modes of transport and providing people and businesses with quality services. In 2017, an average of 23 percent of EU freight vehicles worked (were used) idle. Therefore, innovative models for managing international transport corridors and logistics chains must be implemented, ensuring a smooth transition from the current independent (closed) international supply chains to open chains with compatible, shared resources accessible even to the smallest businesses. It is also necessary to look for efficient ways of preparing the Lithuanian transport system for it to expand its market segment: to serve global Asian-European trade flows, apply innovative models, synchronize transport nodes and activities of companies. The impact of China's *One Belt, One Road* (OBOR) strategy on the EU's Trans-European Transport Network (TEN-T) corridors and logistics system crossing Lithuania's territory should be determined. The introduction of clean, environmentally friendly and sustainable transport technologies should reduce an adverse impact of the transport system on climate and nature (air pollution, noise) while reducing the dependence of the transport sector on imports of fossil fuels and energy sources. Innovative solutions for intelligent transport systems and municipal transport are needed to achieve a breakthrough. The development and application of new mobility models and the integration of engineering, information technology, communication, flow management, data processing and other solutions is necessary for changing the mobility paradigm. Joint interdisciplinary projects should increase the market competitiveness of the products being developed and the efficiency of the transport system as a whole. The following are the directions of the implementation of the priority "Smart, Clean and Integrated Transport":

18.5.1. smart transport systems;

18.5.2. technologies/models for the management of international transport corridors and integration of modes of transport.

18.6. Information and communication technologies. This priority has been selected for the creation and development of a European Digital Single Market and e-management system. The penetration of artificial intelligence and the Internet of Things into many areas (healthcare, transport, state governance, finance, production), the growing need for big data analytics and new ways of using blockchain technology have opened up the way for new business models and new businesses. The Internet of Things can be both a customer-specific infrastructure service and a platform for integrating system services. Deployment of solutions of high-level artificial intelligence and the related automation are forecasted to directly and / or indirectly link all companies in the ICT market in the

future, as this market share is already expanding rapidly. Big data is a technological trend which covers big data processing technologies, data visualization, open data (both state and corporate), and open services. Lithuanian companies already have questions about how to process data and how to optimize them, and, in response to this need, new companies whose activities are related to big data are being established, and data centers and the related infrastructure are thriving. EU has increasingly focused on cybersecurity, which includes the protection of personal data (Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of individuals with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) (OJ 2016 L 119, p. 1), blockchain technologies, technologies for cyber terrorism, espionage, stopping manipulation of opinions and prevention. The number of companies developing cyber security solutions has been increasing and the market has been expanding. There were 506 start-ups in Lithuania in 2018, of which about 3/4 operated using information and communication technologies, thus this sector's capacity already is huge. The sector is distinguished by its highly qualified human capital in the field of technological and physical sciences, high international recognition of R&D results, most successful solutions of data analytics, deep learning, cybersecurity and others, start-ups, clusters being established, and one of the best infrastructures in the European network. Financial technology companies are projected to take over 20 percent of the global financial service market by 2020. Lithuania is particularly attractive for the establishment and expansion of financial technology companies because of advantages that the country has to offer to these companies, namely, well-developed infrastructure, financial market supervisory institution open to innovation, attractive legal environment, qualified and competitive workforce, and opportunities to operate from Lithuania throughout the EU. Lithuania also has a well-developed and strong cyber security system that can offer financial technology companies a new approach to cyber security issues. By making good use of this combination of advantages, Lithuania has a potential to attract more financial technology companies and to become a financial technology hub in the Baltic region. Considering the trends of change in Lithuania and the EU, it is likely that increasing the efficiency of public sector activities, i.e. pursuing better results at lower costs, will be necessary in the future. The experience of other countries has revealed that this can be done by implementing e-solutions (electronic tax return and administration system - one of the success stories of Lithuania), involving residents and communities in the development of public services and the provision of services themselves through the private and non-governmental sectors. The following are the directions of the implementation of the priority "Information and Communication Technologies":

18.6.1. artificial intelligence, big data and distributed data;

18.6.2. Internet of Things;

18.6.3. diversified analysis, processing and deployment;

18.6.4. cyber security;

18.6.5. financial technologies and blockchains.

18.7. Inclusive and creative society. This priority has been chosen to increase the contribution of creative potential and to stimulate the development of creative and cultural industries (hereinafter - CCIs) and non-technological innovation. The global market for interactive learning technologies is projected to grow by about 29% in 2017-2020. Given the global trends, focusing on educational technologies that include personalized, collaborative and mixed learning technologies is important. Socio-cultural environment is also favourable for the development of innovative products and their introduction into the market. The young Z generation is a technology generation, so the market of educational technology consumers has a huge potential, with a continuously increasing demand for a general education system based on e-platforms, e-tools, educational games and other e-resources and services, as well as non-formal education. The study published by KEA European Affairs in 2017 indicates that CCIs generated EUR 558 billion in value added in the EU Member States in 2014, which accounts for 4.4% of the total GDP of the EU. Cultural industries in Europe have created 8.3 million jobs, or 3.8% of the total workforce. The CCI sector has been growing in Lithuania, just like the GDP created by the sector. Its share is expected to account for 7% in GDP by 2020. CCIs are

dominated by non-technological innovations that are different from traditional industrial sector innovations. The demand for audio-visual content and the need for quality new content has been increasing worldwide, with a rapid technological development, changing content consumption patterns and emerging new platforms that allow for an effective mass distribution of works. Creating and implementing innovation is impossible without an innovative and creative society. Not only the society creates an innovation-friendly environment, but it is also a direct object of research and innovation by itself. Ensuring a sustainable development of innovation requires continuously encouraging and nurturing society's creativity. On the other hand, the increasing penetration of technology in different areas of life may result in various social threats that need to be recognized and evaluated in a timely manner, providing for the possibilities and means for bringing them under control. Culture-based innovations include creative and other innovations related to social and cultural development: these are culture-based innovations that encompass the activities defined as creative industries and other related products and activities. The following are the directions of the implementation of the priority "Inclusive and Creative Society":

18.7.1. modern educational technologies and processes;

18.7.2. design and audio-visual media technologies and products;

18.7.3 socio-cultural innovations for the creation of society development products and services, innovative business models;

18.7.4. flexible and applied process control technologies.

19. The formulation of the RDI Priority Areas was based on:

19.1. analyses conducted by the international team of independent experts, the results of which are presented in its reports:

19.1.1. the report dated 25 March 2013 "Global trends and opportunities as challenges for Lithuania's RDI policy", which identifies the trends and challenges that could affect Lithuania's economy and society in the upcoming decade;

19.1.2. the report dated 27 March 2013 "Long-term national challenges to Lithuania's economy and society" laying down the key domestic challenges which could affect Lithuania's development till 2030 and which could be responded to using the current potential;

19.1.3. the report dated 15 April 2013 "Current strengths of Lithuania's economy and its future growth prospects", which presents a map of economic sectors of Lithuania reflecting Lithuania's competitive advantage and its future capacities to create and apply innovative technologies, products, processes and methods, and dividing the sectors of economy into segments showing their role in driving the national economy and its future development. The report was prepared having assessed the current state of competitiveness and specialisation of economic entities (the growth of the competitive advantage in export markets, the development of a competitive strategy of economic entities based on the growing productivity and the quality job creation, successful investment-attracting process, critical mass of human resources, etc.) and opportunities for knowledge-based growth (share of knowledge-intensive companies in the market; share of new products in the market, expenditure on R&D activities; participation in activities of international innovation networks, etc.);

19.1.4. report dated 15 April 2013 "Lithuania's R&D potential", which discusses the country's strengths in individual branches of science that can make a valuable contribution to the implementation of R&D priorities; the report was prepared in light of the number and impact of international R&D publications, the impact factor of scientific papers, the international activity of Lithuanian researchers, doctoral students, post-doctoral trainees, other competences of human resources, capabilities to attract funding for research, investments in R&D infrastructure, the scope of science and business collaboration and the like;

19.2. a survey of R&D development stakeholders conducted in 2013: to achieve stakeholder consensus, discussions were held with the participation of representatives of higher education and research institutions, businesses and decision makers;

19.3. entrepreneurial discovery process report "Report of the Final 5<sup>th</sup> Thematic Meeting" prepared in June 2018, presenting a conducted external environment assessment of each priority, an

expert assessment of the capacity to implement specific priorities, SWOT (strengths, weaknesses, opportunities and threats) analysis, identifying potential new priorities of smart specialization (arguments for their evaluation), ranking the identified technologies according to capacity and impact criteria, assigning codes of the classification of economic activities for smart specialization technologies;

19.4. an interim Programme progress evaluation conducted at the end of 2018. Having analysed the evaluation results and assessed the potential and future perspectives of individual priorities, detailed conclusions, recommendations and possible scenarios for further investments in the relevant directions and formulation of new thematic directions were presented.

### **CHAPTER III**

#### **OBJECTIVES AND TASKS OF THE PROGRAMME AND CRITERIA FOR THE EVALUATION OF THE PROGRAMME'S IMPLEMENTATION**

20. The strategic goal of the Programme is to increase the impact of high value added, knowledge-intensive and highly-qualified-labour-intensive economic activities on the GDP and structural changes of the economy by means of RDI decisions. The strategic goal includes the following objectives:

20.1. to create innovative technologies, products, processes and/or methods and, using the outputs of these activities, to respond to global trends and long-term national challenges;

20.2. to increase the competitiveness of Lithuania's economic entities and their opportunities for establishing in global markets – commercialisation of knowledge created in the implementation of the RDI Priorities as well as knowledge created in developing the RDI Priority Areas otherwise and using the unique synergy arising from the collaboration of science and education institutions, economic entities and other public and private sector entities.

21. Tasks to be carried out to achieve the Programme's objectives:

21.1. to develop and market new technologies, products, processes and methods;

21.2. to promote the establishment of knowledge-based businesses and the development of high-potential companies;

21.3. to promote clustering, involvement in international value-creation networks and investment in RDI;

21.4. to promote public-private partnerships, knowledge and technology transfer for commercializing RDI results;

21.5. to strengthen the potential and capacity of science and higher education institutions and other public and private sector entities to develop and commercialize knowledge, and to train science and innovation management specialists.

22. Progress in the achievement of the Programme's objectives will be determined based on the evaluation criteria provided in the Annex to the Programme.

23. The Action Plan lays down the indicators of the pursued results for each Programme task.

### **CHAPTER IV**

#### **PROGRAMME IMPLEMENTATION**

24. The Ministry of Education, Science and Sport and the Ministry of Economy and Innovation organize the implementation of the Programme.

25. The Council for Science, Technology and Innovation (hereinafter – the STI) formed by the Government of the Republic of Lithuania coordinates RDI development on the strategic level.

26. The Coordination Group coordinates the implementation of the Programme.

27. The Programme shall be implemented from:

27.1. state budget funds of the Republic of Lithuania;

27.2. European Union financial support (measures of priority 1 “Promoting Research, Development and Innovation”, priority 3 “Promoting Competitiveness of Small- and Medium-Sized Enterprises”, priority 9 “Public Education and Enhancing Human Resource Potential” of the Operational Programme for EU Structural Funds Investments for 2014-2020 approved by the implementing decision of the European Commission of 8 September 2014 approving certain elements of the Operational Programme for EU Structural Funds Investments for 2014-2020 to ensure support to Lithuania in pursuit of investments in the economic growth and job creation from the European Regional Development Fund, the Cohesion Fund, the European Social Fund and the dedicated appropriation to the Youth Employment Initiative (the European Commission informed on the said decision by document No. C (2014) 6397)), and co-financing funds;

27.3. funds of research and higher education institutions;

27.4. funds of public and private legal entities;

27.5. funds of the European Union’s Horizon 2020 Framework Programme for Research and Innovation and other international programmes.

28. The Programme tasks are implemented in the execution of the Action Plan approved by a joint order of the Minister of Education, Science and Sport and the Minister of Economy and Innovation of the Republic of Lithuania.

29. The objectives and tasks of the Programme shall be transferred to the draft action plan, planning for competition and planned study and RDI policy measures, the need for funds, sources of financing, interim and final result indicators, and responsible ministries. The plan is to use funds of studies and RDI policy measures implemented in 2014-2020 for the implementation of RDI priorities.

30. The draft Action Plan shall be approved with the Ministries whose regulatory areas are directly related to the implementation of the studies and RDI policy measures laid down in the Action Plan and discussed in the Coordination Group.

31. Ministries shall be responsible for the implementation of certain study and RDI policy measures laid down in the Action Plan under their competence. The implementation of the projects implemented on the basis of certain study and RDI policy measures laid down in the Action Plan financed from EU funds and other sources shall fall within the area of responsibility of institutions implementing these projects under their competence.

32. The Programme implementation is monitored by regularly analysing and evaluating the implementation of the Action Plan. The aim of the regular analysis of the implementation of RDI priorities is to systematically accumulate information on the implementation of RDI priorities and the compliance with the Action Plan. Quantitative and qualitative, intermediate and final indicators set on the basis of internationally recognized RDI indicators and indicators consistent with the concept of the smart specialization process, coordinated with respective indicators of study and RDI policy measures financed by 2014-2020 EU funds are used for conducting a regular analysis of the implementation of RDI priorities.

The regular analysis indicators set by the Ministry of Education, Science and Sport and the Ministry of Economy and Innovation shall be mutually consistent as parts of one set of indicators:

32.1. The area of regular analysis of the Ministry of Education, Science and Sport is the collection and analysis of data on education and RDI-related projects laid down in the Action Plan implemented on the basis of RDI policy measures;

32.2. The area of regular analysis of the Ministry of Economy and Innovation covers the collection and analysis of data on RDI-related projects laid down in the Action Plan implemented on the basis of RDI policy measures.

33. The Ministry of Education, Science and Sport, the Ministry of Economy and Innovation, and MOSTA together:

33.1. engage in a regular analysis of the implementation of the Action Plan and present summarized data on their implementation at the request of the Coordination Group;

33.2. hold interim and final evaluations of the Action Plan and, having summarized evaluation results, present conclusions thereon to the Coordination Group;

33.3. organize the final assessment of the impact of the implementation of all RDI Priorities on the development of RDI and economic competitiveness, and present conclusions to the Coordination Group.

34. The regular analysis by the Ministry of Education, Science and Sport, the Ministry of Economy and Innovation and MOSTA shall not duplicate the functions of institutions implementing projects financed using EU or other funds implemented on the basis of study and RDI policy measures.

35. At any time during the implementation of the Action Plan, the Coordination Group may express to the ministers having approved the Action Plan its reasoned opinion proposing to:

35.1. approve the feasibility of financing of certain study and RDI policy measures so that projects implemented on the basis thereof would contribute to the implementation of the RDI Priorities;

35.2. supplement the Action Plan with new study and RDI policy measures;

35.3. start the implementation of study and RDI policy measures which have been included in the Action Plan but have not yet started, projects to be implemented under such measures and/ or projects to be implemented on the basis of the study and RDI policy measures included in the Action Plan;

35.4. allocate additional funding for the financing and implementation of the study and RDI policy measures and/or projects under them;

35.5. suspend or terminate the implementation of the Action Plan without starting to finance and implement study and RDI policy measures set out therein and/or projects to be implemented on the basis of these measures;

35.6. suspend or terminate the implementation of the project (-s) implemented under the study and RDI policy measures;

35.7. reduce financing of the study and RDI policy measures which have not yet started planned in the Action Plan and/or financing of projects to be implemented under such measures;

35.8. take other actions related to the implementation of the RDI Priority Action Plan.

36. The Ministry of Education, Science and Sport, the Ministry of Economy and Innovation and MOSTA shall arrange an interim evaluation of the Action Plan in observance of the provisions of regular analysis and evaluation laid down therein. The evaluation allows determining the effectiveness of the implementation of the RDI Priority being implemented and whether it is suitable for further development in light of the regular analysis results and changes in social, economic, technological and other environments.

37. Having evaluated the presented conclusions of the interim evaluation of the Action Plan, the Coordination Group shall express to the ministers having approved the Action Plan its opinion, proposing adopting one of the decisions referred to in clause 35 of the Programme, and shall notify the STI Council thereof.

38. Having completed all the projects implemented under the RDI policy measures laid down in the Action Plan or upon the expiration of the period for the implementation of the projects set in the Action Plan, provided that the period has not been extended by a decision of the ministers having approved the Action Plan, the Ministry of Education, Science and Sport, the Ministry of Economy and Innovation and MOSTA shall arrange the final evaluation of the Action Plan with the help of independent Lithuanian and/or foreign experts according to the provisions of the regular analysis and evaluation laid down therein. The evaluation shall determine the impact of the implementation of the Action Plan on the implementation of the respective RDI Priority and the expansion of its development, also the impact of the implementation of all RDI Priorities on the development of RDI and competitiveness of the economy.

39. Having assessed the conclusions of the final evaluation of the Action Plan, the Coordination Group shall provide its opinion to the Ministers having approved the Action Plan and the STI Council.

40. Having completed the implementation of the Action Plan, the Ministry of Education, Science and Sport, the Ministry of Economy and Innovation and MOSTA shall arrange the final

evaluation of the impact of the implementation of the Programme on RDI development and competitiveness of the economy with the help of independent Lithuanian and/or foreign experts taking into account the objectives and tasks of the Programme and the outputs pursued specified in the Annex to the Programme.

41. Having summarized the results of the final evaluation of the implementation of the Programme, the Ministry of Education, Science and Sport, the Ministry of Economy and Innovation and MOSTA shall provide to the Coordination Group its conclusions on the impact of the implementation of the Programme on RDI development and competitiveness of the economy. Having assessed conclusions of the final evaluation, the Coordination Group shall provide its opinion to the ministers having approved the Action Plan and the SIT Council.

## **CHAPTER V PREPARATION AND IMPLEMENTATION OF JOINT INITIATIVES**

42. Joint initiatives are one of the study and RDI policy measures designated for implementing RDI Priorities. The implementation of joint initiatives is aimed at encouraging higher education and research institutions, associated business and other structural units, public-private sector cooperation in RDI and other entities in both public and private sectors to propose ideas for joint initiatives that could contribute to the implementation of a certain RDI priority or a part thereof.

43. The procedure for the submission of applications for, evaluation, selection and implementation of joint initiatives as well as other procedures are established in the Description of the Implementation of Joint Study, Research and Experimental (Socio-Cultural) Development and Innovation Initiatives (hereinafter – the Description of the Implementation of Joint Initiatives) approved by the Minister of Education and Science and the Minister of Economy and Innovation having approved it with stakeholder institutions the areas of regulation of which are directly related to the implementation of RDI Priorities.

44. The Agency for Science, Innovation and Technology organizes the implementation of joint initiatives taking into account the Description of the Implementation of Joint Initiatives.

## **CHAPTER VI FINAL PROVISIONS**

45. All stakeholder institutions may submit proposals to the Strategic Council regarding the identification of RDI Priorities and their inclusion in the Programme within the scope of their competence.

46. Proposals for new RDI Priorities must be based on the Lithuanian economic and scientific potential, anticipated key future challenges, possibilities to adapt innovative technologies, products, processes and/or methods planned to be created for public needs, the pursuit to comply with objectives and tasks of the Programme, focusing on the achievement of the outputs specified in the Annex to the Programme, and they must be based on the provisions of the Description for the Identification of RDI Priority Areas and their Priorities.

47. After the Strategic Council approves the inclusion of a new RDI Priority in the Programme, supplementing the Programme with the new RDI Priority shall be arranged.

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Annex to the Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities

**LIST OF CRITERIA USED FOR THE EVALUATION OF THE ACHIEVEMENT OF OBJECTIVES OF THE PROGRAMME ON THE IMPLEMENTATION OF THE PRIORITY AREAS OF RESEARCH AND (SOCIO-CULTURAL) DEVELOPMENT AND INNOVATION (SMART SPECIALISATION) AND THEIR PRIORITIES, AND THEIR VALUES**

Objective	Evaluation criterion	Evaluation criterion value			Responsible institution
		Current		Target	
		2012	2017	2023	
<b>Strategic objective of the Programme</b>					
Increase the impact of high value added, knowledge-intensive and highly-qualified labour-intensive economic activities on GDP and structural changes of the economy by means of the RDI decisions	Total expenditure on R&D (as a % of GDP)	0,89	0,89	1,9	Ministry of Education, Science and Sport of the Republic of Lithuania
	Business expenditure on R&D MTEP (as a % of GDP)	0,24	0,31	0,9	Ministry of Economy and Innovation of the Republic of Lithuania
<b>Objectives of the Programme</b>					
1. Create innovative technologies, products, processes and/or methods and, using the outputs of these activities, respond to global trends and long-term national challenges	Share of turnover from the sale of new products on the market and in the entity as part of total business turnover (as % of total turnover)	10,4	7,6 (2016)	14	Ministry of Economy and Innovation

	share of small and medium-sized businesses introducing new products and processes (as a % of all SMEs)	16,1	33,7 (2015)	40	Ministry of Economy and Innovation
	employment in knowledge-intensive sectors (%)	8,9	9,7	13,6	Ministry of Economy and Innovation, Ministry of Education, Science and Sport
2. Increase the competitiveness of Lithuania's economic entities and their opportunities to establish themselves in global markets – commercialisation of knowledge created in the implementation of RDI Priorities as well as knowledge created in developing RDI Priority Areas otherwise and using the unique synergy arising from the collaboration of science and businesses, economic entities and other public and private sector entities	impact of advanced and moderately advanced technology products on the trade balance (export/import, %)	- 0,85	(-0,76)	1	Ministry of Economy and Innovation
	export of knowledge-intensive services (as a % of total exports)	17,7	22 (2016)	37	Ministry of Economy and Innovation
	revenues of high education and research institutions from intellectual activities (as a % of total revenues)	—	0,12	0,2	Ministry of Education, Science and Sport