APPROVED
by Order No. V-133/4-88
of the Minister of Education and
Science and the Minister of Economy
of the Republic of Lithuania
of 20 February 2014

ACTION PLAN FOR THE PRIORITY “PHOTONIC AND LASER TECHNOLOGIES” OF THE PRIORITY AREA OF RESEARCH AND (SOCIO-CULTURAL) DEVELOPMENT AND INNOVATION (SMART SPECIALISATION) AND THEIR PRIORITIES "NEW PRODUCTION PROCESSES, MATERIALS AND TECHNOLOGIES"

CHAPTER I
GENERAL PROVISIONS

1. The Action plan (hereinafter referred to as the ‘Action plan’) of the Priority “Photonic and laser technologies” of the Priority Area of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities (hereinafter referred to as the ‘RDI Priority area’) "New production processes, materials and technologies" is prepared while implementing the Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities, approved by Resolution No. 411 of 30 April 2014 of the Government of the Republic of Lithuania "Concerning approval of the Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities " (hereinafter referred to as the ‘Programme’).

2. The Action Plan has been prepared aiming at determining the implementation provisions of the priority "Photonic and laser technologies" (hereinafter referred to as the ‘Priority’) of the Priority area of the Research and (Socio-Cultural) Development and Innovations "New manufacturing processes, materials and technologies".

3. The timeframe of implementation of the Action plan is the period of 2015–2020.

4. The concepts used in the Action plan are defined in this legal act as follows:

4.1. **Laser spectroscopy systems** - tailored to specific spectroscopic measurements, single management systems, which use the laser source of light

4.2. **Laser technology equipment** - equipment where specific technological processes are carried out by using lasers.

4.3. **Optomechanical components** - functional components, comprised of optical and mechanical systems.

4.4. **Special-purpose LEDs** - LEDs with the wavelength or design deliberately selected to best suit the specific requirements for specific applications.

5. Other concepts used in the Action Plan are in line with the definitions used in the Programme.

CHAPTER II
DESCRIPTION OF THE PRESENT SITUATION

6. Laser Technologies, with more than three decades of tradition in Lithuania, are becoming more competitive, their contribution to the global laser market is constantly increasing. The added value, generated by the Lithuanian laser sector, comprises about 2/3 of the sales price of the production, which in 2012 exceeded EURO 57.9 million (in 2009 it was EURO 29 million). Export of Lithuanian laser manufacturing enterprises in 2012 amounted to EURO 50.7 million. Currently Lithuania holds 10 percent of the global scientific laser market, successful entering into the global industrial laser market has been observed recently. The export of terahertz emitters and sensors, layers and derivatives for the long- wave infrared domain has been opened.

7. Currently there are more than 40 small and medium-sized spin-off enterprises operating, which employ about 1.2 thousand of highly qualified professionals. New spin-off enterprises are being opened in increasing numbers. According to the Classification of Economic Activities, the potentially receptive sector, which is closely associated with the laser industry, is the production of computer, electronic and optical products, where 116 businesses operate, employing 3.5 thousand of employees, and the added value in 2010 was EURO 161 million. Business enterprises in 2009-2012 invested more than EURO 14.5 million in scientific and (socio-cultural) development (hereinafter referred to as the 'R&D') in the laser area (this amount does not include investments in upgrading the production lines and the process improvement).

8. Lithuanian academic and research institutions and business enterprises are in close cooperation, participating in activities within the Laser engineering and technology cluster, Lithuanian Association of lasers, Advanced lighting technology developers' association. Lithuanian scientific and educational institutions, businesses and foreign high-tech companies are also closely cooperating within this sector, working in the areas of LEDs, long wave infrared and terahertz emitters and sensors.

9. The potential of Lithuanian academic and research institutions in the area of laser and light technologies is relatively high, the scientific research has already achieved a significant progress, and the results of the research are successfully commercialized. High-level international scientists are concentrated in research and higher education institutions, who are engaged in R&D activities in the most topical trends for the Priority (laser physics, materials science, semiconductor physics, and optics). The scope of preparation of specialists in these areas increases with every year.

Supporting scientific research with the Finances of the measures from the EU Structural Funds for the period 2007-2013, a significant progress has already been achieved as the researchers, engaged in S&D activities in the area of laser and light technologies due to active cooperation with the private sector in commercializing the research results, have great opportunities to participate in actively supported measures for the promotion of science-business cooperation.

Such an important area for the economy and the country's academic and technological prestige as the area of development of photonic and laser technologies is not intended to be neglected in the future. Starting with 2015 the intention is to launch a new national research program, supported grom the Lithuanian state budget funds - "Towards the future technologies", which, aiming at constituting a favourable international context and conditions for research that would pave the way for establishing of the future technologies, for promotion of innovation and increase of the competitiveness of Lithuania, shall significantly serve the implementation of the Priority.

During the process of implementation of the programmes for development of Integrated centers for research, studies and business (valleys), there are research centers established in research and higher education institutions, where the existing R&D infrastructure is used for activities that are relevant for implementation of the Priority. The following research centers from Vilnius Sunrise campus should be mentioned - Vilnius University Laser Research Centre launched the international access laser complex Naglis and the largest research center in Lithuania - National natural science and technology research centre, which shall focus on light and laser technology, developed by Vilnius University in cooperation with the State Scientific Research Institute for Physical Science and Technology Center. These research centers will serve not only the scientific community, but also shall answer the needs of the private sector.

The new European Union Framework Programme for Research and Innovation Horizon 2020 provides for the industry leadership challenge "Leadership in developing high impact and industrial technologies", the implementation of which is likely to actively involve Lithuanian researchers and other professionals. Active involvement of Lithuanian researchers is also expected in implementation of the Progressive research challenge „ Technologies of the future and under development. "

Despite the national efforts to support laser research in the field of R&D activities and the active private sector involvement in commercializing the results of research, the scope of commercialization is not sufficiently large, and the nature of the products themselves does not result in a significant

impact on the national economy. It is expected that this gap shall be filled in by successful implementation of the Priority.

10. The global laser market is growing rapidly and in the closest future it may be about EURO 16 billion, and the increase on the LEDs market is planned from about EURO 16 billion in 2012 up to about EURO 25 billion in 2017.

11. Aiming at implementation of the Priority it is worthwhile to strengthen and to concentrate R&D resources in such R&D thematic areas as coherent light generation, amplification and control, material interaction with coherent and incoherent radiation (THz, IR, visible and UV areas), research of structural, optical and electrical properties of semiconductor materials, nonlinear optics, perception of the color characteristics of the light. Lithuania, striving for promotion of the national economy transformation and competitiveness with available resources, should also strengthen business abilities to contribute to the development and deployment of established technologies in such economic areas as production of lasers and laser systems, production of semiconductor devices, production of optical instruments, production of electronic devices. Also to provide for the project financing schemes with regards to a naturally long cycle of development of new products, prototyping and commercialization in these areas, promotion measures of new spin-off companies and (or) small companies in these areas. In order to implement the Priority in good quality with expected practical results, it would be to the purpose, if necessary, to modernize the infrastructure for R&D.

CHAPTER III
COMPLIANCE OF THE ACTION PLAN WITH THE PROGRAMME AND OTHER STRATEGIC LEGAL ACTS

12. The Action Plan contributes to the strategic goal and objectives, provided for in subparagraphs 19.1 and 19.2 of the Programme and the implementation of the identified task in subparagraph 20.4 to promote R&D and innovation activities, which would enable to establish advanced technologies, innovative processes, products and services, to increase business productivity and efficiency of business processes while reducing costs, to improving efficiency and synchronization of the supply chain aiming at flexibility to move from mass production to mass customization, to switch to more profitable parts on the value added chain (to focus on international markets - to become at least a technological partner in the international value-added chains, to offer high value-added products based on new knowledge and technologies, with exceptional characteristics, better adaptation, to strengthen branding development, including product design).

13. Actions of the Action plan:

13.1. To establish and introduce new technologies, products, processes, methods to the market;

13.2 To promote development of spin-off businesses, high potential companies;

13.3. To promote clustering, integration to the international value - adding networks and investments to R&D and innovations;

13.4. To promote cooperation between research and business, transfer of knowledge and technology, aiming at commercializing R&D results;

13.5. To strengthen the potential of research and study institutions and the capacity to establish and commercialize knowledge and to prepare specialists.

14. Implementation of the Action Plan is designed to contribute to the changes expected from the implementation of the national progress programme of 2014-2020, approved by Resolution of the Government of the Republic of Lithuania No 1482 of 28 November 2012 ‘Concerning approval of the National Progress Programme for 2014–2020‘, which, in its turn, implements the National Progress Strategy under the title ‘Strategy for the Progress of Lithuania ‘LITHUANIA 2030‘ approved by Resolution of the Seimas (Parliament) of the Republic of Lithuania No XI-2015 of 15 May 2012 ‘Concerning approval of the National Progress Strategy ‘Strategy for the Progress of Lithuania ‘LITHUANIA 2030‘. Results, generated during the implementation of Priority, should contribute to addressing the major challenges in the economy of Lithuania - to promote orientation of the economy towards high added value.

CHAPTER IV
IMPLEMENTATION STAGES OF THE PRIORITY

15. Measures, used for implementation of the Priority, have been selected in accordance with the Lithuanian Innovation development programme, approved by Resolution of the Government of the Republic of Lithuania No 1281 of 18 December 2013 , the National development programme on the Development of Studies, Research and (Socio-Cultural) Development for 2013–2020, approved by Resolution of the Government of the Republic of Lithuania No. 1494 of 5 December 2012 and relevant legislation for their implementation.

16. A set of measures of the policy on the study, R&D and innovation, relevant for implementation of the Priority, is defined according to the report of the international working group of independent experts, dated 21 February, 2014 „ Guidelines of Priority implementation“. With regards to this report, the following implementation stages of the Priority are defined:

16.1. the stage of generating the critical mass of research potential includes activities, related to the creating of appropriate environment for new ideas, for searching of solutions, technologies, for developing of prototypes and to the preparation for performing these activities;

16.2. search of new ideas and their solutions comprises general and targeted basic research, relevant to the Priority implementation;

16.3. the stage of developing technologies and their prototypes involves industrial research and experimental development, relevant to the Priority implementation;

16.4. The stage of market introduction includes activities related to the introduction of new products into the market;

16.5. the stage of generating the critical mass of business potential comprises activities related to the transfer and dispersion of knowledge and innovation in the society and to the usage on a large scale.

17. Actions, indicated in subparagraphs 16.1-16.5 of the Action plan, are implemented by performing measures, set out in Annex 1 of the Action Plan.

18. Annex 2 of the Action Plan provides for the set of measures of relevant studies, R&D and innovation policy in each stage of the Priority implementation.

19. Actions and measures, identified in Annex 1 of the Action plan, are implemented according to the set of measures of relevant studies, R&D and innovation policy, set out in Annex 2.

CHAPTER V
THEMATIC SPECIFICITY OF THE PRIORITY

20. The objectives of the implementation of the Action plan:

20.1. to research and establish short pulse lasers;

20.2. to research and establish optic and optomechanical components;

20.3. to develop laser spectroscopic systems;

20.4. to establish and introduce laser technological devices;

20.5. to research and establish compact sources and spectroscopic systems on the far-infrared and mid-infrared of the wavelength;

20.6 to establish and introduce LEDs of special purpose and their systems.

21. Successful implementation of the activities, referred to in subparagraphs 20.1-20.6 of the Action Plan, is inseparable from the R&D activities, carried out by institutions of the public and private sectors.

22. An important role in the implementation of the Priority rests with the study, research and (socio-cultural) development and innovation initiatives (hereinafter referred to as the ‘Joint Initiatives’), which shall be used to address topical issues of the sectors of economy, executing R&D activities within the topical subjects in the economy sectors, and expecting the entities of the private sector to be involved in the realization of the R&D performance results. During implementation of

the joint initiatives with regards to the activities, provided for in the subparagraphs 20.1-20.6 of the Action Plan, and actions, defined in subparagraphs 16.1-16.5 of the Action plan, R&D activities is carried out in order to:

22.1. look for the modes of generation and amplification of short and ultrashort pulses, based on new principles, in solid-state and fiber lasers;

22.2. look for frequency conversion techniques of the short and ultrashort pulse, based on new principles of nonlinear optics;

22.3. research new efficient development opportunities solid-state and fiber of the mid-infrared (1.5 to 4 μm) wavelength band;

22.4. investigate a new type and specialized optical coatings;

22.5. investigate durability of optical components and resistance to optical radiation;

22.6. research new glass, ceramics, crystal materials and fiber in lasers and nonlinear optical devices;

22.7. uptake new processing technologies for fiber production and processing;

22.8. research development opportunities of precision optomechanical products and systems, used in lasers;

22.9. analyze methods of optical spectroscopy of materials by using new characteristics of lasers and other radiation sources with spectrum limitations as well as the latest achievements in photonics;

22.10. look for alternative laser-based methods for solution of technological problems and processing possibilities of materials (micro);

22.11. look for methods of radiation generation with practical application perspectives and of the sensitive and selective detection of broadband in the far- and the mid-section of the infrared;

22.12. select and optimize spectral characteristics of the light source of the special purpose for the niche application in order to realize the optimal characteristics during manufacturing of materials and their derivatives;

22.13. establish models of new laser oscillators and laser systems, generating short or ultrashort pulses;

22.14. establish models of the new type laser amplifiers;

22.15. establish models of the new nonlinear optical devices;

22.16. establish models of lasers, generating short and ultrashort pulses in different parts of the middle infrared;

22.17. establish coating technologies of the optic coatings, tailored for the femtosecond lasers;

22.18. establish production technologies for the optic components of high durability and high resistance to optical radiation;

22.19. apply perspective modern processing technologies for processing optic components and fiber;

22.20. establish technologies of the optical component production from new optically active and nonlinear materials;

22.21. establish models of the products of precision optomechanics and their systems for lasers;

22.22. establish compact and effective systems of the emitters and sensors, based on the new generation semiconducting technologies, in the far- and the mid-section of the infrared and produce their models;

22.23. grow LED chips, look for efficient and specific- application optimized radiation converters (phosphorus);

22.24. establish prototypes of the innovative fiber components;

22.25. establish prototypes of the spectroscopic systems with automated control;

22.26. establish prototypes of the laser process equipment, realizing the selected processing of materials, and to test the main systematic modules;

22.27. automatize compact spectroscopic systems in the far- infrared and the mid-section infrared, to optimize their control, organize their construction and production;

22.28. establish industrial prototypes of LED devices and equipment, research their functionality.

23. The implementation of the joint initiatives aims at creating conditions by the activities, indicated in subparagraphs 22.1-22.28 of the Action plan, enabling:

23.1. to introduce into the market compact, cheap and resistant oscillators of a short and ultrashort pulse;

23.2. to introduce into the market short pulse lasers of high average power for realization of high-intensity technologies;

23.3. to introduce into the market ultrashort pulse lasers for development of modern micro and nanotechnology in the industry;

23.4. to introduce into the market parametric light generators, which are synchronously pumped with ultrashort pulses;

23.5. to introduce into the market femtosecond lasers and their systems for medicine and science;

23.6. to introduce into the market optical parametric amplifiers for a very specific amplification of very short pulses;

23.7.to introduce into the market lasers, generating short or ultrashort pulses and in the area;

23.8. to introduce into the market special optical coatings for femtosecond lasers and for parametric light generators, pumped by them;

23.9. to introduce into the market innovative fiber components for fiber lasers;

23.10 to introduce into the market nonlinear crystals for lasers, frequency converters and laser controllers;

23.11 to introduce into the market products of precision optomechanics and their systems for lasers;

23.12 to introduce into the market pilot spectroscopic systems and adapt them to market segments;

23.13. to unify systematic modules or process equipment aiming at reduction of production costs and increasing of the reliability of equipment;

23.14. to optimize compact sources and spectroscopic systems in the far- and mid-section of infrared with regards to particular application, to produce small batches of them and to apply in the niche sectors;

23.15. to optimize the production of LEDs of the special purpose and lighting systems, based on them, and to introduce them to the market.

24. The subparagraphs 22.1-22.28 of the Action plan may be amended by the coordination group of the Research and (socio-cultural) development and innovations development priorities by deleting or supplementing the activities. The coordination group was formed under order No. V-576/4-409 of June 20, 2014 of the Minister of Education and Science and the Minister of Economy (hereinafter referred to as the 'Coordination group'), according to the justified data and proposals or data, collected during monitoring and evaluation of the Program and Action plan implementation.

CHAPTER VI
IMPLEMENTATION OF THE ACTION PLAN

25. Possible sources of the implementation of the Action Plan:

25.1. funds of the state budget of the Republic of Lithuania:

25.1.1. the European Union Structural Funds' assistance for 2014–2020 (assistance under measures of Priority 1 "Promotion of Research, Development and Innovations" of the Action Programme of the European Union Structural Funds for 2014–2020 (hereinafter referred to as the 'Action Programme'), Priority 3 "Promotion of Competitiveness of Small and Medium-Sized Business" of the Action Programme and Priority 9 "Public Education and Increase in Human Resources Potential" of the Action Programme);

25.1.2. funds of the state budget of the Republic of Lithuania (without the European Union Structural Funds);

25.2. funds of higher education and research institutions;

25.3. funds of private legal entities;

25.4. funds of the European Union Programme for Research and Innovation "Horizon 2020" and other international programmes.

26. A part of funds under measures of Priority 1 and Priority 9 of the Action Programme is earmarked for direct support of activities necessary to implement the Priority, therefore, a preliminary amount to be used for the implementation of the Priority as needed is provided next to these measures in the table of Annex 1.

27. A part of funds under measures of Priority 1 of the Action Programme is not earmarked for specific priorities of research and (socio-cultural) development and innovation development (smart specialisation) priority areas (hereinafter referred to as the RDI priorities), their implementation results may contribute to the implementation of all or the majority of the RDI priorities. These measures are marked with an asterisk in the table of Annex 1 to the Action Plan.

28. The measures implemented using a part of funds of Priority 9 of the Action Programme and funds of the state budget of the Republic of Lithuania are relevant to the whole study, R&D and innovation system and should not be earmarked for the specific RDI priorities, however, results of their implementation may also contribute to the implementation of the Priority. These measures are marked with two asterisks in the table of Annex 1 to the Action Plan.

29. Measures of Priority 3 of the Action Programme, although relevant to the whole business conditions improvement and business assistance system, will indirectly contribute to the implementation of the Action Plan, mainly by creating conditions for private sector entities to place new products on the market and by generating the business potential's critical mass.

During the implementation of measures of Priority 3 of the Action Programme, it is planned to support such activities relevant to the implementation of the Priority as product design development, introduction of enabling technologies in traditional industries, presentation of products at international exhibitions and/or fairs, certification of planned export products and services, new production and service provision capacity building, business incubator infrastructure development, membership in international networks (platforms), raising awareness of new products and services, business start-up consultations.

30. Funds of higher education and research institutions are to be attracted during support of activities related to creation and upgrade of study and R&D infrastructure necessary to implement the Priority (a partial contribution of higher education and research institutions from own funds is expected during the implementation of infrastructure projects). These funds are included in column "State budget and other funds" in the table of Annex 1 to the Action Plan.

31. Funds of private legal entities are to be attracted during the implementation of measures under which state co-financing is provided for the ongoing projects – business companies will have to cover a part of the project value using their own funds. These funds are provided in column "Private sector funds" in the table of Annex 1 to the Action Plan.

32. The Priority may be partially implemented through participation in the European Union Programme for Research and Innovation "Horizon 2020" and other international programmes. The table of Annex 1 to the Action Plan does not include funds attracted through participation in international programmes.

33. The implementation of the Action Plan is aimed at quantitative and qualitative results complying with the evaluation criteria set out in Annex 1.

34. The deadlines for announcement of calls for proposals for measures implementing actions of the Action Plan or the deadlines for making lists of projects will be provided for in accordance with the plans for announcement of calls for proposals and making lists of projects developed by the ministries as provided for in the Rules for Administration of the Action Programme on Investments of the European Union Funds for 2014–2020 approved by Resolution No 1090 "On Approval of the

Rules for Administration of the Action Programme on Investments of the European Union Funds for 2014–2020" of the Government of the Republic of Lithuania of 3 October 2014.

35. The development of research and (socio-cultural) development and innovation development (smart specialisation) priority areas and the implementation of their priorities are coordinated by the Coordination Group.

36. The Programme and the Action Plans of the RDI Priorities are implemented to promote and support interaction and cooperation between business entities and science and education institutions. The promotion of cooperation between business entities and science and education institutions, in accordance with the procedure established by the Ministry of Education and Science and the Ministry of Economy, is implemented by the Agency for Science, Innovation and Technology. The implementation process of the Programme is continuously monitored by analysing and assessing the implementation of the Action Plans of RDI Priorities. Monitoring and assessment of the Programme implementation, in accordance with the procedure established by the Ministry of Education and Science and the Ministry of Economy, is carried out by the Science and Studies Monitoring and Analysis Center (MOSTA).

37. The infrastructure created and the equipment purchased in the course of projects implemented under study, R&D and innovation policy measures set out in Annex 1 to the Action Plan with their financing planned from the EU assistance funds or other financing sources must not duplicate the equipment currently existing in higher education and research institutions or other public sector entities, unless capacities of the existing equipment are not sufficient to ensure the implementation of the Priority.

38. The list of measures provided in Annex 1 to the Action Plan may be amended having regard to results of the interim evaluation of the implementation of the Priority planned for 2018 as well as having evaluated the needs of potential measure promoters.

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Annex 1
Of the Action plan for the Priority "Photonic and laser technologies" of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities "New production processes, materials and technologies"

ACTIONS, MEASURES OF THE ACTION PLAN, PRELIMINARY FINANCE DEMAND FOR THEIR IMPLEMENTATION AND ASSESSMENT CRITERIA

Actions and measures	Preliminary Finances, thous. Euro			Responsible institution	Evaluation criteria for actions and measures	Values of criteria	
	European Union structural funds	State budget funds and other funds	Private sector finances			2018	2023
1 action. To establish and introduce on the market new technologies, products, processes, methods:					**Established prototypes (concepts) of products, services or processes within 3 years after implementation of the project (pcs.)**	**35**	**79**
1.1 measure. Joint academic and business projects, contributing to the implementation of the smart specialization	4 865	-	-	Ministry of Education and Science	Number of joint projects by business and research and study institutions (pcs.)	4	10
	1 394	-	1 261	Ministry of Economy	Number of certified products (pcs.)	1	3
1.2 measure. Support for the establishment and development of a company's R & DI infrastructure and for development of DI activities („Intelektas LT")	19 788	-	17 959				
1.3 measure. Support for RDI of the enterprises in submitting innovation vouchers („ Innovation voucher ") to the interstate network.							
1.4 measure. Support for international patenting processes of inventions and designs („InoPatentas LT")							
1.5. Support for certification of new products and technologies and for performance of tests in labs and in real conditions („Inosertifikavimas")							
2 action. To promote development of spin-off businesses, high potential companies:	1 303	-	145		**New companies, which received investments within 3 years after project implementation (pcs.)**	**1**	**2**
2.1 measure. Support for providing advisory services of innovations (" Inogeb LT")						1	3

2.2 measure. Support for companies, performing RDI, by financial means ("Technostartas LT", "Koinvest")					Number of companies, receiving financial support of some other kind than subsidies (pcs.)		
3 action. To promote clustering, integration to the international value - adding networks and investments to SR & ED and innovations:					**New members of the cluster within 3 years since the commencement of the project implementation (pcs.)**	**1**	**2**
					Private investments raised for the RDI area in accordance with the trends of smart specialization within 3 years after the Project implementation (thous. Euro)	**42 353***	**95 295***
3.1 measure. Support for the cluster operation („InoKlaster LT“)	2 752	-	1 634		Number of legally binding deals with international partners (pcs.)	4	10
3.2 measure. Support to participate in international RDI initiatives („InoConnect LT“)							
3.3 measure. Support for investments into the cluster („InoKlaster LT+“)							
3.4 measure. Support for attracting direct foreign investments in the area of RDI ("Smartinvest LT")	5 792*	-	-				
3.5 measure. Support for direct foreign investment in the area of RDI ("SmartInvest LT+")	28 962*	-	32 011*				
4 action. To promote cooperation between research and business, transfer of knowledge and technology, aiming at commercializing SR & ED results:				Ministry of Education and Science	**Orders of business R&D, under execution by Research and study institutions (thous. Euro)**	**524**	**704**
					Intellectual activity performance income, gained by the Research and study institutions (thous. Euro)	**6,1**	**7,9**
4.1 measure. Creation and development of the material basis for joint research and business projects in scientific and educational institutions (creation and development of the infrastructure for excellence centres)	8 690*	-	-		Patent applications (pcs.) Doctoral studies, performed together with business entities, (Number of doctoral students)	3 1	10 2
4.2 measure. Support for implementation of the R&D activities, performed by the centres of excellence.	11 580*	-	-				
4.3 measure. Implementation of the market –oriented education and business projects through the interstate network.	102	-	-				
4.4 measure. Promotion of commercialization of R&D performance results in research and study institutions.	203	504**	-				
5 action. To strengthen the potential of research and study institutions and the capacity to establish and commercialize knowledge and to prepare specialists:					**External users from foreign research and educational institutions, Lithuanian and foreign business enterprises, using updated open-access**	**81**	**105**

					research infrastructure (funds received from these users (thous. Euro)		
					Number of publications in frequently cited scientific periodicals (pcs.)	**241**	**277**
5.1 measure. Update of the infrastructure of studies and R&D within the areas of smart specialization.	52 132*	-	-		Number of researchers, working on the improved base of the research infrastructure. (full-time equivalents)	70	92
5.2 measure. Establishment and development of the European research infrastructures and integration of Lithuania into the European research infrastructures in accordance with the guidelines of Lithuanian research infrastructures and ESFRI	26 066*	1008**	-		Number of new spin-off companies in the research and education institutions (pcs.)	0	2
5.3 measure. Updating of the equipment used in open-access centers in accordance with the smart specialization trends.	3 099	-	-				
5.4 measure. R&D activities, performed by Lithuanian research and study institutions	1 306	-	-				
5.5 measure. Subscription to the databases, relevant to the R&D activities	28 960*	-	-				
5.6 measure. Establishment of the infrastructure of excellencies centers and parallel laboratories	26 640*	504**	-				
5.7 measure. Development of information infrastructure for research and study (LITNET)	4 340*	-	-				
5.8 measure. Attraction of foreign scientists and SR & ED activities	14 481*	-	-				
5.9 measure. Promotion of the innovations of the research and study institutions and activities of the technology transfer centers	14 480*	-	-				
5.10 measure. Assurance of the process of the doctoral studies; Doctoral studies, travel, scholarship, R&D, moving, finances for visits (including foreign doctoral students as well)	1 287	62 154**	-				
5.11 measure. Employment of scientists and other researchers in spin-off companies	2 896*	-	-				
5.12 measure. Attraction of the bright minds and reintegration	5 792*	-	-				
5.13 measure. Students' R&D activities	2 317*	-	-				
5.14 measure. Promotion of traineeship after doctoral studies	7 240*	-	-				
5.15 measure. Education of the specialists in the study programs, related to the priorities of the smart specialization.	698	-	-				
5.16 measure. Development of the system for science promotion.	12 000**						

5.17 measure. To finance the studies of the first and second cycle as well as integrated and non-degree studies.	-	220 032**	-				
5.18 measure. To support mobility of the Lithuanian and foreign students and lecturers.	-	3 438**	-				
5.19 measure. Practical training for scientists and other researchers, participation of scientists and other researchers in targeted events of international programs, participation of Lithuanian researchers in targeted meetings for the preparation of the project applications, participation of Lithuanian representatives in the working groups of the European Union and other international working groups, committees, commissions, related to scientific research and experimental (socio-cultural) development. / Promotion of participation in H2020.	4 503**	258**	-				
5.20 measure. . To ensure financing of the R&D activities, strategically important to the solution of the challenges of the top level and of importance to the society and the state, and relevant to the development of the economy	-	94 314**	-				
5.21 measure: To support intersectoral cooperation in the area of the R&D	-	2 364**	-				
5.22 measure. Provide researchers with the possibility to access digital scientific data resources	-	450**	-				

* Finances, not attributable to specific priorities of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation, and the results of their implementation can contribute to implementation of all or most of the RDI priorities..

** Finances for measures, which are relevant for the entire study and R&D and Innovation system and not attributable to specific RDI priorities, and the results will contribute to the implementation of the Priority as well..

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Annex 2
of the Action plan for the Priority “Photonic and laser technologies” of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities "New production processes, materials and technologies"

SET OF MEASURES OF THE STUDIES AND R & DI POLICY

<table>
<tr><th>Generation of critical mass of scientific potential</th><th>Search for new ideas and their solutions</th><th>Establishment of technologies and their prototypes</th><th>Introduction on the market</th><th>Generation of the critical mass of business potential</th></tr>
<tr><td>5.1 measure. Update of the infrastructure of studies and R&D within the areas of smart specialization.</td><td colspan="3">1.1 measure. Joint academic and business projects, contributing to the implementation of the smart specialization</td><td>3.1 measure. Support for the cluster operation („InoKlaster LT“)</td></tr>
<tr><td>5.2 measure. Establishment and development of the Euro opean research infrastructures and integration of Lithuania into the European research infrastructures in accordance with the guidelines of Lithuanian research infrastructures and ESFRI</td><td colspan="2">1.2 measure. Support for the establishment and development of a company’s R & DI infrastructure and for development of R & DI activities („Intelektas LT“)</td><td></td><td>3.2 measure. Support to participate in international RDI initiatives („InoConnect LT“)</td></tr>
<tr><td>5.3 measure. Updating of the equipment used in open-access centers in accordance with the smart specialization trends.</td><td>5.4 measure. R&D activities, performed by Lithuanian research and study institutions</td><td colspan="2">1.5. Support for certification of new products and technologies and for performance of tests in labs and in real conditions („Inosertifikavimas“)</td><td>5.11 measure. Employment of scientists and other researchers in spin-off companies</td></tr>
<tr><td>5.5 measure. Subscription to the databases, relevant to the R&D activities</td><td colspan="4">2.1 measure. Support for providing advisory services of innovation (" Inogeb LT")</td></tr>
<tr><td>5.6 measure. Establishment of the infrastructure of excellencies centers and parallel laboratories</td><td colspan="4">2.2 measure. Support for companies, performing RDI, by financial means ("Technostartas LT", "Koinvest")</td></tr>
<tr><td>5.7 measure. Development of information infrastructure for research and study (LITNET)</td><td colspan="4">3.4 measure. Support for attracting direct foreign investments in the area of RDI (" Smartinvest LT")</td></tr>
<tr><td>5.9 measure. Promotion of the innovations of the research and study institutions and activities of the technology transfer centers</td><td colspan="4">3.5 measure. Support for direct foreign investment in the area of RDI ("SmartInvest LT+")</td></tr>
<tr><td>5:10 measure. Assurance of the process of the doctoral studies; Doctoral studies, travel, scholarship, R&D, moving, finances for visits (including foreign doctoral students as well)</td><td colspan="4">4.4 measure. Promotion of commercialization of R&D performance results in research and study institutions.</td></tr>
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<tr><td>5.12 measure. Attraction of the bright minds and reintegration</td><td>5:20 measure. To ensure financing of the R&D activities, strategically important to the solution of the challenges of the top level and of importance to the society and the state, and relevant to the development of the economy.</td><td>1.3 measure. Support for RDI of the enterprises in submitting innovation vouchers („ Innovation voucher ") to the interstate network.</td><td rowspan="11">-</td><td>3.3 measure. Support for investments into the cluster („InoKlaster LT+“)</td></tr>
<tr><td>5.14 measure.</td><td colspan="2">3.2 measure. Support to participate in international R & DI initiatives („InoConnect LT“)</td><td rowspan="10">-</td></tr>
<tr><td>5.15 measure. Education of the specialists in the study programmes, related to the priorities of the smart specialization.</td><td colspan="2">5.13 measure. Students’ R&D activities</td></tr>
<tr><td colspan="2">5.8 measure. Attraction of foreign scientists and R&D activities</td><td>1.4 measure. Support for international patenting processes of inventions and designs („InoPatentas LT“)</td></tr>
<tr><td>5.16 measure. Development of the system for science promotion.</td><td rowspan="9">-</td><td>4.3 measure. Implementation of the market –oriented education and business projects through the interstate network.</td></tr>
<tr><td>5:17 measure. To finance the studies of the first and second cycle as well as integrated and non-degree studies.</td><td rowspan="8">-</td></tr>
<tr><td>5:18 measure. To support mobility of the Lithuanian and foreign students and lecturers.</td></tr>
<tr><td>5:19 measure. Practical training for scientists and other researchers, participation of scientists and other researchers in targeted events of international programs, participation of Lithuanian researchers in targeted meetings for the preparation of the project applications, participation of Lithuanian representatives in the working groups of the European Union and other international working groups, committees, commissions, related to scientific research and experimental (socio-cultural) development. / Promotion of participation in H2020.</td></tr>
<tr><td>5.21 measure: To support intersectoral cooperation in the area of R&D</td></tr>
<tr><td>5.22 measure. Provide researchers with the possibility to access digital scientific data resources</td></tr>
<tr><td>4.1 measure. Creation and development of the material basis for joint research and business projects</td></tr>
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in scientific and educational institutions (creation and development of the infrastructure for excellence centres)				
4.2 measure. Support for implementation of the R&D activities, performed by the centres of excellence.				