



MINISTERUL EDUCAȚIEI NAȚIONALE
ȘI CERCETĂRII ȘTIINȚIFICE

Romanian ERA Roadmap

May 2016, Bucharest

Note

The Romanian ERA Roadmap proposes objectives and measures in line with the National Strategy for RD&I (2014-2020) and its main implementing instruments, as a contribution to the development of the European Research Area. This is a follow-up of the adoption of the European Research Area Roadmap (2015 -2020) by the Competitiveness Council in May 2015, which identifies top actions on the ERA priorities to be addressed to the national level. This document has been prepared as an input of Romania to the preparation of the ministerial lunch of Competitiveness Council on 27 May 2016.

Introduction

The creation of the European Research Area (ERA) is a joint objective endorsed at the highest political level by the European Council and strengthened by the European Commission Communication of July 2012 *"A reinforced European Research Area Partnership for Excellence and Growth"*. There are six individual fields of action identified for ERA, so-called "ERA Priorities":

- More effective national research systems
- Optimal transnational cooperation and competition
- An open labour market for researchers
- Gender equality and gender mainstreaming in research
- Optimal circulation, access to and transfer of scientific knowledge
- Strengthening of the international dimension of the ERA

In May 2015, the Competitiveness Council endorsed the document ERAC 1208/15 "ERA Roadmap" which acknowledges the "ERA partnership" between European countries, the European Commission and stakeholder organisations for tackling provisions of the document, both at the national and the European level. The European ERA Roadmap identifies a number of eight key implementation priorities covering research and innovation with the biggest impact on Europe's science, research and innovation systems.

In this context, the purpose of the National ERA Roadmaps is to identify a limited number of key measures, namely "Top action priorities" (TAPs), which are expected to have the biggest impact on the national research and innovation system in view of its contribution to the implementation of the European Research Area.

The Romanian roadmap, presented in the next pages, has been drawn up taking into account those characteristics of the national, development and innovation (RD&I) system. The focus is on a limited number of priority actions which have the most relevant impact on the national RD&I system and provide particular benefits to many stakeholders.

The Romanian ERA Roadmap covers 2016-2020, overlapping with the National Plan for Research, Development and Innovation (2015-2020), which is the main tool for the implementation of the National Strategy of Research, Development and Innovation (2014-2020). The essence of the national strategy vision for RD&I is to increase the competitiveness based on building an innovation system fed by research and development and linked to the global value chains.

The national objectives proposed in the document are accompanied by relevant indicators to facilitate monitoring of its implementation, seen as a contribution to the future ERA Progress Reports and the European Monitoring Mechanism.

Priority 1: More effective national research systems

Context

The effectiveness of Romania's research, development and innovation (RD&I) system is key to the country's economic growth, which appears to be caught in a middle-income trap. Ensuring such effectiveness implies a concerted effort to set in place an appropriate framework for the structuring of the research and innovation system, including organizational and individual incentives; opportunities for collaboration between research-providing organizations (RPOs) and industry; quality assurance mechanisms in both research institutes and higher education; adequate public funding streams for institutions as well as individual researchers and innovators, and so on.

Despite some qualified successes starting around a decade ago, many of the conditions above still have to be met. One area of clear improvement has been the introduction of international peer review in competitive, project-based national funding schemes. On the other hand, the share of such competitive funding schemes in all national financing for RD&I has been declining recently. Also the share is not sufficiently high to increase the currently lagging competitiveness of Romanian researchers and research organizations.

Furthermore, while the institutional evaluation system in higher education has become more transparent through the national quality assurance mechanism in place since 2006, it is still generally considered insufficiently effective. Conversely, the evaluation of national institutes for research and development has proven unable to adequately distinguish among classes of organizations as far as their overall quality is concerned.

With an eye to increasing the effectiveness of its RD&I ecosystem, Romania adopted the National Strategy for Research, Development, and Innovation 2014-2020 in October 2014, setting up specific objectives to pursue, such as:

- Improving the performance of the national RD&I system by strengthening its material, functional and human capacity;
- Fostering RD&I activities in the private sector in order to increase the Romanian overall economic competitiveness;
- Strengthening the European side of RD&I policies and programmes.

In this respect, the strategic document sets out a policy mix covering a broad range of activities, including improved coordination of investments in smart specialization fields and in research infrastructures (RIs).

Romania must also fulfill a specific ex-ante conditionality as far as the relation between its RD&I and its economic competitiveness strategies is concerned. Namely, it must design and implement a so-called strategic orientation mechanism. The latter should have an entrepreneurial discovery component; it should also be aimed at the better integration of the research and innovation system in the national economy. The strategic mechanism should be directly linked to the process of monitoring and assessment of the implementation of the National Strategy for RD&I 2014-2020.

Objectives

To increase the effectiveness of the national research system by:

- a) Increase the research and development (R&D) expenditures

Indicator: 1% of GDP for public R&D expenditure and 1% of GDP for private R&D expenditure, by 2020.

- b) Improve the efficiency of R&D expenditure by prioritization and competition by:

Improving the governance of the national research system

Indicator: operational mechanism for decision and monitoring

Increasing the share of project based funding

Indicator: the share of project based funding in total public R&D funding (target 50%)

Increasing the competitive institutional funding

Indicator: the share of competitive institutional funding in total institutional funding (target 70%)

- c) Increase the private R&D expenditure

Promoting regulations on fiscal incentives

Indicator: number of initiatives or adopted documents

- d) Enhancing Romanian participation in European research programmes and initiatives

Indicator: number of Romanian participations to European research programmes and initiatives

Measures

Increasing the share of competitive public research funding

Competitive funding should be ensured by:

- The programmes coordinated by the National Authority for Scientific Research and Innovation - NASRI (namely, the National Plan for RD&I 2015-2020 and the Competitiveness Operational Programme 2014-2020 – Priority Axis 1);
- The sectoral programmes coordinated by other ministries (Health, Agriculture, Internal Affairs, Information society and communication etc).

The planned budget for the period 2015-2020 provides for an increase of the allocation for competitive funding in order to reach again the percentage of 70%.

The Ministry of National Education and Research undertakes to increase the share of competitive public funding schemes for RD&I. This will be achieved by:

- Phasing out some of the current institutional funding schemes and replacing them with competitive schemes within the two main programmes coordinated by NASRI;
- Increasing the transparency and improving the standards of institutional evaluation procedures and strongly correlating institutional funding with the results of evaluations. Thus institutional funding will be ensured by the new dedicated scheme, based on the previously mentioned correlation.

Developing the national registries for researchers, experts, research results, and research infrastructures; and the Charter of Transparency in Research

As discussed previously, Romania needs to design and put in place a strategic orientation mechanism for its research and innovation ecosystem. This mechanism is directly linked to the efforts to implement the national smart specialization strategy. It will enable better data collection and analysis and will contribute to improved, evidence-based decision-making.

A part of this mechanism consists in the implementation of four 'registries', specifically for researchers, research and innovation experts, research results, and research infrastructures. The registries will consist of independent online platforms, each of which will be supported by interoperable online databases covering multiple dimensions of the RD&I ecosystem. The registry system will be based on a very similar rationale to the Eurocris model (www.eurocris.org); it will represent, in fact, an integrated platform also serving as a dashboard for decision-makers.

The Registry of Researchers will provide information on individuals in the Romanian R&D system. The underlying data will comprise personal information, including information on R&I specializations, organizational affiliations, training, projects and publications and so on. The social platform www.brainromania.ro represents the core of this registry.

The Registry of Research Outputs will serve in the monitoring of the output of research and innovation activities, the assessment of the quality and of the international dimension of research results, and will contribute to quality assurance processes. This registry will also enable decision-makers to better monitor the relationship between funding schemes, organizational beneficiaries, and research results.

The Registry of Research Experts will be a database of individuals based in Romania and elsewhere who are willing and able to participate in research activities, programmes, and projects, among others as reviewers and evaluators. It will serve in the planning of RD&I programmes and other activities.

ERRIS, the national booking service for Romanian research infrastructures (RIs) was launched in the summer of 2015 (see www.erris.gov.ro). It is currently home to more than 300 RIs (4000 pieces of equipment) and has been growing consistently up to this point. The platform is currently designed primarily as a service for research-providing organizations, but it will be expanded so as to provide information for policy-makers in the field of RD&I. Among others, such data will serve in decisions as to the design of research infrastructures roadmaps, funding decisions (for example, by identifying redundancies in infrastructures), or participation in European Research Infrastructures (ERICs).

An additional instrument aimed at increasing the transparency of Romania's research and innovation system is the Charter of Transparency in Research. The Charter defines the obligations of research-providing organizations as far as data provision for the aforementioned registries is concerned (see the Priority 3).

Supporting Romanian participation under various European funding instruments and initiatives

Romania focuses on increasing the participation, by 2020, in the European framework programme, Horizon 2020, as well as in European research initiatives such as EUREKA and COST and also in Joint Programming Initiatives.

The National Plan for RD&I 2015-2020 includes a specific program dedicated to European and international cooperation, which aims to stimulate participation in programs and projects at European level by:

- different incentive actions for Romanian participants in Horizon 2020;
- supporting Romanian participants in ERA NETs and ERA NET Cofund actions in Horizon 2020;
- supporting Romanian participation in JPIs etc;
- supporting Romanian participation in transnational European research initiatives (COST, EUREKA, EUROSTARS, Art. 185 TFEU etc).

Under the National Plan of RD&I 2015-2020 a particularly support is given to Romanian R&D organizations of strategic interest at European level for participation in pan-European research infrastructure (e.g. ELI-NP, FAIR and ITER), participation in CERN and ESA and also for development of the Danubius RI project included on the new ESFRI roadmap launched in March 2016.

Supporting synergies of European funding sources (ESF, Horizon 2020 etc)

To implement this measure a new action is intended to be launched in 2016 under the Competitiveness Operational Programme – Axis 1, namely: Action A113 – „Creating synergies with Horizon 2020 and other international R&D programmes”. Support will be provided to: setting up centers of excellence, twinning, teaming and ERA Chairs; complementary activities in JTI projects; consolidate participation in ERICs and ESFRI projects; RD&I activities of SMEs in high-quality projects awarded with “Seal of Excellence” under Horizon 2020 competitions.

Priority 2 a. Jointly addressing grand challenges with a focus on alignment within and across the Joint Programming Process and the Joint Programming initiatives

Context

The Competitiveness Operational Programme and the National Plan for RD&I are the two main instruments implementing the National Strategy for Research, Development and Innovation 2014-2020 addressing societal challenges from research prospective. The Strategy was specifically designed as a national-level smart specialization (S2) strategy for research and innovation (RIS3). The two programmes offer a flexible framework through a diversity of instruments for setting up valuable Joint Programming Processes. To address the perceived inability of the scientific community to collaborate successfully in tackling current societal challenges in the frame of H2020, Romania invested substantially in different joint programming processes, under the various scheme of public – public partnerships (Art. 185 TFEU, ERA NET COFUND etc.) but without having a consolidated approach.

Romanian participation in Joint Programming Initiatives has been built around of the National Plan for RD&I (2007-2013), which was regarded as the main instrument for funding research in area of societal challenges in Romania. Some of the barriers for a smooth transnational cooperation were related to the lack of a specific national research programme focused on international cooperation together with the lack of predictability of the budget allocation. In this context, the current National Plan for RD&I (2015-2020), sets up dedicated sub-programmes to support the joint programming process focused on creation of funding schemes under which different research activities were aligned.

The recent Final Report of the Expert Group on “Evaluation of Joint Programming to Address Grand Societal Challenges” (EC, 2016) ¹ shows that Romania is together with Cyprus, Finland, Israel, Poland, Portugal and Turkey in the so-called selective players group – a group defined with high investment in JPIs compared with their size and national public expenditure on RD, but still less than what was expected when JPIs were created. Romania is involved in 9 out of 10 JPIs related activities.

¹ <https://www.era-learn.eu/publications/ec-publications/evaluation-of-joint-programming-to-address-grand-societal-challenges-final-report-of-the-expert-group>

Objective

To increase the Romanian participation and effectiveness in the joint programming processes and Joint Programming Initiatives

Indicator: share of budget allocated to JPI joint activities in total public R&D funding;

Indicator: share of budget allocated to joint programming processes with exception of JPIs (ERA NET, art 185) in total public R&D funding.

Measures

Elaboration and implementation of an Action Plan for a coordinated participation in joint programming process and JPIs

In this regard, some actions should be addressed:

- Strengthening the scientific expertise in JPI domains of interest for Romania;
- Strengthening governance of active participation in the implementation of strategic research and innovation agendas;
- Development of a robust national structure for appropriate JPIs national coordination. National Mirror Groups for each JPI could increase Romania's visibility, create a pool of top level experts to be promoted in various JPI activities, and increase the active involvement of stakeholders;
- Allocation of funding to support active participation in JPIs;
- A dedicated sub-programme of the current National Plan for RD&I to support the projects selected to be funded and to follow joint calls under JPIs, and is expected to run starting from 2017.

Alignment of Romanian research programmes with joint strategies built together at European level

Launching the dedicated subprogramme under the National Research, Development and Innovation Plan for 2015-2020 to support Romanian participation to Joint Programming Initiatives (JPI) as well as dedicated programmes to support other public- public partnerships focused on transnational activities aiming to:

- Integration of Romanian research in the European Research Area in the fields covered by the Joint Programming Initiatives (JPI) and specific joint programming processes;
- Participation of Romanian research organizations to identification of joint solutions and actions to address societal challenges with relevant impact on European communities.

Priority 2b. Optimal use of public investments in research infrastructures

Context

In the last decade Romania has invested significant amounts in building up or upgrading research infrastructures (RIs), as one of the main tool used to increase research performance as well as strengthen participation in EU R&D programs. In this respect, both the National Plan for R&D (2007-2013) and EU Structural Funds (2007-2013) had particular lines of funding for RIs.

At European level, Romania has increased its role in pan-European infrastructures, by participating in several consortia dedicated to setting up world-class RIs in different scientific areas.

Specific attention was paid to RIs included in the previous ESFRI Roadmaps² (e.g. FAIR, EPOS, EMSO, LIFEWATCH, ELI etc). In particular, Romania is hosting one of the three ELI pillars, namely the ELI-Nuclear Physics (ELI-NP). Its construction is jointly funded by the Romanian Government and the European Commission through Structural Funds (Sectoral Operational Program – Increase Economic Competitiveness 2007-2013 and the Competitiveness Operational Program 2014-2020). The construction of ELI-NP is well on track and it is expected to be fully operational in the next few years.

In the last period, Romania has continued to be an important player in European RI landscape. In the recent update of the ESFRI Roadmap that was publicly presented in Amsterdam on 10 March 2016, Romania is mentioned as the coordinator of the “active project” entitled “International Centre for Advanced Studies on River-Sea Systems” (DANUBIUS-RI). Several European countries are prospective members of DANUBIUS-RI, while the number of participants is even larger. It has to be mentioned that DANUBIUS-RI is not a singular Romanian participation to the new entries of the ESFRI Roadmap 2016, where Romania is playing an important role (e.g. ACTRIS -Aerosols, Clouds and Trace Gases Research Infrastructures).

Furthermore, Romania is participating in other more projects labeled as “emerging projects”. (e.g. METROFOOD, in food & health area). This type of initiative is closely followed by the national authorities and supported in order to strengthen their maturity and become “active projects”.

In parallel, the existing RIs are encouraged to actively participate in pan-European RIs (e.g. EU OPENSOURCE and MIRRI).

² see http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=home

Objectives

- a) Focus public investment in national R&D infrastructures with high rates of use
Indicator: national roadmap for RIs
Indicator: budget allocated to Romanian participants to pan-European research infrastructures
Indicator: number of R&D infrastructures with quasi-continuous activity
- b) Active participation in ESFRI research infrastructures
Indicator: number of Romanian participations to ESFRI work groups

Measures

Update of Romanian roadmap on research infrastructures

Romania is actively participating in the construction of several research infrastructures, at both national and international level. Funds from the national budget and structural funds are used to build up research facilities ("green field" and / or "upgrade"). Romania also participates to the construction of pan-European research infrastructures (e.g. ELI, FAIR) while a new project – DANUBIUS-RI – was included in the ESFRI Roadmap in its most recent edition (2016). Therefore, the Romanian roadmap for research infrastructures (issued in 2008) should be updated.

Support Romanian participants to pan-European research infrastructures listed in ESFRI 2016 roadmap

European integration of research system means, among others, linking Romanian research infrastructures to pan-European ones, sharing resources and obtaining the benefits of works and results generated by the scientific community within a well-regulated framework. The Romanian Government will pay special attention to the "active projects" category in ESFRI 2016, as well as to "emerging projects" that are to be funded via the INFRADEV call launched within H2020. Furthermore, attention will be paid to future projects with Romanian participation that will fit the (updated) roadmap and national research strategy recently adopted.

Further development of the open platform for RI services (ERRIS)

Over the past decade, Romania has substantially improved the state of its research infrastructures, mostly funded through competitive financing schemes including the dedicated RD&I streams of European structural funds. As previously mentioned, this has raised important issues, such as improving access to RIs, the rate of usage and ensuring the sustainability of these resources. Funding should continue to be provided under similar streams by 2020. The recently opened portal for RI services, ERRIS (www.erris.gov.ro) will be employed to expand the service-oriented approach with researcher-attracting information.

Active participation to ESFRI

Romania will continue to actively participate to ESFRI processes and to engage in strategic/thematic working groups that are defined in ESFRI. So far, we are involved in the “Environment”, “Physics & Engineering” and “Implementation” Working Groups and it is envisaged to increase our visibility by appointing representatives in the other. Our representatives should be also involved in monitoring of the existing pan-European research infrastructures already listed in the ESFRI roadmap.

Priority 3: An open labor market for researchers

Context

An open labor market providing researchers with the conditions and incentives for an attractive career and with the right advancement opportunities, including the ability to move professionally across Europe, has been highlighted by the European Commission (EC) as an essential ingredient of the European Research Area. The open labor market is expected to foster collaboration across the continent's research and innovation landscape and to increase competitiveness within the country as well as outside.

In order to improve mobility, security and working conditions across the ERA, the European Commission adopted the European Charter for Researchers and the associated Code of Conduct for Recruitment of Researchers. The Charter aims to equalize the rights and roles of the relevant categories of employees, as well as of employers, across the European Research Area, while the Code address specifically the issue of transparency and fairness in recruitment.³ More generally, through these normative instruments the EC enjoins member states to better harmonize their hiring practices, among others by intensifying their determination to eliminate administrative obstacles to geographical and inter-sectoral mobility for researchers.

In Romania, the competitiveness of researchers and of research-performing organizations (RPOs) is affected negatively by the recruitment system in academia and beyond. Currently, there is no promotion system *per se* in the academic system, an arrangement which has been considered detrimental to the openness and effectiveness of RPOs. To move up the professional ladder, researchers and academics must go through the public, open, and competitive – recruitment procedures. The challenge is currently to open the system to the most talented newly minted PhDs and young researchers and to attract the most productive established researchers into the system and temper the brain drain, while also offering fair promotion terms to all researchers in the system.

The expansion of doctoral programmes in Romania over the past decade has made these concerns more visible and acute. With support from structural funds, close to 7,000 doctoral students were trained during this period, in addition to the PhDs enrolled under the traditional terms. This has happened against the background of efforts to better structure the system of doctoral schools in universities and in the institutes of the Romanian Academy. At the same time, the output of doctors has put new pressures on the recruitment system throughout of the public RD&I system.

³ See the European Commission Recommendation on the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers, 11 March 2005.

Recent changes in project-funding schemes (e.g. the condition of hiring postdoctoral and doctoral researchers) are certainly an improvement in this respect. However, these are not sufficient to fully resolve the concerns. As a result, many newly trained scientists have continued to leave the country for other more competitive national systems in Europe. Conversely, the Romanian research and development labor market has been unable to attract a significant number of foreign scientists, be they young or established.

As a result, the challenge of modernizing the doctoral training system remains and its sufficient room to improve the competitiveness of the Romanian RD&I system. To these ends, the National Strategy for RD&I 2014-2020 sets forth the application of the principles of Innovative Doctoral Training, as well as the introduction of industrial doctorates. At this point, however, implementation norms are required in both respects.

Objectives

Raise the attractiveness and competitiveness of the Romanian RD&I system by:

- a) Increasing the transparency and openness of the recruitment and promotion system
Indicator: number of PROs adopting the *European Charter for Researchers and the Code of Conduct*
Indicator: number of jobs/year published in Euraxess
Indicator: share of job recruitments in the public sector with minimum 2 candidates
- b) Improving the quality and increasing the flexibility of doctoral programmes.
Indicator: share of interdisciplinary doctoral studies
Indicator: number of students in industrial doctorate

Measures

Promoting the European Charter for Researchers and the Code of Conduct

In keeping with the aforementioned EC Recommendation, Romania needs to focus its efforts to improve the transparency and openness of its recruitment and career-development system. This can be achieved, inter alia, by bringing the latter in line with internationally accepted hiring and promotion standards. To this end, the Ministry of Education and Research / the National Authority for Scientific Research and Innovation will endeavor to promote the European Charter and the Code of Conduct among research-performing organizations and individual researchers alike.

Among others, these instruments will be formally employed in the establishment of funding principles for the competitive national financing schemes, as well as in the monitoring, evaluation and auditing of the relevant public organizations.

Mandatory publication of openings in Euraxess

Currently, the decision of research-performing organizations to publicize job openings on the Euraxess Romania portal (www.euraxess.gov.ro) is optional. One exception in this respect is constituted by certain nationally-funded competitive projects, for which Euraxess publication of (short-term) positions is mandatory. Available data shows that around half of all openings advertised on the portal are accounted for by a mere 10 organizations (out of a total of around 150 public RPOs), which most likely are those that also get the largest share of the relevant competitive projects. The publicizing terms now in place – which mandate publicity on organizational websites and a major national press venue – render it difficult for prospective applicants to adequately monitor the job market.

Mandatory advertising of openings for all public research-performing organizations on Euraxess would substantially increase the transparency of the hiring process. It would also facilitate the job-seeking efforts of individual researchers. Furthermore, it would provide both policy-makers and the interested public with a convenient tool whereby to monitor the hiring practices in public RPOs. On the medium and long term, the measure may promote changes in organizational practices in the relevant respects. It will also contribute to attracting more international researchers in Romania, thus increasing the international mobility of European researchers in general.

Attracting young foreign researchers

Romanian R&D has substantially improved the state of its available research infrastructures (RIs) over the past decade, mostly benefiting from funding through the national competitive project financing schemes as well as through the dedicated RD&I streams of European structural funds. As discussed previously in this document, this has raised important issues, such as improving access to RIs and the rate of usage, or ensuring the sustainability of these resources. Funding will continue to be provided under similar streams through 2020.

However, the updated infrastructures also provide an important opportunity: they can be leveraged to attract young foreign researchers to carry out R&D activities in the country. A programme to bring in young researchers is expected to increase the international visibility of the RIs themselves, as well as that of their host organizations. Furthermore, it will likely enhance inter-organizational and individual collaboration and potentially increase the sustainability of available or projected infrastructures. To this end, the National Authority for Scientific Research and Innovation shall endeavor to use, among others, the legal framework for European Research Infrastructure Consortia (ERIC) in order to enhance young foreign researchers' access to RIs in Romania. The recently opened portal for RI services, ERRIS (www.erris.gov.ro) will be employed to expand the service-oriented approach with researcher-attracting information.

Increasing the flexibility of doctoral programmes

Despite recent changes in the organization and structure of doctoral programmes, the latter remain exceedingly compartmentalized and lacking in interdisciplinary outlook. For example, in universities many doctoral schools are organized at the level of individual faculties, rather than under the frame of trans-disciplinary schools; communication across subjects remains restricted. With some notable exceptions, the doctoral experience includes very limited interaction with the business sector or with public agencies and the government. Having introduced smart specializations among the principles organizing the public RD&I system, the National Strategy of RD&I 2014-2020 also sets out the application of the Principles of Innovative Doctoral Training (IDT), as well as the introduction of industrial doctorates.

Both of these measures need clarifications of the role of the Ministry of National Education and Research in relation to the organizations currently entitled to operate doctoral schools. Subsequent to these clarifications, the ministry undertakes to explore, in partnership with the relevant organizations providing PhD training, the opportunity of changing the framework for doctoral studies. The latter will be carried out with an eye to objectives such as: the organization of inter-disciplinary schools and the specific provision of inter-disciplinary grants; the introduction of industrial doctorates, including collaborations with public agencies where relevant and the participation of external non-academic advisers; increasing the share of joint and co-tutelle degrees; and providing training and other specific opportunities for doctoral advisers.

Priority 4 - Gender Equality and Gender Mainstreaming In Research

Context

According to the She Figures 2015 report, Romania scores well above the EU average in terms of the share of women in research. This promising result is despite Romania not mentioned among the 17 states which the European Commission identified as having developed gender equality strategies in public research.⁴ A possibly reason for this situation is the communist-era legacy of promoting gender-parity in research, which also could explain partially a very modest institutional culture of gender mainstreaming in the country. According to the ERA survey 2014, slightly below 20% of surveyed Romanian organisations had developed Gender Equality Plans, and just fewer than 40% implemented recruitment and promotion policies for female researchers.

Recent findings are showing that the country has achieved gender parity in most fields of science, among which natural sciences (46.8% female researchers), agricultural sciences (51%) and social sciences and humanities (49.8%). A scientific field with a higher share of women researchers is also the health sciences (59.1%). However, gender parity with a relative high share remains to be attained in engineering and technology (39%), but even in this field Romania is doing better than most countries in Central and Eastern Europe, not to mention Western Europe. The same findings are valid concerning the share of women among researchers in the business sector, where the country has a 10 to 20 point advantage relative to most Western European lands (37.8%), according to UNESCO 2015 data.

Similar findings are available once one takes into consideration access to the top of the hierarchy in R&D organisations. Romania has been significantly better than the EU average in terms of the share of PROs headed by women and the share of gender-balanced research evaluation panels in funders.⁵ Likewise, according to the Glass Ceiling Index compiled by Deloitte, which “measures the relative chance for women, as compared with men, of reaching a top-level position” in research, in 2010 Romania was the most ‘gender-equal’ country in the EU28 and showed improvements compared to 2004. It clearly dominated the field in terms of women with a ‘Grade A’ position among academic staff (35.6%) (Deloitte, Researchers’ Report 2014, 34-5). However, according to the She Figures 2015 report, in spite of a positive trend in the evolution of proportion of women heads of institutions from 9% in 2011 to 11% in 2014, the percentage is still low compared to other European countries and there is enough room for improvement in this respect. As a result, **this progress needs to be carefully monitored in the coming years and specific measures should be promoted in case the current positive trend is reversed.**

⁴ EC, *ERA Facts and Figures 2014*, p. 29.

⁵ EC, *ERA Facts and Figures 2014*, pp. 30-1.

Priority 5 - Optimal Circulation and Transfer of Scientific Knowledge

Top Action Priorities in the European Research Area Roadmap 2015 - 2020:

- a) Fully implementing knowledge transfer policies at national level in order to maximize the dissemination, uptake and exploitation of scientific results.
 - b) Promoting open access to scientific publications and optimal reuse of research data.
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- a) Fully implementing knowledge transfer policies at national level in order to maximize the dissemination, uptake and exploitation of scientific results**

Context

While Romania is considered as having relatively good research and development capacities in many fields, it is seen also as insufficiently successful in commercializing research results through goods and services. In particular, licensing and creating spin-off companies are often considered as major opportunities to capitalize on research findings and to strengthen the economic base in Romania, but opportunities are not sufficiently used to improve knowledge transfer.

Almost all R&D in the public sector is conducted either by research institutes or by universities. Although a significant share of the R&D performed by public research organizations in Romania is basic research with few short-term commercial applications, a substantial (although unknown) share of public research has immediate or potential commercial value. This includes research of value to a wide range of commercial applications, including aerospace, health applications, computerization, ITC, energy, and new materials.

The National Strategy for RD&I (2015-2020) encourages the development of an innovation ecosystem through public – public and public – private partnerships to increase the transfer of knowledge. These partnerships would stimulate innovative entrepreneurship and a more active involvement of firms in research and innovation activities. This is a measure to strengthen links between R&D institutes, universities and innovative firms to a better exploitation of R&D results and to increase competitiveness at enterprise level.

Furthermore, in the National Strategy for RD&I (2015-2020), the management of Intellectual Property is seen as a main direction to develop the innovation ecosystem at the national level, together with devising new financial tools for access to finance of investors in research and innovation. Developing the Intellectual Property (IP) management capacity can be done by increasing the number of experts in technological transfer and commercialization of research results.

Moreover, in the context of promoting the smart specialization activities and by the development of the mechanism for strategic orientation of RIS3, a priority is to set-up a fully operational inter-ministerial committee for competitiveness.

Therefore, an efficient, functional and sustainable ecosystem for transfer of knowledge should be supported.

Objectives

In line with the ERA's measures set for Priority 5, Romania will

- a) Ensure coordination of innovation and entrepreneurship policies
Indicator: operational committee for competitiveness
- b) Promote networking, knowledge and technology transfer between science and industry at both national and international level
Indicator: National Registry of Researchers
Indicator: National Registry of Research infrastructure
Indicator: National Registry of Results of Public Research

Measures

Coordination of innovation and entrepreneurship policies

The National Committee for Competitiveness will support the monitoring and implementation of the National Strategy for Competitiveness 2015-2020 which has *inter alia* a key role in strengthening collaborative research between public and private research performers. The strategy will offer support in the development and implementation of innovation policies meant to increase Romanian competitiveness through innovation, by facilitating the transfer of research results in economic practice. In addition, the setting up of a council for innovation and entrepreneurship would introduce and encourage the establishment of co-investment schemes to address the financing and funding gaps in the innovation ecosystem and will promote networking, sharing of know-how (both national and transnational) between RPOs and the business sector.

Improving the monitoring and evaluation of the entrepreneurial and innovation ecosystem

Romania has recently approached the Policy Support Facility (PSF) and requested an assessment of its entrepreneurial and innovation ecosystem. The review will be carried out in the second half of 2016 and will result in concrete recommendations on how to tackle and implement a reform based on the interaction between entrepreneurship and innovation. These recommendations are expected to assist in devising further actions to stimulate innovative entrepreneurship and to create an environment conducive to the growth of technological startups.

Facilitate networking and exchange between science, industry and society by continuing the development and expansion of an online community of knowledge stakeholders

BrainRomania (www.brainromania.ro), as specified in Priority 1) is the online portal for the worldwide community of actors in the Romanian innovation ecosystem. It is a platform that facilitates promotion and sharing of research results, innovative products, services and opportunities to seize collaborations and project funding.

The BrainRomania platform is designed to become a key source of knowledge sharing between researchers and industry and, eventually, with society. To this end, it was built to be interoperable with other current and future platforms; it links to other online social and professional networks. Implemented at national level, the platform is open and encourages international cooperation in science and innovation.

ERRIS, as the national registry of research infrastructures, will facilitate collaboration in research among public and private research organizations and other actors (such as companies) seeking access to research infrastructure services. The registry will serve as part of a dashboard for the monitoring of the innovation ecosystem, and in particular the planning of investment in RIs.

b) Promoting open access to scientific publications and optimal reuse of research data

Context

Increased openness, rapid and high-quality transfer of knowledge are key to capitalizing on research results and translate them into innovation, ultimately creating economic growth and competitiveness.

This ERA priority focuses on the need to foster knowledge sharing through a systemic transition to open science and to strengthen the collaboration between science and industry in an open innovation environment.

Opportunities to accelerate knowledge sharing and innovation arise along with the “digital ERA”, but the need to establish and implement the optimal conditions for international sharing of knowledge simultaneously increases. At international level, the initiatives and actions in this direction intensified in the recent years, especially in the direction of reforming the scientific publication systems and ensuring open access to research results (publication and data) in order to foster and accelerate innovation⁶.

⁶ Optimizing circulation, transfer and open access to scientific knowledge is emphasised by the Commission in various communications and recommendations from 2012:

European Commission ‘Recommendations on Access to and Preservation of Scientific Information’, (July 2012)
http://ec.europa.eu/research/science-society/document_library/pdf_06/recommendation-access-and-preservation-scientific-information_en.pdf;

Currently, an European Action Plan for 2020 on Open Science is being developed as part of a large consultation with experts, stakeholders and the Member States which had its kickoff at the Amsterdam conference on 'Open Science – From Vision to Action' hosted by the Netherlands' EU presidency on 4-5 of April, 2016. To encourage all stakeholders to join forces in a speedy transition towards open science, the European Commission announced the launch of the European Open Science Policy Platform (planned in May 2016).

At the national level, increasing access to scientific knowledge is encouraged by The National Strategy for RD&I 2014-2020 promoting, among the main measures, access to the main streams of scientific research for all research organizations and the publication of publicly funded scientific results in gold open access.

Still, Romania lacks the strategic framework to ensure open access to publications and research data and to impulse an open science environment and measures are focused in this direction, in line with the European trend and recommendations.

Objectives

To prepare the strategic framework for the transition and alignment to an open science environment, in line with the Commission's Recommendations as of 2012 and the Action Plan currently being developed at European level.

Indicator: national Open Science Strategy

Indicator: open access e-infrastructure

Measures

Developing strategic and operational capacity for Open Science (OS), with the main focus on open access (OA) to all scientific publications publicly funded.

Set the national framework for an OS ecosystem

Developing a national Open Science Strategy which will introduce (mandatory) OA to scientific results in line with the Commission's 2012 Recommendation on access to and preservation of scientific information (scientific publications and research data).

European Commission "A Reinforced European Research Area Partnership for Excellence and Growth" (July 2012)

http://www.research.ro/uploads/politici-cd/politici-europene/era-communication_en_jul-2012.pdf;

European Commission 'Communication Towards better access to scientific information: Boosting the benefits of public investments in research' (2012)

<http://ec.europa.eu/research/science-ERRIS>

[society/document_library/pdf_06/era-communication-towards-better-access-to-scientific-information_en.pdf](http://ec.europa.eu/research/science-ERRIS/society/document_library/pdf_06/era-communication-towards-better-access-to-scientific-information_en.pdf)

Horizon 2020 mandates Open Access to all peer-reviewed output relating to the grant:

http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf.

Facilitate the development of OA infrastructure, including repositories for self-archiving in certified repositories of Green Open Access.

Foster open access to research data by implementing pilot exercises for open research data, creating a methodology for data collection and data management plans (DMPs).

Promote and facilitate open access publishing and archiving, by:

- Informing Romanian actors about the benefits of open access and providing support to Romanian journals for indexing in the DOAJ. This could be facilitated by the development of an (electronic) Blueprint regarding open access, describing publication and archiving steps in open access, containing information about the journals' offerings and conditions regarding OA publishing by mapping them according to their openness (OA, non-OA, hybrid), OA archiving policies and embargoes;
Currently, there are 56 Romanian journals indexed in the Web of Science, of which 50 offer free access to content, but only 15 are recognized as open access, peer-reviewed journals; those which are not OA need to be assisted in improving their knowledge of open licenses and other criteria for registration in the DOAJ;
- Offering support in establishing agreements with international and national journals for fair APCs;
- Develop international mutual learning exercises for the exchange of best practices.

Promote open collaboration in research via e-infrastructures

This measure will build upon the e-infrastructures already developed, *BrainRomania 3.0* and *ERRIS (Engage in the Romanian Research Infrastructure)*, described in Priority 1, which will continue to be developed as main national nodes for networking, knowledge sharing and scientific communication. In order to increase access and visibility to information and scientific knowledge, information on users' publications in BrainRomania could be correlated to the international data base Scopus (Elsevier) and to Web of Science (Thomson) and also, to the *European Open Science Cloud (EOSC)*.

Developing an evaluation and monitoring mechanism for Open Science

Developing an open source data analytics instrument for analysing data on *open access publishing* and data regarding *open collaboration*, in order to monitor the evolution of open science.

The analysis will also provide insights on the research trends at international and national level and the way they correlate to the societal challenges.

Priority 6 – International cooperation

Context

More than 70% of the knowledge worldwide is generated outside of Europe. Therefore, access to the greatest possible extent to this knowledge potential in research and innovation through international cooperation is vital to increase Romania's visibility in this area, strengthen the national RD&I system and enhance Romania's competitiveness in the long term.

Under the previous national plan for RD&I, cooperation at multilateral level with third countries and regions was too small and lacked targeted measures.

Currently, in spite of an existing instrument to finance bilateral cooperation under National Plan for RD&I 2015-2020, Program 3 – European and International Cooperation, sub-program 3.1 Bilateral/multilateral, collaboration with third countries and especially with key actors at global level in research and innovation is limited and brings little contribution to the internationalization of the Romanian research area, mostly due the lack of visibility of the research teams outside the borders or to absent promotion of their scientific achievements and current research interests combined with the lack of appropriate financial resources at national level.

The National Authority for Scientific Research and Innovation will continue to support dialogue with third countries in order to strengthen the ongoing joint cooperation programmes and facilitate opening of new joint cooperation programmes, based on the existing bilateral Agreements on RD&I. A range of bilateral cooperation programmes with third countries, like the ones with South Africa, China, Japan and Ukraine are ongoing and efforts will be made to maximize their impact, whilst special attention will be given to accelerate the policy dialogue with other third countries such as the USA, Argentina, Russia, India, Israel and South Korea, aiming at opening of new joint cooperation programmes.

Romania actively participates to 16 international research organizations, namely: CERN, European Space Agency (ESA), Unified Centre for Nuclear Research (in Dubna), FAIR (Facility for Antiproton and Ion Research in Darmstadt), International Centre for Genetic Engineering and Biotechnology (ICGEB, Trieste), International Seismological Centre (in Newbury, UK), European Physical Society (in Geneva), International Centre for S&T Information (in Moscow), EUREKA, ESF (in Strasbourg), COST, NATO, TERENA (in Amsterdam), CEENET (in Austria), EUROGEOSURVEYS and ITER.

As any other country in the EU, Romania should bring its contribution in terms of resources and knowledge in order to solve the global societal challenges that Europe and worldwide are facing. Effective international cooperation under the great variety of multilateral cooperation frameworks is needed. Thus, a higher level of participation of Romanian academia and economic sector to various European funding instruments that are suitable for international cooperation

with third countries and regions, will be encouraged as it is expected to generate research results with greater impact.

The National Authority for Scientific Research and Innovation will continue to support policy dialogue at bilateral and multilateral level by means of active participation of its representatives and external experts within different fora and in particular to the SFIC activities. In the same time, more efforts are needed in order to foster coherence between the policies at national and EU level towards the international dimension of ERA.

Objectives

Underpinned by the current National Strategy for Research, Development and Innovation 2014-2020 and its main funding instrument, the National Plan for RD&I 2015-2020, Romania aims to enhance international cooperation with third countries in the priority areas identified for the current programming period by making use of its full potential in terms of human, physical and financial resources.

Within the context of the planning and definition process of the next national strategy for RD&I, to be endorsed from 2020 onwards, strategic guidelines, objectives and measures with regard to Romania's international cooperation in RD&I will be given greater focus and reinforced.

Indicators:

- number of bilateral projects with third countries
- number of multilateral projects with third countries
- number of bilateral or multilateral joint calls with third countries
- number of internationally refereed joint scientific publications with co-authors from third countries
- number of policy dialogue meetings attended/organized

Measures

Enhanced cooperation with third countries at bilateral level

Through this measure, support shall be provided for mobility projects and/or complex research projects under PN III, Program 3 – European and International Cooperation, Sub-program 3.1 Bilateral/multilateral.

Strengthened cooperation with third countries and regions at multilateral level

Through this measure, funding shall be provided to Romanian participants under various European funding instruments with variable geometry (e.g. Horizon 2020, ERA NET Cofund, JPIs, Eureka, Art.185 TFEU etc.) by providing support for RD&I projects and support projects under

National Plan for RD&I 2015-2020, Program 3 – European and International Cooperation, Sub-program 3.2 Horizon 2020, Sub-program 3.3 Support to Romanian participation to JPIs and Sub-program 3.5 Other European and international initiatives and programs.

Stronger networking activities with partners from third countries

Networking activities with third country potential collaboration partners are necessary as they lay the groundwork for identifying and grasping new opportunities for international collaboration.

This measure shall provide funding by means of support projects that stimulate participation to European and international cooperation programs and initiatives through:

- participation or organization of conferences, workshops, brokerage events, info days, meetings, training etc;
- preparatory activities aiming at searching partners, building consortia/partnerships and submission of new project proposals.

Funding instruments are provided by National Plan for RD&I 2015-2020, Program 3 – European and International Cooperation, Sub-program 3.6 Support.

More active bilateral and multilateral policy dialogue

This measure shall be focused on policy dialogue at bilateral and multilateral level towards third countries and regions by active involvement in the activities of Strategic Forum for International S&T Cooperation (SFIC), joint S&T committee meetings, senior official meetings (SOMs), group of senior officials (GSOs) and other relevant working groups, initiatives and platforms.

Funding instruments are provided by National Plan for RD&I 2015-2020, Program 3 – European and International Cooperation, Sub-program 3.6 Support and by the funding line “Support actions”.