



Ministry of
Education and Science
Republic of Latvia

Latvian European Research Area Roadmap 2016 - 2020

ACCEPTED BY THE CABINET OF MINISTERS OF THE LATVIA
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ANY INQUIRY CONCERNING THE LATVIAN ERA ROADMAP SHOULD BE DIRECTED
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USED ABBREVIATIONS AND TERMINOLOGY

AREI - Institute of Agricultural Resources and Economics
BMC - Latvian Biomedical Research and Study Centre
DU - Daugavpils University
IECS - Institute of Electronics and Computer Science
EC - European Commission
ME - Ministry of Economics of the Republic of Latvia
EPO - European Patent Office
ERA - European Research Area
ERAC - European Research Area and Innovation Committee
ERDF - European Regional Development Fund
ERIC - European Research Infrastructure Consortium
EU - European Union
ESCEL - „Electronic Components and Systems for European Leadership” Joint Undertaking
ESF - European Social Fund
ESFRI - European Strategy Forum on Research Infrastructures
EUREKA - European Research Coordination Agency
GDP - Gross Domestic Product
ICT - Information and communications technologies
MES - Ministry of Education and Science of the Republic of Latvia
MC - Ministry of Culture of the Republic of Latvia
JPI - Joint Programming Initiatives
LHEI- Latvian Institute of Aquatic Ecology
LIAA- Latvian Investment and Development Agency
LiepU - Liepaja University
LLU - Latvian University of Agriculture
MW - Ministry of Welfare of the Republic of Latvia
LCCI - Latvian Chamber of Commerce and Industry
LASE - Latvian Academy of Sports Education
UL - University of Latvia
ISSP - Institute of Solid State Physics of University of Latvia
IMCS - Institute of Mathematics and Computer Science of University of Latvia
IWC - Latvian State Institute of Wood Chemistry
LAS - Latvian Academy of Sciences
LCS - Latvian Council of Science
MC - Cabinet of Ministers of the Republic of Latvia
SMEs - Small and medium-sized enterprises
NDP - National Development Plan of Latvia
OECD - Organisation for Economic Co-operation and Development
LIOS - Latvian Institute of Organic Synthesis
R&D - Research and Development
CSCC - Cross-Sectoral Coordination Centre
FTE - Full-time equivalent
PSCUH - Pauls Stradins Clinical University Hospital
RIS - Regional Innovation Strategy
RTTEMA - Riga Teacher Training and Educational Management Academy
RSU - Riga Stradins University
RTU - Riga Technical University
MEPRD - Ministry of Environmental Protection and Regional Development of the Republic of Latvia
VUC - Ventspils University College
VUAS - Vidzeme University of Applied Sciences
SEDA - State Education Development Agency
MH - Ministry of Health of the Republic of Latvia
NRC - National Research Centre
RSI - Register of Research Institutions of the Republic of Latvia
MC - Ministry of Agriculture of the Republic of Latvia
STI - Science, technology and innovation

Introduction

On May 29th, 2015, the European Union Competitiveness Council adopted a decision that instructed each EU Member State to develop the national ERA roadmap, which provided for measures of the respective EU Member State involvement and its performance improvement in certain research-development related areas by 2020.

The ERA establishment and development is stipulated by the Treaty on European Union and Article 179th of the Treaty on the Functioning of the European Union, which specifies that „the Union shall have the objective of strengthening its research and technological bases by achieving a European research area in which researchers, research knowledge and technology circulate freely, and of promoting its competitiveness, including its industrial competitiveness, as well as of promoting all of its the research activities”¹.

In Lisbon, 2000, the EU Council adopted a Decision on joint research and creation of the ERA, which set an ambitious task for further development of Europe - to become the most competitive and dynamic knowledge-based economy in the world. To accomplish this task, the EU Member States agreed to increase spending on R&D to 3% of GDP. The main instrument of ERA development is the research funding program “Horizon 2020”, through which the EU Member States, during the period from 2014 to 2020, invest approximately 77 billion Euro in strengthening Europe’s competitiveness on a global scale. Every year Latvia deposits about 13 million EUR in the “Horizon 2020” program fund and implements projects of about 16 million EUR².

EC has set six priorities for further development of ERA, according to which the EU Member States are planning the measures of national ERA Roadmap 2016 -2020. Table 1 summarizes the EC priorities, their corresponding primary tasks and monitoring indicators, which will be used to measure the performance and progress of ERA implementation.

Table 1

ERA priorities, action tasks and their monitoring indicators

1. Effective national research and innovation systems

- 1.1. Strengthening the evaluation of research and innovation policies and seeking complementarities between, and rationalization of, instruments at EU and national levels

Monitoring Indicator - A combined indicator, which is based on Research Excellence Indicator developed by the JRC (components - highly cited publications, the Patent Cooperation Treaty (PCT) patents, the European Research Council (ERC) grants, Marie Skłodowska-Curie actions)

2. Jointly (A) addressing great challenges, and (B) making optimal use of investments in research infrastructures:

- 2 (A) Improving alignment within and across the Joint Programming Process and the resulting initiatives (e.g. Joint Programming Initiatives (JPIs)) and speeding up their implementation.

Monitoring indicator - National Research Budget (Government budget appropriations or outlays for R&D (GBARD)), that is allocated to European level, bilateral or multilateral R&D programs per researcher in public sector

- 2 (B) Making optimal use of public investment in RIs by setting national priorities compatible with the ESFRI priorities and criteria taking full account of long term sustainability.

Monitoring indicator - Availability of national research infrastructure roadmaps with data on national research infrastructures and corresponding investment needs along with identified ESFRI projects and data on national investments

3. An Open labour market for researchers

- 3.1. Using open, transparent and merit based recruitment practices with regard to research positions.

Monitoring indicator - Researchers’ posts advertised through the EURAXESS job portal per 1000 researchers in the public sector per year.

4. Gender equality and gender mainstreaming in research

¹ https://www.ecb.europa.eu/ecb/legal/pdf/c_32620121026lv.pdf

² National Contact Point data of 2014

4.1. Translating national equality legislation into effective action to address gender imbalances in research institutions and decision making bodies and integrating the gender dimension better into R&D policies, programmes and projects..

Monitoring indicator - Proportion of women A grade in Higher Education Sector (HES)

5. Optimal circulation, access to and transfer of research knowledge

5.1. Fully implanting knowledge transfer policies at national level in order to maximise the dissemination, uptake and exploitation of research results. RPOs and RFOs should make knowledge transfer second nature by integrating it in their everyday work.

Monitoring indicator - Percentage of product or process innovation firms collaborating with higher education institutions or with public research institutions for their innovation activities

5.2. to promote open access to research publications

Monitoring indicator - proportion of Open Access paper (Gold and Green OA only) per country.

6. International cooperation

6.1. Develop and implement appropriate joint strategic approaches and actions for international STI cooperation on the basis of Member States' national priorities.

Monitoring indicator - International research co-publications per thousand researchers (FTE) in the public sector.

Source: EC information

To find out the opinion of Latvian participants - ministries, research institutions, universities and the social partners - on the current situation and the action required for further development and integration of the Latvian research within the framework of ERA, the Ministry of Education and Science (MES) conducted a survey, which involved 30 organizations as participants. The respondents mentioned irregular and insufficient public funding for science as the main problem for Latvian science and innovation system.

The following sections of the report contain details on the ERA priorities and action tasks approved by the Council of Europe. In order to focus the actions on the most fundamental directions for Latvia, specific national directions of action and implementable measures were set in accordance with the ERA priorities and tasks approved by the Council of Europe.

Priority 1 - "Effective national research and innovation systems"

Effectively established and functioning national research and innovation systems are the central aspect of the implementation of the ERA. Important factor is the long-term commitment of national governments to invest in knowledge-intensive activities such as education, research, innovation and other intangible assets. The countries, that have developed an attractive and favourable environment for conducting research, much less suffer from labour emigration and other one-way flows of financial or knowledge resources.

Research and innovation system efficiency has a driving role in the country's economic growth and the creation of knowledge society. The efficiency of research and innovation system is influenced by several factors - the amount of public funding and efficient use of it, establishment of appropriate research regulatory environment and implementation structures. It also includes such matters as the quality (selection of the best research projects), usefulness (potential use of the research results in creation of innovative products and services) and effectiveness (investment and generated knowledge ratio). According to the EC, an effective research and innovation system is founded on such research funding system, that includes calls for project applications of research tenders and peer reviews for evaluation of the research projects, allocation of funding via institutional assessments of research organizations, as well as ensures an appropriate balance between the competition and institutional funding.

EC recommendations for the EU Member States:

- to allocate funding for research through open calls for proposals, evaluated by panels of leading independent domestic and non-domestic experts;
- to use international peer reviews for evaluation of the quality of projects;
- to allocate institutional funding based on the institutional evaluation of research organizations.

TOP ACTION PRIORITY - "STRENGTHENING THE EVALUATION OF RESEARCH AND INNOVATION POLICIES AND SEEKING COMPLEMENTARITIES BETWEEN, AND RATIONALIZATION OF, INSTRUMENTS AT EU AND NATIONAL LEVELS."

The main objective of this task is to ensure for the EU Member States, that the competitive funding for the research institutes is allocated on the basis of the peer reviews of projects, and that the institutional funding for public research institutions is allocated on the basis of the results of assessment of the research institutions. Such a system of research funding provides research excellence, which is measured by the indicator of research excellence, whose constituent components are highly cited publications, international patents (PCT) patents, the European Research Council grants and Marie Skłodowska-Curie actions.

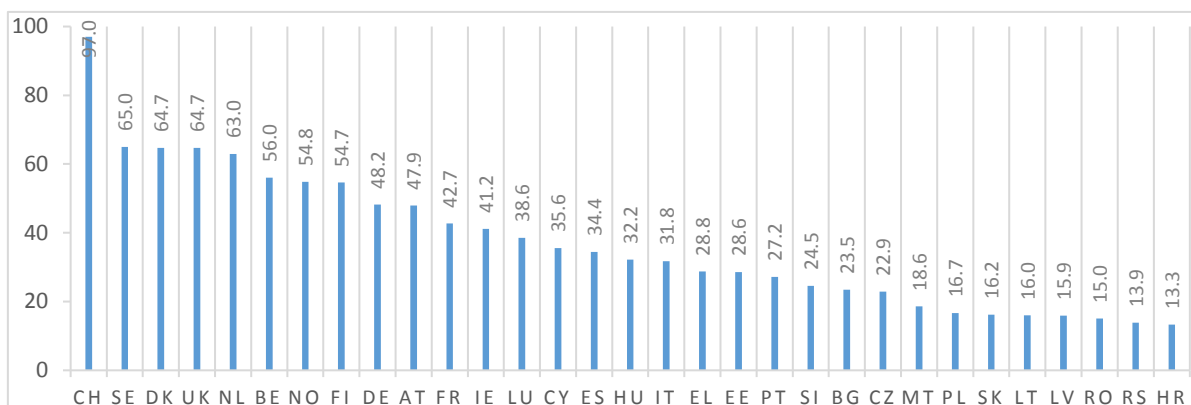


Figure 1 ERAC monitoring indicator - scores of the countries in the indicator of research excellence
Source: EC data

As shown by the indicator of research excellence, Latvia currently has one of the lowest evaluations among the EU Member States (see Figure 1), which indicates that for the four components of the research excellence indicator Latvia has scores that are significantly below the EU average. During the 7 Framework Programme, Latvia has received one European Research Council grant and 18 Marie Skłodowska-Curie fellowships. Whereas, during the period from 2007 till 2014, Latvian scientists have developed 908 highly cited publications, and submitted 52 international patents.

SITUATION IN LATVIA

In order to make efficient use of research resources, improve performance of science, promote establishment of an integrated and comprehensive research system, since 2013, Latvia has carried out various reforms and activities:

1. an international assessment of the research institutions has been implemented³ and the next international assessment of the research institutions is planned to be held in 2017;
2. implementation of the Smart Specialisation Strategy⁴ – the national economic development strategy, which sets out the economic transformation directions, growth priorities and areas of smart specialization providing targeted concentration of research and innovation resources in the areas of knowledge, where the country has a comparative advantage or there is a base for creating such an advantage;
3. based on the international evaluation results, the 1st stage⁵ of consolidation of the research institutions was implemented in 2015, providing ERDF financing of 11.9 million EUR, including 4.5 million EUR for the development of research excellence and 7.4 million EUR for support of the consolidation of research institutions; the number of registered research institutions was reduced by 16 institutions, with the aim to create 20 competitive national research institutions in 2020;
4. a new higher education funding model⁶ has been approved, that provides alignment of the higher education offers with the needs of development of Latvian economy and the labour market, a high-quality, research-based higher education content and management of the results in the higher education institutions; in 2015, Latvia started implementation of the performance financing of the results in development of a research-based higher education, as well as the science base funding is intended for support of research work of the academic staff, thus promoting integration of the higher education and research.

The science funding in Latvia is allocated both institutionally and under a tendering procedure. The institutional funding (Science base funding) consists of funds intended for maintaining research institutions, remuneration of the research staff employed by the research institutions, as well as

³ <http://www.izm.gov.lv/lv/zinatnisko-instituciju-starptautiskais-izvertejums>

⁴ The informative report “About the Development of Smart Specialisation Strategy” (accepted for knowledge on December 17th, 2013, at the meeting No. 6796§ of the Cabinet of Ministers.)

⁵ The terms on the 2.1.1.3.3. sub-activity “Development of Institutional Capacity of Scientific Institutions” of the operational program’s “Entrepreneurship and Innovation” addendum

⁶ <http://likumi.lv/ta/id/274944-par-jauna-augstakas-izglitiba-finansanas-modela-ieviesanu-latvija>

the development coefficient, which is determined by taking into account the research institution's performance results (publications, patents, implemented research and development projects, defended master's and doctoral papers). The science base funding is allocated taking into account the results of international evaluation. In 2015, the science base funding amounted to 22.86⁷ million EUR.

Competitive funding is allocated to research projects under State Research Programmes, the Fundamental and applied research programme, international programmes of Europe, bilateral cooperation programmes (includes co-operative research projects with Belarus, Ukraine, France, Taiwan and Lithuania) and the programmes of the European Space Agency cooperation projects. In 2015, 13.73 million EUR were allocated under these programs. The major part of the competitive funding is covered by the financing of structural funds – in 2015, under the supervision of the Ministry of Education and Science and the Ministry of Economics, seven supportive activities⁸ were implemented with a total funding of 68.65 million EUR, which constituted 67.5% of the total amount of the funding allocated within the framework of these programmes in 2014 and 2015. Institutional and competitive funding ratio is summarized in Table 2. Latvia is among the 16 EU Member States where institutional funding is allocated on the basis of international assessment of research institutions. However, although the volume of the competitive funding against the institutional funding is four times higher, currently it is not possible to objectively assess the balance between the competitive and the institutional funding, because the two types of funding are critically low.

Table 2

Institutional and competitive funding ratio in Latvia

Type of funding		Volume in 2014 (million EUR)	Volume in 2015 (million EUR)	Percentage of the total funding
Institutional funding		16.76	22.86	19,4%
Competitive funding		82.16	82.38	80,6%
	State budget	12.98	13.73	13,1%
	State research program	6.19	6.19	6,1%
	Fundamental and applied research projects	4.36	4.39	4,3%
	International and bilateral cooperation programs	2.43	3.15	2,7%
	Funding from structural funds	69.18	68.65	67,5%
	Support for practical research and human resources ⁹	39.34	41.34	39,5%
	Support for international cooperation ¹⁰	0.07	1.06	0,5%
	Support for research infrastructure and development of institutional capacity ¹¹	29.77	26.25	27,4%
Total		98.96	105.24	100%

Source: MES data

By 2013, the international peer reviews had not been systematically applied in the R&D programs administered by Latvia. The expert database of Latvian Council of Science (LCS), involving Latvian scientists, was used for the evaluation of the projects of research programmes that were financed from the state budget and the EU structural funds during the period of 2007 to 2013. Only starting from 2011 LCS launched peer reviews of fundamental and applied research projects by inviting foreign experts for the

⁷ In the budget programme 05.02.00 "Science base funding", the allocated funding

⁸ Activity 1.1.1.2. "Attraction of Human Resources to Science", activity 2.1.1.1. "Support For Science and Research", activity 2.1.1.2. "Support For International Cooperation Projects in Science and Technology", activity 2.1.1.3.3. "Development of Institutional Capacity of Scientific Institutions" and activity 2.1.1.3.2. "Improvement of Information Technology Infrastructure and Information Systems For Scientific Activity", activity 2.1.1.3.1. "Development of Scientific Infrastructure", activity 2.1.2.1.1. "Competence Centres".

⁹ Activity 1.1.1.2., activity 2.1.1.1., activity 2.1.2.1.1.

¹⁰ Activity 2.1.1.2.

¹¹ Activity 2.1.1.3.1., activity 2.1.1.3.2., activity 2.1.1.3.3.

evaluation of new projects, however, the assessment of the interim results of projects was still entrusted to the local experts. Such approach does not comply with the EC recommendations.

In order to ensure the appropriate regulatory basis for attraction of international experts, on December 13th, 2015, the Latvian Parliament passed the Law “Amendments to the Public Procurement Law”¹², which provides that it is no longer required to apply procurement procedure for the peer reviews intended for initial research assessment of research project applications, if the costs of this service does not exceed 134 000 EUR and if the experts are registered in an internationally recognized database of research experts .

Direction of national action - “Fully providing international evaluation for the projects of Latvian competitive research programmes”

From 2016 it is planned to involve only international experts in the project assessment of most of the activities of the research programs financed by structural funds. In addition, for the evaluation of the research quality of the projects submitted within the framework of the activities, it is planned to apply the assessment principles and criteria of the “Horizon 2020” programme’s practical research projects. The criteria are based on three principles of evaluation of research projects – excellence, impact and the quality and efficiency of project implementation. Application of those criteria in Latvia at a national level will allow to rationalize and synchronize the expertise of the national and EU research programs. Observation of these principles should be strengthened in the other Latvian research programs as well.

Table 3 summarizes the Latvian-budget-funded or co-financed competitive research programmes, in which the international expertise of the projects is provided or is planned to be provided. Currently, of the 14 identified research support programs, 8 either have already been provided the international expertise or it is planned to involve such.

Table 3

Latvian state budget funded or co-financed competitive research programmes, in which the international expertise of the projects is provided or is planned to be provided

Research programmes	Yes	No	Comment
1. State research programmes	X		
2. Fundamental and applied research projects	X		Only the selection of projects
3. European Space Agency projects	X		Projects are assessed by ECA experts
4. Tripartite Latvian-Lithuanian-Taiwan Research Cooperation Programme		X	Projects are evaluated by Latvian, Lithuanian and Taiwanese experts
5. Latvian - Belarusian Bilateral Cooperation Programme		X	The program is not currently being implemented
6. Latvian-Ukrainian Bilateral Cooperation Programme In the Area of Science And Technology		X	Projects will be assessed by Latvian and Ukrainian experts
7. Latvian - French Research Partnership Programme “OSMOSIS”		X	Projects will be assessed by Latvian and French experts
8. European Programme “EUREKA” and EUROSTARS-2	X		Projects are evaluated by Latvian experts and experts from the project cooperation partner’s country
9. ERDF activity 1.1.1.1 “Practical Research Support”	X		Planned for II quarter of 2016
10. ERDF activity 1.1.1.2. “Post-doctoral research support”	X		Planned for III quarter/ IV quarter of 2016
11. ERDF activity 1.1.1.3. “Innovation grants for students.”		X	
12. ERDF activity 1.1.1.4. “Development of R&D infrastructure in the Smart specialization areas and	X		It is planned that JASPERS experts will be attracted for the project evaluation process of measure 1.1.1.4.

¹² <http://likumi.lv/ta/id/278412-grozijums-publisko-iepirkumu-likuma>

sustainment of the institutional capacity of research institutions”			
13. ERDF activity 1.1.1.5. “Support For International Cooperation Projects In Research And Innovation”		X	Implementation conditions for the measure 1.1.1.5. are currently at the stage of development
14. ERDF activity 1.2.1.1. “Support For Development of New Products And Technologies Within Competence Centres”	X		“Support For Development of New Products And Technologies Within Competence Centres” in 2 nd and 4 th selection round as necessary

Source: MES data

Latvia will continue to make use of the national research expertise in research programs, where international peer reviews are not rational, as, for example, for small aid grants, for providing maximum transparency and independent assessment of project applications, creating equal opportunities to access to the small research grants.

Measures:

- to use international peer reviews for evaluation of the research projects;

Direction of national action - “Allocating national science funding respectively for guidelines of research, technological development and innovation policy”

Institutional funding or science base funding aims to provide operational stability of research institutions and the ability to raise competitive funding from various sources. From 2009 to 2013, the core activity expenses of public research institutions were financed at the amount of approximately 25% for the necessary needs of research institutions according to the calculations (see Table 4). Disproportionately low science base funding reduces the capacity of research institutions, including failing to ensure the necessary co-financing from EU structural funds and other international research projects. Given that science industry is characterized by a high labour mobility, the lack of financial reference amount and the critically low volume of competitive funding promote emigration of the highly skilled labour force and thereby inhibits the growth of the Latvian economy and the transformation towards a higher added value. This, in turn, makes it impossible to increase the tax base of state budget.

The current increase in the funding of science sector is significantly lower than the one, that is necessary for development of such science sector performance, which would meet the requirements set for Latvian economy development. In 2015, science base funding was not fully allocated to the research institutions because of the scarcity of funds in the state budget program’s 05.00.00 “Science” sub-program 02.05.00 “Science base funding”. The actual allocated amount was about 51% compared to the required amount, which is calculated according to the Regulations No.1316 of the Cabinet of Ministers from 12th of November, 2013, “Procedure for calculation and allocation of the science base funding to research institutions” (see Table 4). The above-mentioned Regulations of the Cabinet of Ministers determine the amount of science base funding of research activity taking into account the research institution’s capacity and performance indicators – the number of employees, publications, patents and other intellectual property, participation in international projects and the attracted funding from contractual research, as well as the indicators of human capital renewal. These criteria stimulate research institutions to cooperate with the business sector and develop demanded and relevant research projects for society and the economy.

From 2016, the science base funding will be allocated only to those research institutions, that in the international assessment have received an evaluation of “3”, “4” and “5”, and was cut for those institutions, who received the assessment of “1” and “2”, except for the institutions, who took part in the structural reform of science consolidating with the strongest research institutions. Whereas 10% of the science base funding to be granted is additionally allocated to the institutions, which received an assessment of “4” and

“5”, which evidences the international competitiveness of these institutions. Thus, after those already carried out reforms, the funding aims to support excellence in the science sector.

Table 4

Proportion of the allocated financial reference amount against the necessary amount¹³

Year	The Science base funding allocated at the beginning of the year, EUR	Proportion of the allocated Science base funding against the necessary amount, %	Amount of the lacking Science base funding, EUR	Necessary Science base funding of 100%, EUR
2016	19,947,540	58	14,444,770	34,392,310
2015	18,381,165	51	17,660,335	36,041,500
2014	14,070,216	39	22,007,261	36,077,477
2013	11,461,059	25	34,383,176	45,844,235
2012	11,297,073	28	29,049,616	40,346,689
2011	11,297,073	22	40,053,258	51,350,331
2010	10,825,557	21	40,724,716	51,550,273

Source: MES data

The opinions expressed in the questionnaire carried out by the Ministry of Education and Science show that the research institutions have considerable difficulties in improving the performance of any of the ERA priorities due to the shortfall of a stable, continuous and sufficient funding for science. Since 2011, the Science base funding has gradually slightly increased and has reached 58% of the necessary funding volume in 2016 (see Table 4). In addition, the necessary amount decreases year by year, which indicates that the lack of funding has led to a considerable decline in the research performance.

State research programmes are the state orders for conducting of research in particular economic, educational and cultural or any other priority sectors of the country in order to promote the development of the respective sector.

The prior directions of the State research programs of the period of 2014 -2017 and the overarching goals were developed and defined in collaboration with Latvian researchers, entrepreneurs and line Ministries. The MES announced the state research program tender in March, 2014. 28 applications were submitted for the implementation of the State research programmes in period of 2014-2017 with the total funding request of EUR 32,895,593. The current state budget funding for the implementation of State research programmes for the period of 2014-2017 is EUR 20,987,361 or EUR 5,246,840 per year.

The problem of the financing system of Latvian research projects is that the proportion of funding for bottom-up research¹⁴ projects of the total public funding is very low (11% or EUR 4,388,212), which indicates excessive reliance on EU funds for investments. It differs significantly from Lithuania (30%) and Estonia (49%), where the public investments in fundamental research are considerably higher.

With the currently low capacity of public investments in fundamental science, there are significant risks for the growth of science in Latvia, largely due to the fact, that fundamental science is regarded as the base science and one of the key foundations of a qualitative higher education. The two most highly rated research institutions according to the international assessment of Latvian science – the Latvian Institute of Organic Synthesis and the Institute of Solid State Physics, can largely substantiate their success on the previously made investments exactly in the fundamental research.

The current fundamental and applied research funding is insufficient in long-term and the number of the research projects implemented under its support has decreased significantly from 161 projects in 2012 to 98 in 2015 with a tendency to continuously decline in future. In order to ensure fundamental and applied research projects as the research basis, which focuses on a long-term economic development, there is a need for additional financing of about 4 million EUR. These investments will also allow continuing the implementation of fundamental and applied research programs, enhancing the importance of the research-excellence-oriented criteria in allocation of funding.

¹³ The necessary amount is calculated to cover the minimum costs of employee remuneration for all the scientific institutes and the institution’s maintenance according to the specific formula.

¹⁴ Fundamental and applied research projects

Measures:

- to provide allocation of the estimated science base funding of 100% in accordance with the regulatory requirements.
- to provide additional funding for State research programs.
- to provide additional funding for Fundamental and applied research in accordance with the policy guidelines.

Priority 2 - "Optimal transnational cooperation and competition"

This ERA priority determines two sub-priorities – 2 (A) "Jointly Addressing Grand Challenges" and 2 (B), "Making optimal use of investments in Research Infrastructures."

Sub-priority 2.1 - "Jointly Addressing Grand Challenges"

The EU needs to act urgently and coherently to address the social grand challenges with the limited public research funds available. In recent years, the grand social challenges, such as climate change, the aging population, energy security and others, have become a major player in the development of research programs. Research programmes of grand social challenges are interdisciplinary and include the whole innovation chain from fundamental research to demonstration projects. Typical component of a challenge-based research is that it is financed from public funds, as it is in the public interest to address the social challenges. Challenge-based research has become one of the main pillars of European research policy.

EC Joint Programming Initiatives (JPI) were established in 2008¹⁵, in order to create sufficient critical mass for the implementation of the research in community's crucial areas, by combining the resources of EU Member States, a aligned implementation of state research programs and synergy. Within the framework of JPI, the EU Member States develop the Strategic Research Agenda, which is based on a common vision of the way, in which the major social challenges can be addressed. This means either a strategic collaboration between the existing national programmes or planning and creation of completely new programmes. In both cases, the resources are combined, the most appropriate instruments are selected or developed, programs are implemented and the progress is jointly monitored and controlled. JPI aims to enhance and improve cross-border cooperation and alignment¹⁶ of the publicly funded research programmes of the EU Member States, and integration of these programs in a limited number of strategic areas, thereby contributing to public research funding.

EC recommendations for the EU Member States:

- to align the State research programs and strategies with JPI strategic research programs, providing them with appropriate public funding;
- to ensure a profound inter-ministerial coordination and pooling of funding, taking into account the interdisciplinary nature of the social challenges;
- to provide mutual recognition of such research assessments, which comply with the standards of international peer reviews, so that they form the basis for decisions on funding allocation.

¹⁵ https://ec.europa.eu/research/era/pdf/programming_st16775_en.pdf

¹⁶ Alignment is the strategic approach taken by the Member States to modify their national scientific programmes, priorities or activities as a consequence of the adoption of joint research priorities in the context of Joint Programming with a view to implement changes to improve efficiency of research at the level of Member States and ERA.

TOP ACTION PRIORITY - "IMPROVING ALIGNMENT WITHIN AND ACROSS THE JOINT PROGRAMMING PROCESS AND THE RESULTING INITIATIVES (E.G. JOINT PROGRAMMING INITIATIVES (JPIs)) AND SPEEDING UP THEIR IMPLEMENTATION."

The main objective of this action task is to implement joint research programs in EU Member States, improving the framework conditions for JPI and cross-border cooperation in R&D. The performance of EU Member States on behalf of this action task is measured as the National Research Budget volume (GBARD¹⁷), which is assigned to the European level, bilateral or multilateral R&D programmes per scientist. The ERAC monitoring indicator shows, that in 2012, Latvia has allocated only 112 EUR per scientist for European level, bilateral or multilateral R&D programmes, which is the third lowest score in the EU (see Figure 2).

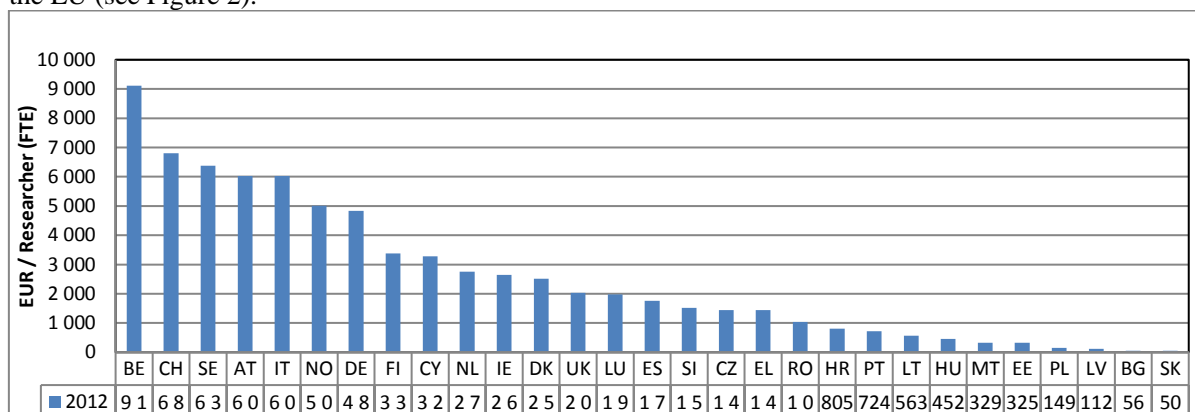


Figure 2 ERAC monitoring indicator

Source: EC data

SITUATION IN LATVIA

One of the most important indicators of science quality and competitiveness is the performance of Latvian scientists in international research and technology development programmes.

The following 10 Joint Programming Initiatives are at the stage of implementation: “Alzheimer’s disease and other neurodegenerative diseases” (JPND), “Agriculture, Food Security and Climate Change” (FACCE), “A Healthy Diet for a Healthy Life” (HDHL), “Cultural Heritage and Global Change: a new challenge for Europe” (CH), “Urban Europe – Global Urban Challenges, Joint European Solutions” (UE), “Connecting Climate Knowledge for Europe” (CLIMATE), “More Years Better Lives – Challenges and Opportunities of Demographic Change” (MYBL), “Antimicrobial Resistance: An Emerging Global Threat” (AMR), “Water Challenges for a Changing World” (WATER), “Healthy and Productive Seas and Oceans” (OCEANS).

Latvia is involved in four JPIs as an observer and in one as a joint call partner, but in none as a member. The reasons for Latvia’s non-participation are the limited R&D funding, lack of information on JPI conditions, as well as the non-existing or limited research budget of line Ministries and their hesitation to participate in the addressing of grand social challenges at the European level. Latvia participates in four¹⁸ ERAN-NET projects, whose main objective is to implement research projects on certain themes related to the social challenges by bringing together national funding and organizing open calls for proposals. Latvia’s participation in the ERA-NET projects is related to three JPI themes – “Climate Change, Agriculture and Food Security”, “Urban Europe: Global Urban Challenges – Joint European Solutions” and “Antimicrobial Resistance”.

¹⁷ Allocation of public funding for R&D

¹⁸ 1. ERA-NET Cofund “European Research Area on Sustainable Animal Production Systems” (SusAn)

01.03.2016. -28.02.2021; 2. ERA-NET Cofund “ERA-NET for Monitoring and Mitigation of Greenhouse Gases from Agri- and Silvi-Culture” (ERA-GAS) 01.05.2016. – 30.04.2021; 3. JPI UE 4th project tender is implemented as ERA-NET Cofund “Smart Urban Futures” (ENSUF); 4. ERA-NET Cofund “ERA-NET for establishing synergies between the Joint Programming Initiative on Antimicrobial Resistance Research and Horizon 2020” (JPI-EC-AMR) 01.11.2015. 31.10.2020.

Direction of national action - “Ensure participation of Latvia in Joint Programming Initiatives”

In 2015, the proportion of Latvian science budget allocated to the European level, bilateral or multilateral R&D programs has only been 112 EUR per scientist. This is the third lowest score in the EU. One of the reasons for such a bad performance is the fact that Latvia does not participate in JPI. The JPIs currently implemented by the EU are associated with different sectors of the economy, as medicine, agriculture, food quality, climate, urban environment, demography, seas and waters. The relevant ministries of Latvia should assess the necessity to examine the need to engage in coordination of such European-level State Research Programs, thus stimulating the development of the respective sector in coordination with other EU Member States.

The Ministry of Education and Science in collaboration with line ministries should carry out an evaluation to assess, to which of the JPIs Latvian scientists can provide their contribution, what will be the return and which of the social challenges are most topical for the Latvian society, economy and research progress. When deciding on participation in a JPI, the financial resources must accordingly be planned for organization and implementation of the respective research project at the EU level with the involvement of Latvian specialists. Given that JPI includes strategic alignment and implementation of research programmes in certain areas, the JPI process should involve the relevant line ministries, research institutes and universities. In the JPI process, it is necessary to ensure a comprehensive and profound coordination among all the parties involved.

The provisional allocation of responsibility of the line ministries according to the JPI strategic areas is presented in Table 6.

Table 6

Provisional allocation of responsibility of the line ministries according to the JPI strategic areas

	<i>JPND</i>	<i>FACCE</i>	<i>HDHL</i>	<i>CH</i>	<i>UE</i>	<i>Climate</i>	<i>MYBL</i>	<i>AMR</i>	<i>Water</i>	<i>Oceans</i>
MH	X		X				X	X		
MW							X			
MEPRD		X			X	X			X	X
MA		X	X			X				X
MC				X						

Source: MES evaluation

The analysis carried out by the Ministry of Education and Science shows that the Latvian research institutions are competent in all the areas of grand social challenges or JPI determined by the EU and they are ready to accept the challenges and get involved in addressing the issues related to them. According to the research directions defined within the development strategies of research institutions, numerically the greatest capacity of Latvian research institutions is for research in the following JPIs - “Agriculture, Food Security and Climate Change” (FACCO) and “Cultural Heritage and Global Change: A New Challenge for Europe” (CH). At least 9 research institutions have competence in the other JPIs as well, hence several Latvian research institutions are able to solve some of the aspects of the 10 European grand social challenges.

Analysing the conformity of JPIs to the prior directions of science in Latvia for the period of 2014-2017, three main prevailing directions are – “Public Health”, “Environment, Climate and Energy” and “Exploration and Sustainable Use of Local Resources”. JPI also matches four RIS3 priority areas, whereas the RIS3 priority area “Information and Communication Technologies” (ICT) has a horizontal effect on all the JPIs. Finally, looking at the conformity of JPIs to the policy planning documents of line ministries, it can be concluded that all the JPIs at a certain level match some of the problems or directions of action set within sectoral policy planning documents of Latvia.

Given that more and more research in Europe and the world is funded focusing the research on addressing the grand social challenges, also Latvia has to be aware of its prior social challenges at its highest political level by providing national funding for implementation of their solutions.

Measures

- to engage in certain JPIs as a member state and align Latvian research programs with JPI;
- to evaluate to which of the JPIs Latvian scientists can provide their contribution, what will be the return and which of the social challenges are most topical for the Latvian society and economy;
- to establish a working group with representation of line ministries and research institutions for coordination of Latvian participation in JPI;
- to plan financial resources for participation in relevant JPIs and organization, as well as implementation of the respective research projects at the EU level with the involvement of Latvian specialists;
- to organize informative seminars on JPI strategic areas.

Sub-priority 2.2 - "Making optimal use of investments in research infrastructures"

Research infrastructures are an integral part of the ERA and the Innovation Union¹⁹. These include the many billions of long-term investments, thus supporting thousands of researchers from research organizations and industry. High-quality research infrastructure is the centre of knowledge triangle – research, education and innovation. Research infrastructures help to address the grand social challenges by providing scientists and policy-makers with the instruments, data and information on which an evidence-based policy-making is based. To develop research infrastructures in Europe, the EU Member States have developed a common approach within the program "Horizon 2020" and ERIC legal framework.

EC recommendations for the EU Member States:

- to approve financial commitments in respect of participation in research infrastructures of ESFRI, global, national and regional importance by developing national ESFRI roadmaps;
- to remove legal barriers to cross-border research infrastructures, if any exists.

TOP ACTION PRIORITY - "MAKING OPTIMAL USE OF PUBLIC INVESTMENTS IN RIs BY SETTING NATIONAL PRIORITIES COMPATIBLE WITH THE ESFRI PRIORITIES AND CRITERIA TAKING FULL ACCOUNT OF LONG TERM SUSTAINABILITY."

The main objective of this action task is to provide financial resources for EU Member States for creation, development and maintenance of the roadmap for ESFRI European research infrastructures (hereinafter - the ESFRI roadmap). The performance of EU Member States on behalf of this action task is measured as the availability of national research infrastructure roadmaps with data on national research infrastructures and corresponding investment needs along with identified ESFRI projects and data on national investments (see Table 7). Latvia approved its national ESFRI roadmap on 5th of April, 2016.

Table 7

Availability of national research infrastructure roadmaps with data on national research infrastructures and corresponding investment needs along with identified ESFRI projects and data on national investments

2013-2015	2010-2012	2007-2009	In preparation	No roadmap
Austria	Bulgaria	Ireland	Belgium	Iceland
Croatia	Czech Republic	Romania	Cyprus	Slovakia
Estonia	Denmark		Turkey	Luxembourg
Finland	France		Latvia ²⁰	Malta

¹⁹ http://ec.europa.eu/research/innovation-union/index_en.cfm

²⁰ Approved by MC on 5th of April, 2016

Germany	Hungary			
Greece	Italy			
The Netherlands	Lithuania			
Norway	Slovenia			
Poland	Sweden			
Portugal	United Kingdom			
Spain				
11	10	2	4	4

Source: EC data

SITUATION IN LATVIA

At its meeting on the 5th of April, 2016, the Cabinet of Ministers approved the informative report “On Latvia’s Participation In the European Research Infrastructure Roadmap Consortium (ERIC) of European Strategy Forum For Research Infrastructures (ESFRI)”, which approved participation in eight prior consortia and platforms of the ESFRI Roadmap, planning the necessary funding for participation.

Involvement in the ESFRI research infrastructures will provide the international collaboration of research institutions and their integration in ERA, as well as facilitate access to European level research infrastructures qualifying for support of various EU programs, including within the framework of the ESFRI. Latvia can participate in ERA activities also with the research infrastructure objects located in Latvia – those which enable an effective introduction of research results in production through development of high technology, as well as operation and development of unique research infrastructure objects.

The Ministry of Education and Science has determined eight prior infrastructures (consortia and platforms) of the ESFRI roadmap that would require Latvia’s participation, thereby providing Latvian research institutions access to such infrastructures of the ESFRI roadmap:

1. Consortiums:

- 1) **BBMRI-ERIC**²¹ – Biobanking and Biomolecular Resources Research Infrastructure, in which the functions of Latvian contact institution would be entrusted to Latvian Biomedical Research and Study Center;
- 2) **CLARIN**²² – Common Language Resources and Technology Infrastructure, in which the functions of Latvian contact institution would be entrusted to the Research Institute of University of Latvia – the derived public person “Institute of Mathematics and Computer Science, University of Latvia”;
- 3) **ESS-ERIC**²³ – European Social Survey in which the functions of Latvian contact institution would be entrusted to Institute of Philosophy and Sociology, University of Latvia;
- 4) **EATRIS – ERIC**²⁴ – European Advanced Translational Research Infrastructure in Medicine in which the functions of Latvian contact institution would be entrusted to Riga Stradins University;
- 5) **JIV-ERIC**²⁵ – Joint Institute for Very Long Baseline Interferometry in Europe in which the functions of Latvian contact institution would be entrusted to Ventspils International Radio Astronomy Centre;

2. Research Infrastructure Platforms (prospective consortiums):

- 6) **EU-OPENSREEN**²⁶ – European Infrastructure of Open Screening Platforms for Chemical Biology in which the functions of Latvian contact institution would be entrusted to Latvian Institute of Organic Synthesis;
- 7) **INSCTRICT**²⁷ – Europe’s research hub for structural biology in which the functions of Latvian contact institution would be entrusted to Latvian Biomedical Research and Study Center, Latvian Institute of Organic Synthesis and Riga Stradins University;

²¹ <https://www.structuralbiology.eu/resources/organisations/bbmri-biobanking-and-biomolecular-resources-research-infrastructure>

²² <http://clarin.eu/>

²³ <http://www.europeansocialsurvey.org/>

²⁴ <http://www.eatris.eu/>

²⁵ <http://www.jive.nl/eric-council>

²⁶ <http://www.eu-openscreen.eu/>

²⁷ <https://www.structuralbiology.eu/>

8) **MIRRI**²⁸ – Microbial Resource Research Infrastructure in which the functions of Latvian contact institution would be entrusted to University of Latvia.

The compliance of the research infrastructure available in Latvian research institutions with the infrastructures (consortia and platforms) of ESFRI roadmap is summarized in Table 8.

Table 8

The compliance of Latvia's research research infrastructure with the infrastructures of ESFRI roadmap

ESFRI infrastructures	Participating Latvian research institutions	Latvian research infrastructure
BBMRI-ERIC (consortium)	Latvian Biomedical Research and Study Centre	National Human Genome Research Institute (NHGRI)
	Riga East Clinical University Hospital	Specialized biobanks of research institutions
	Pauls Stradins Clinical University Hospital	
CLARIN (consortium)	Institute of Mathematics and Computer Science of University of Latvia	Common Language Resources and Technology Infrastructure (CLARIN)
ESS-ERIC (consortium)	Institute of Philosophy and Sociology of University of Latvia	Infrastructure of Institute of Philosophy and Sociology of University of Latvia
EU-OPENSREEN (Platform, prospective consortium)	Latvian Institute of Organic Synthesis	Chemical biology infrastructure of Pharmaceutical and Biomedical Research Centre of National Importance
INSCTRICT (Platform, prospective consortium)	Latvian Biomedical Research and Study Centre	Structural biology infrastructure of Pharmaceutical and Biomedical Research Centre of National Importance Infrastructure of Public Health and Clinical Medicine Research Centre of National Importance
	Latvian Institute of Organic Synthesis	
	Riga Stradins University	
JIV ERIC (consortium)	Ventspils International Radio Astronomy Center	Irbene Radiotelescope Complex
MIRRI (Platform, prospective consortium)	University of Latvia	Microbial Strain Collection of Latvia
EATRIS_ERIC (consortium)	Riga Stradins University	Public Health and Clinical Medicine Research Infrastructure of National Importance, Biomedical Infrastructure of Pharmaceutical and Biomedical Research Centre of National Importance

Source: Information collected by MES

Collaboration of the research infrastructure of Latvia's research institutions mentioned in Table 8 with the ESFRI roadmap infrastructures will contribute to the smart specialization areas of biomedicine, medical technology, biopharmacy and biotechnology, information and communication technology, engineering and technology, as well as promote the transfer of knowledge and provide e-Science opportunities in humanities and social sciences. Selected priority infrastructures of ESFRI roadmap (consortia and platforms) cover all the smart specialization areas of Latvia, with the exception of smart energy. In this area, the ESFRI roadmap infrastructures are under development, thus the list of the ESFRI roadmap infrastructures in which Latvia's participation is a priority might be amended upon establishment of these infrastructures.

²⁸ <http://www.mirri.org/home.html>

Direction of national action - "To ensure the representation of Latvia and involvement of Latvian research institutions in the European Research Infrastructure Consortium according to the approved ESFRI roadmap"

After the establishment of the Consortium, the activities of the European Research Infrastructure are no longer financed by EC, but by the Member States of Consortium, therefore Latvia has to plan the required annual funding for participation in the respective consortia and cover the expenses from the state budget. Membership fee formation conditions are set within the statutes of each individual consortium. Typically, the annual membership fee of consortia depends on size of population and GDP of the certain member state of the consortium. The amount of membership fee also depends on the member state status in the consortium – whether it is a member or an observer.

The ESFRI roadmap is periodically updated including the new research infrastructures. Accordingly, in the future, the involvement of Latvian research infrastructures in the infrastructures of the ESFRI roadmap will be reviewed and participation in the new consortia, that are the ESFRI roadmap infrastructures, will be planned. It will also involve examination of Latvia's participation in such consortia, with which Latvian research institutions already cooperate, e.g. the Institute of Solid State Physics of University of Latvia (ISSP) has established cooperation with the representatives of ESS-ERIC (European Spallation Source), IFMIF (International Fusion Materials Irradiation Facility) and ELI (Extreme light infrastructure), which in the future might lead to a full membership of Latvia in these consortia. Whereas, the Faculty of Power and Electrical Engineering of RTU is also interested in cooperation with ESS-ERIC, but the university's Faculty of Electronics and Telecommunications is interested in developing cooperation with the PRACE (Partnership for Advanced Computing in Europe), where there is a possibility to engage in supercomputer technology development and use for research purposes.

To enhance development of the Latvian smart specialization direction "Biomedicine, Medical Technology, Biopharmacy and Biotechnology", the possibility to join the EECRIN ERIC (European Clinical Research Infrastructure Network) will be considered based on the infrastructure of Public Health and Clinical Medicine Research Centre of National Importance, also taking into account its further development. The perspective for development of the area of biopharmacy is cooperation with INFRONTIER (European Research Infrastructure for phenotyping and archiving of model mammalian genomes).

Measures:

- to provide funding for maintenance of nationally important research infrastructure objects, including for research and technical maintenance of research collections for participation in the objects of ESFRI roadmap;
- to ensure the representation of Latvia and involvement of Latvian research institutions in the European Research Infrastructure Consortium set within the ESFRI roadmap.

Priority 3 - "An open labour market for researchers"

Open and attractive labour market for European researchers is an important component of the ERA, in which the highly qualified workforce can easily move across borders, branches and disciplines of science, to facilitate the recruitment of the talented scientists in the best organizations for them, thus expanding the boundaries of their knowledge and supporting innovation across Europe. Research in countries that reach this goal is more attractive career option and the scientists have adequate knowledge needed for today's and future needs. Open and merit-based recruitment procedures offer for researcher's equal opportunities at all levels of their careers, ensuring fair access to all the research positions announced through tendering procedure at a national and international level.

Open and merit-based recruitment procedures include the following principles:

- existence of an independent recruitment commission that respects the gender equality principles, involving at least one international representative;
- advertise all vacancies on the EURAXESS Jobs portal with links to detailed information on job description, required competencies and duties, remuneration, social security;
- recruitment commission is available for the candidate, the candidate must be informed about the reasons of non-acceptance for work indicating his/her as candidate's strengths and weaknesses.

Open and merit-based recruitment procedures in state universities and research organizations are a precondition for the implementation of the ERA in Europe. It is a prerequisite for a high-quality academic activity and excellence in teaching by providing appropriate human resources, whose selection is based on academic merits.

EC recommendations for the EU Member States:

- to assess at a national level, how the national research financial instruments can better promote integration of open and merit-based recruitment principles in universities and research institutions, as laid down in the European Charter for Researchers and the Code of Conduct for the recruitment of researchers;
- research institutions should get involved in the Human Resources Strategy for Researchers²⁹ developed by the EC;
- research institutions should critically evaluate the current recruitment process.

TOP ACTION PRIORITY - "USING OPEN, TRANSPARENT AND MERIT BASED RECRUITMENT (OTM-R) PRACTICES WITH REGARD TO RESEARCH POSITIONS"

The main objective of this action task is to apply such recruitment practices in research institutes and universities of EU Member States, that comply with the European Charter for Researchers and the Code of Conduct for the recruitment of researchers³⁰, following open, transparent and merit-based practice principles in relation to recruitment for positions in research. The performance of EU Member States on behalf of this action task is measured as the share of research posts advertised on the EURAXESS Jobs portal per thousand researchers in the public sector.

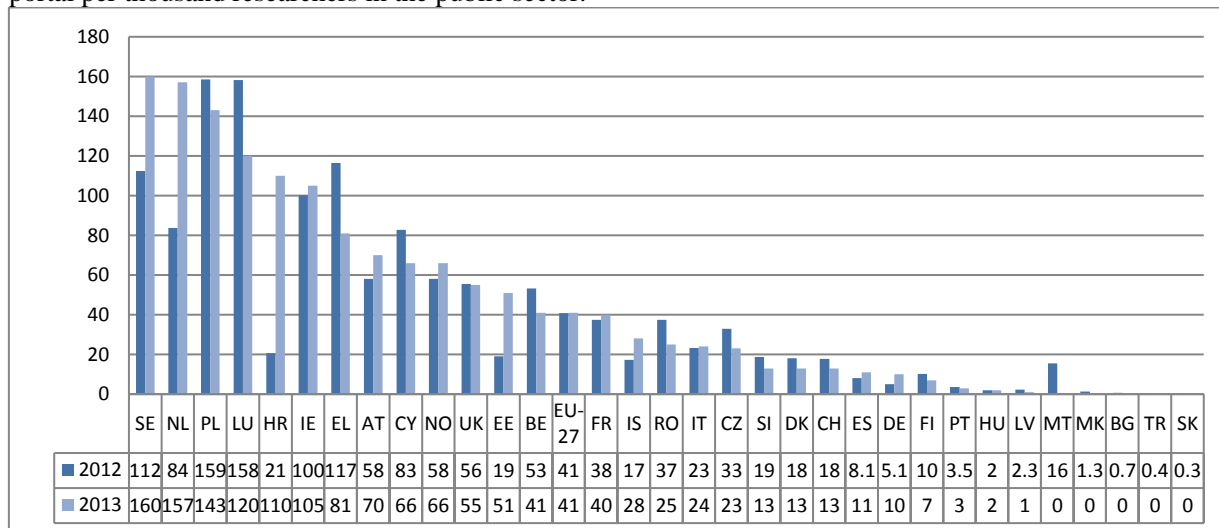


Figure 3 ERAC monitoring indicator

Source: EC data

²⁹ <http://ec.europa.eu/euraxess/index.cfm/rights/strategy4Researcher>

³⁰ http://ec.europa.eu/euraxess/pdf/brochure_rights/kina21620b3c_lv.pdf

In 2012-2013, there have been only three entries from Latvia on the database of EURAXESS, which is one of the worst rates in the EU (see Figure 3).

SITUATION IN LATVIA

In 2006, Service Centre of EURAXESS Latvia began its operation and the EURAXESS Latvia portal (until April, 2011, entitled – “European Researcher’s Mobility Centre and Portal”) was also started, which has been integrated with the European EURAXESS portal and ERA of other similar sites of the Member States, who together form a network that provides constantly updated information on job and scholarship offers for research staff in universities, research centres and companies of the EU Member States, as well as information on the legal and daily life matters faced by researchers and their families when moving to another country.

EURAXESS Latvia portal provides a link to the official publication “Latvijas Vēstnesis”, which advertises vacancies for academic positions, as well as positions of directors of research institutions and other high-level positions. Service Centre of EURAXESS Latvia carries out also other measures to inform the potential mobile foreign researchers and their Latvian employers (research institutions) on topical matters relating to the academic staff mobility in the ERA. Latvian research institutions are presented with the opportunity to place their job advertisements for scientists on the EURAXESS job advertisements database, while Latvian research employees are encouraged to use this database.

Recruitment for academic positions at public research institutions, positions of directors and other high-level positions is organized by tender procedure in accordance with the requirements of the Law on Research Activity and Law On Institutions of Higher Education, which by their principles and conditions comply with the EC recommendations (March 11, 2005)³¹ on the European Charter for Researchers and the Code of Conduct for the recruitment of researchers. Vacancies are announced in the official publication of Latvia “Latvijas Vēstnesis”.

Direction of national action - “Enhancing open, transparent and merit-based practices with regard to recruitment for positions in the field of research”

EURAXESS job ad database is considered to be one of the key indicators of applying open, transparent and merit-based practices with regard to recruitment for positions in the field of research.

The data collected in the survey carried out by the Ministry of Education and Science show that research institutions announce vacancies in the official publication of Latvia “Latvijas Vēstnesis” in accordance with the Law on Research Activity and Law on Institutions of Higher Education. Just a few research institutions indicate that for implementation of international projects they advertising job posts on EURAXESS portal, the other research institutions have not been informed about it or do not use the EURAXESS portal being unable to offer adequate remuneration for foreign researchers. In order to facilitate the use of EURAXESS portal, the Ministry of Education and Science is planning to announce on the EURAXESS portal the information on the annual selection of postdoctoral research applications of the measure 1.1.1.2 “Postdoctoral Research Funding”.

A study from 2013 titled “Remuneration – Cross-Country Report”³² shows that the minimum size of salary for researchers in Latvia (in 2010) is one of the lowest in the EU and accounts for only 20% of the most paying most EU countries, such as Luxembourg and Switzerland. The minimum salary for a principal researcher in Latvia, 2010, amounted to an average of 9 032 EUR. It is more than four times lower than the EU average amount of lowest researcher’s salary (37 077 EUR in 2011). Low salaries are often linked to lack of financial resources for providing a full-time job, as well as significant interruptions in involvement of scientists in execution of research projects.

Hence, it is not purposeful to publish on the EURAXESS portal the advertisements of vacancies, which cannot provide researchers with a full time workload or part-time workload for predictable period of time, because Latvian research institutions cannot compete with the salary levels and predictable stability of employment in the research institutions of other countries. The specific of Latvian situation is that the basic part of researcher’s salary and provision of his/her position arises from research projects. A research group already is involved in the application for a specific project and as such competes and gains (or not)

³¹ http://ec.europa.eu/euraxess/pdf/brochure_rights/kina21620b3c_lv.pdf

³² http://ec.europa.eu/euraxess/pdf/research_policies/more2/Report%20on%20case%20study%20of%20researchers_%20remuneration.pdf

the project financing, thus ensuring its remuneration and also existence of its position for the time of the project. In essence the contest for certain positions takes place already in project tenders. Thus posting such project ensured positions on the EURAXESS portal would be meaningless, because the researcher, who receives project funding, is beyond competition, if his project has gained support.

EURAXESS portal can announce also permanent vacancies, which are provided with funding for a specific period and to the extent, that is not inconsistent with the labour regulatory framework, and within this period, are not funded by financial means of the project or the contract.

It is also important to promote the usage opportunities of EURAXESS portal for Latvian research institutions and universities strengthening operation of the EURAXESS Latvia Service Centre, and to inform Latvian research institutions and universities about the principles of open, transparent and merit-based recruitment practice, and on the European Charter for Researchers and the Code of Conduct for the recruitment of researchers.

Measures:

- to engage in and strengthen the operation of the EURAXESS Latvia Service Centre;
- for Latvian research institutions to involve in the process of Human Resources Strategy for Researchers (HRS4R);
- to assess the need to amend the regulatory framework by stipulating a requirement for universities and research institutes to announce vacancies for permanent academic positions also in the EURAXESS portal, with the exception of the academic positions, whose remuneration is mainly provided from financing of projects for scientists and research groups that are acquired through a tender procedure;
- to inform the Latvian research institutions, universities and private organizations, which are involved in the projects of “Horizon 2020” and which engage in research activities, on the requirements of Article 32 of the “Horizon 2020” Rules for Participation, that require for the institutions involved in the program’s projects to comply with the EC recommendations (11th March, 2005) on the European Charter for Researchers and the Code of Conduct for the recruitment of researchers;
- to continue to actively inform the Latvian research research institutions and organizations which undertake research activities, on the possibility to place their job offers in the EURAXESS Jobs Database or to look for employees through the EURAXESS job seekers database.

Priority 4 - “Gender equality and gender mainstreaming in research”

The main objective of this priority is to improve research excellence by fully realizing equal representation of both genders in research processes, avoiding the unjustifiable waste of talents. Research has shown that Europe is far from gender equality in science. Despite the European and national level strategies, the rate of change is slow, and there are significant differences between countries.

EC recommendations for the EU Member States:

- at the national level to develop gender equality provision policies in universities and research institutes, regularly monitor their effectiveness and apply appropriate measures where necessary;
 - Universities and research institutions should review and improve existing policies for gender equality provision, with particular emphasis on the areas where women are under-represented, such as top positions in science management.

TOP ACTION PRIORITY - "TRANSLATING NATIONAL EQUALITY LEGISLATION INTO EFFECTIVE ACTION TO ADDRESS GENDER IMBALANCES IN RESEARCH INSTITUTIONS AND DECISION MAKING BODIES AND INTEGRATING THE GENDER DIMENSION BETTER INTO R&D POLICIES, PROGRAMMES AND PROJECTS."

The main objective of this action task is to ensure gender equality in research and to eliminate discrimination against women in top research positions in the EU Member States. The performance of EU Member States on behalf of this action task is measured as the proportion of women with A³³ level degree in the sector of higher education.

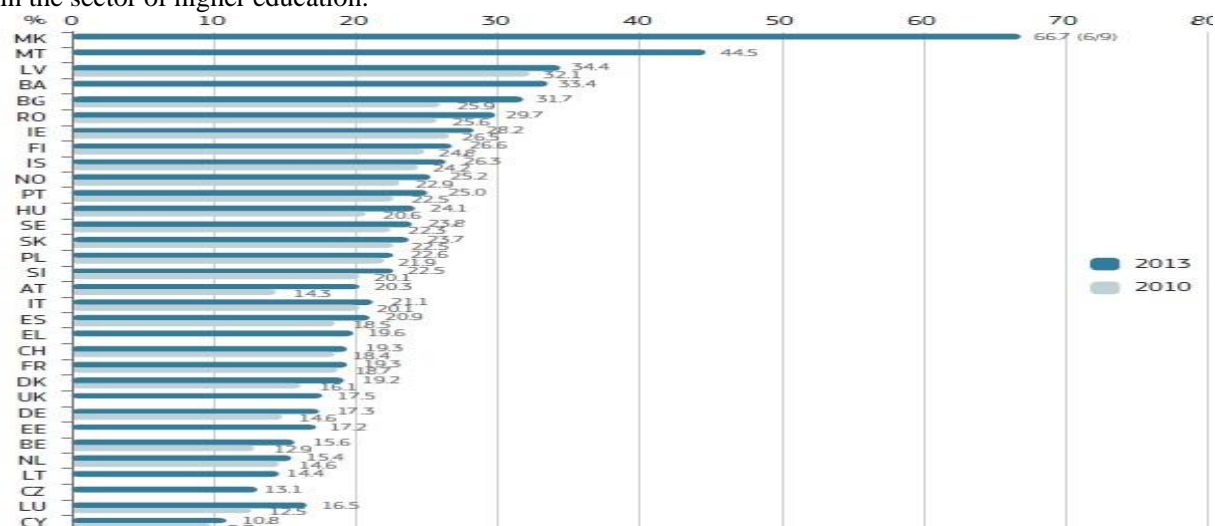


Figure 4, "ERAC monitoring indicators"

Source: Data from the Eurostat study „She Figures 2012”

According to the data of the ERA Progress Report 2014 and the Eurostat study “She Figures 2012”, Latvia is among the leaders in gender equality in science in the EU (see Figure 4).

SITUATION IN LATVIA

In most of the main indicators, Latvia has a score above the EU average, while in two indicators – the proportion of women scientists and proportion of women with doctoral degree – Latvia has the highest rate in the EU (see Table 9). Latvia does not have policies, strategies or financial incentives for gender equality in science. The situation in Latvia is rather a consequence of the gender structure of the population, women’s greater success in the sector of higher education and the low prestige of scientist’s position in Latvia.

Table 9

Gender equality in science Latvian compared to the EU

Indicator	Latvia	EU	Ranking among EU states
Proportion of women scientists in the total number of scientists (2011)	53,3%	33,3%	1
Proportion of women scientists in the number of PhD graduates (2012)	59,9%	47%	1
Proportion of women senior scientists in the total number of scientists (2010)	32%	20%	2

³³ The highest degree or position in which research is implemented in an institutional or corporate system. (The single highest grade/post at which research is normally conducted within the institutional or corporate system)

Proportion of women as leaders of institutions in the sector of higher education (2014)	25%	15,5% (2010)	4
Proportion of women in the number of employed persons in knowledge intensive activities (2010)	41%	45%	21
Proportion of women in top academic positions (2013)	34.4%	19.8	3

Source: ERA Progress Report 2014 and data from Eurostat study "She Figures 2012"

Universities and public research institutes in Latvia have enjoyed great autonomy in defining procedures for the recruitment of researchers and career development principles. Latvian legislation does not specify gender, gender balance and gender equality aspects, however, the existing regulatory framework creates no legal barrier to obtaining some specific rights. Everything depends on the person's abilities and competencies.

Thus, the regulatory framework of Latvian science sector provides the conditions for development of research staff policies promoting the gender aspect and gender equality at the institutional level.

In Latvia, proportionally fewer women occupy top-level management positions in research institutions. Of the rectors of the 17 state universities, only five are women. According to the "She Figures 2012" data, in Latvia, 2010, only 30% of women were represented in the research councils of research institutions, which is below the average EU level – 36%³⁴.

Direction of national action "Continue to ensure equal opportunities for both gender in organization structures and decision-making processes in the fields of higher education and science, and to raise the prestige of scientist's profession in Latvia"

Although Latvia is one of the leaders in gender equality observation, compared to the average level of the EU, still gender disproportion in a number of indicators can be observed. Proportion of women scientists in the total number of scientists and proportion of women scientists in the number of PhD graduates in Latvia exceeds 50%, which shows that the prestige of scientist's profession among men is relatively low.

The overall low prestige of scientist's profession in Latvia is evidenced by the World Bank's collected data on the number³⁵ of researchers per million inhabitants.³⁶ Latvia with its 1,802 scientists per million inhabitants is the 25th worst figure among the EU Member States, lagging behind both Lithuania (2,887) and Estonia (3,339). Moreover Latvia lags behind the EU average - 3422. It can be observed that the number of scientists closely correlates with the R&D funding allocated by the state and generally available in the sector (see Table 10). For example, in 2008, 67 million EUR were allocated to R&D, which generally is the largest public funding allocated to R&D. In 2008, also the largest number of scientists (2,038) per million inhabitants was observed. Although in 2010 and 2011 the R&D funding through support of EU structural funds began to rise, and in 2014 reached the all-time highest total R&D funding, the number of scientists still is not increasing to the level of 2008. This fact shows that the people employed in the R&D sector do not return to science, continue to emigrate and there is no sufficient renewal of science human resources due to the instability and unpredictability of the sector. Hence raising the prestige of scientist's profession, that would lead to the increase in the number of scientists, is unlikely without further increase of the funding for R&D.

Table 10

Correlation of research staff and the available R&D funding

Indicator	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Research staff ³⁷	3282	4024	4223	4370	3621	3896	3947	3904	3625	3748
Total funding for R&D (million EUR)	72.0	111.3	125.1	141.6	85.2	109.6	141.4	145.4	139.5	162.8

³⁴ https://ec.europa.eu/research/swafs/pdf/pub_gender_equality/she_figures_2015-leaflet-web.pdf

³⁵ According to the CSB terminology - Number of employees engaged in the scientific research work

³⁶ <http://data.worldbank.org/indicator/SP.POP.SCIE.RD.P6>

³⁷ The number of employees in accordance with the normal working time equivalent.

State funding for R&D (million EUR)	33.2	42.5	62.5	67.0	38.1	28.9	31.9	34.7	33.4	41.7
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Source: CSB data

The opinions expressed in the questionnaire carried out by the Ministry of Education and Science show that the Latvian research institutions do not implement separate measures for provision of gender equality and mainstreaming, while professional growth in the research institutions is not discriminated by gender. By contrast, the high proportion of women in the total number of scientists has been explained by lack of competitive and stable remuneration in the science sector of Latvia.

The large percentage of women representation in science is mainly based on the humanities and social sciences - Latvia has a considerable disproportion between the social sciences and humanities and the physical sciences. Most women are engaged in social sciences and humanities (66%), but relatively few - in maths and engineering (39%), which are considered to be the profitable sciences and are related to access to the public resources.

Thus, although the proportion of women in science is high, they generally occupy lower positions with fewer opportunities to participate in decision-making processes. Hence, the issue to be assessed is the addition of gender equality principle in the Law on Research Activity and the Law On Institutions of Higher Education, since it is an essential aspect for provision of gender equality, high-quality and reliable employment.

Measures:

- for research institutions, to integrate the gender equality aspect in their decision-making bodies, study programs, operational strategies, development and implementation of research projects;
- to assess the need to develop the principle of gender equality in laws and regulations;
- for research institutions, in their activity, to primarily highlight the issues of science popularization, to promote recognition of science, its social prestige, to promote the spreading of research knowledge and raise the prestige of scientist's profession in society.

Priority 5 - "Optimal circulation, access to and transfer of research knowledge"

Today's economy is driven by the help of intangible assets – knowledge, discoveries and creativity. Research and innovation is advanced by scientists, research institutions, businesses and citizens by accessing the results of existing research projects, sharing and using them. It is therefore important to ensure the transfer of knowledge between these players. In Europe, there are a number of factors that hinder knowledge transfer - legal, cultural, language barriers, differences between science and business cultures, lack of incentives, as well as fragmented knowledge of the requirements of the market and available technologies. It is important to emphasize knowledge transfer between state funded research and the private sector respecting the intellectual property rights.

Prevention of the legal, political and technical obstacles to increased circulation of knowledge will increase the Europe's growth and competitiveness providing benefits to scientists, research institutions, citizens and business.

EC recommendations for the EU Member States:

- to ensure that the knowledge transfer from research institutions to industry becomes a political priority at all levels;
- each line ministry implementing knowledge transfer activities has determined the person responsible for supervising their impact;

- science policy enhances private sector's involvement in identifying the needs of technology and knowledge, fosters private investment in research and promotes the use of publicly funded research results;
- to promote development of effective knowledge transfer mechanisms with the use of appropriate support instruments;
- to develop appropriate indicators for measuring the social and economic impacts of knowledge transfer policies;
- for universities and research institutes to develop procedures for better management of intellectual property, to ensure optimal interaction and strategic partnership between the academic environment and industry, as well as to improve the professionalism of knowledge transfer centres.

TOP ACTION PRIORITY - "FULLY IMPLEMENTING KNOWLEDGE TRANSFER POLICIES AT NATIONAL LEVEL IN ORDER TO MAXIMISE THE DISSEMINATION, UPTAKE AND EXPLOITATION OF SCIENTIFIC RESULTS. RPOs AND RFOs SHOULD MAKE KNOWLEDGE TRANSFER SECOND NATURE BY INTEGRATING IT IN THEIR EVERYDAY WORK."

The main objective of this action task is to ensure a smooth knowledge transfer in the EU Member States from public research institutes and universities to the commercial sector, by funding the activities of knowledge transfer. The performance of EU Member States on behalf of this action task is measured as the share of innovative enterprises in cooperation with higher education institutions or national research institutions producing innovative products or implementing innovative technological processes. (See Figure 5)

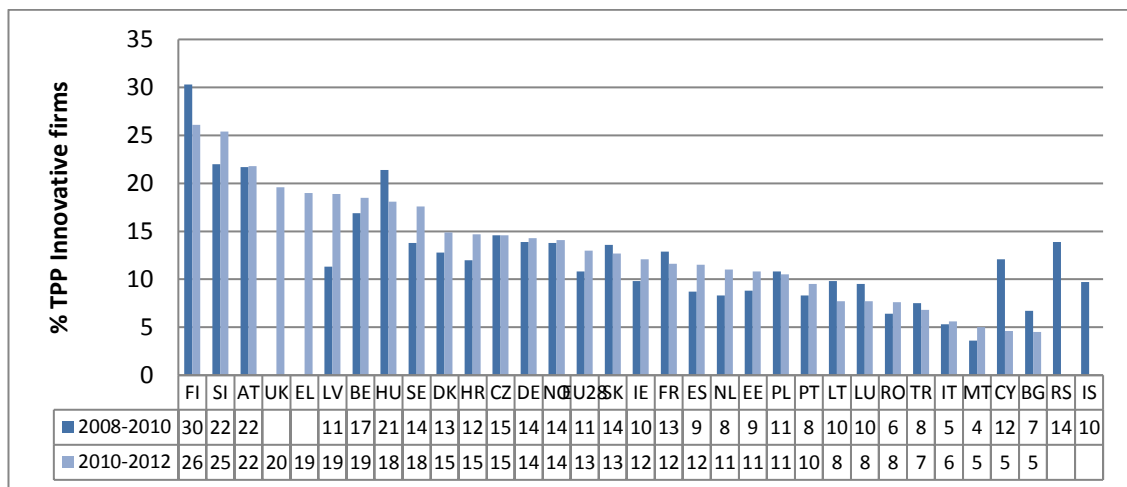


Figure 5 ERAC monitoring indicator
Source: EC data

SITUATION IN LATVIA

ERAC main indicator shows that there are 19% of innovative enterprises in Latvia, that produce innovative products or implement innovative technological processes and collaborate with higher education institutions or national research institutions, which is one of the highest rates in the EU (see Figure 5). The recent provisional data (2012 - 2014) shows that Latvia has only 12.9% of companies, which had technological innovations in the period.

The Cabinet of Ministers at its meeting on January 5, 2016, approved the new EU funds program developed by ME for supporting the activities of competence centres³⁸. The aim of the Competence Centre Support Program is to increase the competitiveness of enterprises, promoting the cooperation of research and industrial sectors in implementation of industrial research projects, new products and technology development until 2021. The total ERDF funding for the new program is 72.3 million EUR. Support for the centres will be provided for conducting industrial research, experimental development, techno-economic feasibility studies, for creation of necessary research infrastructure and for covering of the management costs. The maximum funding available per competence centre project in a round is planned to amount to 3.2 million EUR.

In order to ensure the transfer of knowledge from research institutions to the industry, the Technology Transfer Program will be continued in the EU Structural Fund programming period of 2014 - 2020 as well. Within the program, the technology transfer system will be designed to increase the income of research institutions from the commercialization of state-funded research, as well as to ensure, that the research results of research institutions are market-oriented and are implemented through practical business. The total ERDF funding available within the framework of the program till the end of 2022, is planned to amount to 31.5 million EUR.

In 2016, there is initiated two support activities of EU structural funds – “Post-doctoral research support” and “Practically - oriented research”, the implementation of which is expected to result in increased number of new products and technologies with commercialization potential.

Direction of national action “Strengthening co-operation between the business and the research sector in order to implement joint projects aimed at the commercialization of research results”

Both the EU responsible entities and Latvian experts and policy planners as one of the main development problems of Latvia's research sector have identified the weak linkage between the sectors of research and industry. Business sector's investments in R&D in Latvia, 2014, amounted to 0.24 % of GDP, which is much less compared to the EU-28 average (1.2% of GDP)³⁹. This has resulted from the current structure of the Latvian economy, which is consists of the traditional industries and SMEs, whose competitiveness is based on a cheap labour and the available natural resources. More than a half (55%) of Latvia's industry is low technology. High technology attributes to only 5% of the industry, but the averagely high technology – to another 11%.

The available statistics on the key indicators (see Table 11) of the cooperation between the business and the public sector shows that the commercial investments in R&D are unevenly growing, until in 2014 they have almost reached the level of 2007 amounting to 27.8% of the total amount of investments in R&D. In this context, the NDP 2014 - 2020 has set a target for the business sector to increase its R&D investments up to 48% by 2020, which would be difficult to achieve. It should be noted that the percentage of business sector's investments since 2010 has only been declining and just in 2014 a substantial growth is observed.

Whereas, such impact indicator as the cooperation of Latvian research institutions and the business sector through development of joint publications, is very insignificant averagely creating 0,5 publications per year since 2007-2014. The situation is better with the number of the co-publications which involve at least one representative from Latvia and at least one businessman – although relatively low, the indicator at least shows signs of growth year by year. Also, since 2007, the indicator of the number of companies which had technological innovations continues to substantially decline and there are no signs of growth.

Table 11

Indicator	2007	2008	2009	2010	2011	2012	2013	2014
Corporate investments in R&D (million EUR) and proportion	45.5 (36)	38.3 (26.9)	31.5 (36.9)	42.5 (38.7)	35.1 (24.7)	34.6 (23.7)	30.4 (21.7)	45.3 (27.8)

³⁸ <http://likumi.lv/doc.php?id=279410>

³⁹ Eurostat data

(%) of the total investments in R&D								
Number of public and private co-publications in the <i>Scopus</i> database with at least one representative of Latvia	4	4	6	8	16	12	14	20
Number of co-publications of Latvian research institutions and enterprises in the <i>Scopus</i> database	1	0	1	0	0	0	1	1
A number of enterprises, which had technological innovations, as % of the total number of enterprises ⁴⁰	Between 2006 and 2014 an average of 16.08%							
2006-2008	20.1%							
2008-2010		16.7%						
2010-2012			12,9%					
2012-2014 (provisional data)					14.6%			

Key indicators of business and public sector cooperation in Latvia

Source: CSB and MES data

Measures:

- for research institutions, to observe the EC Recommendations of April 10, 2008, “On the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations”⁴¹;
- for research institutions, to develop and implement technology and knowledge transfer strategies;
- for research institutions, to educate employees on knowledge and technology transfer issues, including engaging in establishment of knowledge and technology transfer structural units and provision of their functioning;
- for research institutions, to get involved in the activities of various national support programmes that promote knowledge and technology transfer (for example, the Competence Centre Programme, Technology Transfer and Innovation Voucher Programme, Cluster Programme);
- to ensure the implementation of the following activities of the EU structural funds:
 - • 1.2.1.1. “Support for Development of New Products and Technologies Within Competence Centres”;
 - • 1.2.1.2. “Support for Improvement of Technology Transfer System”;
 - • 1.2.1.4. “Support for Introduction of New Products in Production”.
- to continue the corporate income tax (CIT) incentive for R&D activities, allowing to reduce the income taxable with CIT by the expenses multiplied by a factor of 3, if they directly relate to the costs of research labour force and purchasing of research services from specialized research institutions for development of the taxable person's business.

TOP ACTION PRIORITY - “PROMOTING OPEN ACCESS TO SCIENTIFIC PUBLICATIONS”

Open access to research publications means unlimited access to research information through the Internet. Open Access aims to provide users with free, easy and fast access to research literature and data

⁴⁰ Technological innovations - product innovations, processes innovations, incomplete or abandoned innovations. The data collection was made by three-year periods – 2006-2008, 2008-2010, 2010-2012, 2012-2014.

⁴¹ <http://eur-lex.europa.eu/legal-content/LV/TXT/HTML/?uri=CELEX:32008H0416&from=EN>

without legal and technical barriers to do so, as well as the right to re-use and reproduce the research literature and data. The “gold” or “green” open access to research publications provides faster and more extensive circulation of research ideas, promotes interdisciplinary research, inter-institutional and cross-border cooperation increasing the benefits for science (with a rapid distribution of research concepts, avoiding duplication, improving the reproducibility and the quality of research results) and society as such (by improving public awareness and encouraging SMEs to make use of research results).

The “golden” or “green” open access and self-archiving must be provided for the research publications and data arising from publicly funded R&D activities. The EU has a common belief that society does not have to re-pay for access to research information and data, if the research is conducted on public funds.

EC recommendations for the EU Member States:

- to promote the “gold” and “green” way of publishing in accordance with the EC recommendations of 2012 on access to research publications and preservation of research information, including both research publications and research data;
- to enhance valid use of repositories for the “green” open access and to stimulate self-archiving in cases, when the research author publishes his/her work without the publisher’s intervention;
- to ensure open access to research data in accordance with the principles and guidelines of OECD and “Horizon 2020” for access to publicly funded research data, taking into account the constraints linked to commercial exploitation.

SITUATION IN LATVIA

Although, at the national level there is no developed policy of open access to research publications in Latvia, scientists use the opportunity to publish their work in open access journals and repositories to ensure a wider dissemination and availability of the research results. Currently, in Latvia, there are seven open access journals⁴², two open access repositories (UL E-resource Repository and the Academic Repository of National Library of Latvia – “Academia”) and one partly open access repository (RTU Institutional Repository). Since 2009, an open access information point operates in Latvia, which was started as participation of the University of Latvia in the project *OpenAIRE* (in 2015, the third stage began).

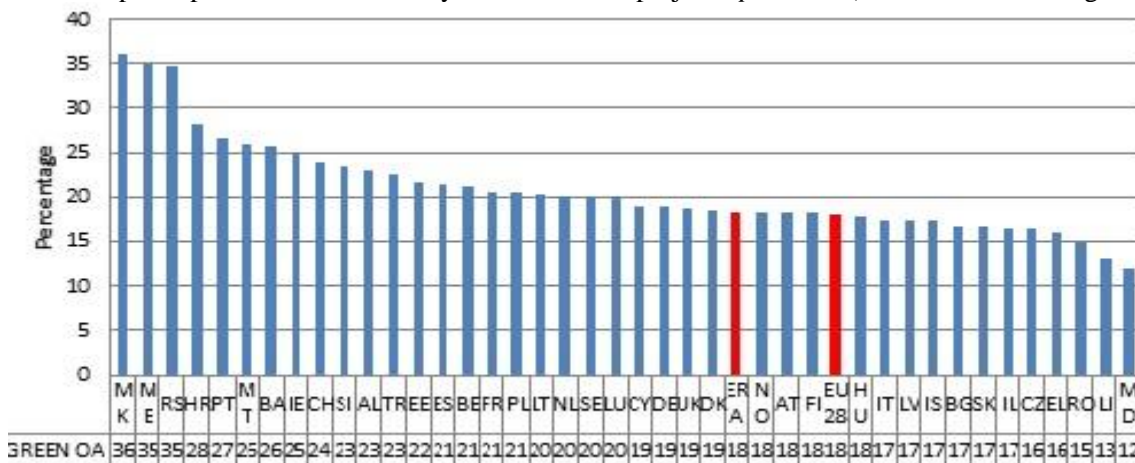


Figure 6, “ERAC monitoring indicators”

Source: EC data

The performance of EU Member States on behalf of this action task is measured as the share of open-access research papers and data (the “gold” and “green” open access) in the country (see Figure 6).

⁴² Latvian Journal of Physics and Technical Sciences;
 Proceedings of the Latvian Academy of Sciences. Section B: Natural, Exact and Applied Sciences;
 Environmental and Experimental Biology;
 Baltic Journal of Modern Computing;
 Complex Systems Informatics and Modeling Quarterly;
 Transport and Telecommunication;

Direction of national action “To provide appropriate infrastructure and regulatory conditions that would facilitate increasing proportion of open access research publications and data”

The data collected in a survey carried out by the MES evidence, that research institutions sufficiently broadly use a variety of open-access publishing options –both the open-access repositories available in Latvia, and open access journals in Latvia and abroad. The available data on the proportion of open-access research papers and data in Latvia has shown that the proportion of open-access publishing in Latvia is low. Only 17% of the research articles and data are provided with open access (see Figure 6). Insufficient financing is mentioned to be the main reason for this low share since publishing through open access resources is for a fee, especially in the foreign open access journals that require significant fees for publication. Therefore, the main reason to publish in open access resources is the available financing within the framework of research projects.

Publishing in open access resources is also hampered by the absence of appropriate laws and regulations that would define what kind of research publications and data must be provided with open access and archiving in institutional open access repository. It should be noted that currently there exist only two institutional open access repositories in Latvia – UL E-resource Repository and the Academic Repository of National Library of Latvia – “Academia”, which does not allow posting publications and research data for all the research institutions. Consequently, the question to be assessed is establishment of the national repository for open access publications and data.

Scientists also lack the motivational factors and information about the possibility of publishing their work through open access resources. This could be solved by regular outreach activities for encouraging the awareness of publishing through open access resources, the usable technologies and tools. At the same time another thing to assess is the question on inclusion of open access publications and research data in the evaluation criteria of Latvian research institutions, for example by allocating science base funding and assessing applications of research projects. It is believed that research project evaluations need to transfer the focus from quantity of publishing or the productivity indicators to quotability and popularity rates of the works, which will also increase the argumentation for using open access resources.

In Latvia, an essential aspect of promoting open access resources is the impact factor of the chosen research journal, i.e. scientists are interested for their research paper to reach the widest possible audience of the relevant scientists. The influence and prestige of research journals and publishing houses are important factors for scientists when deciding with which to publish. It is therefore necessary to promote the influence and prestige in the science society.

Latvia has to move towards the principles set within “Horizon 2020” on policy of open access publications and research data, which state that in order to increase knowledge circulation and use, open access must be provided to research publications and data arising from research projects financed from public funds.

Measures:

- to ensure that the existing research programmes provide funding for publishing research articles and data through open access journals or repositories;
- to amend the relevant laws and regulations, by providing for defining what kind of research publications and data must be provided with open access and must be archived in the institutional open-access repository;
- to develop a concept for establishment of the national repository for open-access research publications and data in Latvia;
- to organize informative seminars for research institutions informing about the possibilities to publish their work through open-access resources, the usable technologies and tools.

Priority 6 - "International collaboration"

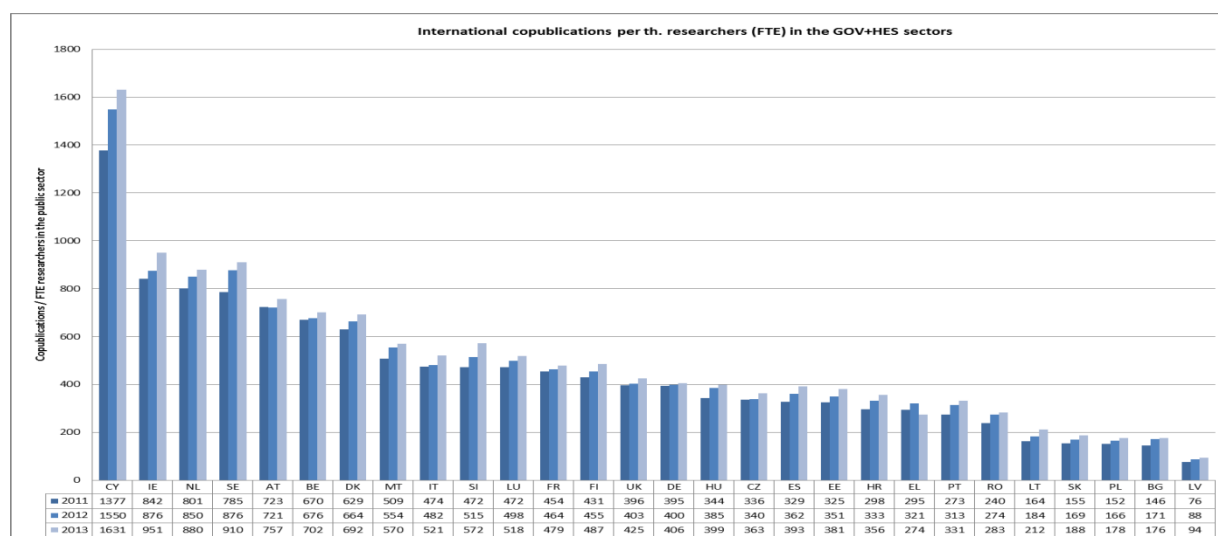
EC has estimated that more than 70% of the world's knowledge is generated outside Europe. International collaboration is the key to access the knowledge that is generated outside the borders of the ERA. In order to jointly address the grand social challenges, to facilitate access to new growing markets and increase the attractiveness of the ERA for talented researchers and investors all over the world, an effective international collaboration with third countries⁴³ is required at national, as well as European level. The main objective of the priority is to gain the maximum advantage of the best opportunities of research and innovation on a global scale. When creating bilateral and multilateral relations with the third countries, ERA needs a common and aligned international focus in order to take advantage of the Europe's leading position in research and innovation.

EC recommendations for the EU Member States:

- in order to promote stronger collaboration with third countries, the EU Member States need to engage in collaboration with partners from the third countries much more consistently, efficiently and sustainably by developing internationalization strategies of science;
- to ensure better use of the results of multilateral and inter-governmental projects and initiatives with the international dimension.

TOP ACTION PRIORITY - "DEVELOP AND IMPLEMENT APPROPRIATE JOINT STRATEGIC APPROACHES AND ACTIONS FOR INTERNATIONAL STI COOPERATION ON THE BASIS OF MEMBER STATES' NATIONAL PRIORITIES.

The main objective of this action task is to achieve that the EU Member States provide openness for research collaboration with the third countries, expanding collaboration and increasing the R&D budget for collaboration with the third countries. Latvian co-publications with foreign partners in the SCOPUS database during the period from 2010-2014 (total number and separately by regions) amounted to: in total - 2317, Africa - 51, Asia and Pacific region - 317, Europe - 2046, the Middle East - 169, North America - 371, South America - 73.



⁴³ The countries, that are not EU28 countries and the associated countries of ERA

Figure 7 ERAC monitoring indicator
Source: EC data

Performance of EU Member States on behalf of this action task is measured as international co-publications per 1000 researchers in the public sector (see Figure 7).

SITUATION IN LATVIA

In Latvia, science internationalization is included in the “Science, Technology Development and Innovation Guidelines 2014-2020”, which provide for supporting the internationalization of science and international collaboration. International cooperation in the sectors of science, technology and innovation is not only type of knowledge and experience accumulation and transfer, but also an important direction for the sector's development and provision of financial and other resources. International collaboration also promotes development of the “Latvian-raised” and globally linked science human capital.

At national level, collaboration in research with the third countries which are not EU Member State or countries associated with ERA, in Latvia is implemented with Belarus and Taiwan. In the beginning of 2016, a collaboration program with Ukraine in the fields of science and technology was launched.

Collaboration with Belarus contains joint research projects, scientist exchanges and expert exchange visits, joint seminars, conferences and exhibitions; consultations are held regarding development and implementation of a policy for science, technology and innovation related matters between the two countries. In 2014-2015, within the framework of the Latvia-Belarus collaboration program for science and technology, six projects were implemented with a total funding of 256 552 EUR.

Research collaboration between the Republic of Latvia and Taiwan was launched in 1997 by concluding a bilateral collaboration agreement between the Latvian Academy of Sciences and the National Science Council of Taiwan. This cooperation was extended by establishment of a tripartite Latvian-Lithuanian-Taiwan research cooperation aid fund in 2000. The fund was created by the National Science Council of the Republic of China, the Ministry of Education and Science and the Lithuanian Ministry of Education and Science. Creation of such collaboration fund was Taiwan's initiative. The Taiwan-Lithuania-Latvia agreement on the establishment of the Fund and initiation of the collaboration programme was signed in autumn, 2000, in Taipei. Currently 10 tripartite research collaboration projects of Latvia, Lithuania and Taiwan are in the implementation process in the total amount of 245,000 US dollars for the Latvian partners.

At the end of 2015, the preparation of the bilateral collaboration programme for 2016-2020 in the fields of science and technologies was approved and signed between the two countries. The program aims to promote and develop collaboration in the fields of science and technology between Latvia and Ukraine. The program is intended to support implementation of research projects with participation of the two parties, as well as exchange visits of scientists and experts. It is planned that the funding available for each project will be approximately 20 000 EUR for Latvian partners and the project implementation period will be two years.

Direction of national action - “Strengthening international bilateral and multilateral collaboration in research with countries outside the EU and ERA associated countries⁴⁴, in particular within the program “Horizon 2020” framework”

Performance of Latvia in international collaboration with the third countries is one of the lowest in the EU (see Figure 7). In such meaningful indicator as the number of international co-publications per 1000 researchers in the public sector, Latvia convincingly has the last place among all the EU member states.

Surveys show opinions that the research organizations actively use the available international research programs with Belarus, Ukraine and Taiwan. At the same time it is noted that funding available

⁴⁴ ERA associate countries are Switzerland, Norway, Iceland, Serbia, Montenegro, Turkey

for the existing bilateral collaboration programs is inadequate, which prevents the development of more extensive and profound collaboration.

Important factor is also the mobility of scientists to and from the third countries to facilitate the attraction of partners and preparation of projects with the third countries. Research institutions indicate that this type of aid, including scholarships for mobility of doctoral students and researchers to the third countries, is not currently available.

Looking at the potential strategic partners for international cooperation in R&D with the third countries, three indicators were analysed - number of co-publications with the third country, export of science-intensive goods or value-added goods to the third country and the size of investments in R&D of GDP (see Table 12). Cooperation with neighbouring countries of the former Soviet Union – Russia, Ukraine and Belarus, dominates in the two indicators – the number of co-publications, as well as the size of export of science-intensive products, however, there is a relatively smaller share of investments in R&D in these countries. From countries of other regions the most important collaboration for Latvia is with the larger nations - the US, Australia, Canada and Japan. In terms of the number of co-publications, these countries are not far behind their neighbouring states, however, in terms of export of science-intensive goods they are already lagging behind significantly, which can be explained by the great distance between these countries and Latvia. The advantage of the US, Australia, Canada and Japan is the much greater proportion of investments in R&D, which indicates high level of science and technological development, hence the level of research collaboration quality is expected to be significantly higher as well.

Table 12

Major indicators of cooperation with third countries

State	Number of co-publications with the third countries in 2010-2015	Export of science-intensive goods and added-values goods in 2010-2015 (million EUR)	Proportion of investments in R&D of GDP (%) ⁴⁵
Russia	427	1,794.8	1.11
US	407	295.7	2.81
Ukraine	145	224.1	0.76
Australia	109	20.4	2.20
Canada	105	28.7	1.73
Japan	102	9.3	3.38
China	81	72.4	2.01
Brazil	65	21.8	1.15
Belarus	63	361.4	0.67
South Korea	61	11	4.04

Data source: CSB, Eurostat and MES data

The existing finance instruments should be used to promote collaboration with the third countries, such as “Horizon 2020” projects, which provide support for collaboration with the third countries and associated countries of the EAR. Latvian scientists and entrepreneurs have gained notable results by participating in the project tender organized within the framework of the project “ERA.NET RUS Plus” (which focuses on promotion of collaboration between the EU scientists and Russian scientists). Latvian scientists have a great interest in the project tender announced within the framework of the project “ERA-LAC” (which aims at increased collaboration between the EU scientists and Latin American and Caribbean scientists). This indicates that the collaboration should be developed not only with the countries of the former Soviet Union, but also with countries of farther regions of the world, such as Latin America, South Korea, China and Japan, where the level of science and technological development are also high.

Measures:

- to continue the existing international bilateral collaboration programmes with Belarus and Ukraine, as well as the operation of trilateral cooperation Latvia-Lithuania-Taiwan fund;

⁴⁵ In the last year of available data

- to enter into new bilateral or multilateral collaboration programs with the third countries, which Latvia has a strategic interest to cooperate with;
- to provide support for researchers mobility to and from third countries;
- Within the new period of the European Economic Area Financial Mechanism and the Norwegian Financial Mechanism planed till 2021, to continue in the priority area “Innovation, Research, Education and Competitiveness” the bilateral collaboration started in the period of 2009-2014, within the sectors of higher education and research between Latvia and the donor countries, with the aim of expanding the collaboration networks of Latvian research organizations for successful participation in the “Horizon 2020” programmes and joint addressing of regional challenges.

Plan of Further Measures

The Plan of Further Measures summarizes the tasks to be performed in accordance with the ERA priorities, top action priorities and directions of national action. The responsible institutions and indicative funding source and amount are determined for expenditures to be taken.

No.	Task	Responsible institution/ Involved institutions	Monitoring indicator	Base value	Target value	Deadline	Indicative funding, source of funding
ERA priority 1 - "More effective national research systems"							
ERA Top Action Priority - "Strengthening the evaluation of research and innovation policies and seeking complementarities between, and rationalisation of, instruments at EU and national levels. "							
	ERAC indicator		The Indicator of Research Excellence developed by the Joint Research Center (constituent components - highly cited publications, PCT patents, the European Research Council grants and Marie Skłodowska-Curie actions)	15.9 (2010)	30	2020	n/a
Direction of national action - "Fully providing international evaluation for the projects of Latvian research programmes"							
1.	To use international peer reviews for evaluation of the research projects;	MES	Proportion of the internationally evaluated Latvian research programmes	57% (2015)	80%	2020	Within the existing budget
Direction of national action - "To allocate national science funding respectively for guidelines of research, technological development and innovation policy"							
2.	To provide allocation of the estimated science base funding of 100% in accordance with the regulatory requirements.	MES	Allocation proportion of science base funding of the necessary amount as	58% (2016)	100%	2020	Necessary additional funding ⁴⁶ : The required state funding within the state

⁴⁶ The additional financing required for 2017 and subsequent years is required through the New Policy Initiative

			set by laws and regulations.				budget program's 05.00.00 "Science" sub-program 02.05.00 "Science base funding" 2017 – 38 million EUR 2018 – 46 million EUR 2019 – 54 million EUR 2020 – 62 million EUR
3.	To provide additional funding for State Research Programs.	Research institutions, MES, ME	Allocated additional funding for State Research Programmes	5 691 487 EUR (2016)	9 691487 EUR	2020	Necessary additional funding ⁴⁷ : The required state funding within the state budget program's 05.00.00 "Science" sub-program 05.12.00 "State Research Programs" 2017 – 4 million EUR 2018 – 4 million EUR 2019 – 4 million EUR 2020 – 4 million EUR
4.	To provide additional funding for fundamental/applied research in accordance with the science policy guidelines.	Research institutions, MES, LCS	Number of the fundamental/applied research studies	98 (2015)	150	2020	Necessary additional funding ⁴⁸ : The required state funding within the state budget program's 05.00.00 "Science" sub-program 05.01.00 "Provision of Research Activity" 2017 – 4 million EUR 2018 – 4 million EUR 2019 – 4 million EUR

⁴⁷ The additional financing required for 2017 and subsequent years is required through the New Policy Initiative

⁴⁸ The additional financing required for 2017 and subsequent years is required through the New Policy Initiative



							2020 – 4 million EUR
ERA priority 2 (A) - “Jointly Addressing Grand Challenges”							
ERA Top Action Priority - “ Improving alignment within and across the Joint Programming Process and the resulting initiatives (e.g. Joint Programming Initiatives (JPIs)) and speeding up their implementation.”							
	ERAC indicator		National Research Budget (Government budget appropriations or outlays for R&D (GBARD)), that is assigned to European level, bilateral or multilateral R&D programs per each scientist, EUR PER YEAR	112 (2012)	1500	2020	n/a
Direction of national action - “Increasing Latvia’s involvement in Joint Programming Initiatives”							
5.	To engage in certain JPIs as a member state, aligning Latvian research programs with JPIs	MES, SEDA, MH, MA, MEPRDM MC, MW	Number of JPIs in which Latvia participates as a member	0 (2016)	3-5	2020	Sub-programme 70.06.00 “Participation In the EU Research And Technology Development Programmes” of the state budget programme 70.00.00 “Implementation of Projects And Measures of Other European Union Policy Instruments” The necessary state budget funding for 2017-2020 will be calculated upon deciding on the Latvia's participation in the JPI
6.	To evaluate to which of the JPIs Latvian scientists can provide their contribution, what will be the return and	MES, SEDA, MH, MA,	n/a	n/a	n/a	2016	Within the existing state budget

	which of the social challenges are most topical for the Latvian society and economy	MEPRDM MC, MW					
7.	To establish a working group with representation of line ministries and research institutions for coordination of Latvian participation in JPI	MES, SEDA	n/a	n/a	n/a	2016	Within the existing state budget
8.	To plan financial resources for participation in relevant JPIs, in order to organize and implement the respective research projects at the EU level with the involvement of Latvian specialists	MES, MH, MA, MEPRDM MC, MW	n/a	n/a	n/a	From 2017	The necessary state budget funding for 2017-2020 will be calculated upon deciding on the Latvia's participation in the JPI
9.	To organize informative seminars on JPI strategic areas	SEDA	n/a	n/a	n/a	permanently	Within the existing budget
ERA priority 2 (B) - "Making optimal use of investments in research infrastructures"							
ERA Top Action Priority - "Making optimal use of public investments in RIs by setting national priorities compatible with the ESFRI priorities and criteria, taking full account of long term sustainability."							
	ERAC indicator		Availability of national research infrastructure roadmaps with data on national research infrastructures and corresponding investment needs along with identified ESFRI projects and data on national investments	1 (2016)	Prepared and valid	permanently	n/a
Direction of national action - "To ensure the representation of Latvia and involvement of Latvian research institutions in the European Research Infrastructure Consortium according to the approved ESFRI roadmap"							
10.	To provide funding for maintenance of nationally important research infrastructure objects, including for research and technical maintenance of research collections for participation in the European Research Infrastructure Consortium of the ESFRI roadmap	MES	Number of the unique nationally important research infrastructure objects, which are provided with funding for maintenance of the	0 (2015)	20-25	permanently	Necessary additional funding ⁴⁹ : 2017 – 2.3 million EUR 2018 – 2.3 million EUR

⁴⁹ The additional financing required for 2017 and subsequent years is required through the New Policy Initiative

			research infrastructure objects				2019 – 2.3 million EUR
11.	To provide the representation of Latvia and involvement of Latvian research institutions in the European Research Infrastructure Consortium set within the ESFRI roadmap.	MES	Number of the ESFRI Roadmap Consortia and Platforms with Latvia's representation	1 (2016)	8	2018	Sub-programme 70.06.00 “Participation In the EU Research And Technology Development Programmes” of the state budget programme 70.00.00 “Implementation of Projects And Measures of Other European Union Policy Instruments” within the existing budget: 2016 - 266 231 EUR 2017 - 339 389 EUR 2018 - 339 868 EUR
ERA priority 3 - “Open labour market for researchers”							
ERA Top Action Priority - “Using open, transparent and merit based recruitment (OTM-R) practices with regard to research positions”							
	ERAC indicator		Researchers’ posts advertised through the EURAXESS job portal per 1,000 researchers in the public sector per year.	1 (2013)	30	2020	n/a
Direction of national action - “Enhancing open, transparent and merit-based practices with regard to recruitment for positions in the field of research”							
12.	To engage in and strengthen the operation of the EURAXESS Latvia Service Centre;	SEDA	n/a	n/a	n/a	permanently	Within the existing budget
13.	To assess the need to amend the regulatory framework by stipulating a requirement for research institutions to announce vacancies for permanent academic positions also in the EURAXESS Latvia portal, with the exception of the academic positions, whose remuneration is mainly provided from financing of projects for scientists and research groups that are acquired through a tender procedure;	MES	n/a	n/a	n/a	permanently	Within the existing budget

14.	To inform the Latvian research institutes, universities and private organizations, which are involved in the projects of “Horizon 2020” and which engage in research activities, on the requirements ⁵⁰ of Article 32 of the “Horizon 2020” Rules for Participation, that require for the institutions involved in “Horizon 2020” projects to comply with the EC recommendations (11th March, 2005) on the European Charter for Researchers and the Code of Conduct for the recruitment of researchers	SEDA	n/a	n/a	n/a	permanently	Within the existing budget
15.	for Latvian research institutions to involve in the process of Human Resources Strategy for Researchers (HRS4R)	MES/all research institutions	n/a	n/a	n/a	permanently	Within the existing budget
16.	To continue to actively inform the Latvian research institutions and organizations which undertake research activities, on the possibility to place their job offers in the EURAXESS Jobs Database or to look for employees through the EURAXESS job seekers database.	SEDA	n/a	n/a	n/a	permanently	Within the existing budget
ERA priority 4 - “Gender equality and gender mainstreaming in research”							
ERA Top Action Priority - “Translating national equality legislation into effective action to address gender imbalances in research institutions and decision making bodies and integrating the gender dimension better into R&D policies, programmes and projects.”							
ERAC indicators			The proportion of women with A ⁵¹ level degree in the higher education sector	34.4% (2013)	40%	2020	n/a
Direction of national action “To ensure equal opportunities for both sexes in organization structures and decision-making processes in the fields of higher education and science, and to raise the prestige of scientist’s profession in Latvia”							
17.	for research institutions, to integrate the gender equality aspect in their decision-making bodies, study programs, operational strategies, development and implementation of research projects	MES/all research institutions	n/a	n/a	n/a	permanently	Within the existing budget
18.	Assess the need to develop the principle of gender equality in laws and regulations	MES	n/a	n/a	n/a	2017	Within the existing budget

⁵⁰ http://ec.europa.eu/research/participants/data/ref/h2020/mga/gga/h2020-mga-gga-multi_en.pdf

⁵¹ The single highest grade/post at which research is normally conducted within the institutional or corporate system

19.	For research institutions, in their activity, to primarily highlight the issues of science popularization, to promote recognition of science, its social prestige, to promote the spreading of research knowledge and raise the prestige of scientist's profession in society	MES/all research institutions	n/a	n/a	n/a	permanently	Within the existing budget
ERA priority 5 - "Optimal circulation, access to and transfer of research knowledge"							
ERA Top Action Priority (A) - "Fully implement knowledge transfer policies at national level in order to maximise the dissemination, uptake and exploitation of scientific results. RPOs and RFOs should make knowledge transfer second nature by integrating it in their everyday work."							
	ERAC indicator		The share of innovative enterprises in cooperation with higher education institutions or national research institutions producing innovative products or implementing innovative technological processes	19% (2012)	30%	2020	n/a
Direction of national action - "Strengthening co-operation between the business and the research sector in order to implement joint projects aimed at the commercialization of research results"							
20.	For research institutions, to observe the EC Recommendations of April 10, 2008, "On the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations"	MES/all research institutions	n/a	n/a	n/a	permanently	Within the existing budget
21.	For research institutions, to develop and implement technology and knowledge transfer strategies	MES/all research institutions	Number of research institutions that implement technology and knowledge transfer strategies	6 (2015)	20	2020	Within the existing budget
22.	For research institutions, to train employees or set up a structural unit dealing with knowledge and technology transfer issues	All research institutions	Number of research institutions, which have trained their staff or set up a structural unit to deal with knowledge and technology transfer issues	7 (2015)	20	2020	Within the existing budget

23.	For research institutions, to get involved in the Competence Centre Programmes, Technology Transfer Programmes, Innovation Voucher Programmes and Cluster Programmes;	Research institutions, ME	Number of research institutions, which have engaged in the Competence Centre Programmes, Technology Transfer Programmes, Innovation Voucher Programmes, Cluster Programmes and in introduction of new products in production for implementation of the programme	0 (2015)	20	2020	Within the existing budget
24.	To implement the EU Structural Funds activity - 1.2.1.1. "Support For Development of New Products And Technologies Within Competence Centres"	ME	The number of businesses which receive support to launch new products in the market	0 (in 2015, as the EU fund measure will be launched in 2016)	67	2020	ERDF funding
25.	To implement the EU Structural Funds activity - 1.2.1.2. "Support for Improvement of Technology Transfer System"	ME	Number of supported projects for commercializing research results	0 (in 2015, as the EU fund measure will be launched in 2016)	58	2020	ERDF funding
26.	To implement the EU Structural Funds activity - 1.2.1.4 "Support for Introduction of New Products In Production"	ME	The number of businesses which receive support (grants) to launch new products in the market	0 (in 2015, as the EU fund measure will be launched in 2016)	23	2020	ERDF funding
ERA Top Action Priority (B) - "Promoting Open Access to scientific publications "							

	ERAC indicator		Proportion of open-access research papers and data in the country	17% (2008-2013)	40%	2020	n/a
Direction of national action - To provide appropriate infrastructure and regulatory conditions that would facilitate increasing proportion of open access research publications and data							
28.	To ensure that the existing research programmes provide funding for publishing research articles and data through open access journals or repositories	MES, LCS	Number of research programs, which provide funding for publishing research articles and data through open access journals or repositories	0 (2015)	10	2020	Within the existing budget
29.	To amend the relevant laws and regulations, by providing for defining what kind of research publications and data must be provided with open access and must be archived in the institutional open-access repository	MES	n/a	n/a	n/a	2017	Within the existing budget
30.	To develop a concept for establishment of the national repository for open-access research publications and data in Latvia	MES, SEDA	n/a	n/a	n/a	2017	Within the existing budget
31.	To organize informative seminars for research institutions informing about the possibilities to publish their work through open-access resources, the usable technologies and tools.	SEDA	n/a	n/a	n/a	permanently	Within the existing budget
ERA priority 6 - "International collaboration"							
ERA Top Action Priority - "Develop and implement appropriate joint strategic approaches and actions for international STI cooperation on the basis of Member States' national priorities."							
	ERAC indicators		International co-publications per 1000 researchers in the public sector	94 (2013)	250	2020	n/a
Direction of national action - "Strengthening international bilateral and multilateral collaboration in research with countries outside the EU and ERA countries, in particular within the program "Horizon 2020" framework"							
32.	Continue the existing international bilateral collaboration programmes with Belarus and Ukraine, as well as the operation of trilateral cooperation Latvia-Lithuania-Taiwan fund	MES, SEDA	n/a	n/a	n/a	permanently	Within the existing budget

33.	Enter into new bilateral or multilateral collaboration programs with the third countries, which Latvia has a strategic interest to cooperate with	MES	n/a	n/a	n/a	permanently	Necessary additional funding: State budget programmes under 05.00.00 "Science" sub-programme Calculated indicative state budget funding of 05.01.00 "Provision of Research Activity" 2018 - 400 000 EUR 2019 - 400 000 EUR 2020 - 400 000 EUR
34.	To provide support for researchers mobility to and from third countries	MES, SEDA	n/a	n/a	n/a	permanently	Within the existing budget
35.	Within the new period of the European Economic Area Financial Mechanism and the Norwegian Financial Mechanism planed till 2021, to continue in the priority area "Innovation, Research, Education and Competitiveness" the bilateral collaboration started in the period of 2009-2014, within the sectors of higher education and research between Latvia and the donor countries, with the aim of expanding the collaboration networks of Latvian research organizations for successful participation in the "Horizon 2020" programmes and joint addressing of regional challenges	MES, SEDA	n/a	n/a	n/a	permanently	Indicative necessary additional funding for the new programming period from 2015 to 2021 5 million EUR