



# Country Review of the Romanian Research and Innovation System

*Final report*

**PSF COUNTRY**

**HORIZON EUROPE  
POLICY SUPPORT FACILITY**

Independent  
Expert  
Report



*Research and  
Innovation*

## Country Review of the Romanian Research and Innovation System

European Commission

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# **PSF Country Review of the Romanian Research and Innovation System**

## ***Final report***

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## LIST OF ACRONYMS

ADR/RDA	Regional Development Agency
ALFRED	Advanced Lead Fast Reactor European Demonstrator
AR/I-AR/RA	Romanian Academy
ARACIS	Romanian Agency for Quality Assurance in Higher Education
AREI	Adjusted Research Excellence Index
ASAS	Academy of Agriculture and Forestry Services
ASM	Academy of Medical Science
ASTR	Academy of Technical Science
AUF	Agence Universitaire pour la Francophonie
BERD	Business Expenditure on Research and Development
BES	Business Enterprise Sector
CAGR	Compound Annual Growth Rate
CCCDI	Advisory Board for R&D&I
CCSI	Committee for Coordination of Smart Specialisation
CEA	Commissariat à l’Energie Atomique et aux Energies Alternatives
CEE	Central and Eastern European Countries
CERIC	Central European Research Infrastructure Consortium
CERN	European Organisation for Nuclear Research
CIAP	Inter-institutional Committee for the Partnership Agreement
CNATDCU	National Council for Attesting Higher Education Titles, Diplomas and Certificates
CNCS	National Council for Scientific Research
CNECSDTI	National Council for Ethics in Scientific Research, Technological Development and Innovation
CNFIS	National Higher Education Funding Council
CNIPMMR	National Council for Small and Medium Private Enterprise in Romania

CNPSTI	National Council for Science Technology and Innovation Policy
CNR	National Council of Rectors
CNSPIS	National Council of Statistics and Forecast for Higher Education
CNTTI	National Council for Technology Transfer and Innovation
CoE	Centres of Excellence
COP/POC	Competitiveness Operational Programme (Cohesion Policy)
COST	Cooperation in Science and Technology
CSR	Country Specific Recommendations (European Semester)
CRIC	Romanian Committee for Research Infrastructures
DESI	Digital Economy and Society Index
DG	Directorate General
DG ECFIN	Directorate General for Economic and Financial Affairs
DG RTD	Directorate General for Research and Innovation
EAFRD	European Agricultural Fund for Rural Development
EC	European Commission
EDP	Entrepreneurial Discovery Process
EEA	European Economic Area
EIS	European Innovation Scoreboard
EIT	European Institute of Technology
ELI-NP	Extreme Light Infrastructure – Nuclear Physics
EMSO	European Multidisciplinary Seafloor and Water Column Observatory
EPO	European Patent Office
EPOS	European Plate Observing System
ERA	European Research Area
ERA-NET	European Research Area Network
ERC	European Research Council

ERDF	European Regional Development Fund
ERIC	European Research Infrastructure Consortium
ERRIS	Engage in the Romanian Research and Infrastructure System
ESA	European Space Agency
ESF	European Social Fund
ESFRI	European Strategy Forum on Research Infrastructures
ESIF	European Structural and Investment Funds
EU	European Union
EU-27	The Member States of the European Union
EU-13	Member States joining the European Union since 2004: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia
EU-14	EU Member States that are not listed under EU-13
EURATOM	European Atomic Energy Community
EUREKA	Intergovernmental organisation for pan-European research and development funding and coordination
FAIR	Facility for Antiproton and Ion Research in Europe
FDI	Foreign Direct Investment
FP	Framework Programme for R&D in the EU
FTE	Full-Time Equivalent
F4R	European Joint Undertaking for ITER and the Development of Fusion Energy
GBARD	Government budget allocations for R&D
GBAORD	Government budget appropriations and outlays for R&D
GCI	Global Competitiveness Index
GD	Government Decision
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditures on R&D
GII	Global Innovation Index

GOV	Government sector
GVA	Gross Value Added
H2020	HORIZON 2020 European Framework Programme for R&I
HE	Horizon Europe - the 9th European Framework Programme for R&I
HEI	Higher Education Institution
HERD	Higher Education Expenditure on R&D
HRS/HRST	Human Resources in Science and Technology
HES	Higher Education Sector
I-AR/AR/RA	Romanian Academy
IB	Intermediary Body
ICT	Information and Communication Technology
IDF	Institutional Development Fund
IFA	Institute for Atomic Physics
INCD	National R&D Institutes - Institute Nationale de Cercetare, Dezvoltare
INS	National Institute of Statistics
IP	Intellectual Property
IPR	Intellectual Property Rights
ISCED	International Standard Classification of Education
JPI	Joint Programming Initiative
JTI	Joint Technology Initiative
JRC	Joint Research Centre of the European Commission
JU	Joint Undertaking
KIC	Knowledge and Innovation Community
KTO	Knowledge Transfer Office
MA	Managing Authority (of EU Cohesion Policy Operational Programme)
MADR	Ministry of Agriculture and Rural Development

MCID	Ministry of Research, Innovation and Digitalisation
MDPWA	Ministry of Development, Public Works and Administration
ME	Ministry of Education
MIPE	Ministry of European Investments and Projects
MNC	Multinational Company
mPPS	million Pounds Purchasing Standards
MS	Member State/s of the European Union
MSCA	Marie Skłodowska-Curie Actions
M&E	Monitoring and Evaluation
NASRI	National Authority for Scientific Research
NCIE	National Council for Innovation and Entrepreneurship
NCP	National Contact Point (for EU Framework programme)
NCSTIP	National Council for Science, Technology and Innovation Policy
NGO	Non-Governmental Organisation
NRP	National Reform Programme
NRRP/RRP	National Recovery and Resilience Plan
NUTS	Nomenclature of Territorial Units for Statistics
OECD	Organisation for Economic Cooperation and Development
OP	Operational Programme (Cohesion Funds)
OPC	Operational Programme Competitiveness (Cohesion Funds) 2014-2020
OPEE/POEO	Operational Programme Education and Employment (Cohesion Funds) 2021-2027
OPH/POS	Operational Programme Health (Cohesion Funds) 2021-2027
OPHC	Operational Programme Human Capital (Cohesion Funds) 2021-2027
OPIEC	Operational Programme Increasing Economic Competitiveness (Cohesion Funds) 2007-2013
OPSGDFI/POCIDIF	Operational Programme Smart Growth, Digitalisation and Financial Instruments (Cohesion Funds) 2021-2027

OSIM	National Office for Inventions and Trademarks
PA	Priority Area
PCT	Patent Cooperation Treaty
PNCDI	National Plan for Research Development and Innovation (2014-2021)
PNCISI	National Plan for R&I and Smart Specialisation (2022-2027)
PNDR	National Rural Development Plan
PNP	Private Non-Profit sector
POC/COP	Operational Programme Competitiveness (Cohesion Funds) 2014-2020
POCIDIF/OPSGDFI	Operational Programme Smart Growth, Digitalisation and Financial Instruments (Cohesion Funds) 2021-2027
POCU	Operational Programme Human Capital (Cohesion Funds) 2014-2020
POEO/OPEE	Operational Programme Education and Employment (Cohesion Funds) 2021-2027
POR/ROP	Regional Operational Programme (Cohesion Funds) 2014-2020 and 2021-2027
POS/OPH	Operational Programme Health (Cohesion Funds) 2021-2027
PRO/PRI	Public Research Organisation/Institution
PPP	Public-Private Partnership
PPS	Purchasing Power Standard
PRO/PRI	Public Research Organisation/Institution
PSF	Horizon Europe Policy Support Facility
RA/I-AR/AR	Romanian Academy
RDA/ADR	Regional Development Agency
RDI	Research, Development and Innovation
ReNITT	Romanian Network for Innovation and Technology Transfer
RIO	Research and Innovation Observatory
RIS3/S3	Smart Specialisation Strategy (also S3)

ROP/POR	Regional Operational Programme (Cohesion Funds) 2014-2020
ROSA	Romanian Space Agency
RON	Romanian New Leu (Romanian currency)
ROP/POR	Regional Operational Programme (Cohesion Funds) 2014-2020 and 2021-2027
RRF	Recovery and Resilience Facility
RRP/NRRP	Recovery and Resilience Plan
RTD	Research and Technological Development
R&D	Research and Development
R&I	Research and Innovation
SCOs	Simplified Cost Options
SEWP	Spreading Excellence and Widening Participation – programme under H2020
SIPOCA	OP for Administrative Capacity
SMIS	Structural Management Innovative System
STEM	Science, Technology, Engineering and Mathematics
STI	Science, Technology and Innovation
SME	Small and Medium-sized Enterprise
SNC	National Strategy for Competitiveness
SNCDI	National Strategy for Research Development and Innovation 2014-2020
SNCISI	National Strategy for R&I and Smart Specialisation 2021-2027
SoE	Seal of Excellence
STAR	Space Technology and Advanced Research
STEAM	Science, Technology, Engineering, Arts and Media
S2E	Stairway to Excellence
S3/RIS3	Smart Specialisation Strategy (also RIS3)
S&T	Science and Technology
TEAMING	Funding instrument from H2020 (Widening) to create CoE

TRL	Technology Readiness Level
TTO	Technology Transfer Office
UEFISCDI	Executive Agency for Higher Education, Research, Development and Innovation Funding
USPTO	US Patent Office
WIPO	World Intellectual Property Organisation
WoS	Web of Science



## **ABOUT THE PSF COUNTRY REVIEW EXPERT PANEL**

**Mariam Camarero (Spain), Chair**, is a full professor of Economics at the University Jaume I (Castellón, Spain) and holds an Ad Personam Jean Monnet Chair in European Economic Integration. An expert in time series econometrics and international economics, she is currently the Academic Director of INTECO, a joint research unit of the University of Valencia and Jaume I on Economic Integration. She has published more than 60 papers in peer-reviewed academic journals on topics related to international finance and open macroeconomics. In particular, exchange rate determination, economic convergence, external and fiscal sustainability and applied econometrics. She has led or participated in multiple research projects awarded in competitive tenders. She holds a Master's degree from the College of Europe and a PhD from the University of Valencia. A visiting scholar at the University of Nottingham, the Wharton School, the University of Göttingen and the Complutense College at Harvard, she has been an evaluator for scientific journals as well as for research agencies, both national and international, including the European Commission. In particular, she has been chair for Latvia's recent PSF. Concerning public positions, she has been the regional Vice-Minister of University and Science in the Valencian Community and Secretary General for Universities in the Spanish Central Government. In these positions she has been responsible for the design and management of research policies and has participated in the proposals for the reform of the universities funding system in the Valencian Region.

**Claire Nauwelaers (Belgium), Rapporteur and Expert**, is an independent policy analyst and governmental adviser on science technology and innovation policy. During the last 30 years, Claire has been working on policy advice for regional, national and European authorities in the domain of science, research, technology and innovation policies. She performed this work in an academic environment (Universities of Louvain, Belgium and Maastricht, Netherlands), at the OECD (in the Innovation unit of the Regional Development Policy Division of the Governance Directorate) and as independent expert. Claire's primary areas of research and expertise revolve around analysis and policy advice regarding the functioning of research and innovation systems. She is working on policy development, analysis and evaluation in the areas of research, technological development and innovation, including in the framework of European Cohesion Policy. She is one of the leading experts in Europe on Smart Specialisation Strategies. She is a member of the scientific steering committees of several research networks, part of the policy review teams, and is regularly invited as an expert in high-level expert groups for the European Commission or the Member States. She has published numerous books and articles on policy aspects of research, technology and innovation.

**Richard Harding (United Kingdom), Expert**, is a specialist in EU Cohesion Policy, with well over 25 years' relevant professional experience overall. Early on in his career, Richard spent 8 years as a Desk Officer in EC-DG Regio in Brussels (1991-1999) overseeing the implementation of mainstream Structural Funds programmes in EU industrial transition regions in 'old' Member States. He also has long experience of working in 'new' Member States, mainly Romania, and still lives in Bucharest today. Between 1999 and 2012 Richard worked as Team

Leader (Resident Advisor), or Expert, on numerous Twinning and Technical Assistance projects in Romania supporting the country's EU accession negotiations and preparations for Cohesion Policy 2007-2013, as well as the establishment of the partnership-based programming mechanism for the 2014-2020 phase. More recently, he has been involved, as adviser to the World Bank, in Romania's preparations for Cohesion Policy in 2021-2027, including the improvement of monitoring and evaluation systems across all the new OPs. In addition, Richard has continued to work on assignments directly for the EC, such as the DG Regio Pilot Action 'Regions in Industrial Transition', which recently assisted 12 Pilot Regions in enhancing their Smart Specialisation Strategies for 2021-2027. He still provides expert inputs for DG Regio as Coordinator of Lithuania's High Impact Action stemming from the EC Pilot Action – Roadmap for the Circular Economy transition of Lithuanian Industry.

**Lauritz B. Holm-Nielsen (Denmark), Expert,** was Executive Director of the Sino-Danish Centre (SDC), Beijing, 2013-18; Rector of Aarhus University from 2005-2013. He was a global lead specialist for higher education, research and innovation at the World Bank, Washington DC, 1993-2005. As the Rector for the Danish Research Academy (1986-93), Lauritz was in charge of reforming research training in Denmark and introducing PhD programmes in Denmark's research universities. He was a member of the Danish Prime Minister's Growth Forum; Chairman of the Science Research Council, the National Committee for Research Infrastructure, the Research Council for Development Research, and of the Danish National Fund for Nature; and vice-chairman of the Danish Research Commission (White Paper). He was the President of Euro Science, Strasbourg, vice-president of the European University Association (EUA), Brussels, and the Chairman of the Nordic Academy for Advanced Study, Oslo, and the Nordic University Cooperation, member of the Governing Board of Gothenburg University, Sweden. He was an expert member of the PSF for Poland, member of several OECD expert review teams (Netherlands, Ireland, Chile) and other international review and advisory panels on higher education and research.

**Ondřej Hradil (Czech Republic), Expert,** is the Research Infrastructures Manager at Masaryk University in Brno, Czech Republic. He has great experience with the design and implementation of projects funded by the EU Structural Funds as well as EU Framework Programmes, such as FP7, Horizon 2020 as well as from the policy perspective, which helps him to connect these two distinct worlds (cohesion and research) in particular with the help of synergies. Currently, his main area of activity is developing an institutional strategy for research infrastructures and safeguarding the leading role of Masaryk University at the Czech and European levels in this field. Ondřej studied business administration and management at the University of Economics in Prague. Before joining Masaryk University, he worked for the Czech Chamber of Commerce and helped to prepare Czech companies for EU accession. That took him to Brussels where he spent five years defending the interests of Czech businesses as Deputy Director of Czech Business Representation. Later he was instrumental in the establishment of CEITEC – Central European Institute of Technology, a major research centre established with the help of EU Structural Funds. During his career he has been active in many public private partnership discussions, including the Smart Specialisation Strategy of the South Moravian Region and

while being involved in developing research infrastructures hosted by CEITEC with users and suppliers of scientific technologies.

**Domagoj Račić (Croatia), Expert,** has more than 20 years of working experience in research, consultancy and lecturing activities. He has a wide experience in RDI, enterprise, education and regional development policies in the EU and other countries. Since 1998, he has worked as a project consultant and author of analytical papers, feasibility studies, reports and evaluations for international organisations (European Commission, OECD, World Bank, UNDP etc.), government institutions and private sector companies. In the area of innovation policy, he has been particularly involved in the analysis of R&I system and governance issues in several countries, including assessments of policies/strategies, institutional set-up, funding arrangements and R&I performance (as an indicator of efficiency). His innovation policy work includes background reports to inform policymaking, innovation policy reviews and research papers, for clients such as the European Commission, EIT, OECD and the World Bank. The assignments covered different countries in Central and Eastern Europe, Southeast Europe and the Middle East. He has coordinated research and consultancy projects, working groups and managed organisations in the business and NGO sectors. Domagoj Račić is also a part time lecturer at the University of Zagreb. He has more than 90 research and professional publications (journal papers, book chapters, conference papers, reports etc.). He has also been a member of various professional bodies in Croatia and abroad.

**Mateusz Gaczyński (Poland), National Peer,** is Deputy Director in the Department of Innovation and Development of Ministry of Education and Science. In his current position he deals with research and innovation policy in national and European settings, including cohesion policy programmes and Horizon Europe negotiations and national support mechanisms. He represents Poland in the European Research Area and Innovation Committee, and has participated in Bulgarian and Polish PSF exercises. Before taking this post in the Ministry of Education and Science he worked for the Ministry of Economy (sustainable development, climate change, National Reform Programme, Lisbon Strategy), the Permanent Representation of the Republic of Poland to the EU (cohesion policy portfolio), Polish Agency of Enterprise Development (entrepreneurship research) and the Ministry of Labour and Social Policy (labour migration). He is a graduate of Jagiellonian University and the National School of Public Administration.

**Ward Ziarko (Belgium), National Peer,** was, until 2021, Director of the Department for Monitoring and Evaluation at the Belgian Science Policy Office (Belspo) and has worked for 35 years as an adviser on STI-indicators and science policy monitoring. He started his career as programme manager directing research programmes on new technologies and their societal impacts, on sustainable development and other societal themes. Later, he was in charge of the production of Belgian official statistics on research and innovation. In this position he was the Belgian delegate to the Eurostat working party on STI indicators and the OECD working party on STI statistics NESTI, which he chaired for 6 years. He was a member of OECD science policy working parties (NESTI, CSTP, and TIP) and EU working parties (ERAC). He led the ERAC ad-hoc working group on the European Semester and ERA monitoring. In Belgium he was a member of several Belgian working parties in charge of policy coordination

between the different Belgian authorities. Ward organised two peer reviews of the Belgian science policies and participated as a peer in similar exercises that took place in South Africa, Spain and Poland.

**The PSF Support Team:** the project was overseen by the PSF Team in the EC's Directorate-General for Research and Innovation (DG R&I) unit A1 European Semester & Country Intelligence. Annamaria Nemeth coordinated the exercise and ensured liaison with the Romanian authorities.

**The PSF contractor** supported the EC's PSF Team in this activity. This involved Vladimir Cvijanović, Project Manager of the assignment, Cristina Șerbănică, National Support Expert, Mantas Pupinis – Analytical Support Expert, Monica Andriescu – Senior Expert for Quality Review.

**The Romanian Authorities** provided data and background documentation useful for the experts' work and supported the visits to Romania by inviting the representatives of government institutions and stakeholders to meet the group. The Policy Support Facility unit of the Ministry of Research, Innovation and Digitalisation (MCID) coordinated the Romanian authorities, ensuring the involvement of other relevant ministries, agencies and bodies and kindly made available facilities for the meetings.

**The PSF Review Panel extends thanks to all the Romanian stakeholders who gave their time to meet and discuss with its members and/or provide written contributions to the exercise. This helped the Panel acquire a well-informed view of the current situation and future plans and was greatly appreciated.**

## **KEY FINDINGS AND REFORM PRIORITIES**

### **The context and aim of the Policy Support Facility Review of the Romanian Research and Innovation system**

In July 2020, the Romanian Minister for Education and Research requested the support of the European Commission Policy Support Facility (PSF) for an independent review of Romania's Research and Innovation (R&I) system, focusing on the public science base. As a response, this Country Review of the Romanian Research and Innovation System was launched to support the Romanian authorities in designing and implementing reforms, to improve the quality and performance of their R&I system, and enhance the country's integration into the European Research Area. The Country Review focuses on five interlinked topics: the governance of the Romanian R&I system and the R&I strategies and policies; the framework conditions for public research; the internationalisation perspectives for the Romanian R&I system; the stimulation of public-private partnerships in research and the role of Cohesion Policy Funds.

The review was carried out from June 2021 until February 2022 by the PSF Panel, composed of six independent experts and two peer reviewers from seven countries, acting in their personal capacities. The PSF Panel conducted two visits to Romania, in September and December 2021, during which it interviewed around 160 representatives of 71 organisations, covering all components of the Romanian R&I system relevant for the focus areas. The exercise was supported in its task by a new PSF Unit established under the Romanian Ministry of Research, Innovation and Digitalisation (MCID), in charge of providing information and the follow-up of the review recommendations. At the beginning of its work the review was provided with a background report providing an overall picture of the system.

### **The main assessment of the PSF Review Panel**

The Romanian R&I system underperforms relative to the potential of the country and to its European peers, despite the presence of pockets of excellence (as testified by the high success rates achieved in the Horizon 2020 programme) which signal opportunities in the future. The PSF Panel, nevertheless, is optimistic about a brighter future for this system and its overall contribution to the socio-economic development of Romania, provided that the current barriers to opportunities are lifted.

While most of the problems in the R&I system are well-known, having been repeated in several earlier reports, and acknowledged by the Romanian authorities, great inertia, combined with a very limited political commitment to this sector and the lack of engagement by Romanian society feed a vicious circle of low effectiveness and stagnation. Unless all components of this vicious circle are addressed, it is highly likely that the situation will remain unchanged, causing further frustration and tension, exacerbating the brain-drain and jeopardizing the contribution of science and research to crucial societal issues of the present day. Romania cannot afford to lose more of its talented people who prefer to conduct

their research abroad, nor to see its investments in research delivering meagre results.

The release of this report comes at an opportune moment: it coincides with the start of the new EU Multiannual Financial Framework (MFF) covering the period 2021-2027, the upcoming adoption of a new national strategy for R&I (SNCISI), a range of relevant new EU Cohesion Policy programmes in Romania, and the start of the country's National Recovery and Resilience Plan (NRRP), which collectively provide new funding sources and levers to undertake the much needed reforms and investments. The intentions behind the R&I reforms included in the NRRP closely match many of the subjects treated by this Review and give commitments for their implementation. The PSF Panel report provides recommendations on how to translate the intentions stated in these governmental documents, into reality.

## The PSF Review Panel’s diagnosis of the situation

***The foundation of Romania’s research and innovation system is not sufficiently solid to support the country’s move towards becoming a knowledge-based economy***

While Romania’s research sector shows elements of strength, it does not perform as a coherent system. The combination of a fragmented public research sector, lack of financial stability and predictability, fragmented governance, erosion of human capital, weak public-private sector interaction, uneven monitoring and evaluation, and unpredictable political support, form a vicious circle which needs to be broken. This is a prerequisite for any successful and synergetic implementation of SNCISI, NRRP and Cohesion Policy Funds, and it is for the government to take action urgently. Breaking out of that vicious circle through reforms would offer multiple and interlinked opportunities to improve the performance of the R&I system and its contribution to society (cf Figure 1).



Figure 1 Towards a positive circle for the Romanian Research and Innovation system

Source: PSF Panel

### ***Under-funding and mis-funding***

The often-stated headline criticism of the Romanian R&I system is that it is under-funded. While this is a fact, the PSF Panel is equally concerned by mis-funding as well as by under-funding. The PSF Panel does not believe that simply adding more funds in the system as it currently is, will be sufficient to address its fundamental shortcomings. As mentioned above, the PSF Panel views the situation as one of a vicious circle, with many intertwined elements that reinforce each other and contribute to the poor performance and reduced attractiveness of the Romanian R&I system.

### ***Fragmentation and weak effectiveness of public research***

One core component of this vicious circle is the over-fragmentation of the system of public organisations performing R&I. This 'system' is actually not a system, but a constellation of institutions of various types and origins, which are the product of historical developments. They have neither been properly assessed to clarify their individual and joint missions, nor reformed to ensure effectiveness in realising these missions. The situation is that of a juxtaposition of institutes and laboratories, some of them having little research capacity and being of sub-critical size, with overlapping areas of expertise coupled with weak incentives for cooperation, as well as ineffective mechanisms to reward performance over the status-quo.

High-quality research centres that are able to deliver excellent research and position themselves in highly competitive EU projects co-exist with under-performing and outdated research units. The accountability of the public research organisations is oriented towards administrative and financial needs rather than to the outcomes and impacts of research activities. Research infrastructures are not run according to open access practices. This landscape of publicly-funded organisations – universities, research institutes under several Ministries and the independent Romanian Academy - is in need of serious reform on many fronts.

### ***An unbalanced policy mix for R&I***

The policy mix displays a relative over-investment in infrastructure and equipment at the expense of institutional funding and support for human resources. Multiannual basic funding for institutions is insufficient to maintain core institutional capacities such as staff, premises and recurrent expenditure for major equipment. While human resources, in particular early career researchers, provide the energy and brain power for the research system, and competitive grant systems ensure efficiency and resources for the most successful researchers and research units, the research system must stand on a predictable and solid structural base. Imbalances between different objectives and funding sources occur, and the diversity of funding programmes, does not add up to a coherent public funding mix.



### ***Fragmentation and lack of vision at governmental level***

Another part of the vicious circle, which both explains and further contributes to the above component, is the lack of an overarching governmental vision on the role of science and research for Romanian society. As an illustration, Romania chooses to direct only a small percentage of its EU Cohesion Policy Funds allocation towards R&I – around 2-3 times less than most other EU13 Member States. Despite the adoption of strategies and laws governing the R&I system, the overall expectations of this system are not articulated sufficiently clearly to influence the relevant funding mechanisms and the operation of the system's components. Fragmentation is also evident at the governmental level, hampering the search for synergies between policies, notably between national and EU Cohesion Policy programmes. Through inadequate cross-ministerial attention to R&I matters, this sector remains very low on the government's list of priorities.

### ***Improved inclusiveness but ongoing low effectiveness of strategies***

While efforts are increasingly being paid to involve broader constituencies in the design of strategies – in particular in the context of EU Cohesion Policy and Smart Specialisation Strategies (S3) – there is a persistence of practices that shed doubts on the openness, and thus on the wider endorsement of research and innovation strategies. Even in cases of open consultations, these tend to involve primarily actors from the system itself, rather than from a wider set of stakeholders. With only one tenth of the planned budgets under PNCDI actually being implemented, the evident gaps between the stated intentions in the strategies and the realities of their implementation further fuel distrust in their value. Competing prioritisations and lack of any concrete implementation of these priorities for the actors in research, all contribute to the inertia and lack of recognition of the value of R&I for society.

### ***Public-private cooperation happening at a small scale in spite of the system's unfavourable features***

Innovation that takes place in the business sector, is not the main focus of this Country Review. However one aspect of it - the role of the public research system in supporting innovation – is part of it. Science-industry collaboration happens in Romania at best on an ad hoc basis, usually due to the availability of external funding. Some good examples nevertheless do not hide the situation of a public system that is not properly incentivised to engage in such activities, due to weak recognition of a third mission in their operation. Public support schemes do not solve the problem, and the invitations that target science-business partnerships tend to be infrequent, highly competitive and endowed with limited budgets. There are however positive evolutions with Romania's new Cohesion Policy programmes planned for 2021-2027, which place a distinctly stronger emphasis than previously on partnerships between public research institutes and private companies in R&I interventions targeting S3 domains.

### ***A growing role for regions in the national R&I system***

The regional dimension of R&I has been progressively brought onto the scene, mostly thanks to developments supported by EU Cohesion Policy in the Romanian regions. So far, weaknesses in national-regional coordination have blurred the role of each level of governance in the promotion of research and innovation. The situation has been recently improving, and the presence of significant public research capacities in some (although by no means all) Romanian regions indicates a better recognition of the role of regions in the national R&I system.

### ***A serious lack of policy-relevant evidence to guide R&I policy***

A key element contributing to the vicious circle is the lack of robust policy-relevant evidence on the Romanian R&I system, and on R&I trends affecting this system. Basic information on the broad allocations of public funding by objectives is missing, as is the availability of independent results from evaluations (with the notable exception of better practice that is found in the Cohesion Policy management context). In the absence of sound and transparent, publicly available data on various aspects of the system, covering not only inputs but more importantly outcomes and impacts of research, decisions on further policies and instruments to support R&I lack an objective basis.

Funding streams are likely to be driven by inertia or 'strong voices', rather than by objectives as stated in the strategies. In the absence of sound evidence, it is also hard to convince authorities of the relevance of considering research as an investment with potentially high returns, rather than as an expense – especially in a sector that appears far removed from the challenges faced by Romanian society.

### ***Ineffective practices in the public sector generally hindering R&I policy implementation***

In addition to the above elements of direct relevance to the R&I domain, important hindrances also come from general public sector management practices in Romania, and weigh heavily on the effectiveness of the R&I system. The most serious problem is the unpredictability and lack of continuity of funding for the system. This frustrates policy effectiveness, strategic planning and performance improvement at the level of the institutions concerned.

Other major challenges are the excessive administrative burden faced by beneficiaries of domestic as well as Cohesion Policy funds, slow implementation leading to absorption problems, and weak capacities in public administration. Lags in implementation fuel the lack of political interest in R&I: in the case of Cohesion Policy, tangible results have been slow to materialise for the 2014-2020 programme period, making it politically difficult to justify increased allocations for R&I in the current period.

## ***Unattractive framework conditions for human resources in the R&I sector***

Partly as a consequence of the reticence to consider the role of R&I for society, poor framework conditions for human resources in the public sector result in too limited a pool of well-trained young researchers available for Romania's R&I system. Highly qualified human resources for R&I are not sufficiently recognised or remunerated, and too many well-trained people need to struggle for their career pathway rather than contributing effectively to the advancement of research. The fragmentation of sources of income for researchers and professors, as well as uncertainties over funding sources, encourage dilution of their activities.

## ***The brain-drain and weak international position as major threats***

The most acute symptoms of the poor performance of the Romanian R&I system are: first, the heavy and continuous brain-drain, which deprives the system of its human capital; and second, the system's lack of international attractiveness and visibility, which makes brain-gain strategies unrealistic. These symptoms create huge entry barriers into the European Research Area, even for the best Romanian researchers. The weak performance of Romania in EU competitive funding schemes, despite strong attention in all strategies towards this goal and multiple related instruments foreseen, is a serious threat, harmful for the development of the research capacity. Quick fixes for these problems are not at hand. Dedicated funding schemes to attract researchers from abroad or to participate in EU competitions may provide some oil on the joints, but it is the whole system that needs to be fixed, in all its dimensions.

## **The PSF Panel's recommendations**

The PSF Panel proposes ten courses of action which are in the form of key policy messages, with 30 recommendations that, if implemented immediately and with strong political backup, hold the promise of addressing the weaknesses of the R&I system and releasing its potential for the benefit of sustainable development in Romania (see Figure 3 at the end of this section for a summary picture of the key policy messages and recommendations).

Immediate action is needed, but this should go along with sustainable and continued implementation of reforms related to the R&I system over the medium and long terms. The system will not be fixed with a series of temporary measures, and reforms and actions should be followed through systematically, across political cycles, if they are to provide lasting, effective and positive changes.

The momentum is there: this is the starting period for the implementation of Romania's new domestic R&I strategy SNCISI and its associated plan PNCDI IV and of the sizeable funding amounts brought by Cohesion Policy programmes and the NRRP. There is even a unique opportunity in 2025 for accelerating the move, when the mid-term review of Cohesion Policy programmes will take place and the Commission will take a decision on the allocation of the 'flexibility amount' of these Funds for 2026-2027 - provided that convincing implementation

performance is achieved by then. An overview of the reforms announced under the NRRP, linking these with the PSF Panel’s analysis and key policy messages, is shown in Figure 2.

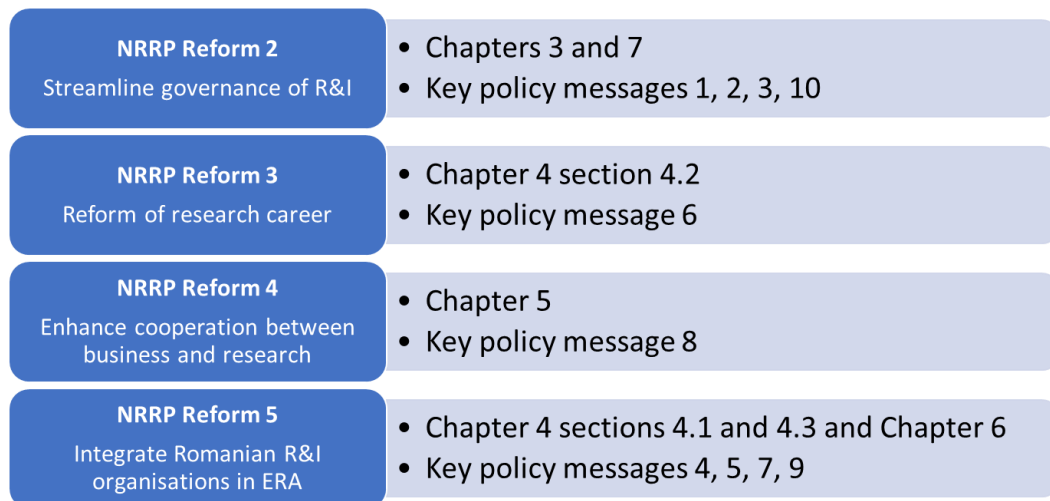


Figure 2 Reforms announced under the National Recovery and Resilience Plan (NRRP) and PSF Panel’s analysis and Key Policy Messages

Source: PSF Panel

**KEY POLICY MESSAGE 1: Reinforce the overall governance of the R&I system through cross-governmental coordination and inclusion of the voice of society into this system (See Chapter 3)**

Recommendation 1.1: Strengthen the national vision for investment in R&I and coordination in the system through concerted action between the President’s and the Prime Minister’s offices, and with the engagement of key Ministers and Ministries.

Recommendation 1.2: Under Reform 2 of the NRRP, establish a single R&I Coordination Structure with: at the political level, an inter-Ministerial Committee under the Prime Minister, coordinated by MCID, with close association of MIPE; and at the implementation level, a professional/technical national body - possibly a development of the Committee for Coordination of Smart Specialisation (CCSI). The executive structure should cover both national and Cohesion Policy programmes and be appropriately empowered and resourced to implement complex coordination actions with national and regional dimensions, including the synchronisation of funding calls, mutualisation of specialist expertise, enhanced data collection and monitoring between programmes.

Recommendation 1.3: Establish a public debate about the implementation of the new strategy and the vision of ‘science for society’, in all major cities and with the involvement of national, regional and social media. Establish a sounding board representing the voice of stakeholders (from the quadruple helix, not only from the public research system) to support the relevance of the R&I activities.

**KEY POLICY MESSAGE 2: Ensure predictability and effectiveness of public funding for the R&I system (See Chapter 3)**

Recommendation 2.1: Ensure multi-year funding and regular, predictable funding streams for the R&I system, both for institutional and competitive funding. Establish practices of ex-ante funding to public research organisations and enable the transfer of unspent funding to the subsequent year.

Recommendation 2.2: Revise the overall policy mix in two directions: ensuring sufficient institutional funding, and reforming funding mechanisms to ensure increased impact-orientation.

**KEY POLICY MESSAGE 3: Foster the use of policy intelligence to support better strategic governance of the R&I system (See Chapter 3)**

Recommendation 3.1: Design and implement the monitoring system for R&I, envisaged in SNCISI and covering the whole R&I system, based on interoperability of national and Cohesion Funds systems. The evaluation component should be institutionalised and could be organised by the same body in charge of monitoring, provided that it relies on independent experts.

Recommendation 3.2: Establish an R&I Observatory, to map Romania's best R&I strengths in the international context and study national developments in the light of EU and international trends. Reinforce the use of such evidence to serve the needs of the MCID in terms of policy implementation (including for an internationalisation strategy - see Recommendation 9.1).

Recommendation 3.3: Strengthen institutional capacities in Ministries and Agencies, by investing more resources for capacity development and ensuring good performance-related working conditions, including effective delegation of authority and up-to-date digitalisation.

**KEY POLICY MESSAGE 4: Launch an in-depth, evidence-based consolidation process of the four pillars of public research performers, to gradually transform this fragmented landscape into a 'system' of centres of excellence and centres of competence in strong priority domains (See Chapter 4)**

Recommendation 4.1: Under Reform 5 of the NRRP, launch a reorganisation process covering the four types of public research organisations, with the aim of transforming that landscape into a real 'system' and achieving higher quality research through better synergies across the whole system. A three-step process is advised, involving:

- Step 1: Promote cooperation between research players within and across the pillars, around joint research topics. For example, through joint doctoral schools, joint projects, joint research infrastructures, and common mobility projects;
- Step 2: Conduct a thorough system review including independent evaluations (with international experts) of research carried out at all institutions, assessing their alignment with national Strategic Research

Agendas and S3 priorities, and using performance in Horizon Europe and other international competitive funding programmes, as well as implementation of the European Charter for Researchers and Code for the Recruitment of Researchers as objective criteria;

- Step 3: Draw lessons from the review in terms of areas of strengths, as well as of gaps and redundancies, and possibilities for cooperation or integration, across all four pillars. Legal obstacles for the effective use of scarce resources, and cooperation across the system, should be identified and removed. Initiate a move towards a new architecture of the Romanian public research ecosystem, including the possibility of bringing all national research institutes under a common umbrella, and establish a Romanian brand for high quality applied and strategic research, such as the Fraunhofer Institutes in Germany or the Łukasiewicz Research Network in Poland.

**KEY POLICY MESSAGE 5: Improve governance at the level of public research institutions and adjust institutional funding sources towards performance-based funding channels, minimising the administrative burden (See Chapter 4)**

Recommendation 5.1: Ensure that each public research institution’s mission is clearly articulated, is aligned with national Strategic Research Agendas and S3 priority areas, and is in line with societal expectations and communicated to society.

Recommendation 5.2: Encourage individual research institutions to establish an International Scientific Advisory Board.

Recommendation 5.3: Prioritise financial support to the foundations of Romania’s research system in the form of sufficient institutional base funding, including for fundamental research in universities. Transform and align the institutional funding channels (CORE/NUCLEU, Institutional Development Fund for universities, Romanian Academy,) towards performance-based funding channels. Allocate funds on the basis of institution’s plans and rigorous evaluation. Different criteria should be used according to types of missions (academic research; industrial research; service to society, etc.) and ambition (regional, national, international excellence).

Recommendation 5.4: Reduce the administrative and bureaucratic burden on public research organisations, targeting simplification. Adjust reporting requirements to the needs of the overall monitoring system, with special attention to for outcomes of research activities and not only outputs.

**KEY POLICY MESSAGE 6: Provide a better environment for human resources in the public research system (See Chapter 4)**

Recommendation 6.1: Under Reform 3 in the NRRP, simplify the evaluation of human resources in the research system and align conditions for career advancement to those implemented in other EU countries. Individual career plans should be agreed with institutions, and researchers should be held accountable against their own development plans.

Recommendation 6.2: Clarify and realign the conditions and incentives in the salary and other remuneration for human resources in PROs and HEIs, as well as focusing on improving social prestige and recognition. Provide reasonable income guarantees to researchers, and ensure fair treatment.

Recommendation 6.3: Complete the reform of doctoral studies (under responsibility of ME), encouraging collaboration between different institutions (National Research and Development Institutes, Academies and Universities).

**KEY POLICY MESSAGE 7: Develop a sound strategy for research infrastructure ensuring alignment with national priorities, sustainability and openness (See Chapter 4)**

Recommendation 7.1: Establish a coherent research infrastructure strategy with good articulation, institutional structure and human resource capacity, on the basis of the needs of all user groups. The strategy should align with the process of consolidation of the Romanian public research landscape by promoting clustering and cooperation of various research organisations on major research infrastructures, in priority areas.

Recommendation 7.2: Revise the policy mix to ensure coherent funding for investment as well as sustainable funding for the operation and maintenance of research infrastructures.

Recommendation 7.3: Under Reform 5 of the NRRP, foster the utilisation and open access to research infrastructures by all users groups, modifying the current IOSIN programme, including open access provision to users. All funded research infrastructures have to be open by definition to all relevant users (academics or companies, domestic or foreign) following their open access policy.

**KEY POLICY MESSAGE 8: Foster public-private partnerships in research (See Chapter 5)**

Recommendation 8.1: Under Reform 4 of the NRRP, provide stable and regular sources of financing for collaborative research between public and private sector actors, including applied research and public-private partnerships in R&I. Enable access by large industrial companies to R&I grants for riskier and long-term R&I projects.

Recommendation 8.2: Develop the third mission within academic institutions and other public research institutions and strengthen the capacity of the public research sector to engage in collaboration with business while reforming the public research system (see Key policy message 4). Integrate the third mission in research career advancement (see Key policy message 6).

Recommendation 8.3: Make intermediary institutions more effective and provide them with basic and project funding, and provide ongoing support to innovative clusters which demonstrate viability and impact.

**KEY POLICY MESSAGE 9: Offer more effective support for the internationalisation of Romanian research actors, relying on a more focused internationalisation strategy and stronger incentives for 'brain circulation' (See Chapter 6)**

Recommendation 9.1: Develop an internationalisation strategy with indicators and realistic quantified targets, which is aligned with national priorities (Strategic Research Agendas and S3 priority domains), and is more selective in terms of countries and topics for international cooperation/EU partnerships and builds on policy intelligence for a better understanding of Romanian pockets of excellence (see Recommendation 3.2).

Recommendation 9.2: Devote efforts to improve the position of Romania in the European context, moving from a passive to a more active role, concentrating on priority areas and involving experts with forward-looking views.

Recommendation 9.3: Reform the National Contact Point (NCP) model, moving towards a more integrated, more professional and adequately funded NCP network.

Recommendation 9.4: Develop 'intermittent brain circulation' rather than 'brain attraction' strategies to attract researchers from abroad, as a more realistic path given the current conditions for conducting public research in Romania.

**KEY POLICY MESSAGE 10: Reinforce the role of EU Cohesion Policy Funds to support R&I in Romania through greater political support, enhanced synergies between programmes and improved implementation quality (See Chapter 7)**

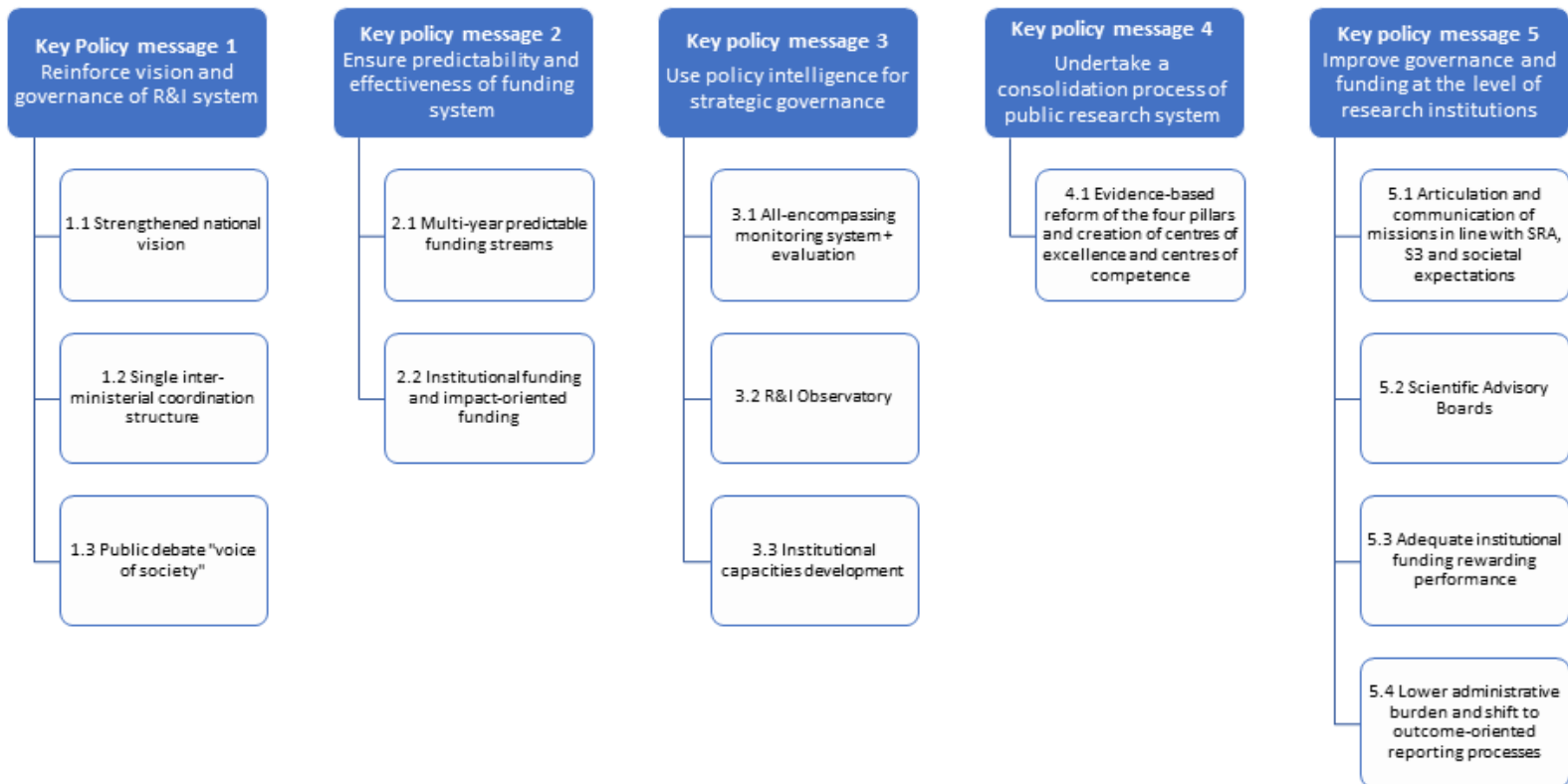
Recommendation 10.1: Mobilise all forces, from the highest level, to fight more convincingly for R&I in the country's Cohesion Policy budget context over the medium to long terms. This should resist any threats to its existing Cohesion Policy budget from other fields of intervention, where it is easier to spend EU money. Performance on new R&I interventions must be robust and visible enough to enable the sector to achieve its full potential from the mid-term 'flexibility amount' award in 2025.

Recommendation 10.2: Under Reform 2 of the NRRP, ensure that enhanced coordination of EU Cohesion Policy programmes and between them and NRRP and the PNCDI IV is a principal attribution of the single R&I Coordination Structure to be established (see Recommendation 1.2).

Recommendation 10.3: Adopt a more forward-looking anticipatory approach to programme management for R&I interventions under Cohesion Policy. Plan Calls much further in advance, making sure that potential applicants have sufficient time to prepare and submit their applications. Make effective use of Technical Assistance, and anticipate public procurement and other technical delays. Build and maintain internal capacities. Improve the performance of the management information system SMIS, and its linkage with the new monitoring platform envisaged for SNCISI. Ensure interoperability between IT platforms between national institutions (Recommendation 3.1).



Recommendation 10.4: Support applicants and beneficiaries of R&I interventions by more proactively simplifying the requirements they need to fulfil. Such actions will have resource implications for implementing bodies which will need to be recognised from the outset. MAs and IBs should aim for a radically simpler approach to procedures and processes to be followed when interfacing with applicants and Beneficiaries. In particular, they should be bolder in the deployment of Simplified Cost Options, broadening their use wherever possible.



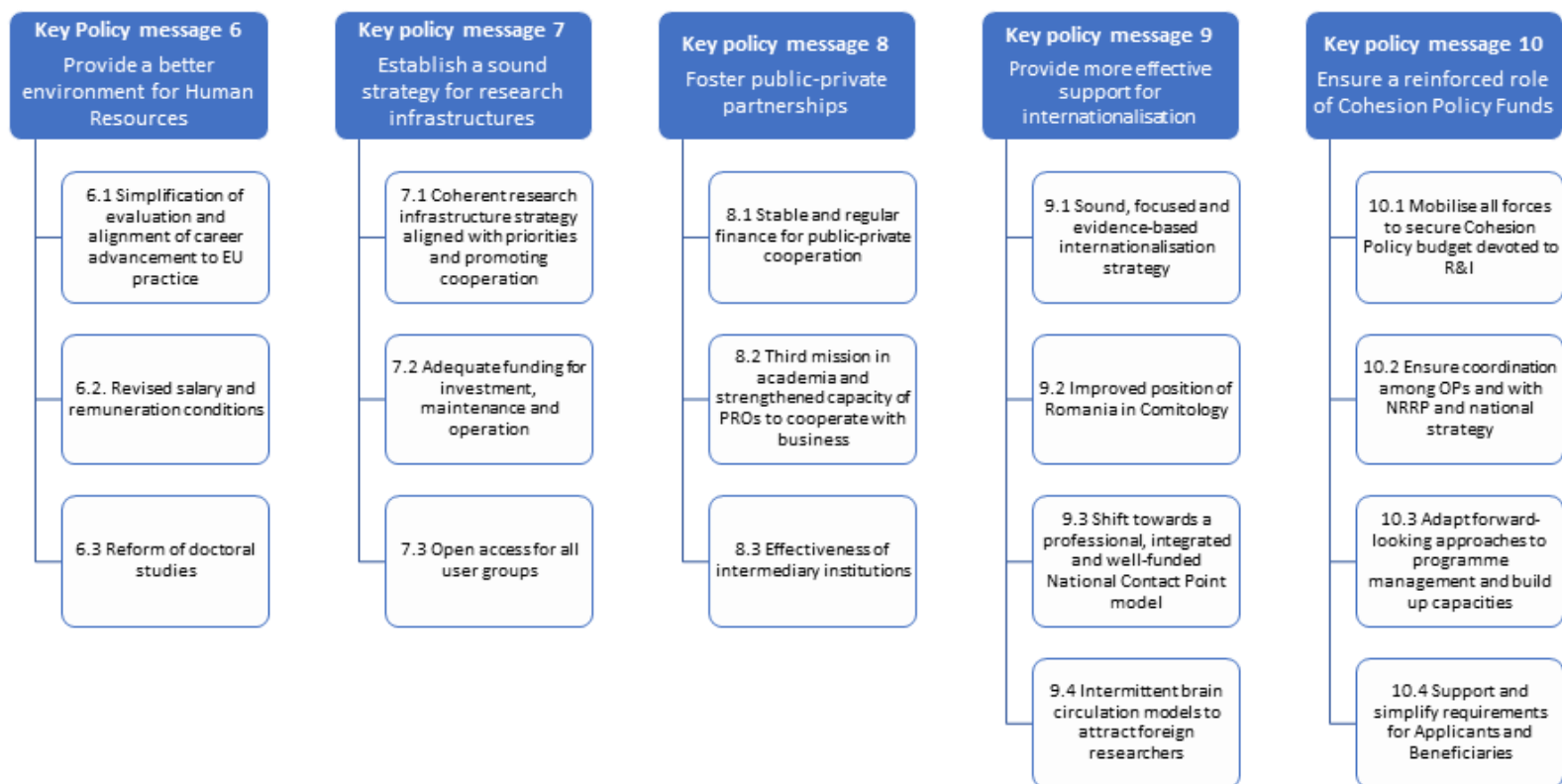


Figure 3 PSF Panel Key Policy Messages and Recommendations

Source: PSF Panel

# **1 Introduction, Aim and Methodology**

## *1.1 Policy Support Facility*

The Policy Support Facility (PSF) is a tool set up by the European Commission (DG Research & Innovation) under Horizon Europe, the EU's funding programme for research and innovation (R&I). It supports EU Member States and countries associated with Horizon Europe in improving the design, implementation and evaluation of national R&I policies.

The PSF is demand-driven (generated by a demand from the country's highest authorities) and is geared towards policy practice. The PSF activities are evidence-based and take into consideration the perceptions of the national R&I stakeholders. Robust quantitative and qualitative evidence supports the PSF policy recommendations. The PSF activities are tailor-made and flexible, and adapted to the specific features of each country, including the political cycle. Experts and peers take an in-depth look at the national situation and provide recommendations based on a process of the 'de-contextualisation' of lessons learned from their own experience.

Country Reviews of national R&I systems are one of the main services offered by the PSF. They build upon experience gained through Peer Reviews of countries implemented in the framework of the H2020 PSF. They constitute an in-depth assessment of a country's R&I system carried out by a panel of international experts and policy practitioners at the country's request. The PSF Panel formulates recommendations to the national authorities on the reforms, which are necessary to improve and strengthen the quality of the national R&I system.

## *1.2 Aim of the Review and Key topics*

In July 2020, the Romanian Minister for Education and Research, Monica Cristina Anisie, addressed a letter to the Commissioner for Innovation, Research, Culture, Education and Youth, in which she requested the support of PSF for an independent review of Romania's R&I system. The PSF review was to support the Romanian authorities in designing and implementing reforms in the public science base in order to improve the quality and performance of the R&I system and accompany the country's integration into the European Research Area. Responding to this request, Commissioner Gabriel launched this PSF review in July 2021.

Romania has already benefited between 2016 and 2017 from a PSF Specific Support for developing a robust ecosystem to support Romanian innovation and entrepreneurship (European Commission 2017). The final report of that PSF exercise includes a wide range of recommendations for supporting start-ups and entrepreneurship. In addition, Romania benefitted from a recent OECD Review on Supporting Entrepreneurship and Innovation in Higher Education in Romania (OECD/EC 2019). Based on Romania's request, the current PSF exercise also takes a complementary angle by focusing on the public science base and its interface with the private sector.

The Romanian Government has set as a milestone in the National Reform and Resilience Plan (NRRP) to implement the majority of the recommendations from the current PSF Review by mid-2026.

*Upon the request from the Romanian authorities, the PSF review addressed the following five focus areas:*

1. Governance of the Romanian R&I system and structural changes: efficiency of public R&D funding; policy assessment of legislation related to public research institutes/organisations; assessment of R&I funding and performing bodies; assessment of Romanian current R&I policies and strategies; and evidence-based R&I policy making and funding;
2. Framework conditions for public research: incentives and barriers for public research organisations to conduct high quality research, incl. links with the private sector; human resources for R&I; brain drain vs. capacity building;
3. The internationalisation of the Romanian R&I system in an inclusive ERA (including participation to the EU Framework Programmes, other relevant EU/international cooperation initiatives and researchers' international mobility);
4. Public-private partnerships as key drivers for better innovation: efficiency of instruments used for improving public-private cooperation;
5. Efficiency, effectiveness and impact of the European Structural and Investment Funds in connection with the National R&D&I Plan (2015-2020).

### *1.3 Methodology*

The Country review was carried out by the PSF Panel, composed of six independent experts and two peer reviewers, policy-makers or funding agency representatives, all acting in their personal capacity.

The PSF Panel carried out its work from July 2021 until February 2022. It conducted two field visits in Romania from 27 to 29 September 2021 and from 13 to 15 December 2021. During the two visits, the PSF Panel interviewed about 160 representatives of 71 organisations (hereafter referred to as stakeholders). Stakeholders included R&I performers from both the public and private sectors, intermediary organisations in the R&I system, Secretaries of State, Members of the Parliament, public administration bodies at national and regional levels and experts. Together they cover the relevant components of the Romanian research and innovation system. Additional interviews, as well as email exchanges were performed by Panel Members during the mission (see list in Annex 1).

The PSF Panel was supported in its task by the new PSF Unit established in the Ministry of Research, Innovation and Digitalisation (MCID), in charge of providing information and ensuring the follow-up of the Panel's recommendations.

In addition to the in-depth discussions with various stakeholders and experts during the field visits and virtual interviews, the PSF Panel relied heavily on the

background report prepared specifically for this project (Șerbănică and Pupiniș 2021), as well as all available documents of either national or EU origin. The PSF Panel analysed quantitative data and qualitative information from national and international sources, relevant reports, strategies, legal documents and news releases. The references section at the end of the report lists the documents that are cited in the report or were analysed during the process.

The PSF Panel faced difficulties in acquiring a complete view of the policy mix for R&I in Romania, due to the fragmentation of sources and non-availability of some data needed for the analysis. The requested budgetary data was supplied by the MCID (PSF Unit). These are to be considered as proxies of the reality as it has not been possible to verify them in detail. Exchange rates for 2021 have been used throughout the analysis. Proposals for improvements on this front are part of the recommendations of the PSF Panel, in Chapter 3.

Advanced drafts of the new national strategy SNCISI and its implementation plan, and of the new programmes under Cohesion policy for the period 2021-2027 were made available to the Panel. These were not yet adopted officially during its mission, and all references to these documents have to be read with this situation in mind.

Relevant examples and lessons learned from good practices in other countries have been used to enrich the Panel's analyses and recommendations.

The analysis and recommendations provided in the report are based on the situation as of February 2022.

#### *1.4 Structure of the report*

The summary and main policy messages from the PSF Panel to the Romanian authorities are compiled at the front of the report. Each Key Policy Message is substantiated by an analysis found in the relevant chapters of this report.

Chapter 1 (this Chapter) presents the aim and methodology used for the Country review.

Chapter 2 presents a snapshot of the economic and R&I situation of the country, providing a backdrop for the PSF Panel's analyses. It also provides an overview of main strategies, institutions and key actors in the R&I system.

Chapters 3 to 7 present, for each issue, both the current situation, with assessment of strengths and weaknesses, and detailed recommendations for improving the situation. Each Chapter starts with a summary of the main conclusions reached in the analysis and of recommendations. The detailed analyses themselves follow in the body of the Chapters. All funding for R&I at governmental and agency levels.

Chapter 3 provides an assessment of the governance and coverage of the PSF Panel on Romania's strategies and the role of the various stakeholders in charge of policy design and implementation, and on the overall policy mix for R&I, also covering the questions of policy monitoring, evaluation and use of evidence base.

Chapter 4 deals with the framework conditions for the public research sector, covering the role, strategies and funding for actors in the higher education and public research organisations sector. It assesses the situation with respect to research infrastructure and the availability of skills for the research and knowledge-based development of Romania.

Chapter 5 addresses conditions, barriers and incentives for engaging in public-private cooperation in R&I. It also assesses the policy mix for supporting public-private cooperation in research.

Chapter 6 examines the internationalisation of the R&I system and actors and its integration into the ERA, and how this is promoted in Romania. It includes an assessment the mobility situation and incentives for researchers

Chapter 7 covers the role of Cohesion Policy Funds to support R&I in Romania, looking at general governance issues of these funds, the internal and external coherence of investments, practices for selection and funding of R&I projects as well as for monitoring and evaluation.

## 2 The Research and Innovation Context in Romania

This chapter provides an overview of the context for, and performance of Romania's research and innovation system (Section 2.1), and the governance and key actors of this system (Section 2.2).

### 2.1 Country context and general performance of the Romanian R&I system

**Romania, which joined the EU in 2007, is still undergoing a profound economic transformation process.** With a population of 19 million inhabitants, Romania is the second largest Central and Eastern European Member State, after Poland. After the fall of Ceausescu in 1989, Romania experienced a slower development than many other former communist countries in the region, and a slower pace of reforms.

During the decades of economic transition and integration with the EU, the country embarked on a transition from an industrial-agricultural economy to a services-based economy, but the basic structural changes are still ongoing. At present, despite a significant decline, the share of employment in agriculture, forestry and fishing in total employment (21.4% in 2020 but with low gross value-added contribution to the economy) is almost five times higher than the EU average (4.5% in 2020).

The share of employment in knowledge-intensive sectors is very low, even in EU13 comparison (Figure 4). Medium-high technology sectors (in particular the automotive and related sectors) are strong contributors to growth and exports. Foreign-owned companies account for three-quarters of exported goods and half of exported services. Romania has recently introduced a consumption-led growth model, supported by strong domestic demand, stimulated by tax cuts and large wage increases (EC 2020b). However low productivity in the economic sectors combined with increasing wage levels present a real threat to the country's competitiveness.

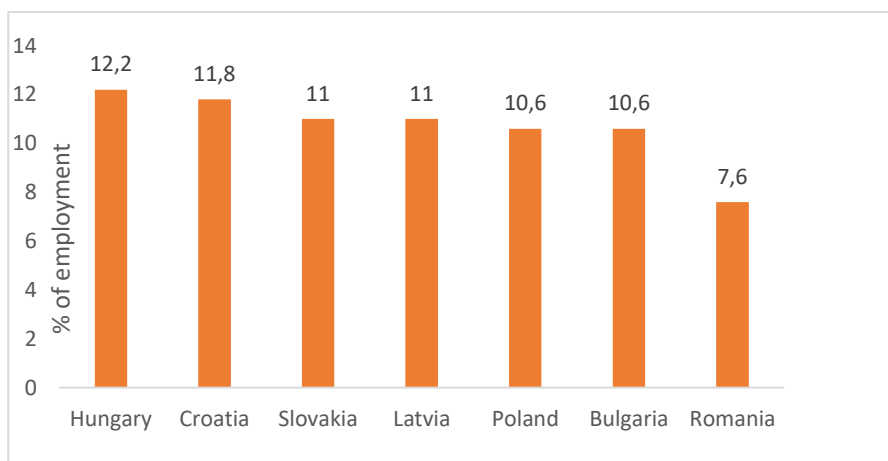


Figure 4 Employment in knowledge-intensive activities – Emerging innovators – 2021

Source: European Innovation Scoreboard, 2021 – EC (2021)



**Despite a fast-growing GDP, Romania remains amongst the poorest EU countries.** In 2021, GDP per capita was still much lower than the EU average, and below that of many EU13 countries (Figure 5). GDP per capita is converging with the EU average: Romanian GDP per capita measured in purchasing power standard (PPS) reached 71.5% of the EU27 average in 2020, up from 44.1% in 2007 (Șerbănică and Pupinis 2021, based on World Bank data).

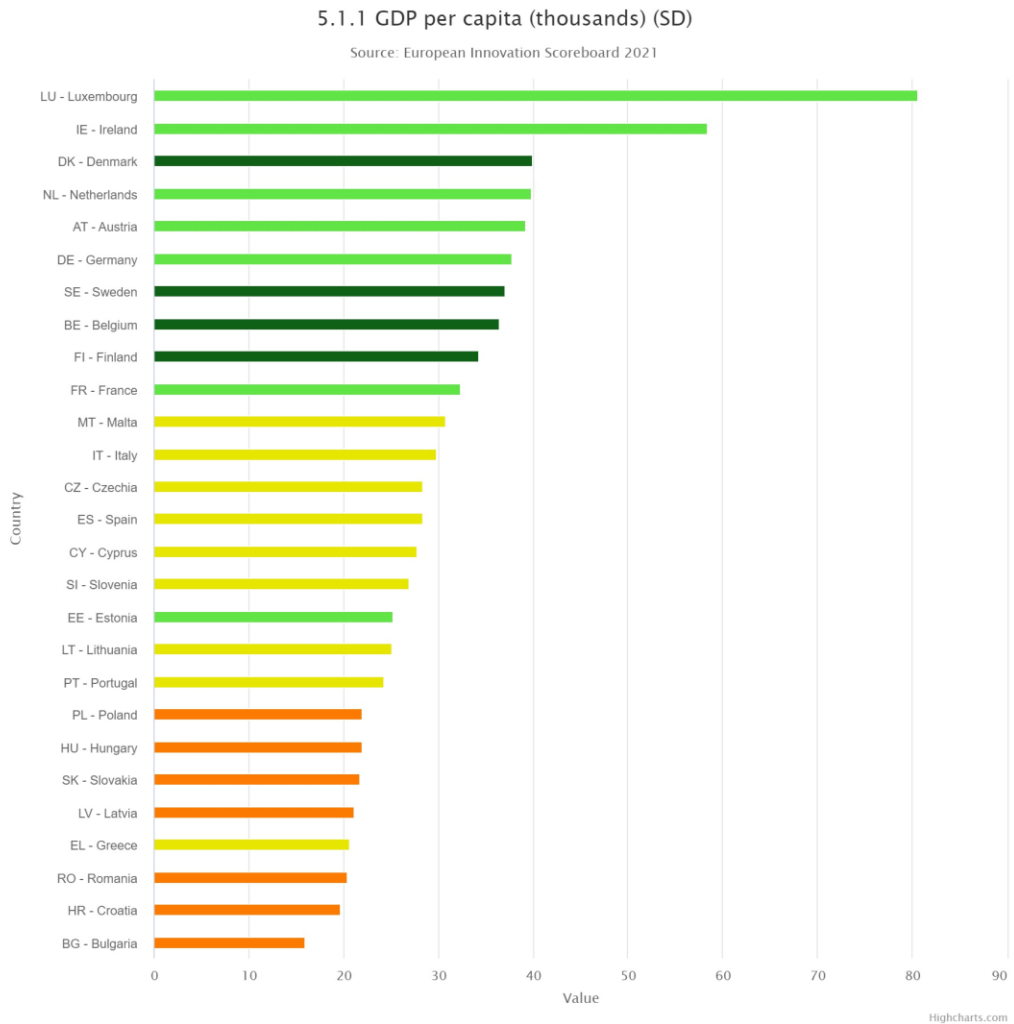


Figure 5 GDP per capita – thousands € – EU – 2021

Source: European Innovation Scoreboard, 2021 – EC (2021)

**One of the main challenges for the country is the strong depopulation trend.** The country is facing a severe and persistent negative population growth trend (Figure 6), due to strong emigration flows, affecting in particular the segment of the skilled labour force. The population has fallen from 22.4 million in 2000 to 19 million in 2021, with outward migration responsible for more than 75% of this decline (OECD 2019b). This trend accelerated when Romania accessed the EU in 2007, even if some restrictions on free mobility remained in place until 2014. Today a large Romanian diaspora exists in both EU and non-EU countries.

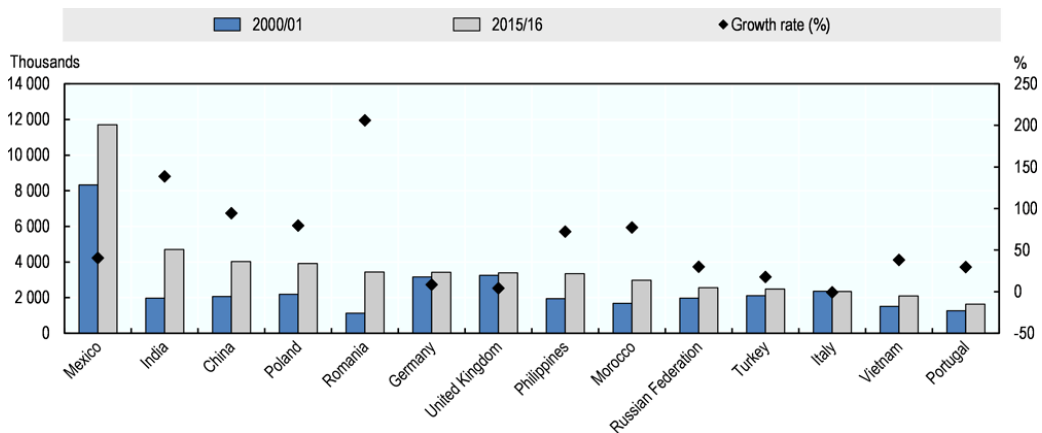


Figure 6 Total emigrant population aged 15 and above (left scale), growth 2000/01-2015/16 in percentages (right scale)

**The level of education of the Romanian population is low.** Romania is the EU country with the lowest level of achievements in terms of the tertiary education of its population (Figure 7). Similarly, Romania is at the bottom of the league of EU countries concerning the share of individuals with above basic digital skills (EC 2021).

### 1.1.2 Population with tertiary education (Regional)

Source: European Innovation Scoreboard 2021

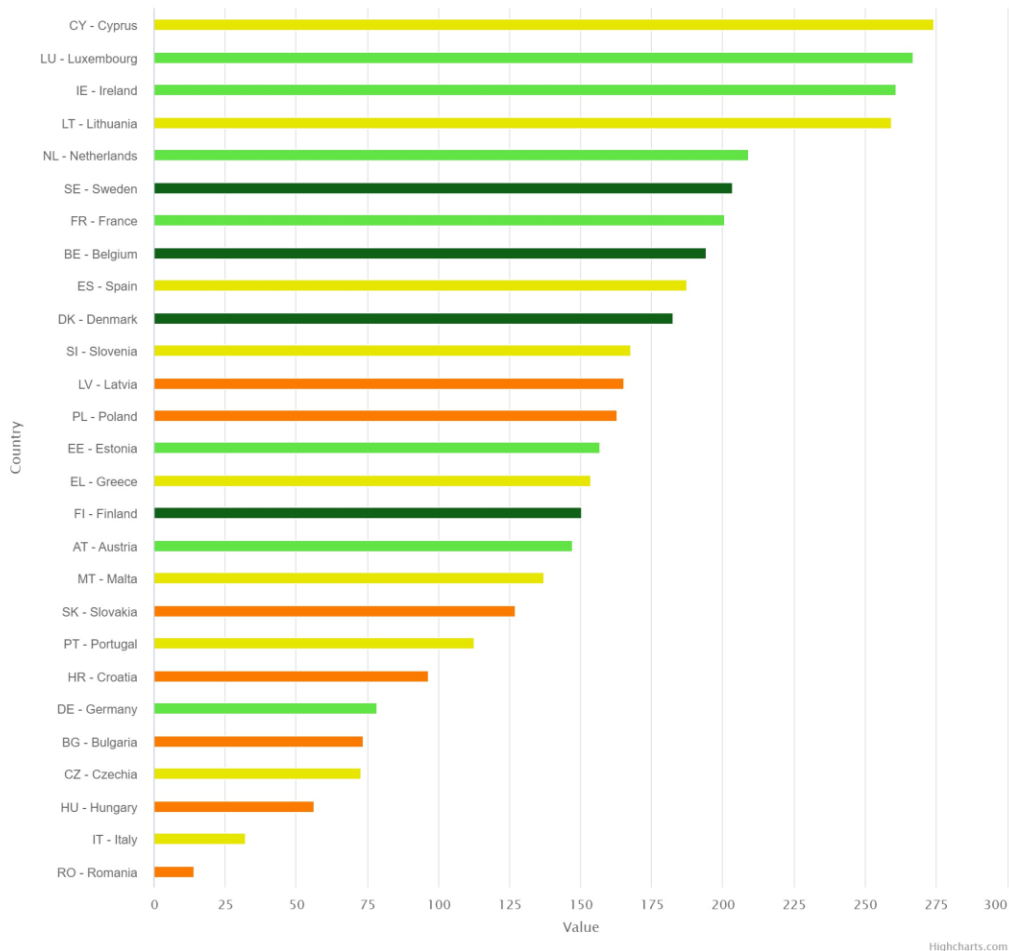


Figure 7 Population with tertiary education, European Union – 2021

Source: European Innovation Scoreboard, 2021 – EC (2021)

**Regional imbalances are high.** The country is composed of 8 (non-administrative) Development Regions. There are high disparities between the capital region and the other regions. In 2019, the GDP per inhabitant of the capital region, Bucharest-Ilfov, was 49,700 PPS per capita, more than three times higher than that of the poorest Romanian region, North-East (13,700 PPS per capita) (Șerbănică and Pupinis 2021). Cross-regional differences in income, in firms' concentration and investments are very large, and result in wide dispersion in the rates of development of the regions as well as socio-economic conditions for the populations living in the various parts of the country (Figure 8).

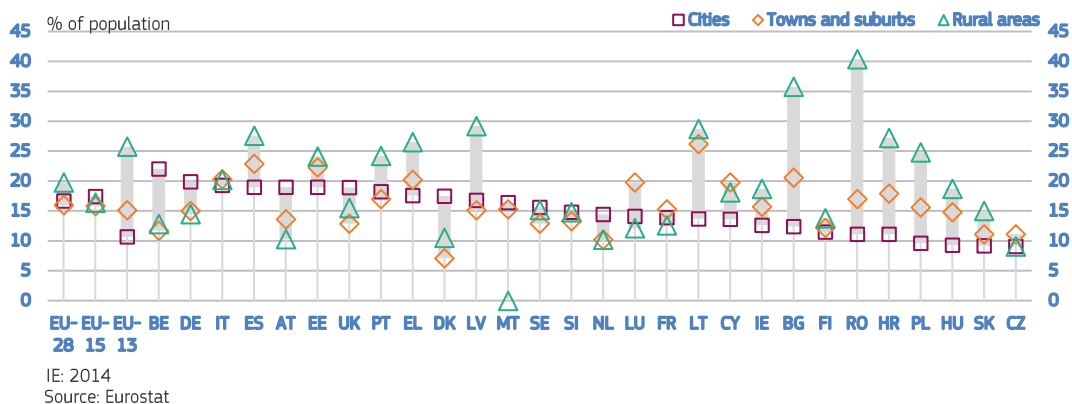
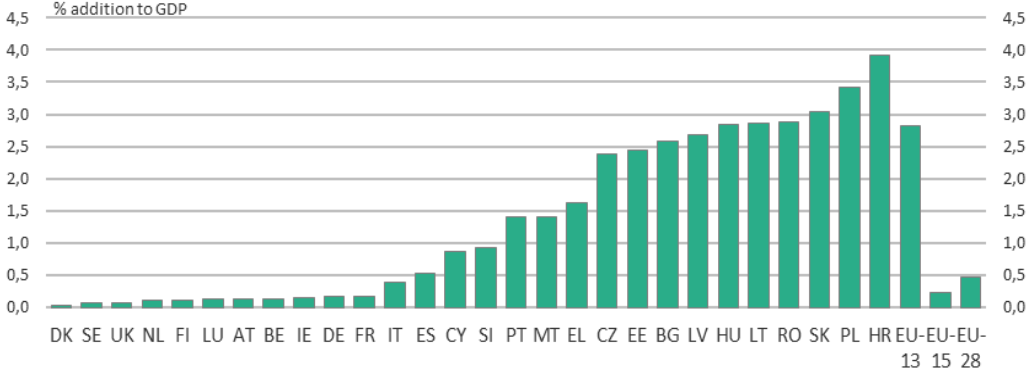


Figure 8 Share of population at risk of poverty and difference between cities, towns and sub-urbs and rural areas – EU – 2015

Source: EC (2020c)

**Romania is a large recipient of Cohesion Policy Funds.** In line with its low economic development status and its size, since its accession in 2007 Romania has received large absolute amounts of EU Cohesion Policy Funds which were aimed at supporting a more balanced socio-economic development and job creation in the different regions of the EU. According to EC estimates, Romania is one of the EU countries with the largest expected impact from Cohesion Policy Funds (Figure 9). The new National Recovery and Resilience Programme (NRRP) will add significant resources from the Cohesion Policy to Romania (almost €30bn, half in grants and half in loans).



Source: QUEST macroeconomic model

Figure 9 Estimation of impact of 2014-2020 EU Cohesion Policy programmes on Member States' GDP, 2023  
 Source: EC (2020c)

**Government effectiveness is lagging behind.** According to various analyses, the effectiveness of government, despite showing improvement over the last two decades, remains low in Romania (Figure 10). The country administration suffers from corrupt practices, and the population displays a lack of trust in the institutions.

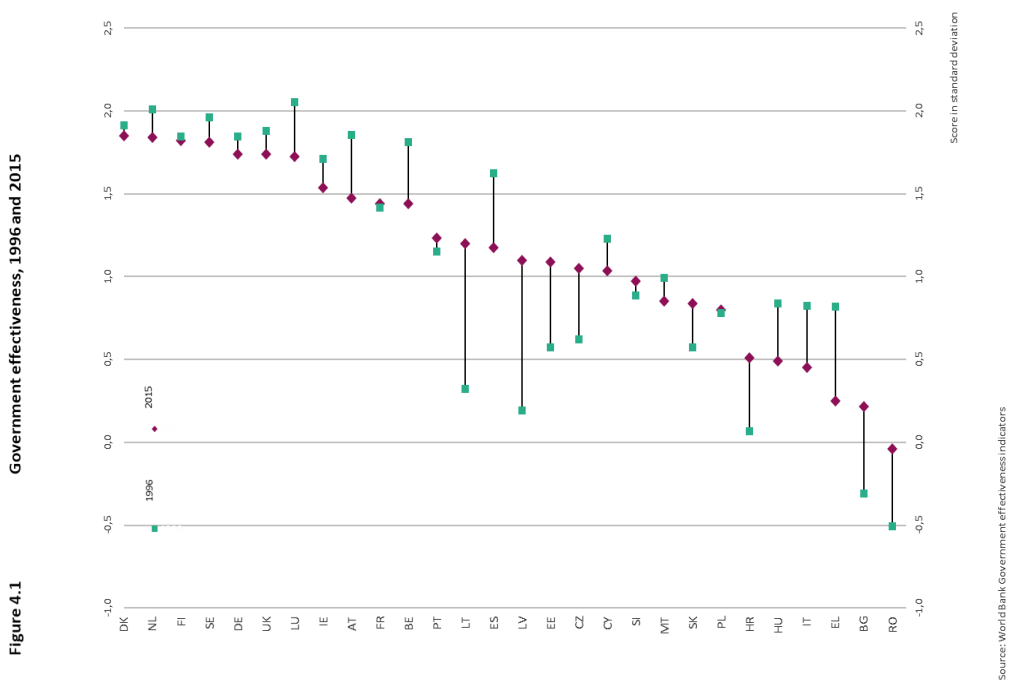


Figure 10 Index of government effectiveness – EU – 1996 and 2015

Source: EC (2020c)

**Romania has the lowest R&D intensity in the EU.** In 2020, R&D expenditure in Romania accounted for 0.47% of GDP, of which 0.19% was public R&D and 0.28% private R&D, well below the target set at 2%. Since 2000, R&D expenditure has increased by 1.4% annually, which is more than the EU average (1.1%), but less than most other EU13 countries (Table 1). Romania is also the Member State with the lowest government budgetary appropriations for R&D relative to GDP (GBARD/GDP).

Table 1 Situation of EU13 Member States with regard to the R&D intensity targets

EU13	R&D intensity 2020	Public R&D intensity 2020	Private R&D intensity 2020	R&D intensity CAGR (%) 2000 -2018	R&D intensity target 2020
Bulgaria	0.86	0.27	0.59	2.4	1.50
Czech Republic	1.99	0.77	1.22	3.1	1.1 (public sector)
Estonia	1.79	0.78	1.01	4.8	3
Croatia	1.27	0.66	0.61	0.1	1.4
Cyprus	0.85	0.37	0.39	5	0.5
Latvia	0.7	0.49	0.21	2.1	1.5
Lithuania	1.17	0.61	0.56	2.3	1.9
Hungary	1.62	0.37	1.24	4.4	1.8
Malta	0.66	0.24	0.42	0.8	2
Poland	1.39	0.52	0.88	3.6	1.70
<b>Romania</b>	<b>0.47</b>	<b>0.19</b>	<b>0.28</b>	<b>1.4</b>	<b>2</b>
Slovenia	2.15	0.56	1.59	0.4	3
Slovakia	0.92	0.42	0.5	1.5	1.20
EU27	2.32	0.78	1.54	1.1	3

Source: (Șerbănică and Pupinis 2021) based on Eurostat, GERD by sector of performance data on R&D intensity CAGR extracted from: EC (2020)

**The leading Romanian research-performing sector is the private sector.** R&D expenditures by the private sector have been steadily growing between 2014 and 2019, while R&D expenditures by the governmental sector remained more static. The Higher Education sector is responsible for only a minor share of R&D expenditures in Romania, at 0.04% in 2020 (Figure 11).

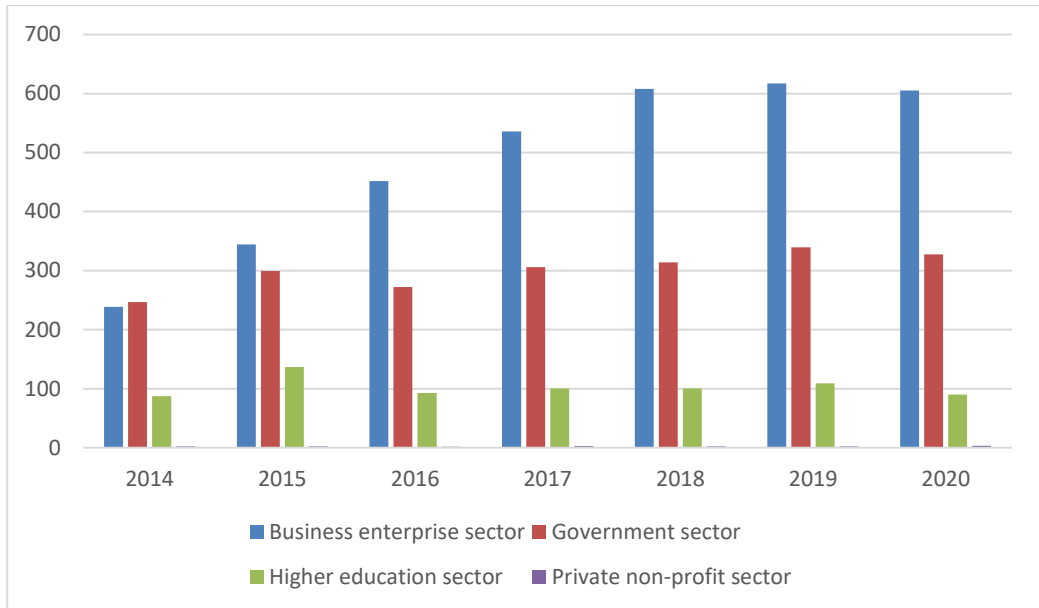


Figure 11 GERD by sectors of performance, Romania (€ million)

Source: Eurostat, GERD by sector of performance [rd\_e\_gerdtot]

**According to the European Innovation Scoreboard 2021, Romania is an emerging innovator,** whose performance relative to the EU has remained stable over time (EC 2021). Romania's strengths are in broadband penetration and in high-tech goods exports, where performance is equal to the EU27 average. Recent performance increases are observed for International scientific co-publications, most-cited publications, public-private co-publications, venture capital expenditures, employed ICT specialists, trademark and design applications, and sales impacts. The most problematic areas, where performance is particularly poor and deteriorating or stable, are the numbers of the population involved in lifelong learning, the level of the population with tertiary education, R&D expenditures in the public sector, and government support for business R&D.



**The performance of the Romanian public research system is lagging behind.** Romania ranks second-to-last in the EU in the Adjusted Research Excellence Index 2020, which is a composite of four components: share of top 10% most highly cited publications per total population, Patent Cooperation Treaty (PCT) patent applications per population, participation in Marie Skłodowska-Curie Actions (MSCA), and European Research Council (ERC) grants per public R&D initiative (Caperna 2020). Recent improvements in performance have been observed for scientific publications, but not for patent activity. On the indicator of the number of scientific publications amongst the 10% most cited – a measure of quality of the publications – Romania also ranks at the bottom of EU countries (Figure 12).

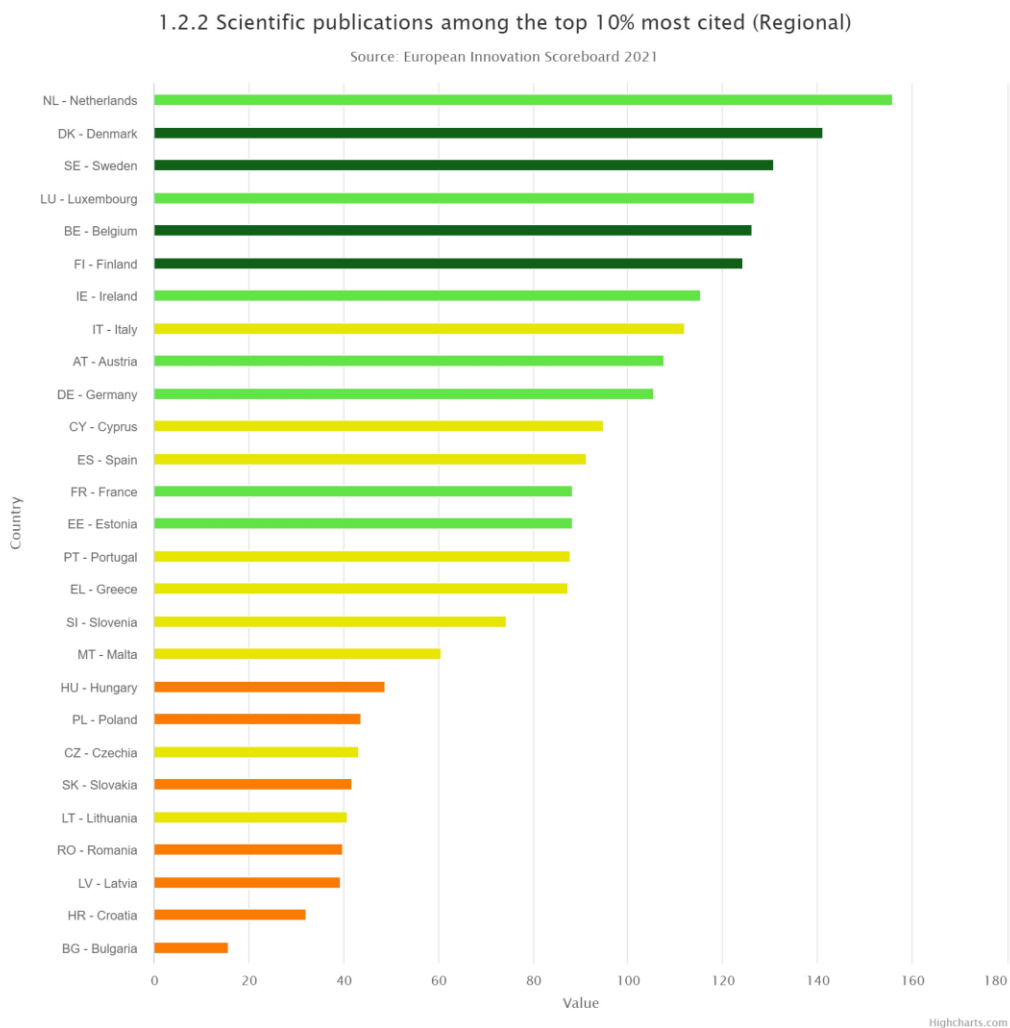


Figure 12 Scientific publications amongst the 10% most cited, European Union – 2021

Source: European Innovation Scoreboard, 2021 – EC (2021)

**Romania displays scientific strengths in the areas of engineering, electrical and electronics, material science and chemistry.** According to publications data, these fields are the ones that account for the largest share of publications from Romanian scientists. Life science and pharmacy appear at the lower end of the publications share (Figure 13).

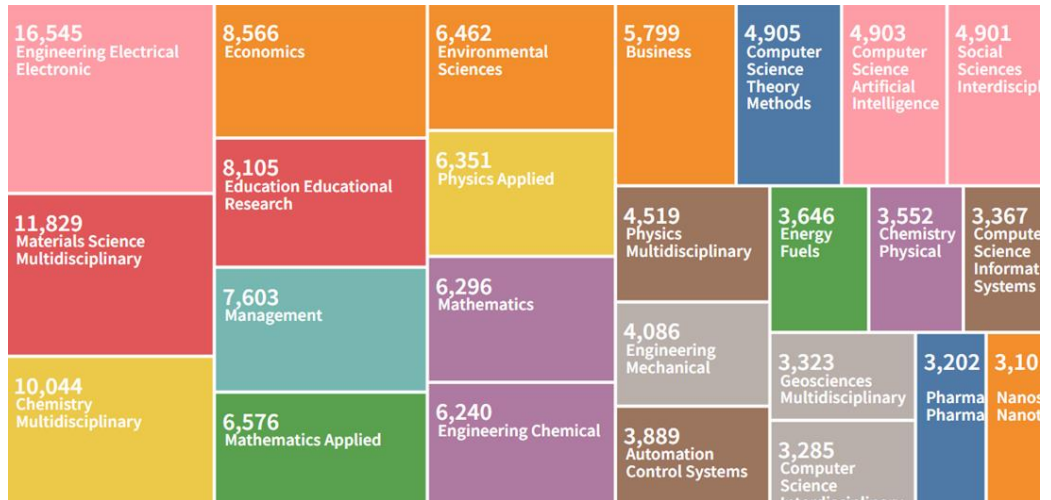


Figure 13 Top categories for publications under Web of Science – Romania – 2010-2020

Source: UEFISCDI, based on Web of Science: <https://www.webofscience.com/> (28.09.2021)

## *2.2 Institutions, funding sources, strategies and key research performers in the public sector in the R&I system*

### *2.2.1. Institutions and funding sources*

**The institutional framework for R&I has been changing in the past decades.** The governance system has been modified following governmental changes, involving the creation of new entities or the shift of responsibilities between existing ones. The current situation is displayed in Figure 14.

**The Commission(s) for Science, Innovation and Technology of the Chamber of Senate and the Chamber of Deputies of the Romanian Parliament have the mission to develop the legal framework and prepare the budget law.** In December 2020, the former Commission(s) for Education, Science, Youth and Sport of the Romanian Parliament were split, to better reflect the new organisation of the Romanian Government, with two different ministries being in charge of science, innovation and technology, on the one hand and education, on the other.

**The National Council for Science, Technology and Innovation Policy (CNPSTI) is a consultative body, under the Prime Minister, on R&I matters.** Its task is to advise the government in this field and follow-up and monitor strategy and policies. This body is not active (see Chapter 3).

**The State Authority for R&D in Romania is the Ministry of Research, Innovation and Digitization (MCID).** The MCID develops, updates and ensures the institutional framework for the implementation of the National Strategy for Research, Innovation and Smart Specialisation (SNCDI until 2021, SNCISI from 2022, and see below). It coordinates government policy at the national level, monitors the level of R&D activity, and conducts, in some cases, programmes or parts thereof. It establishes the strategic objectives included in the National Plan for Research, Development and Innovation (PNCDI), as well as some other specific instruments for the implementation of SNCDI/SNCISI in accordance with the priorities of the Government. MCID is advised by 6 consultative bodies (see Chapter 3).

**MCID is coordinating for 43 National R&D Institutes (INCD) and two specialised agencies, the Romanian Space Agency (ROSA), and the Institute of Atomic Physics (IFA).** MCID manages the CORE/NUCLEU funding programme for the INCDs. MCID shares the implementation of the National R&D&I Plan with UEFISCDI and two executive agencies: the Romanian Space Agency (ROSA), which coordinates the space activities in Romania and the participation in European and international space programmes; and the Institute of Atomic Physics (IFA), which coordinates and executes scientific research and technological development in the field of atomic and subatomic physics, and manages Romanian participation in international scientific partnerships in this field.

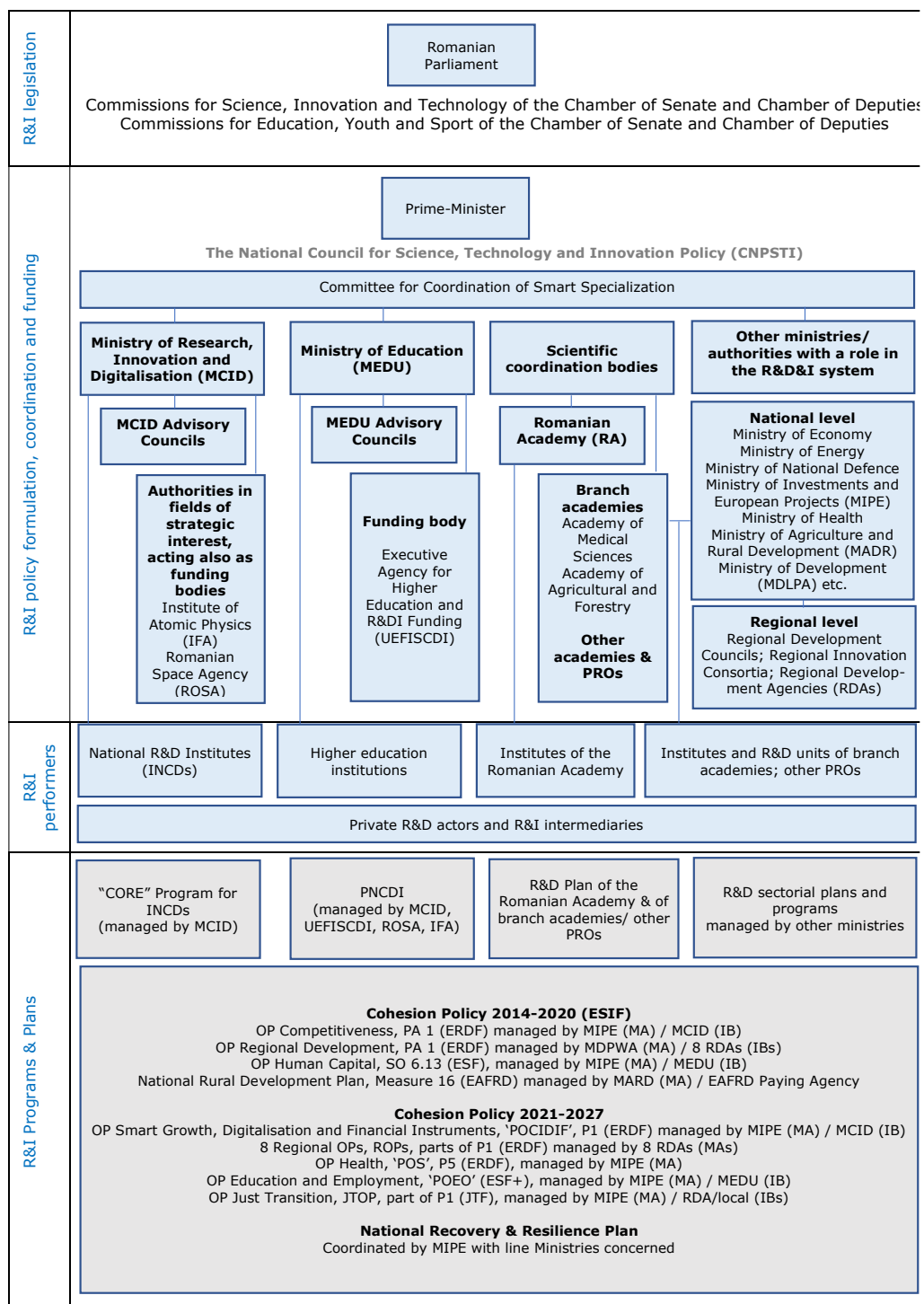


Figure 14 Institutional framework and governance of national R&I system – 2021

Source: Serbănică and Pupinis 2021, updated by PSF Panel

**The Romanian Academy (RA) functions autonomously.** The RA has its own chapter in the state budget, and its research institutes conduct their activities on the basis of their own research plans, under the direction of the scientific sections of the Academy.

**The Ministry of Education (ME) is the central public authority responsible for public education, training and scientific research at the universities.** ME manages the National Strategy for Tertiary Education 2015-2020, monitors the application of the Law of National Education, and allocates state funds for public universities, amongst other responsibilities. MEDU is supported by councils, agencies and consultative bodies.

**The Executive Agency for Higher Education and R&I funding (UEFISCDI), under ME, is the executive agency for part of the programmes of the National Research, Development and Innovation plan (PNCDI).** UEFISCDI manages some, but not all of PNCDI components based on a contract concluded with the National Authority for R&D/MCID. Along with the responsibilities for funding higher education and research, UEFISCDI is responsible for the coordination of various programmes and sub-programmes of PNCDI, such as "Human Resources", "Increasing the competitiveness of the Romanian economy through Research, Development and Innovation", "European and international cooperation", and "Fundamental and frontier research".

**Other Ministries play a role in the R&I system.**

- **The Ministry of Economy and Ministry of Entrepreneurship and Tourism** are responsible for strategic policy making, regulation and implementation in the fields of economy, industrial policies, competitiveness, intellectual property, inventions and trademarks, SMEs, entrepreneurship, trade, and foreign direct investments. The Ministry oversees the National Strategy for Competitiveness, the National Strategy for Exports, the government strategy for SMEs, and manages state aid support schemes. While it is not entrusted with responsibilities in research, its responsibilities are important with respect to fostering innovation.
- **The Ministry of Agriculture and Rural Development (MADR)** manages the R&D Sector Plan for Agriculture, the National R&D Strategy for the agro-food sector, and the National Rural Development Plan (including R&I measures for agricultural knowledge systems, cooperation for R&I, pilot projects etc.). The Academy of Agricultural and Forestry Sciences (ASAS) coordinates R&D activities in agriculture, forestry and food industry.
- **The Ministry of Health** coordinates the National Strategy for Health that has a specific objective related to the Promotion of R&I in Health
- The Academy of Medical Sciences (ASM) coordinates R&D activities in health sciences and biomedical research.
- **The Ministry of Investments and European Projects (MIPE) plays a central role in Cohesion Policy Funds, as well as for the National Recovery and Resilience Programme (NRRP).** For the 2014-2020 period, MIPE was the Managing Authority for four mainstream Cohesion Policy Operational Programmes (OPs) as well as being responsible for

coordination across all OPs. For 2021-2027, MIPE is the Managing Authority for seven OPs and coordinator for the implementation of the National Recovery and Resilience Plan (NRRP), in addition to retaining the overall coordination role. Several line ministries also play an important role as Intermediate Bodies for Cohesion Policy OPs (see Chapter 7).

- **Other ministries have specific roles in the R&I system.** The Ministry of National Defence manages the R&D Plan for Defence, the Ministry of Energy manages R&D programmes in energy, and the Ministry of Finance oversees R&D tax incentives.

**At regional level, the Regional Development Agencies are responsible for coordinating the design and implementation of regional development strategies and plans.** Romania has eight development regions at NUTS2 level, which have no legal and administrative status, but play an important role in the implementation of certain Cohesion Policy programmes: most notably the ERDF-funded Regional Operational Programme (ROP) during the 2007-2013 and 2014-2020 periods. Regional Development Councils are composed of the Presidents of the County Councils in each region. The Regional Development Agencies (RDAs) are the executive bodies of the Regional Development Councils. The RDAs act as Intermediate Bodies for the ROP 2014-2020 and will be Managing Authorities for the eight regional-level ROPs in 2021-2027 (see Chapter 7).

**Competitive international funding sources complement national funding under PNCDI and Cohesion Policy Funds** (see Chapter 6). Research performing actors in Romania obtain R&D funds from the European Research Framework programme as well as from programmes based on international collaboration agreements, the main one being the EEA-Norway grant scheme.

### *2.2.2. Strategies*

**The National Research, Development and Innovation Strategy (SNCDI) 2014-2020, has been the overarching policy document for R&I in Romania until the adoption of the new strategy - the National Strategy for R&I and Smart Specialisation 2021-2027 (SNCISI)** (see Chapter 3). The National Strategy sets out the vision, the general and specific objectives, the main lines of action that support the specific objectives, the targets and the governance framework over each period. It incorporates Romania's smart specialisation strategy (S3).

SNCDI had three general objectives: setting the ambition to increase the competitiveness of the Romanian economy through innovation; foster the contribution of the Romanian research to the progress of science; and strengthen the role of innovation.

The draft SNCISI mentions four goals: to develop the research system; to support innovation ecosystems associated with S3; to mobilise towards innovation and to deepen European and international collaboration. The strategies are implemented via the National Plan for Research, Development and Innovation (PNCDI III), European Structural Funds, Sector R&I plans of other Ministries (such as Agriculture, Health, Energy, and Defence) and the R&D Plan of the Romanian Academy and its units.

**Some programmes funded under EU Cohesion Policy, including the new NRRP, contribute to R&I funding in Romania** (see Chapter 7). Besides PNCDI, the SNCDI's implementation was supported over the period 2014-2020 by: the EU-funded Operational Programme "Competitiveness" (OPC), Priority Axis (PA) 1: "Research, Development and Innovation for supporting the business environment and competitiveness"; the Regional OP (ROP) - the SMEs competitiveness component; the OP Human Capital - the Education & Training component; the Rural Development Programme - the Knowledge transfer & Cooperation component.

The Cohesion Policy programmes for the period 2021-2027 are being prepared at the time of the release of this report, in parallel with the SNCISI, with a view to adoption in 2022. The NRRP provides for further additional funding to R&I in Romania for the period 2021-2026.

**The eight development regions have produced regional Smart Specialisation Strategies (S3).** The RDAs have elaborated and implemented their S3 and organise the entrepreneurial discovery processes, starting in the period 2014-2020. Each region has set up a Regional Innovation Consortium, with a consultative role for S3 processes. Regional Smart Specialisation Strategies were approved by the Regional Development Councils and related actions funded under the ROP 2014-2020. Under the eight ROPs in preparation for 2021-2027, new regional S3s, recently approved by the Regional Development Councils, will form part of the enabling condition to access Cohesion Policy Funds under Policy Objective 1.

### *2.2.3. Key research performers in the public sector*

**The public research system in Romania includes four pillars.** The four pillars are: Higher Education Institutions (HEIs); National R&D Institutes (INCDs); Institutes from branch academies; and Institutes from the Romanian Academy (RA).

**Romania has 55 public higher education institutions (HEIs) (407 faculties) and 35 private higher education institutions (139 faculties).** They receive funding from the Ministry of Education. Starting with the 2005/2006 academic year, all higher education institutions in Romania implement the 3-cycle structure: Bachelor, Master and Doctorate. Law 1/2011 refers to three categories of universities: education-focused universities, education and scientific research universities (or education and arts universities) and advanced research and education universities (Art. 193). Only 12 HEIs were included in the category of advanced research and education following the 2011-2012 classification exercise.

**Romania has 43 National R&D Institutes (INCDs) under the coordination of MCID.** Most INCDs are active in technical and engineering fields. Some other INCDs are under the coordination of other ministries. MCID ensures institutional funding for the INCDs operating under its coordination, through the CORE/NUCLEU Programme.

**Institutes from branch academies conduct their own scientific and research activities in specific fields of science – mainly medicine and agriculture and forestry.** Academies of Medical Science (ASM) and Academies of Agricultural and Forestry (ASAS), managed by their respective Ministries, develop R&D sector plans and coordinate the R&D activities of the various institutes of the Branch Academies.

**The Romanian Academy (RA) has 51 research institutes and 18 research centres.** Institutes from the Romanian Academy are funded directly by the State budget and operate under the direction of scientific sections of the Academy. The Romanian Academy also organises postgraduate, doctoral and postdoctoral studies.



### 3 Governance and Funding of The Romanian R&I System

This chapter provides an assessment and recommendations for the governance and overall funding for R&I in the public sector at governmental and agency levels. It provides an overview and assessment of: key strategies and coordination of the R&I system at strategic level (Section 3.1); the funding mechanisms and the overall policy mix for R&I with a focus on the public research sector (Section 3.2); and policy monitoring, evaluation and the use of the evidence base in both strategy and funding (Section 3.3).

#### **GOVERNANCE AND FUNDING OF THE ROMANIAN R&I SYSTEM**

##### **Key conclusions and recommendations**

- **Governmental vision on the role of science and research for society could be strengthened.** The rationale for investing in science, research and innovation is not fully articulated in Romania. Further high-level commitment to science, research and innovation across the government is required, because it is a driver for increased competitiveness and sustained economic development. However, at this point in time, it is not clear that the country prioritises investments in research as a key element of a strategy towards increased and sustainable growth. For the R&I system to perform it would be necessary to improve predictability in funding, to increase trust, and to ensure congruence between strategic intentions and their implementation. Sustained high levels of instability would be harmful for any research and innovation system, and it is critically important that all elements in a tiered system are committed and well-articulated. The role of existing bodies should be clarified and coordinated in order to ensure a consistent and coherent overall promotion and coordination of the R&I system including SNCISI, Cohesion Policy Funds and NRRP.
- **Governance of Romania's research system is challenged by incoherencies in horizontal and vertical coordination.** Romania has elements of strength in its research and innovation system, but these qualities do not integrate into a coherent system. The country has developed a new strategy for the system taking into account the view of important stakeholders predominantly from the public science system. However, horizontal coordination across Ministries and Agencies involved, as well as vertical coordination between the regions and the state could be improved to reduce the fragmentation in funding and in activities of the public R&D performing system. A dichotomous view is one in which "Strategic Research Agendas" are developed from a national-level perspective. Smart specialisation domains are mostly seen as relevant from a regional perspective, and this involves the risk of research performers at national level overlooking opportunities for interactions with the regional ecosystems. Current efforts to link strategies (S3) at regional and

national levels are paving the way for further vertical coordination in the system, it would be beneficial in the future if these efforts were combined with a similar horizontal action. Increased cohesion in the R&D system is a prerequisite for the effective use of human and financial resources. Recently an Inter-Institutional Committee at the level of state-secretaries, coordinated by MCID, has begun to meet: this provides a step forward in system coordination.

**Recommendation 1.1: Strengthen the national vision for investment in R&I and coordination in the system through concerted action between the President's and the Prime Minister's offices, and with the engagement of key Ministers and Ministries.** The primary Ministries to involve are: Ministry of Research, Innovation and Digitalisation (MCID), Ministry of Education (ME), Ministry of Investments and European Projects (MIPE), Ministry of Finance, Ministry of Economy, Ministry of Entrepreneurship and Tourism, Ministry of Agriculture and Rural Development (MADR) and Ministry of Health.

**Recommendation 1.2: Establish a single R&I Coordination Structure for the whole system, with adequate executive capacity under Reform 2 of the NRRP.** A system could be developed to ensure good articulation, horizontal and vertical coordination, as well as effective implementation of the science, technology and innovation strategies, covering all funding sources. At the political level this could be the inter-Ministerial Committee under the Prime Minister, coordinated by MCID in close association with MIPE. At the implementation level this could be a development of the Committee for Coordination of Smart Specialisation (CCSI). The executive structure should cover both national and Cohesion Policy programmes, and be appropriately empowered and resourced to implement complex coordination measures with national and regional dimensions, including synchronisation of calls between programmes, mutualisation of specialist expertise, enhanced monitoring between programmes, improved data collection at relevant territorial levels and proactive problem-solving-type monitoring approaches.

- **The effectiveness and wide endorsement of the new strategy is yet to be achieved.** To this aim, it is necessary to keep the strategy process, also during implementation, as open as possible. Despite wide consultation efforts deployed for SNCISI and S3 preparation, the strategy preparation process at national level might have involved more independent stakeholders with different views to the future such as younger researchers and entrepreneurs and representatives of civil society. A positive element is the development of Strategic Research Agendas through consultative processes, centred on the public research sector. Recent efforts at the regional level to involve a wider set of stakeholders in an Entrepreneurial Discovery Process pave the way towards more inclusive processes.

**Recommendation 1.3:** Establish a public debate on the implementation of the new strategy and on a vision of 'science for society', in all major cities and with engagement from national, regional and social media. Establish a sounding board representing the voice of stakeholders (from the quadruple helix, not only from public research system) to support the relevance of the R&I activities. This could be done in many ways, for example inviting the general public to open days at research institutes and universities, inviting young researchers to public debates, inviting people for facilitated webinars etc. The necessary incentives (minor funding) must be available for the organisers. The national level would benefit from having a sounding board representing the voice of stakeholders (from the quadruple helix, not only from public research system) to support the relevance of the R&I activities. This could be facilitated by establishing a permanent advisory body for MCID with membership spanning beyond the research community and including, for example, science journalists, directors of innovation from business and industry, and academia etc.

- **Public funding streams for R&I are characterised by instability and unpredictability.** Uncertainty about which resources are available and when these are being disbursed destabilises and may constrict the system. The lack of a proper long term (multiannual) research budget at the national level, not abiding by previous budget commitments (for specific funding programmes), the ad hoc and infrequent launch of calls, are burdens for the system. This causes many players to become defensive, short-term oriented and less likely to collaborate across structures or with other players. In addition, frequent serious delays in disbursing allocated resources cause interruption of activities, hesitation to take action and results in an ineffective system. This can result in a loss of momentum and less than desired innovative activity. With the exception of the Romanian Academy structure, the system is characterized by an inherent "stop and go" culture in which too much time is spent waiting for even basic resources to flow. The situation is detrimental for research activities that by nature need continuity and dedication in order to be effective and productive.

**Recommendation 2.1:** Ensure multi-year funding and regular, predictable funding streams for the R&I system, both for institutional and competitive funding. Establish practices of ex-ante funding to public research organisations and enable transfer of unspent funding to subsequent years. Predictability of the calendars adopted for public funding streams needs to be achieved, both at the stage of calls launch, and at the stage of project launch and deployment (including regular disbursement of funds), and should be communicated to stakeholders. Funds being made available at the beginning of each year should become the norm, with regular disbursement of funds beginning in

the first day of the fiscal year. Flexibility should be allowed to transfer funds over the next fiscal year.

- **There is imbalance between funding for the foundation of the research system and competitive and external funding sources.** There is insufficient institutional funding for all parts of the public research system. Investments in research infrastructure have been important but are not matched by sufficient funding for projects and human resources. It is impossible to capitalise on infrastructure and equipment investments without sufficient numbers of well-trained people. While human resources, in particular, early career researchers such as doctoral students and post docs, with competitive grants ensure efficiency and resources for the most successful researchers and research units, it is evident that a research system must rest on a predictable and solid structural base.
- **Public funding is insufficiently geared toward impacts.** Public funding is geared towards serving the needs of the research community and insufficient consideration is paid to the potential impact of research on society.

**Recommendation 2.2: Revise the overall policy mix in two directions: ensuring sufficient institutional funding and reforming funding mechanisms to ensure increased impact-orientation.** Revisit the balances in the country's total R&I budget and prioritise the financial support of the foundations of Romania's research system in the form of adequate institutional funding. More impact-orientation requires a priority placed on funding those developments that are conducive to exploitation, linking research actors to users and stakeholders such as companies as well as cities or hospitals, and societal groups) - the latter being the ones that are faced directly with the societal challenges and need R&I to respond to these.

- **Establishing a national Monitoring and Evaluation (M&E) system covering the whole R&I system is a welcome and much needed initiative.** While implementing the country's new strategy and improving focus and funding for research units it would, for accountability reasons, also be necessary to develop a coherent M&E system covering the whole R&I system. The SNCISI foresees such a mechanism, involving interoperability between the various existing systems: this is a significant step forward for harmonised monitoring of R&I interventions in the 2021-2027 period. It is very important to establish a system for the systematic collection of data in accordance with a common protocol for all research entities in Romania. The UEFISCDI's monitoring system only includes a limited part of the public research sphere, and other policy-relevant information is collected elsewhere in different format by MCID, the RA, ME, MIPE, etc. As a consequence, there is limited systemic overview. The evaluation component could be organised by the same

body in charge of monitoring, provided that it relies on independent experts.

**Recommendation 3.1: Design and implement the envisaged all-encompassing monitoring system for R&I, based on the interoperability of national and Cohesion Funds systems.** On the national front, the UEFISCDI's monitoring system is a first step in this direction, and it would not be a good use of scarce human resources and know how to duplicate this effort. At the same time, it would be beneficial for the efficiency of the system if results and impact studies were institutionalised and fed directly into corrective measures to the implementation of the national plan SNCISI. It is recommended to establish a national database with longitudinal data sets.

- **As a newly established Ministry, MCID would benefit from an observatory to track and analyse R&I data and trends.** Decisions, both at the strategic level and at the implementation level, are not sufficiently supported by policy-oriented evidence, such as smart monitoring data, insights from independent evaluations, and analyses by domains. While evidence from independent evaluation of Cohesion Policy OPs is clearly taken into account, the same cannot be said for national programmes. The identification of technological trends and foresight activities are already part of UEFISCDI's activities and have been used during consultations for SNCISI and S3 preparation. These should be reinforced to serve the ongoing needs of the MCID in terms of policy implementation, and also to further refine and update S3 priority domains where Romania's R&I system can excel. As an emerging innovator, it is important for Romania to keep abreast of the developments in other knowledge societies and place the Romanian research and innovation system into the international landscape.

**Recommendation 3.2: Establish an R&I Observatory, to map Romania's best R&I strengths in an international context and study national developments in light of EU and international trends.** A Romanian R&I Observatory could collect statistical data from international databases, analyse them in the Romanian context, and map Romania's position. The information should be shared with policy makers and the public.

- **Institutional capacity and professional support are limited both at government and institutional levels.** In spite of all the positive intentions to ensure good-will in the system, the administrative capacity of public administration within the Romanian research system such as MCID, ME, and UEFISCDI is a major limiting factor of any changes and proper implementation of the research policy. Evidence of understaffing, unattractive conditions for public servants (low pay, bad working conditions and low level of infrastructure such as internet connection, and computers) and the

lack of an adequately skilled staff is visible. This is true not only for the research and development policy, but it is also a generic problem of Romanian public administration, that is clear even after more than 11 years since Romanian accession to the European Union. Additionally, the level of digitalisation of funding processes (from call documentation in machine readable format to reporting) is rather low. It was observed that responsible leaders and managers often seem to lack sufficient professional support, particularly for policy design, implementation and M&E. It is unclear whether sufficient analytic capacity is available and used. The decision-making system in general appears highly hierarchical and seems not to be governed through trust and with sufficient delegation of authority. This leads to overly bureaucratic processes, reluctance in decision-making at lower levels, and reduced implementation capacity.

**Recommendation 3.3: Strengthen institutional capacities, by investing more resources for capacity development and ensuring good performance-related working conditions, including effective delegation of authority and up-to-date digitalisation.** Resources are foreseen under Cohesion Policy and the NRRP for supporting capacity building. Capacity development may consist of advanced training, staff retention and exchange policies, additional hiring, work (re)organisation, transnational learning activities, and others. Any investment in capacity building should include a plan for knowledge dissemination and retention within the institution. All bodies implementing research policy in Romania should have proper staffing, an adequate salary and good working conditions.

### *3.1 Strategies and coordination at the system level*

#### *3.1.1. Introduction*

**The Romanian R&I system under-performs relative to the potential of the country and to its European peers, although several individual elements show excellent performance and high research quality.** As depicted in Chapter 2, this system is too small compared to similar countries both in the number of individuals performing R&D activities and in terms of the size of R&D investments. At the same time there are a high number of public research units implementing R&D under MCID, ME, RA and a variety of other ministries, which makes the system complex.

**The Romanian R&I system is the product of historical development and is in need of deep reform.** A complex system structure has developed over time, perhaps simply by proliferation (see details in Chapter 4). It displays a certain level of inertia. Existing elements in the system are being defended by some stakeholders, although they seem to have lost their rationale or simply have become redundant. Decision makers have been reluctant to engage in a

deep reform effort. This situation, paired with a very low level of public investment and unpredictability in programmes, results in a shallow and ineffective national innovation system, which is unlikely to support any sustained innovation and growth of the Romanian economy.

**Governance of the R&I system is not coherent, and a consequence has been a lack of stability, discontinuity of funding streams and mismatch between funding expectations and implementation.** For the R&I system to perform it would be necessary to improve predictability in funding; to increase trust; and to ensure congruence between strategic intentions and their implementation. Continued high levels of instability would be harmful for any research system. In addition, chronic underfunding hinders policy effectiveness and performance improvement, and inadequate financing is curbing the deployment of Romania's potential, forming a vicious circle. As a consequence, decision-making in research-performing units is at best limited to the basic maintenance of elements. However, there are strengths in the system (see Chapter 4), good examples of public-private cooperation in R&I (see Chapter 5), as well as actors who are performing well on the international scale (see Chapter 6), which could be capitalized upon.

### *3.1.2. Status of R&I in overall governmental strategies*

**Governmental vision on the role of science and research for society could be strengthened.** The main resource for a country's growth is its human and cultural capital, but this rationale for investing in science and research is not fully articulated in Romania. Further, high-level commitment to science, research and innovation across the government is essential because it is a fundamental driver of increased competitiveness and sustained economic development. However, at this point in time, it is not clear that the country prioritises investments in research as a key element of a strategy towards increased and sustainable growth.

**The Government's Programme 2020-2024 reaffirms the ambition to reach a 2% R&D intensity by 2024 and its commitment to reforms.** This was already set as a goal for 2020 by SNCDI, but it was not achieved. The SNCISI again sets this goal to reach a ratio of GERD/GDP of 2% (1% of the GDP public R&D and 1% of the GDP private R&D) by 2027. Government's objectives for the R&I sector refer to structural changes in the national R&I system, improving the framework conditions for public research and stimulating public-private partnerships.

**There is a strong case for building more coherent leadership on R&I at the level of government.** Both the President and the Prime Minister have advisers on R&I matters, however, there seems to be room for raising the game. The National Council for Science, Technology and Innovation Policy has never been active. The Ministerial portfolios as well as the structure of the Ministries change frequently, making coordination more difficult. At strategic levels compartmentalization obscures the purpose of Romania's R&I system.

The members of the Parliament committees have not yet succeeded in promoting a convincing argumentation of how a well-functioning R&I system can contribute to the country's competitiveness, to the growth of the economy, and bring about societal benefits more generally. At the political level a certain degree of distrust exists and there is a belief that stakeholders from the sector convey self-serving arguments rather than objective advice into the political process.

The network of advisory bodies is confusing and several so-called 'advisory bodies' are, in fact, performing policy implementation tasks. Some committees have never functioned, or only on an intermittent basis and others have operated under shifting mandates; none seems to have had sustained political support.

**There is disconnection between intentions enshrined in governmental plans and strategies, on the one hand and budget and action, on the other.** The Institutional Strategic Plan – which, according to the legislation in force, is the main planning tool at the level of public authorities – does not allow a clear correlation between the strategic objectives of the Ministry in charge of Research and the budgetary allocations for R&D. This often results in confusion between aim, strategy, budgets, implementation, and follow-up.

The Ministry has not ensured the predictability of funding, nor operationalized the governance framework of the SNCDI, with negative consequences in terms of the elaboration and implementation of R&I policies. Although the strategy included a vision, objectives and actions, the linkages between these elements were not sufficiently articulated with funding opportunities in PNCDI. Intermediary targets beyond the very general ones presented in its Chapter 5, are missing, preventing a clear view on the overall intervention logic of the strategy. At the end of 2020, the total actual allocations of the PNCDI amounted to barely 10% of the planned budget (according to MCID data, see section 3.2).

**Most players in the system have a shared view of the weaknesses of the system, however none of them seems to hold the keys to unlock the system.** The number, and degree of influence of 'agents of change', is too small to successfully implement the dialogue between the different stakeholders and push for actual reforms. It would not be an effective strategy to once again set promising targets for investment levels without simultaneously evaluating and possibly simplifying the system.

### *3.1.3. Strategic capacity*

**Institutional capacity and professional support are still limited both at government and institutional levels.** It was observed that responsible leaders and managers often lack sufficient professionally trained support, particularly for policy design, implementation management and adjustment, and Monitoring and Evaluation (M&E) capabilities. Despite the good work carried out by UEFISCDI, it is unclear whether sufficient analytic capacity is available and used. The decision-making system in general appears very hierarchical, and seems not to be governed by trust and with delegation of authority.

In addition, existing professional support staff often seem not to enjoy much leverage beyond narrowly defined tasks. This leads to overly bureaucratic



processes and reluctance in decision-making at lower levels. No evidence for systematically ensuring the professionalism of the existing staff, nor recruiting a new stock of staff, managers and leaders is apparent. Recently hired staff are recruited from academia without additional professional training. This situation still holds despite past efforts devoted under Cohesion Policy Technical Assistance (the 'SIPCOCA' programme in 2014-2020). The next period for Cohesion policy (2021-2027) will provide further support under Technical Assistance as well as the NRRP.

#### 3.1.4. Horizontal coordination

**The SNCDI 2014-2020 was designed and implemented in parallel with two other important strategies.** The two governmental strategies that were most closely linked to SNCDI are:

- **The National Strategy for Competitiveness 2014-2020 (SNC):** this strategy, coordinated by the Ministry of Economy, aimed at coordinating the competitiveness of interventions and taking into account the national areas of excellence. SNC identifies 10 economic sectors with competitive potential. It has five strategic priorities related to (i) improving the regulatory environment; (ii) strengthening the partnerships between the public and the private sector; (iii) advancing the supporting factors and the support services (iv) promoting the 10 economic sectors with competitive potential; and (v) preparing the Generation 2050 and addressing societal challenges. It is complemented by a Government Strategy for the SME sector and business environment.
- **The Strategic Policy Framework for Education and Training and the National Strategy for Tertiary Education 2015-2020.** The long-term objective of this Strategy is to contribute to the Government of Romania's efforts to support economic growth, productivity increases and social cohesion by investing in human capital and research, as a precondition for a knowledge-based economy. The Strategy is structured around three pillars: (i) improving participation in tertiary education, (ii) flexible, relevant and high-quality programmes; and (iii) strategic commitment to the economic sector. Among others, the strategy aims to increase the quality of the study programmes, especially in the areas with relevance for the (10) sectors of competitive advantage (defined by the SNC) and for the Romanian smart specialisation areas (defined by SNCDI) and to increase the quality and relevance of the doctoral and post-doctoral programmes.

**There is a lack of horizontal coordination for the R&I system, aggravated by split of responsibility for R&I activities between several line ministries and the Romanian Academy.** The separation of advanced education and research in two ministries is unfortunate, and it remains to be seen how the newly established MCID will perform its mandate. The effectiveness of the research and innovation system depends largely on how well human and physical resources are being integrated. There have been frequent institutional changes in the Central Authority for R&D, which have impacted strongly on the quality of governance. Policy ambitions and capacities are not aligned. Furthermore, the

Romanian Academy has its own budget line and plays an independent role, disconnected from the responsibilities of MCID.

**The National Council for Science, Technology and Innovation Policy (CNPSTI), acting at policy level, has not been active for a long time,** despite the fact that its role and function are established in both the Law on Research and the SNCDI 2014-2020. CNPSTI, gathering the Ministers with competencies relevant for the R&I system, should have worked as a consultative body under the Prime Minister, and should have monitored and evaluated the implementation of the SNCDI and the evolution of the national R&I system as a whole. Typically, such a body would have to be accompanied by a body tasked with overseeing the implementation of the strategic decisions of CNSPTI and be supported by an R&I Policy Unit.

**Recently an Inter-Institutional Committee at the level of state-secretaries has begun to operate at the strategic level.** The Committee is coordinated by MCID, and it is defined as the main inter-ministerial body to coordinate the full implementation of the National Plan. The Inter-Institutional Committee is intended to support the PSF Reform Implementation Unit in implementing the NRRP. The PSF unit works with the General Secretariat of the Government in order to operationalize the National Plan. MCID/PSF unit will work with the Ministry of Finance on the legislative proposal to amend HG 1265/2004, which aims at creating a favourable environment for public and private investments in RDI. Provided it is well supported and empowered, such a body could potentially play a positive role in the horizontal coordination of R&I policy.

**The Committee for Coordination of Smart Specialisation (CCSI) is active and can potentially play a horizontal as well as vertical coordination role at the implementation level.** This Committee is one of the MCID consultative bodies, created in 2019, to respond to the 2021-2027 EU Cohesion Policy Enabling Condition related to the governance of S3, under Policy Objective 1. The Enabling Condition also foresees that the implementation of the strategy should be adequately monitored. CCSI has a horizontal composition as it includes representatives of MCID, ME, Ministry of Economy, Ministry of Agriculture, Ministry of Development and MIPE and it also involves the regions through the RDAs. According to interviews, the CCSI has been created with a view of supporting the programming stage only, not the implementation stage. It could potentially play a positive coordination role at the implementation level, complementing that of the Inter-Institutional Committee at the strategic level.

**The position of UEFISCDI under ME may limit the agency's potential.** The place of UEFISCDI as an agency for funding research, under the Ministry of Education is questionable: while this may facilitate the inclusion of university (fundamental and applied) research in the R&I system, it however complicates the implementation of directional (strategic) research programs or public-private cooperative programmes under the responsibility of MCID. Today UEFISCDI covers many but not all R&I programmes at play in Romania, and the process of establishing a coherent set of institutionalized bodies for funding research activities is incomplete. This hampers the overarching role that MCID is supposed to play with respect to R&I activities in Romania.

### *3.1.5. Strategic developments and prioritisation*

**Thematic priorities defined under the SNCDI via Smart Specialisation (S3) were not sufficiently aligned with those in the SNC and education and training strategies nor with research priorities.** Under S3, a large foresight process, coordinated by a consortium of relevant public and private institutions, was carried out in order to start the definition process for the R&I priorities, including the smart specialisation priorities and the priorities of public interest. The S3 priorities were: Bio-economy; ICT, Space and Security; Energy, Environment and Climate change; Eco-nano Technologies and Advanced materials; Health. In addition, the national priorities include basic research, heritage and cultural identity and new and emerging technologies, with the latter being more a framework for public procurement for innovation than a pre-defined set of technologies. The match between these S3 priorities and the 10 economic sectors with competitive potential available in the other two strategies is not articulated. In parallel, the SNCDI defined "R&I activities of general social interest", which appear disconnected from the S3 areas.

**The planned new National Strategy, SNCISI, which incorporates the new S3 and covers the period 2021-2027, has involved two large consultations exercises to define very broad S3 priority domains and Strategic Research Agendas, with unclear articulation between the two.** An entrepreneurial discovery process was carried out in 2020 for the S3 at the national level, involving an online exploratory consultation on proposals for sub-domains, prepared by experts on the basis of studies and data provided by UEFISCDI, followed by expert panels and a second online consultation. In 2021, another consultative process involved expert panels discussing 6 Strategic Research Agendas that address societal challenges, aligned with those of Horizon Europe, and followed also by an online consultation. These processes resulted in 7 broad S3 priority domains and 6 "areas addressing societal challenges" subject to very wide "Strategic Research Agendas". The resulting two lists are very broad and the rationale for the co-existence of the two lists is not clearly articulated in the SNCISI. In addition to these, each region has defined its own S3 priority list, based on Entrepreneurial Discovery Processes (EDP).

**It is unclear how the priorities included in the successive strategies already influenced or are expected to influence the profile of the R&I system.** The efforts paid to define S3 areas or Strategic Research Agendas are not matched with efforts to align funding mechanisms and investments in R&I with these priorities. Researchers at the Academy and in universities enjoy traditional academic freedom to determine their research subject and methodology, and S3 priorities had a marginal role - if any - in the funding mechanisms of INCDS (see Chapter 4).

**Recent strategies in the field of education show high levels of ambition and are promising in terms of improving the interface between higher education and research.** A 2030 vision and action plan "Educated Romania" has been adopted. It is a national project initiated by the President of Romania to support the repositioning of society on values, the development of a culture of success based on performance, work, talent, honesty and integrity. Between 2016 and 2020 ME developed an integrated information system for education and

research, and worked on increasing the internationalisation of higher education, promoting entrepreneurial education, increasing the quality of higher education and its matching with the labour market needs etc.

**Reinforcing university research and increasing the performance of doctoral schools are among the strategic priorities of the Ministry of Education.** University research through UEFISCDI were for the first time supported by a specific budget allocation in 2021 (100 million Lei), which is expected to be increased in 2022 and subsequent years. During 2021 all doctoral programmes in Romania were subject to an extensive external evaluation and subsequent accreditation process which also included international peers, and the results were published of ME by the end of the year. Thus, there are positive signs of improved focus on the interface between education and research and on the importance of formation of advanced human capital (see Chapter 4).

### *3.1.6. Vertical coordination*

**Alignment of priorities between strategies at national and regional levels is improving, but remains a challenge.** Each region has set up a Regional Innovation Consortium, with a consultative role for S3. In the process of elaborating the National Strategy for 2021-2027 (SNCISI), which incorporates the National Smart Specialisation Strategy, the need to develop better synergy with the S3 Strategies elaborated at the regional level was recognised. The new Committee for Coordination of the Smart Specialisation (CCSI), which includes delegates both from the national and regional levels, is in a position to play such a role.

In a centralised country like Romania, regional strategies are implemented mostly with national budgets (as well as Cohesion Policy Funds). This enhances the need for identifying good synergies between the two decision levels (see Chapter 7). A dichotomous view is where so-called “Strategic Research Agendas” (which include long lists of technologies) are developed from a national-level perspective and smart specialisation domains are mostly seen as relevant from a regional perspective, which is not conducive to knowledge-based regional development. This involves the risk of research performers at national level overlooking opportunities for interactions with the regional ecosystems.

### *3.1.7. Consultative and participatory mechanisms*

**Both MCID and ME are supported by multiple councils, however, the system misses a genuine advisory function.** MCID has six advisory bodies: the National Council for Scientific Research (CNCS), the Romanian Committee for Research Infrastructures (CRIC), the Advisory Board for R&D&I (CCCDI), the National Council for Ethics in Scientific Research, Technological Development and Innovation (CNECSDTI), the National Council for Technology Transfer and Innovation (CNTTI), and the newly created Committee for Coordination of the Smart Specialisation (CCSI).

ME’s main advisory bodies are the National Council for the Financing of Higher Education (CNFIS), the National Council for Attesting Higher Education Titles, Diplomas and Certificates (CNATDCU), the National Council of Statistics and

Forecast for Higher Education (CNSPIS), and the National Council of Rectors (CNR). Many of these Councils – notably CNCS, CCCDI and CNECSDTI for MCDI - are not advisory bodies in the traditional sense but are actually supporting policy implementation. These functions are necessary, but the system as a whole is missing a sounding board with representative stakeholders with a mission to advise, on own initiative or upon request, on strategies, policies and programmes. Such a sounding board could contribute to improving wider trust in the system.

**The importance of transparency in policy design processes cannot be underestimated.** For SNCISI a range of studies have been prepared (funded by the ESIF programme for capacity building POCA) by experts to feed into the strategy. However it seems that the final process of writing the strategy does take place in an open and transparent manner, with some stakeholders of the system (with vested interest) preparing drafts in parallel with drafting work performed by UEFISCDI. An effort to disseminate SNCISI studies would be beneficial. The process has had stakeholders' participation from outside the scientific world, aimed at bringing in the voice of society with respect to the role of science and research in addressing societal challenges. However, wider representation would be desirable in order to increase the buy in to the national policies, and to improve confidence in the R&I system.

**Romania has been experimenting with wide participative, evidenced-based processes within the framework of S3 preparation for some time.** The Entrepreneurial Discovery Process (EDP) central to the S3 concept was carried out at regional and national levels. At the regional level, the support of the Joint Research Centre of the European Commission helped to improve the process. In the 8 regions, Regional Innovation Consortia were established, with a consultative role for the strategies. At the national level, the process in 2014-2020 was initially based on data analytics and supported by wide stakeholder participation (200 panellists and 4000 online respondents). However, according to certain Romanian observers, *"...whatever progress was made during this period was not directly relevant to smart specialisation. In many cases, the changes suggest that traditional policy routines were not circumvented. Despite the hands-off approach of the ministry during the strategy design phase, which enabled it to capitalise on the analytical intelligence and consultation expertise available elsewhere, the old policy-making style subsequently made an informal comeback through the backdoor after the formulation phase and just in time for implementation"* (Gheorgiou et al. 2017). The two-steps EDP process (involving expert panels and online consultations) was repeated for 2021-2027 S3 preparation and led to positive results at the regional level. In addition, a national consultation process was carried out in 2021 – again with panels and online consultations- for the definition of Strategic Research Agendas in the SNCISI.

### 3.1.8. Science communication strategy

**Promotion of science, technology and innovation towards the general public could be improved.** It is important to improve the image of the research within the society in general and to promote the importance of R&I for Romania's development, general economy and people. The system of publicly funded research organisations, clearly deploying its activities for the benefit of the

country could be showcased to raise its importance with the public, in line with other national systems such as the health system.

The different roles and missions of the various publicly-funded Public Research Organisations (PROs)/Higher Education Institutions (HEIs)/Romanian Academy Institutes (RAIs) could be explained and illustrated. The expected impacts from public investments in research, in the different HEIs/PROs should become transparent with the purpose of aligning expectations of Government as well as institutions. The proposed sounding board representing the voice of stakeholders (mentioned above) would also help to ensure dissemination of Romanian research and innovation results beyond the research community. Public research organisations themselves would also need to establish or enhance their communication strategy in the frame of their third mission (see Chapter 5).

### 3.2 Public funding for R&D: mechanisms and policy mix at national level

#### 3.2.1. Public funding for R&D

**Public funding for R&D is critically low and achievements are not aligned with the targets set in strategies: raising the intensity of R&D is not yet in sight.** Romanian authorities acknowledge this situation and admit that they find it difficult to solve. As mentioned above, the Law of Research and SNCDI committed an official 2% of total GERD intensity and 1% of GDP for public R&D expenditures, but these targets have never been attained. SNCISI restates the same goals for 2027. As depicted in Chapter 2, Romania had the lowest R&D intensity in the EU in 2020. R&D expenditure accounted for 0.47% of the GDP, of which 0.19% was public R&D and 0.28% private R&D.

Since 2000, R&D expenditure has increased by 1.4% annually, which is more than the EU average (1.1%), but less than in other countries in the EU13, and insufficient to catch up with them. Other EU13 countries boosted their public R&D intensity and are now above the EU average on this indicator (i.e. Czech Republic, Estonia). The share of government budget allocations for R&D (GBARD) on GDP has been declining since 2016 in Romania (Figure 15).

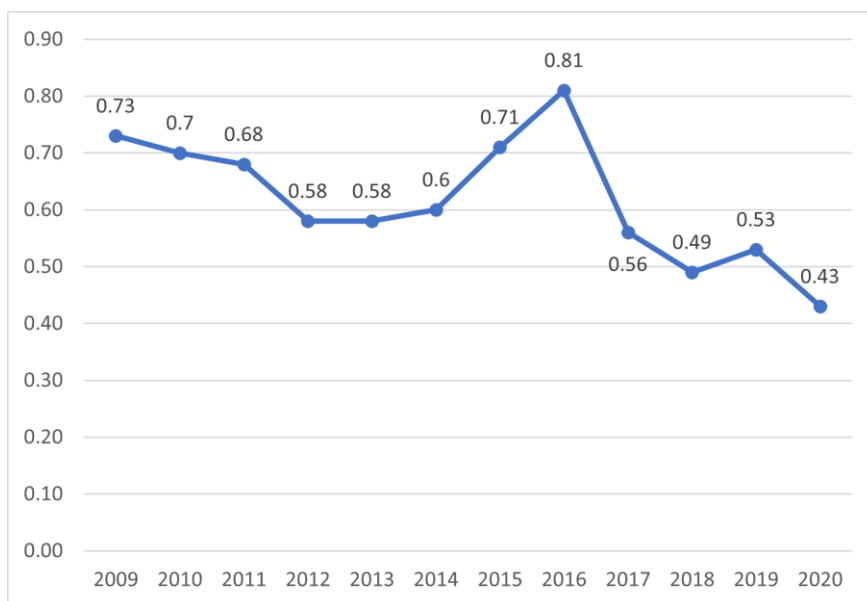


Figure 15 Share of government budget allocations for R&D (GBARD) on GDP – Romania 2008-2020

Source: Eurostat, extract 29.10.21

Romania has the lowest share of government support for R&D (GBARD) on GDP in the EU (Figure 16).

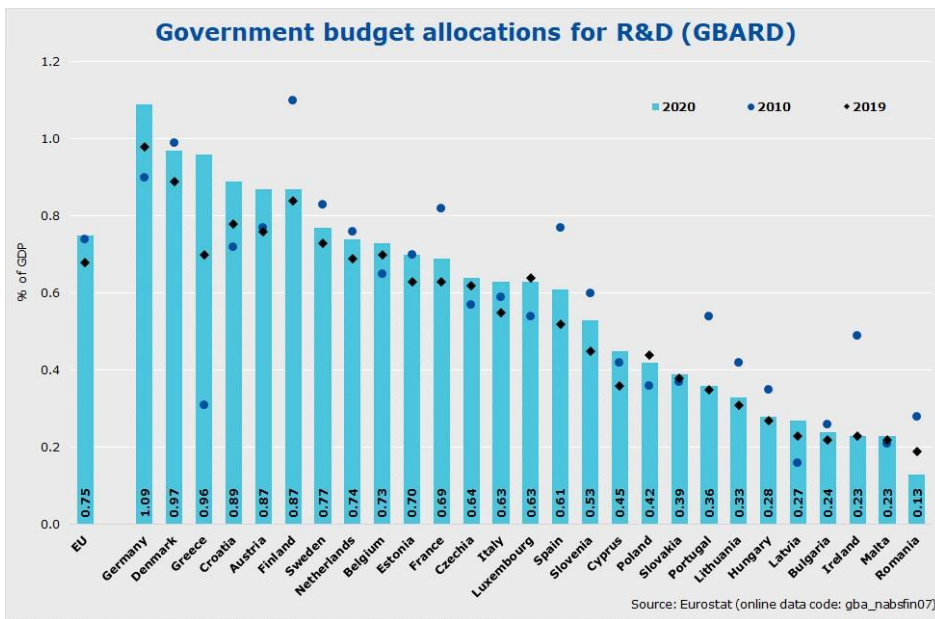


Figure 16 Share of government budget allocations for R&D (GBARD) on GDP – EU 2010, 2019 and 2020

Source: Eurostat, 15.09.2021

### 3.2.2. Funding bodies and instruments

#### Funding for R&D in Romania comes from three sources (Table 2):

- National budget (GBARD);
- Cohesion Policy Funds: more details are found in Chapter 7;
- EU competitive funds under the Framework Programmes (Horizon2020 in 2014-2020): more details are given in Chapter 6.

**EU funds amount to one third of the total public funding for R&D in Romania.** While each of those two EU sources provide low absolute amounts (due to low prioritization of R&D in Romania’s overall Cohesion Policy allocation and low performance in attracting EU Horizon funds), taken together they play an important role in funding R&D in Romania as they accounted for about one third of the total public funds devoted to R&D (i.e. GBARD + Cohesion Funds + Horizon) in the period 2014-2020 (based on planned allocations for Cohesion Funds) (Figure 17). With an average co-funding rate of Cohesion Funds of 16%, there is the opportunity for national funds to fund complementary activities to the funded by EU Cohesion Funds.



Table 2 2014-2020 GBARD, Horizon 2020 and 2014-2020 ESIF for R&I (Planned), € million

EU13	GBARD Total 2014- 2020  <i>Spent</i>	Horizon 2020  <i>Acquired</i>		ERDF for R&I  <i>Planned</i>	EAFRD for R&I  <i>Planned</i>	ERDF & EAFRD for R&I  <i>Planned</i>	
		EU contr.	% of GBARD	EU contri- bution	EU contri- bution	EU contr.	% of GBARD
Bulgaria	816	161	19,7%	291	43	334	40,9%
Czechia	8347	502	6,0%	2347	63	2410	28,9%
Estonia	1116	274	24,6%	589	30	618	55,4%
Croatia	2573	137	5,3%	689	13	703	27,3%
Cyprus	509	319	62,8%	88	2	89	17,6%
Latvia	410	116	28,4%	448	27	475	116,1%
Lithuania	952	96	10,1%	656	42	698	73,3%
Hungary	3028	371	12,3%	1843	75	1918	63,3%
Malta	173	37	21,5%	50	6	56	32,2%
Poland	12693	743	5,9%	7330	175	7505	59,1%
<b>Romania</b>	2738	300	11,0%	914	81	995	36,3%
Slovenia	1309	379	29,0%	498	25	523	39,9%
Slovakia	2301	139	6,0%	1129	55	1184	51,5%

Source: (Serbănică and Pupinis, 2021) based on Eurostat: GBARD [gba\_nabsfin07]; \*GBARD data for 2020 are only provisional or estimated based on the 2019 values; EC ESIF 2014-2020 Data Platform: <https://cohesiondata.ec.europa.eu/>; EC Horizon 2020 – Country profiles. Updated by PSF Panel.

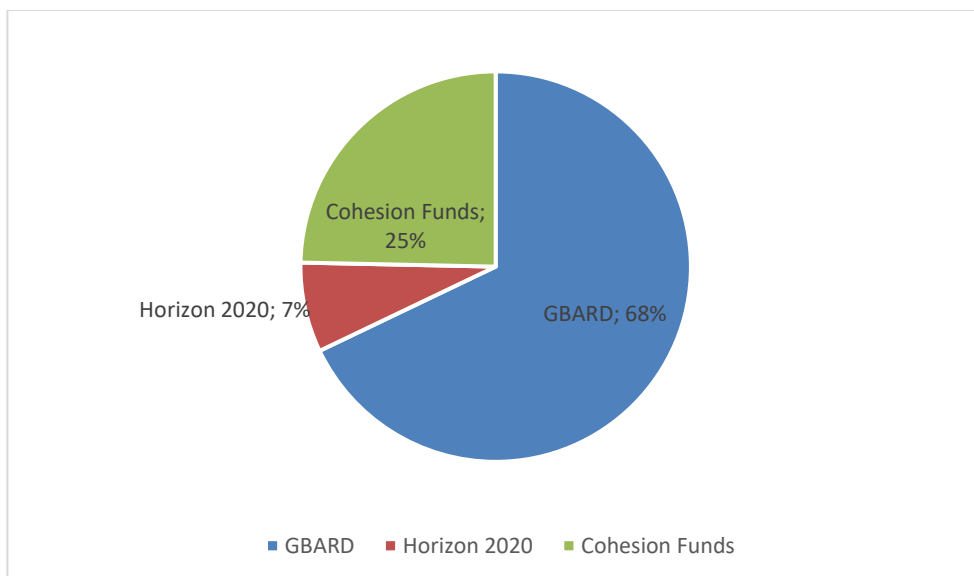


Figure 17 Total public funds allocated to R&I in Romania: National funds for R&D (GBARD, spent), Horizon 2020 (acquired) and Cohesion Funds for R&I (Planned) – Romania – 2014-2020

Source: as for Table 2

**The National Plan for Research Development and Innovation (PNCDI) is the main national funding instrument for R&I.** As noted above, there was a large gap between the planned budget for PNCDI for the period 2014-2020, set at €7b, and the actual budget spent, which by the end of 2020 reached only 11% of the planned amounts, with total allocations of €785m (according to data communicated by MCID). In 2020, to form the bridge until the adoption of the subsequent Strategy and Plan, PNCDI III was extended until adoption of PNCDI IV. The new PNCDI will cover the period 2022-2027.

**The national budget for R&D (GBARD) is distributed by several bodies: UEFISCDI, ROSA, IFA and MCID.** The Executive Agency for Higher Education and R&D&I Funding (UEFISCDI) is a public institution in charge of part of the programmes of the PNCDI, working under a contract concluded with MCID. UEFISCDI does only manage a little more than a quarter of the total national budget devoted to R&D in Romania (Figure 18). MCID manages another 43%, including the CORE/NUCLEU programme, which delivers structural funding for the INCDS. The Romanian Academy manages 16% of the total R&D funds and the Ministry of Agriculture another 9%.

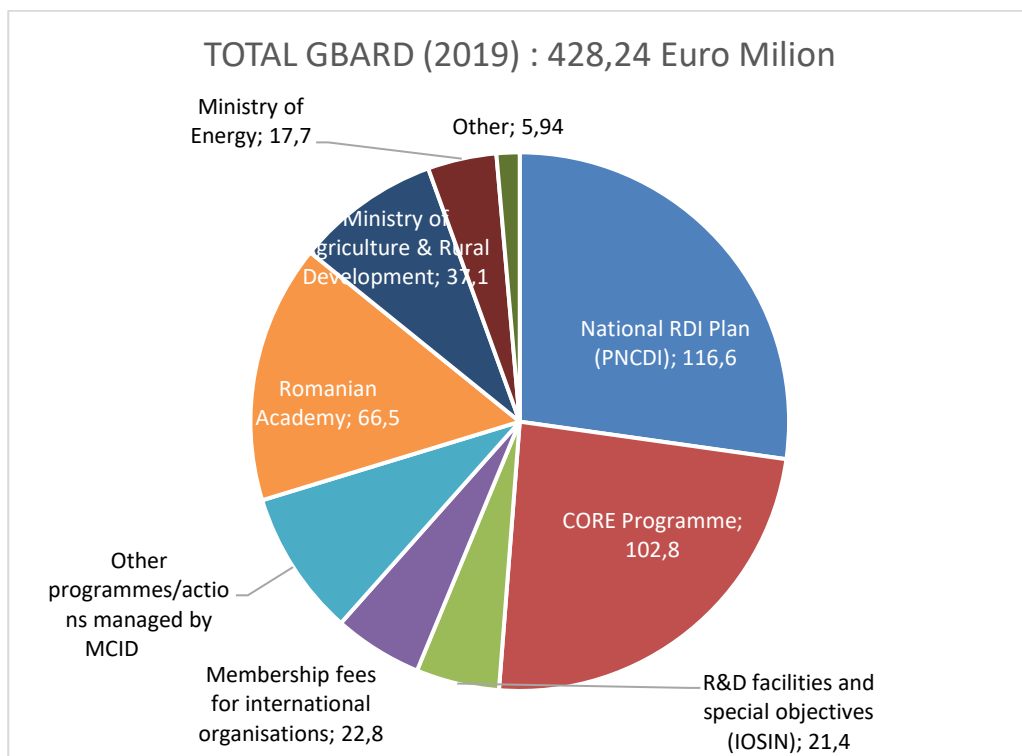


Figure 18 Distribution of GBARD according to national funding sources in Romania – 2019

Source: Serbănică, specific PSF contribution

The Romanian Space Agency (ROSA) is a public institution that coordinates the space activities in Romania and the participation in European and international space programmes. The Institute of Atomic Physics (IFA) is a public institution under the MCID, which manages the programmes in the field of atomic and

subatomic physics, as well as the participation in international scientific partnerships and major research infrastructure projects (ELI, EURATOM, CERN etc.). In addition, ME allocates an annual average of €13.5m (Source: UEFISCDI) for research activities in a selected number of more research-intensive universities.

**The mechanisms for structural financing (or base funding) of the four branches of Romanian public research sector differ greatly.** The Romanian Academy is financed mostly from the national budget providing approximately 70% of its budget. The Institutes of the Romanian Academy appear to benefit from a larger and more stable funding envelope than other public research institutes and research units at universities. The national institutes (INCDs) receive approximately 30% of their budget from the CORE/NUCLEU programme, managed directly by MCID.

The HEIs do not have any visible core research budgets (with the exception of a recent, limited new Fund managed by UEFISCDI established in 2021 with €20m, projected to become €40m 2022, and potentially increasing to €100m in 2025 and beyond). The Branch Academies receive funding directly from their Ministries. More details and discussion of these funding models are found in Chapter 4.

### *3.2.3. The policy mix*

**Romania's policy mix needs to be evaluated for effectiveness.** A suitable balance needs to be achieved between: (i) institutional core funding in the form of performance (formula-based) block grants such as NUCLEU/CORE, which must become sufficient to maintain the intended capacity of the institutions; (ii) competitive project grants (such as grants managed by UEFISCDI); and (iii) directed strategic investments (such as institutional budgets managed by MCID and other ministries).

The mix of funding instruments and the allocation of funds builds on the assumption that the backbone of the R&I system is reasonably consolidated and well-functioning. This assumption should be disputed, as scientific achievements of this system are weak (see Chapter 2 for comparative performance of Romania in highly cited scientific publications, research excellence index or attraction of ERC grants; and science-business cooperation).

**An overview on the policy mix is missing.** Due to the fragmentation of policy responsibilities, funding lines are operated separately and no one holds a complete overview of the policy mix. This hampers the strategic management of public budgets to achieve the intentions set out in strategies and programmes. The PSF Panel was confronted with difficulties when trying to obtain a simple aggregated picture of various budget lines at play in Romania.

Table 3 provides a view on the budgets allocated to the policy mix from both national and EU sources. These figures are to be considered as a proxies, as consistent sets of budgetary data have not been made available to the PSF panel, hence the table has been compiled based on the exploitation of fragmented sources and subsequently validated by MCID. Table 3 shows a calculated total

public R&I budget of €483.1m per year on average (which is actually a theoretical figure as the volatility of budgets allocated on a yearly basis is very high).

Table 3 A schematic view on the policy mix for R&D in Romania: objectives/type of funding, source, instrument, target groups and budgets - €m per year

Objective/ Type	Source	Instrument Agency - period	Target group	Budget (€m over the period and per year)
<b>Institutional funding for public research</b>	MCID	CORE/NUCLEU (2016-20)	INCDs	€ 433.4m <b>€ 86.7m per year</b>
	ME/ UEFISCDI	Institutional Development Fund (2019-2021)	Research Universities	€ 40.5m <b>€ 13.5m per year</b>
	National budget	Romanian Academy budget (2019-20)	RA	€ 132m <b>€ 66m per year</b>
	Ministry of Agriculture	Research Funding line (2019-20)	ASAS	€ 13m <b>€ 6.4m per year</b>
	Ministry of Health	Research Funding line (2019-20)	ASM	€ 6.9m <b>€ 3.4m per year</b>
<b>Research projects (competitive)</b>	MCID	PNCID 1.2 (2015-20)		€ 153.1m <b>€ 25.5m per year</b>
	MCID	PNCID (2015- 20) UEFISCDI PCE (exploratory research) (calls 2016, 2020 and 2021)	Univ, INCD, AR, ASAS, ASM, others	€ 124.4m <b>€ 20.8m per year</b>
	MCID	PNCID (2015- 20) UEFISCDI PCCF (complex frontier research) (call 2016 only)	Univ, INCD, AR, ASAS, ASM, others	€ 35.8m <b>€ 6m per year</b>
	MCID	PNCID (2015- 20) UEFISCDI ERC- like projects (calls 2016 and 2021)	Univ, INCD, AR, ASAS, ASM, others	€ 4.6m <b>€ 774.6K per year</b>
<b>Human resources</b>	MCID	PNCID 1.1 (2015- 20) UEFISCDI Programme 1	Research projects	€ 187.7m <b>€ 31.3m per year</b>
	MCID	PNCID 1.1 (2015- 20) UEFISCDI Programme 4	scholarships	€ 161m <b>€ 26.8m per year</b>
	ESIF	POCU (2014-2020)	PHDs and post- docs	€ 84m <b>€12m per year</b>

<b>Infrastructures in public sector</b>	MCID	IOSIN 19 (2019-21)	INCDs	€ 66.3m <b>€ 22.1m per year</b>
	ESIF	OPC 1.1.1. Funding for large Research Infrastructure (2014-2020)	large infrastructure	€355.4m <b>€50.8m per year (Planned rather than spent)</b>
		OPC 1.1.2. Funding for support networks (2014-2020)	Networks grid and RoEduNet	€ 16m <b>€2.3m per year</b>
	MCID	PNCIDI 5 (part) MCID+IFA (2016-2021)	ELI-RO, Danubius, Alfred	€11.7m <b>€1.7m per year</b>
<b>Internationalisation</b>	MCID	PNCIDI 2 UEFISCDI (2015-20)	Mobility	€ 993K <b>€ 165K per year</b>
	MCID	PNCIDI 5 (part) ROSA+IFA (2016-2021)	Participation in international research	€56.7m <b>€8.1m per year</b>
	ESIF	OPC 1.1.3. Co-funding of Horizon & ESFRI (2014-2020)	Univ, INCD, AR, ASAS, ASM, others	€ 33.507.543 <b>€ 4.8m per year</b>
		OPC 1.1.4 - Attracting high-skilled personnel from abroad (2014-2020)	Univ, INCD, AR, ASAS, ASM, companies	€ 86.3m <b>€ 12.3m per year</b>
<b>Public-private partnerships and technology transfer</b>	MCID	PNCIDI (2015-20) UEFISCDI Complex projects: PCCDI Programme (call only 2017)	Univ, INCD, AR, ASAS, ASM, others	€ 88.2m <b>€ 14.7m per year</b>
		PNCIDI (2015-20) UEFISCDI Demonstration Experimental projects (PED) (calls only 2016 and 2019)	Univ, INCD, AR, ASAS, ASM, companies	€ 66.4m <b>€ 11m per year</b>
		PNCIDI (2015-20) UEFISCDI Other programmes		€ 50.5m <b>€ 8.4m per year</b>
	ESIF	OPC 1.2.3 (2015-20)	Univ, INCD, AR, ASAS, ASM, others	€ 129.5m <b>€ 21.6m per year</b>

		ROP 1.1 (2015-20)	Tech transf., S&T parks, SMEs w. TTO	€ 156m <b>€ 26m per year</b>
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Note 1. Data are computed based on budgetary data for different periods, hence the indicated amounts are an approximation of the reality for a specific year.

Note 2. R&D tax incentives are not included into this table.

Source: MCID (PSF Unit)

The total public R&I funds (domestic and EU Cohesion Policy Funds) is distributed between the various objectives as follows (Figure 19): 36.5% is in the form of institutional funding, half of the latter being CORE/NUCLEU; 17% is for public-private partnerships and technology transfer; 16% goes to Research infrastructures; 14.5% are individual competitive allocations for human resource development such as scholarships; 11% is devoted to competitive research grants and finally support to internationalisation accounts for 5%.

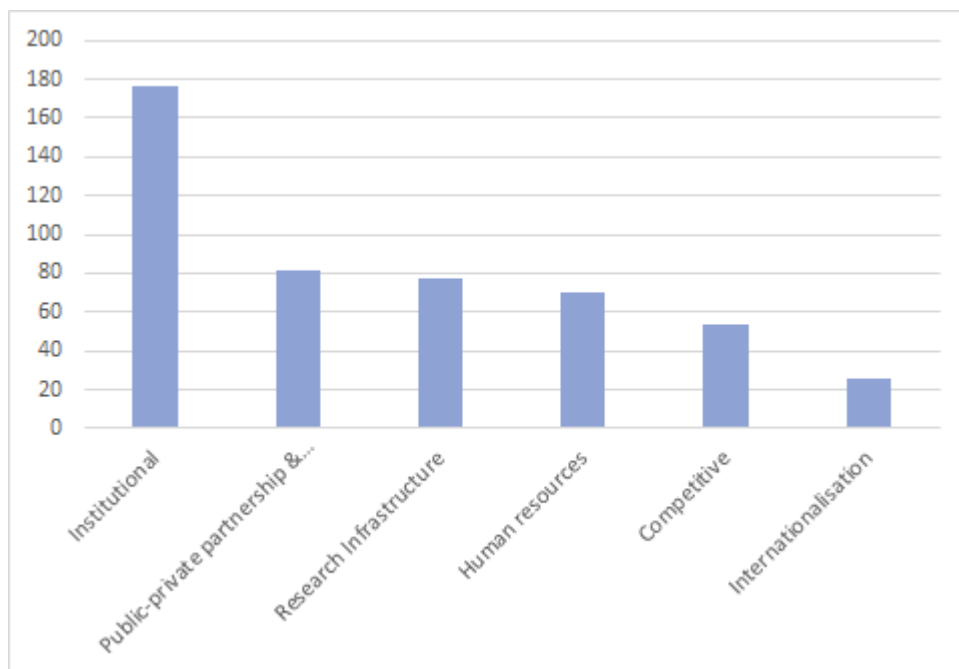


Figure 19 A schematic view on the policy mix for R&D in Romania by type of funding – €m per year

Source: as for Table 3

**Cohesion policy funds are strongly oriented towards funding research infrastructures and provide minimal funding to research activity in the public sector.** The planned allocations of Cohesion funds for the 2014-2020 period were dominated by investments in research infrastructures, as had been the case in the previous period 2007-2013, during which reallocations of budgets took place causing this category of expenses to even further dominate the scene.

As a consequence, the outputs indicators for that period were: for a target set at 100, “New research infrastructures” achieved a value of 893, and “Modernized research infrastructure” a value of 367 (Serbanica and Pupinis 2021). For 2014-2020, 45% of Cohesion Funds were planned to be invested in research infrastructures, and only 5% in research activities in the public sector (Table 4, see also Chapter 7).

Table 4 Planned Cohesion Policy Funds allocations for R&I in Romania: POC programme per intervention code – €m – 2014-2020

Intervention Code	Amount (€m)	Share
058. Research and innovation infrastructures (public)	€356m	45.6%
059. Research and innovation infrastructures (private and scientific parks)	€90m	11.5%
060. Research and innovation activities in public research centres and centres of competence, including networking	€39m	5%
061. Research and innovation activities in private research centres, including networking	€144.5m	18.5%
062. Technology transfer and cooperation between universities and businesses, mainly for the benefit of SMEs	€101.5m	13%
064. Research and innovation processes in SMEs (including coupon systems, processes, designs, services and social innovations)	€50m	6.4%
<b>TOTAL</b>	<b>€781m</b>	<b>100%</b>

Source: POC programme

**The policy mix displays a relative over-investment in infrastructure and equipment at the expense of institutional funding and support for human resources.** Multiannual basic funding for institutions is insufficient to maintain core institutional capacities such as staff, premises and recurrent expenditure for procured major equipment. Funding for infrastructure has played too large a role as opposed to funding for human resource development and funding of recurrent costs in the system in general. While human resources, in particular early career researchers, provide the energy and brain power to a research system, and competitive grant systems ensure efficiency and resources for the most successful researchers and research units, it is evident that a research system must rest on a predictable and solid structural base. Imbalances between different objectives and funding sources occur, and the diversity of funding programmes does not add up to a coherent public funding plan.

### 3.2.4. Effectiveness of funding

**There is a significant mismatch between strategic intentions and implemented budgets for R&D.** As mentioned above, only about one tenth of the projected budgets of PNCDI 2014-2020 have been implemented, and as a consequence, the research system has been underfunded. According to interviews with a large number of representatives from public research organisations of all types (see list in Annex 1), budget allocations appear to be driven by the need to allow public research units survive, rather than by strategic intentions to invest in prospective research domains or existing excellence.

**Targets set in PNCDI have largely not been achieved.** Most of the 12 targets set as result indicators to PNCDI have not been achieved, with two exceptions: the share of innovative SMEs that collaborate and public, and private co-publications (Table 5). The results linked to human resources are particularly negative, as the numbers have been decreasing between the baseline figures in 2011 and the latest data available.

Table 5 PNCDI 2015-2020 result indicators: baseline 2011, targets 2020 and achievements 2020 or latest available year

PNCDI Indicators	Base-line 2011	Target 2020	Achievement 2020
Public expenses for research and development (% GDP)	0.31	1.0	0.47
Number of the doctoral graduates (ISCED 6) per 1 000 inhabitants aged 25-34	1.4	1.5	0.4*
Number of researchers in the public sector (full-time equivalent)	12409	17000	7267*
Scientific publications in the top 10 % most cited publications in the world (% of total of scientific publications at country level)	3.8	7	4.2*
International scientific co-publications (number per 1 million inhabitants)	148	300	182.6**
Risk capital (% of the GDP)	0.033	0.090	-
Research and development expenses of the business sector (% of the GDP)	0.17	1.00	0.28
Number of researchers in the private sector (full-time equivalent)	3518	14500	4809*
Public and private co-publications (number/1 million inhabitants)	8.3	16.0	19.1*
Share of innovative SMEs that collaborate (%)	2.93	6.00	6.76
EPO patent applications (no./year)	40	120	54
USPTO patent applications (no./year)	17	60	-

Source: PNCDI and PSF Panel calculations. \* 2018 or 2019; \*\*: 2016.

**For the 2015-2018 period, it is estimated that SNCDI made a direct contribution to GDP of 0.205%** and a direct contribution to employment growth of 0.518%. According to the Impact Assessment of SNCDI 2014-2020, while the direct effects are modest (due to the low level of R&D funding and the low number of R&D employees), the total cumulative contribution of SNCDI to



the evolution of macroeconomic indicators (direct, indirect and induced effects) should not be neglected.

**Evaluations of PNCDI and OP Competitiveness highlight a number of shortcomings with respect to implementation of the programmes.** The most important issues raised in terms of funding instruments were the lack of a pre-established call schedule, the discontinuities in project financing, especially in the first part of the year (until the approval of expenditure budgets), the project appraisal process (i.e. the impossibility of contesting the appraisal results, except for the procedure, the long duration of appraisal), and the short duration of the interventions in relation to the time needed to achieve the R&D objectives (Ernst and Young 2021) (see Chapter 7 for more details).

**The national R&I system would greatly benefit from improved budgetary efficiency through more transparency and predictability of funding.** Even when funding has been politically decided, institutions experience long delays in the disbursement of resources. Uncertainty about which resources are available and when they are being disbursed leads to many players becoming defensive and less likely to collaborate across structures. This can result in a loss of momentum and less innovative activity than desired. Outside of the Romanian Academy structure, the system is characterised by an inherent “stop and go” culture in which too much time is spent waiting for even basic resources to flow. The situation is detrimental for research activities that by nature need continuity and dedication in order to be effective and productive. The situation differs between INCDS and HEIs:

- **The lack of multi-annual budgeting frameworks and the unpredictability of financing are detrimental to the performance of INCDS.** CORE/NUCLEU accounts for about 30% of funding for INCDS on average, and the disbursement of this critical share of funding is normally unpredictable and delayed. Therefore, the management of some INCDS were forced to contract bank loans to cover current expenses (see also discussion in Chapter 4). The payment of the costs of these bank loans can be considered a proof of the inefficiency of the management of this pillar of the Romanian R&I system. Beyond their limited ‘core’ funding through NUCLEU, INCDS research activities rely on reduced and unpredictable funding. In addition, there are no well-designed mechanisms that enables any roll over of budgetary surplus, which is likely to occur because of delayed disbursement and as a result procurement and contracts finalised very late in the year.
- **The continuity of research at HEIs is hampered by inadequate funding models.** Research in HEIs only rely on PNCDI funding instruments of competitive type, and for the first time in 2021 a limited direct research budget allocation (€20m). In addition, there is indirect funding of university research As in all countries, research at universities is financed implicitly through the general budget, to support, for example, time spent on research activities by professors and other personal, library resources, lab-space and consumables. In the GBARD calculations an unknown share of university base allocations is allocated to R&D.

**One competition is no competition.** Most of the competitive grants provided across the research system are distributed by UEFISCDI, which operates very much like research councils or funding agencies in other European countries. Provided reliable budget allocations are available, UEFISCDI handles calls for proposals professionally and in a timely manner. However a key problem is that, for several instruments, only one competition was organised in recent years, with a relatively low allocation of financial resources. In such cases, competition was fierce and the bidding efforts from the applicants were high, and for some competitions the resulting success rates rather low, although most calls had normal success rates for European standards. When designing competitive mechanisms, it is best practice to organise repeated calls for proposals and applications, and at fixed dates (terms) every term or year. This is for the beneficiaries to gain confidence in the mechanism, and for the administrators to gain experience.

**The collaboration with UEFISCDI's representatives was favourably appreciated by the entities that carry out research projects.** The project submission and monitoring platform managed by UEFISCDI was favourably evaluated, with the exception of the section dedicated to the project budget, which requires, in the opinion of beneficiaries, too much detail of project activities and costs (Chioncel 2020).

### *3.3 Policy intelligence, monitoring, evaluation and use of evidence for policy making and policy implementation*

**The R&I system is lacking an overall policy intelligence function, covering monitoring, evaluation and the collection of policy-relevant evidence.** It is necessary to strengthen monitoring and evaluation capacity and to ensure utilization of policy intelligence for the design of strategies and distribution of public funds for R&I. Such intelligence would provide an evidence base for foresight and benchmarking of Romania's R&D system, which would become part of the foundation of the national strategy process. Notably, it would nurture the work of a political inter-Ministerial Committee under the Prime Minister, such as being proposed in Recommendation 1.2. MCID does not benefit from a strategic function, adequately staffed and empowered, to follow-up all aspects of the R&I system. The role of UEFISCDI in this regard is limited and does not cover INCs nor the RA Institutes, and it remains to be seen if the newly created PSF Unit may play such a role. The lack of oversight on the complete R&D budget, which includes both national and foreign resources, is a major constraint for designing and implementing efficient policies. Aggregated multi-year budget numbers may lead stakeholders to believe that budget volumes are larger than they are, and obscure the reality for individual researchers. At this point there is a need for consistent, coherent and reliable data sets to guide policy making for R&I.

**The dedicated monitoring platform foreseen under SNCISI is viewed as a significant step forward for harmonised monitoring of R&I interventions in the 2021-2027 period.** There is to date, no integrated system for collecting and managing information on inputs, outputs and, even more importantly outcomes and impacts of the funded research activities, covering the whole system. The Cohesion Policy programmes benefit from

systematic monitoring according to EU rules, as well as from independent evaluations, and UEFISCDI is monitoring the programmes under its responsibility under PNCDI.

There is, however, no connection between these two monitoring efforts. The new system envisaged under SNCISI will be based on a common nomenclature of indicators incorporating context-type indicators with data provided by national, EU and OECD statistical databases, as well as output and result information which can be input directly by beneficiaries. The system aims to include indicators to show contributions of the regional S3s to the achievement of national S3 targets. It is understood that the platform will have a dedicated computer system, drawing data from SMIS/MySMIS for Cohesion Policy OPs and UEFISCDI's EVOC programmes.

The system is planned to be interoperable with key national registers relevant for R&I, including the Register of RDI Organizations, the Register of Researchers, Innovators and Entrepreneurs, certain components of a 'Brain map' and the Register of Research Infrastructures ERRIS. If realised as planned, the new SNCISI monitoring platform seems likely to make a major contribution to coordinated implementation of R&I interventions across different OPs and national programmes.

**The production and use of policy-relevant evidence is progressing: the recognised role of UEFISCDI in collecting and preparing such evidence is a good basis for developing of fully-fledged R&I Observatory.** The design of S3 at national level has become increasingly evidence-based. According to SNCIDI, "knowledge maps" bringing objective evidence were used as a central component of the S3 process for 2014-2020. These maps represent a tool for visualising the relations between the main players in the Romanian R&I ecosystem. Their construction involved compiling, processing and linking databases of all projects funded competitively in Romania during the 2007-2013 cycle (over 6,000), publications from the main flows by Romanian authors (around 100,000), patents awarded (over 7,000) and data regarding half a million companies.

For 2021-2027, SNCISI mention support provided in the form of information from UEFISCDI databases (technological trends, projects in the results register, etc.). UEFISCDI is recognized as a foresight hub and as the developer/administrator of strategic platforms such as ERRIS (European Research Infrastructures System), Study in Romania, Brain map (the online community of researchers, innovators, technicians and entrepreneurs), and the Integrated Educational Register. It has developed the Horizon scanning mechanism using artificial intelligence. UEFISCDI collects data and information, but this Agency placed under ME does not cover the whole system, its database is not comprehensive. The Agency's platform works well, and it is comparable to efficient platforms in other European countries.

## 4 Framework Conditions for Public Research

This chapter provides an assessment of the framework conditions for conducting excellent research in the public research sector. It starts with an overall overview and assessment of the landscape of Higher Education and Public Research Organisations and the regulatory framework (Section 4.1). It then investigates two crucial framework conditions: the availability of high quality human resources for R&I in the public sector (Section 4.2) and of research infrastructures (Section 4.3).

The chapter does not address issues regarding costs and budgets for campuses, premises and other physical infrastructure such as building maintenance, recurrent expenses for energy, ICT systems, local fibre networks etc. Despite its importance, the performance of the general education system is not discussed in this chapter, as it lies beyond the mandate of the PSF panel.

### FRAMEWORK CONDITIONS FOR PUBLIC RESEARCH

#### Key messages and recommendations

##### *Consolidating the Romanian public research system*

- **The performance and visibility of the Romanian public research system is hampered by excessive fragmentation: a new opportunity lies in developing a common understanding of publicly funded research organisations as a 'system', articulated around strong priority domains.** Outcomes of Romania's research activities in the public research sector are low relative to other EU13 countries. Most researchers are underfunded and many research units do not have the necessary critical mass for undertaking competitive research of international standard. The public research system is too diversified and organised in four main pillars – public universities, national research and development institutes (INCDs), the Romanian Academy, and branch academies. The different roles and missions of these bodies are not clear, neither are the expected impacts from research in each category/type of HEI/PRO. The quality and quantity of research outcomes varies widely between the individual institutions and entities. Prioritisation exercises carried out under the S3 are not yet visibly translated into strong poles of excellence. The rationale for having two priority lists included on the one hand in S3, and on the other under the Strategic Research Agendas is still to be clarified and translated into the missions of PROs/HEIs. There are few measures in place to support cooperation among these players: public research units in Romania would benefit from increased mutual trust and a reduced sense of competition. A number of them have already expressed their wish

for stronger incentives for collaboration across organisations and disciplines.

**Recommendation 4.1: Under Reform 5 in the NRRP, launch an in-depth, evidence-based consolidation process of the public research system leading to the creation of centres of excellence for public research as well as centres of competence gathering public and private partners within a few selected domains where Romanian science and research can excel.** The reorganisation of the national public research system must aim at consolidation around best performing research units, and eliminate redundancies. A reorganisation effort must also be aligned with the country's vision and intellectual and financial capacity. The PSF Panel recommends embarking on a thorough reorganisation, and strengthening process leading to a coherent public research landscape. The affiliation of research units to one pillar (universities, INCDs, Romanian or Branch Academies) should not act as a barrier for cooperation, synergies or even merger when this improves research quality and relevance. This process should be based on evidence from rigorous evaluations and informed by the established national research priorities. It would take time, and the PSF Panel recommends to undertake the process step by step.

- **Step 1: Promote cooperation between research players in the various pillars as well as within the pillars driven by common topics of research.** This can be achieved by joint doctoral schools (in the same domain with participation from several organisations), joint projects funded from different sources utilising instruments of SNCISI, and funding agencies to support joint centres of excellence – establishing a critical mass of excellence in basic or fundamental research with international visibility built on existing strengths in Romania; centres of competence, for establishing critical mass in applied or strategic research and with joint participation from academia and industry with European visibility in response to real demand from the productive sectors (see Recommendation 4.2); and joint research infrastructures or common mobility projects. Legal obstacles to the effective use of scarce resources and cooperation across the research ecosystem should be identified and removed.
- **Step 2: Conduct a thorough system review including an evaluation of research carried out by all institutions in the four public research pillars.** The evaluation should follow established international best practice and relate measurable outcomes to the missions of research entities, assessing alignment with national Strategic Research Agendas and S3 priorities. The evaluation must assess measurable outputs against inputs and combine bibliometrics and other metrics with peer review: the latter is only useful at this meta level if it involves international peers. Performance in Horizon Europe and other international competitive funding programmes as well as implementation of the European Charter for Researchers and Code for the Recruitment of Researchers

should be part of the evaluation criteria. Conducting such an evaluation would require adequate funding, good planning and use of objective data possibly collected by a forthcoming national M&E system (see Recommendation 3.1). The evaluation would mark the beginning of a long-term process of periodic comprehensive evaluations of Romanian public research organisations.

- **Step 3: Draw lessons from the review and initiate a move towards a new architecture of the Romanian public research system.** Based on the evaluation at the level of individual research units or institutes, new realistic strategic plans and roadmaps have to be defined with necessary steps to be implemented from the evaluation, along with a timeline. The system reform would need to be articulated around the national and regional priorities of the Strategic Research Agendas and S3 priorities. The identification of areas of strengths, as well as of gaps and redundancies, and opportunities for cooperation or integration, across all four pillars, will form the basis for the reform. Detailed analyses of cooperation (domestic and international) in the form of network analyses, may also be used in order to support the reform and to strengthen the groups of collaborating researchers in specific fields. All forms for strengthening coherence and consolidation including the formation of formal alliances and mergers in the Romania research system should be considered. In other EU-13 countries, such as Poland, similar processes have been established and lessons from such experience can be used: it could be considered to bring the national research institutes under a common umbrella and establish a Romanian brand for high quality applied and strategic research such as Fraunhofer Institutes in Germany or the Łukasiewicz Research Network in Poland. The resulting coherent Romanian landscape of recognised research units becoming centres of excellence would be the core of the country's research and innovation system.
- **Missions and priorities of public research institutions and units are generally insufficiently articulated.** The missions of individual organisations of the public research system are set in their founding documents, as in the law 751/2001 for the Romanian Academy. The discussions with Romanian research stakeholders showed that research players are often deploying an opportunistic strategy and survive by periodically changing or adjusting their strategy in view of resource availability. The lack of funding predictability results in a survival strategy which does not serve the country's ambition and has little chance to improve Romania's competitiveness. This situation is not conducive to the search of synergies and cooperation within and across the four pillars.

**Recommendation 5.1: Ensure clearer articulation of the mission of each public research organisation and improve visibility.** All public research institutions should establish a detailed mission for their organisation, and clearly communicate its purpose and research focus to the society at large. Establishing their primary goals, and agreeing them with

relevant stakeholders, would enable them to operate in accordance with societal expectations and needs. The participative exercises conducted under the Strategic Research Agendas (linking with societal challenges) and the Smart Specialisation (linking with economic opportunities) would need to be reflected under these missions. The national monitoring and evaluation system should be aligned accordingly and collect relevant data and conduct pertinent evaluations against this back-drop.

- **None of the research institutions interviewed have an International Scientific Advisory Board** to help in defining their strategy.

**Recommendation 5.2: Individual research institutions should be stimulated to establish an International Scientific Advisory Board.**

This will help to further define the strategic orientation of research and to implement international best practices in research management. It will also inspire research agendas, establish linkages with international partners, stimulate international collaboration, create opportunities for research staff, and contribute to the internationalisation of the public research system.

- **Romanian public research organisations are often both under-funded and badly funded.** Institutional funding channels do exist for three of the four pillars: MCID provides resources to national institutes through the CORE/NUCLEU programme, institutes of the Romanian Academy receive basic funding from the academy's budget line in the national budget, and the branch academies are funded by the relevant Ministry. Up to 2020, universities did not formally receive any such core funding for research activities, but in 2021 €20m were disbursed to the universities, which is expected to continue and increase in 2022. As a whole, these funding sources appear too limited to secure a stable basis for the public research system. In addition these funding channels are not sufficiently tailored to performance.

**Recommendation 5.3: Reform funding channels for public research organisations: strengthen the institutional funding and direct funds towards these strongest research groups and fields, seeking alignment with EU-level priorities.**

Public funding to the R&I system should prioritise support to the foundations of Romania's research system in the form of sufficient and transparent institutional funding for all four pillars, based on institution's plans and rigorous evaluations. The various institutional funding channels (CORE/NUCLEU, Institutional Development Fund for universities, Romanian Academy) should be aligned and oriented towards performance-based funding channels. In particular, a transparent allocation mechanism of institutional funding from the Romanian Academy to its institutes, aligning it with criteria used for the other 'pillars', should be established. The CORE/NUCLEU programme should be expanded to cover a larger share of INCD's budgets. A programme of institutional funding for research at universities should be established, possibly by expanding the

nascent Institutional Development Fund (ME). Different criteria should be used according to types of missions (academic research; industrial research; service to society, etc.) and ambition (regional, national, international excellence). Moreover, the translation of Strategic Research Agendas into R&I projects with impact on major societal challenges requires a change in funding models towards being more impact-oriented. This would require a priority placed on funding those developments that are linked to the exploitation of opportunities, linking research actors to users and stakeholders (companies, as well as, cities or hospitals, societal groups) the latter being the ones that are faced directly with the societal challenges and need R&I to respond to these.

- **All programmes, calls, projects, and also individual research organisations are subject to many administrative, bureaucratic and reporting obligations.** Such obligations are justified according to the need for good management of public money, and many procedures are well intended. Taken together, they however create red tape with little value added. Some programmes are overly bureaucratic (case of IOSIN e.g.) with financial reporting on monthly basis. Much of this is conducted in a traditional fashion with limited digitalisation. As a result, a lot of information generated through these processes is not being consolidated, for example, a great deal of data fails to feed systematically into an overall monitoring and evaluation system in a format that is useful for policy decisions (see Recommendation 3.1).

**Recommendation 5.4: Lower the administrative and bureaucratic burden on the research organisations.** Changes are needed in order to lower this burden: review the obligations and simplify them as much as possible and avoid duplication of requests; and adjust reporting requirements to the needs of the overall monitoring system. This implies in particular increased attention to the collection of data that reflect outcomes of research activities, and not only outputs. Introduce longer reporting periods for financial issues, for example at least 3 months, and move to a standard system of annual reporting across the whole research system. A new simplified funding and financial reporting system would benefit the research system in general and should apply to all legal forms of public research organisations.

#### ***Human resources aspects of the Romanian research system***

- **Romania suffers from an acute brain-drain problem, which deprives the R&I system of its main resource: as established in the SNCISI, attracting human resources to research is crucial for the consolidation and gradual expansion of the R&I system in Romania.** Due to the time necessary to train scientists and innovators, the solutions should be implemented by decisive commitment at the highest level, as part of a long-term programme affecting the whole education system of Romania. Therefore, a



forward-looking human resources strategy is a fundamental part of a broader strategy to improve Romania's competitiveness and move towards becoming a true knowledge economy. The country needs to recognise the value of science and the social benefits of investing in its human capital, in scientists and highly trained people. Romania needs more STEM graduates as well as a larger number of PhD holders that can drive the country's research system to meet the country's ambitions. This next generation will become leaders in not only in science but also in other relevant positions in public and private sectors. For Romania to effectively integrate in global knowledge exchange, Romanian research results must be made available to the scientific community through open access and be made subject to international scrutiny.

**Recommendation 6.1: Under Reform 3 in the NRRP, simplify the evaluation of human resources in the research system and align conditions for career advancement with EU practice. Provide user-friendly platforms and a unified information system to avoid unnecessary paperwork.** The conditions for career advancement are considered stringent and are, in general, well known and established in the system. However, these conditions should be externally assessed and revised, to make sure that they are equivalent to those implemented in other EU countries for similar positions. Romanian language journals and other local journals still have a very high weight in the average curriculum. Incentives to promote publication in international journals would increase the visibility and impact of Romanian research, these incentives could be in the form of training in international scientific and research publication, in addition to existing financial support to such publications.

- **Advanced human resources for R&I are not sufficiently recognised and remunerated. Too many well-trained people need to struggle for their living rather than contribute to the advancement of research in their country.** There are substantial differences in the remuneration of human resources for equivalent positions depending on the institute or university of affiliation. The fragmentation of the sources of income for researchers and professors as well as the uncertainty about the outcome of the research projects from the national plan (both in terms of the funding received and the date of allocation of the resources) provide incentives to dilute and fragment their activities. In the case of the universities, there is a clear incentive to increase the number of hours taught at the expense of the research dedication. In addition, the funds received from research projects are often used to complement salaries or to pay supplements to those of the PhD students, whose stipend is too small to cover their basic needs. This leaves less available time and funds to effectively do research.

**Recommendation 6.2: Clarify and realign the conditions and incentives in the salary and other remuneration for human resources**

**in PROs and HEIs, and focus on improving social prestige and recognition.** In parallel, increase the accountability of the institutions in the process of recruitment and career advancement, and provide more transparency on their sources of income and their use. The funds obtained from competitive research projects should be used to meet the research goals and only marginally to pay salary supplements and small stipends. Such supplements may be seen as incentives, not as a regular component of the salaries of the researchers. For the researchers in open ended employment to be internationally competitive and truly independent they should have reasonable guarantees for their income, and have trust in fair treatment. Individual career plans should be agreed with their institutions, and researchers should be held accountable against their own development plans.

- **During the last decade an important effort has been made to bring Romanian doctoral schools on par with developments in other EU countries.** There is an ongoing process to bring best practices into the Romanian graduate schools in terms of structure, conditions and functioning of PhD study programmes. A key role has been attributed to human resources in the new national strategy SNCISI, as well as in Educate Romania, the latter bringing changes and improvements in doctoral study programmes and schools. However, the number of PhD graduates is well below the target set by the Romanian authorities (3.000 per year). One of the main reasons is the poor attractiveness of the PhD studies, as the stipend for those that obtain a grant is very low and PhD-students often have too little time left to pursue their studies, because they need to work as research assistants, part time teachers or otherwise earn a living. This lack of coherence between ambition and will to make a sufficient investment in the next generation of Romania's advanced human capital results in a very low rate of graduation from the country's doctoral schools, and a limited pool of well-trained young researchers available for Romania's research and innovation system.

**Recommendation 6.3: Complete the reform of doctoral studies (under responsibility of ME), encouraging collaboration between different institutions (National Research and Development Institutes, Academies and Universities).** The goal should be to gradually increase the number of PhD grants per year (to at least 2,000), as well as the stipend to an amount sufficient for the PhD student to be able to work full time on their study programme (e.g. around €750 or €800 per month). Other changes should be implemented: homogenize the conditions and regulations for all doctoral students in terms of remuneration, benefits while reducing the paperwork and the reporting; promote the exchange of experiences and the joint workshops of doctoral students from the different institutions in order to foster transversal skills and to socialize the next generation of researchers; create a "job market" for young PhD graduates

where positions are advertised in advance and where the hiring institutions can meet the candidates in an open environment.

### ***Research infrastructures in the Romanian research system***

- **There are good initiatives to support research infrastructures in Romania.** These include the ERRIS database, the Romanian research infrastructure roadmap (initial version adopted in 2017 and ongoing update of the Roadmap, started in 2020 and expected to be published in 2022), and the IOSIN programme to fund operational costs of nationally important installations and funding of research infrastructures investments from Structural Funds. All of these were launched at different times and with different ambitions and focus. They are also implemented by different bodies in the Romanian research system including Managing Authorities of the Structural Funds. Although it is understandable to benefit from opportunities as they arise, this leads to an unclear vision and incoherent strategy for research infrastructures both for policy-makers and researchers. A prioritisation exercise could take into account both the demand and supply side. On the demand side a strategy of maximising the socio-economic benefits must be clearly formulated by the bodies in charge of research infrastructures. Relevant Strategic Research Agendas, strong sectors of the Romanian economy and links to the Smart Specialisation Strategy must be taken on board. On the supply side clear articulation needs to be made with the capacity of the research community, and publicly available open access policy should be developed (see recommendation 7.3). These elements should be provided by research infrastructures managers and carefully reviewed during the prioritisation exercise.

**Recommendation 7.1: Establish a coherent research infrastructure strategy and develop an articulated narrative with clear prioritisation.** An infrastructure strategy must clarify the concept of research infrastructures (as opposed to instrumentation and investments) and should link to institutional structure and human resource capacity. The strategy should align with the process of consolidation of the Romanian public research landscape by promoting clustering and cooperation of various research organisations on major research infrastructures (see recommendation 4.1), whilst also bearing in mind R&I collaboration with private entities. Priority should be given to Romania's internationally visible trademark research infrastructures, ELI-NP and Danubius, but not at the expense of national infrastructures. The strategy has to be followed-up by the relevant funding agencies (for example, those for investments by Managing Authorities of Structural Funds and for operations by MCID).

- **Research Infrastructures lack appropriate funding streams for their operations.** The Romanian research system currently lacks the required funding resources to meet the operating costs of research infrastructures, which also weakens their ability to attract human

resources and expand the pool of users and partners. As opposed to organisations in Western Europe, infrastructures managers do not have enough core funding to fund research infrastructure operations on their own. The current policy mix does not foster a generous infrastructure environment, and does not encourage the efficient use of established infrastructures.

**Recommendation 7.2: Revise the policy mix to ensure sustainable funding for operation and maintenance of research infrastructure.**

The strategy should be accompanied by a coherent funding policy for both investment (by national or EU funds) and operational funding (by modifying the current IOSIN programme including open access provision to users).

- **Open access to publicly-funded infrastructure is not fully a reality.** A key purpose of research infrastructure roadmap is to ensure maximum utilisation of shared state-of-the-art equipment and other specific infrastructure. This is normally done by serving its user community through providing open access. It includes users from the public research sector as well as from private companies, both national and foreign. During interviews with various research players, it became apparent that due to mainly financial reasons (no operational funding, no money to repair/service broken equipment, little fund for user experiments) existing research infrastructures and research equipment in general is underutilised. Apparently, there are no logs of usage available and no hard data on the actual utilisation of research infrastructures and equipment are available to make informed choices. In general, the culture of open access and transparency is not sufficiently developed by the bodies responsible for Romanian research infrastructures.

**Recommendation 7.3: Under NRRP Reform 5, foster the utilisation and open access to research infrastructures.**

All funded research infrastructures have to be open by definition to all relevant users (academics or companies, domestic or foreign) following their open access policy. It should be mandatory to establish a usage log for each major infrastructure. All implemented support measures and funding streams would need to take into account the data on users served/utilisation of the research infrastructure and its impact (reached by users) measured by indicators relevant for both basic and applied research. At the level of research organisations and research infrastructures, measures promoting openness and transparency of research infrastructures such as use of booking systems, open reporting on the users and their experiments and impacts (available on the research infrastructures website) need to be encouraged. Linking research infrastructures and their users transparently by openly acknowledging RI use is international best practice and needs to be followed.

#### 4.1 *The landscape of Higher Education and Public Research Organisations and the regulatory framework*

This section gives an assessment of the situation with the landscape of HEIs and PROs forming the public research sector in Romania. An overview of the landscape of Higher Education Institutions and Public Research Organisations is provided in Annex 2.

**The public science base is fragmented and the scarce resources are dissipated across a large number of public research organisations.** The system seems to be the result of a combination of historic legacy and ad hoc exploitation of external (mostly EU) funding sources. It involves a large range of institutions and R&I performers, and almost all parts of the system are underfunded. For the current level of funding the number of public institutions performing research in Romania is considered too high and detrimental to the formation of critical mass in many research domains. Each of the systems' pillars has its own rationale, level of autonomy and core financing.

At this point in time a general view of the *raison d'être* and expected outcomes of individual research entities, and MCID's role in this regard has yet to be established. Consolidation is necessary: the strongest, best performing and most important units need to be protected and nurtured in a proactive manner as opposed to the current dead lock and survival mode. In addition, there is much room for improvement with regard to the reporting of the research results and the assessment of institutional performance. The newly established Intergovernmental Committee may become an important step towards building a consolidated national view of the sector.

**There is a risk of overlapping research domains.** Universities and the Romanian Academy cover all fields of study and academic research. Some specific research domains, such as biomedicine, are being pursued as well in universities as at Academy institutes and within the framework of the Academy of Medical Sciences. In applied sciences overlapping activities occur between national institutes, universities and other research units.

**There are too few incentives for collaboration across the various types of PROs and HEIs.** Coordination and cooperation between institutions is very limited, within and across the four pillars. Collaboration across institutional borders is ad hoc, and often hindered by differences in operational modes and regulations. Despite this fragmented framework some cooperation in research still occurs across types of organisations, notably through double affiliations. Some institutes organise joint activities such as conferences. It would be beneficial to move towards compatible regulations across the research sector and encourage greater institutional collaboration.

**The National Research Strategy 2021-2027 rightly foresees a requirement for individual evaluations of all public research organisations but falls short of establishing a process of systemic consolidation as envisaged in the NRRP.** One objective of the SNCISI is 'Competitive Public Research Organisations', which addresses the issues of fragmentation and lack of adequate funding as root causes for the lack of

competitiveness of PROs. The way forward in SNCISI involves undertaking periodic evaluations for all units and institutions, which would influence the institutional funding of them. However, neither the criteria used for such institutional evaluations, nor the deeper consequences of these evaluations in terms of consolidation of the system are made explicit. There is a risk that the individual evaluations, however relevant these are, would not lead to a much-needed overall reform of the Romanian research system as such.

**The need for deeper reforms is rightly put at the forefront in the NRRP**, under Reform 5 "Support to integrate the research, development and innovation organisations in Romania in the European Research Area". The reform envisaged in NRRP goes indeed further than the SNCISI by indicating that "*the periodic evaluation shall identify synergies and potential mergers among research institutes, and access to financial and non-financial support for research organisations shall depend on the results of these periodic evaluations*".

The assessment of the PSF Panel concur with the NRRP's vision. Such deeper reform can be organised through the creation of a network between public research organisations, taking lessons from the Polish experience of the Łukasiewicz Research Network, which involves collaboration and development of strategic research agendas leading to a reconfiguration of the system (Box 1).

The challenges of modern society and economy require strong support from the side of the research community. This task requires not only a legal basis and effective procedures, but also a strong brand. A brand which will be easily recognised by the innovative community and society at large.

National research institutes in **Poland** have their own legal framework – the Law on Research Institutes. This law includes an obligation for cooperation with business and for knowledge transfer. The supervision of the institutes is charged to several ministers, and financing is guaranteed by the Ministry of Science and the Ministry of Higher Education. However, some research institutes underperformed, and their operations were unsatisfactory in applied research, and their technology transfer mission were not satisfactory. This view was obscured by the fact that some research institutes have other missions – like the education of PhDs and excellent basic research.

In order to improve the situation government decided to review and reform an important part of the national research institutes. The process of reform was lengthy, it took two years to discuss the final shape of the law with the institutes and its partners both from industry and the higher education sector.

In 2019, on a basis of a new regulation, the Łukasiewicz Research Network was created. It included 37 research institutes active in different areas of technology, from biotechnology and pharmacy to mining. The name Łukasiewicz” is widely recognized in Polish society as one of the pioneers of Poland’s industry, research and philanthropy<sup>1</sup>. The created network has a number of features that on the one hand clearly establish the mission, on the other allow for flexible management of the new organism. These include:

- All institutes in the network has “Łukasiewicz” in its name – it goes first, then a word that describes the area of operation of a given institute (similar to Fraunhofer Gesellschaft);
- RNŁ is financed by the Ministry of Education and Science – both statutory funding and grants for research in the areas important for government policies;
- Strategy (mid and long term) and Research Agenda (for each year) are adopted by the Łukasiewicz Council operating under the Minister of Economy (with the participation of Ministers of climate, digitalization and science) on the basis of the development strategy adopted by the government;
- Operation of the RNŁ is supported by the College of Councillors – 20 persons, among those: 10 entrepreneurs (some from foreign companies), 5 scientists (including Poles based abroad), and 5 directors of RNŁ institutes. The Council advises to the management of the RNŁ on research activities, procedures and mechanisms of cooperation with business;
- The whole network operates on unified procedures for technology transfer, IPR management, research infrastructures management, HR management, and financial management;

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<sup>1</sup> [1] [https://en.wikipedia.org/wiki/Ignacy\\_%C5%81ukasiewicz](https://en.wikipedia.org/wiki/Ignacy_%C5%81ukasiewicz)

- The network has single contact point for cooperation with entrepreneurs and scientists – Łukasiewicz Challenge System<sup>2</sup>;
- The institutes operate in flexible research groups designed to implement research agenda. Currently these are health, sustainable economy and energy, digital transformation, intelligent and clean mobility;
- The institutes can be merged in order to better use the potential and resources – in 2019 there were 37 institutes, as of 1st January 2022 there are 27 institutes. The procedure is simple, requires only opinion of the Łukasiewicz Council and a decision by the President of the RNŁ.
- The President of the RNŁ can build ad hoc consortia to implement projects of special interest for the network or the government;
- The development of research infrastructure is dependent on the research agenda – only infrastructure needed to implement research agenda can be financed.

Lessons learned:

1. Detailed preparation process, including many stakeholders, is needed when introduced reforms change drastically the long functioning structure.
2. There is no need to have a strongly unified structure if there are mechanisms implemented that will guarantee efficient cooperation (single rules for cooperation with enterprises, and so on).
3. Simple and understandable mechanisms of cooperation with business (Łukasiewicz Challenge System) combined with support mechanisms (i.e. tax incentives for R&D) are highly successful – since its implementation in 2020 more than 200 new partners submitted around 450 research questions.
4. It is important to have an easily identified brand (Łukasiewicz) that is widely recognizable across society.

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<sup>2</sup> [2] System is simple – entrepreneur formulates the research problem (via web application), within 15 days RNŁ responds with the proposed solution, including institutes who can participate in the research project, possible way of financing it, possible timeline for implementation.



**The amount of institutional funding at the system level (overall research budget) varies between countries** and there is no magic ratio between institutional (dedicated budget 'envelopes' to institutions, with a large diversity of criteria used in practice) and competitive funding (project-based funding based on competition). This ratio depends on the level of development of the system and its composition (e.g. share of universities versus governmental institutes). In the case of Romania, given the underfunding of the system and its weak performance, it is advisable to stabilise the system and to increase the institutional funding (core funding). The Romanian higher education sector is underfunded in general, and in 2019 the budget allocated to higher education was of only 5,338 million Lei, or about 0.5% of GDP.

**Although universities are considered important actors in the national research system, they do not benefit from sustainable institutional funding from the R&D budget.** In general, young brains are in universities, and a rejuvenation of advanced human capital in Romania's R&D&I system is urgently needed. This calls for further investments in research and research education (Ph.D. and post.doc. programmes) in universities. Except for the universities in the category of Social, human and economic sciences, the amounts attracted by the Romanian universities from the national R&D budget are lower than those from non-reimbursable external funds.

Universities employ different approaches in establishing the university norm, which, by law, includes the teaching norm and the research norm. Only few universities make a clear separation between the teaching norm and the research norm, or have dedicated R&D staff. The Research budget in universities is based on project funding through national and international competitions, and this makes universities' research activities unstable and continuity cannot be guaranteed, particularly ensuring the sustainability of the R&D infrastructure after the completion of projects. There is scope for improving the flexibility and performance of Romania's higher education institutions, provided that the government and ME maintains a focus on implementing a block allocation (block grant) mechanism, which in its fundamental algorithm would include a provision for university research. From 2021, research in selected universities received €13.5m per year through an Institutional Development Fund under ME.

**Developing the research component at the university level and increasing the performance of doctoral schools in conditions of transparency, ethics and integrity is on the 2021 agenda of the Ministry of Education.** Initiatives are being considered in order to improve the situation for higher education in Romania. These activities are envisaged to increase the financing of research at the university level, change the human resources policies so that advancement in a purely research career should not be automatically linked to progress in the teaching career, involve foreign researchers in the activities of doctoral schools, and attract researchers from the diaspora and other nationalities. The reform of financing of HEIs in Poland provides a reference case as several problems in the Romanian system have already been resolved there, particularly regarding a lack of predictability and stability of funding, move towards performance-based formulas, use of data for evidence-based policy-making.

Institutional financing of HEI and PRO sector in **Poland** was extremely complicated and divided into different streams. This situation was especially visible at the level of the universities, which obtained (as basic funding) separate financial streams for research and education (which should be accounted for separately). Research funding has, for a number of years, been based on outcomes from evaluation of research performance. Evaluation is conducted every 4 years on the basis of criteria described in a regulation of the Ministry, which is published prior to each evaluation cycle. All the data used in the evaluation are collected in an information system, POL-on, which is also used by Central Statistical Office for all activities related to R&D and higher education.

As an effect of the reform, the financing of the university was simplified. Instead of dual financing streams (for research and teaching) a block-allocation system was introduced. The funds are at the disposal of the university management, according to the needs of the institution. Resources not spent one year may be transferred to the next year, and there is no need to pay it back to the state budget. In certain cases the Minister might increase the size of the grant, and such a decision is made public via publication in the official journal of the Ministry.

The block allocation is determined by a publicly known algorithm (described in the regulation of the Minister). The algorithm describes different types of HEI's (universities, technical universities, and so on), cost-intensity of the teaching activities, number of teachers, researchers, students and PhD's and all the variables that are of importance for the entity.

The system provides predictability and stability to financial flows. A significant feature is that right up to the date of the final division of resources in a given year (normally in March), the institutions automatically receive every month 1/12 of the funding received in the previous year.

In addition to the block-allocation, HEIs might obtain a limited number of dedicated grants for research infrastructure, or within the framework of specially created ministerial programs. Grants for research infrastructure are distributed in an open call on the basis of criteria laid down in the Ministerial regulation. Every year half of the financial allocation for research infrastructure is reserved for infrastructure that are in the Polish Roadmap of (major) Research Infrastructures. In this way the investment process is streamlined for the most important strategic infrastructure.

Two governmental programs – "Excellence initiative – research university" and "Regional excellence initiative" are specific initiatives which were developed in the follow-up a PSF review, and are aimed at improving Poland's research and teaching potential in HEIs. The first allows for selection of 10 excellent research universities (on the basis of transparent criteria and with the support of international evaluation panel, evaluated is the current potential and development plan of the entity) which over the 6 years following this evaluation will receive 10% increased subvention. The second focus on improving performance and quality in regional universities, and this program allows for selection of HEIs that are of special importance for regional and local needs and prepares students in the disciplines indicated by a ministerial communique.

Entities participating in this initiative receive a 2% increase in the subvention over a period of 4 years.

Lessons learned:

1. Simplification of financial streams makes management of the HEI easier and improves efficiency in the utilisation of public resources, both at the level of the rectors and the financial services of the Ministry.
2. Flexibility in the use of the resources (block-grants) at the HEIs level allows for better adjustment of the financing for the immediate needs of the entity, it gives the opportunity to implement development strategies more efficiently.
3. Transparency of the procedures and publication of all the decisions increase trust and predictability within the system and allows for more informed decisions by the management of the HEI's.
4. Submission of the data needed for the evaluation is simplified via standardized forms in the POL-on system. This improves system overview and enables evidence-based policy making.

## 4.2 Human resources for R&I in the public sector

### 4.2.1. Introduction: the current situation<sup>3</sup>

**The lack of critical mass of researchers continues to be a major challenge for the Romanian R&I system.** The process of ageing and the level of attrition of Romania's advanced human capital is likely to be one of the major impediments for the country's effort to catch-up with European peers. All PROs have difficulties in attracting and retaining talent, given that research careers are not attractive. The incentive system is not sufficiently strong to face the brain drain phenomenon (a widespread phenomenon, as mentioned in Chapter 2).

SNCDI set ambitious targets in terms of human resources, but as mentioned in Chapter 3 these targets have not been attained. As an example, the target was to reach 17,000 FTE researchers in the public sector by 2020 (current value 12,500) and 14,500 FTE researchers in the private sector (current value 4,600). The underfinancing of both the educational and the R&I system translates into poor job prospects, limited career development opportunities, low wages, and is one of the root causes of the lack of attractiveness of the research careers.

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<sup>3</sup> All figures related to salaries refer to gross salaries.

**Romania has the lowest number of researchers among the EU 27.** The number of researchers is critically low. The recruitment of early career researchers is limited and the number of PhD graduates is declining. Total R&D personnel, that was over 70,000 in 1993, decreased substantially and has stabilised around 30,000 since 2000 (Table 6). The HES is the only sector to have increased the number of R&D personnel during the last two decades, reaching a maximum of 9,000 persons in 2015 and decreasing thereafter. Romania has the smallest pool of employees in R&D and science in the EU, and it is not increasing over time (Figure 20).

Table 6 Evolution of R&D Personnel by sectors of performance

R&D resources	1993	2000	2007	2014	2015	2016	2017	2018	2019	2020
<b>R&amp;D Personnel (FTE)</b>	73.611	33.892	28.977	31.391	31.331	32.232	32.586	31.933	31.665	33.189
GOV	16.438	7.571	8.786	11.866	12.080	12.663	12.500	11.986	12.220	12.218
HES	1.991	3.780	6.931	8.966	9.008	8.627	8.416	7.695	7.600	8.862
BES	55.182	22.541	13.107	10.437	10.128	10.785	11.525	12.081	11.628	11.880
PNP	N/A	N/A	153	122	115	157	145	171	217	229

Note: The sectors of performance in R&D statistics are GOV (government), HES (higher education), BES (business enterprise) and PNP (private non-profit).

Source: Eurostat, GERD by sector of performance [rd\_e\_gerdtot]; R&D personnel by sector of performance [rd\_p\_persocc]

Source: Serbanica and Pupinis 2021

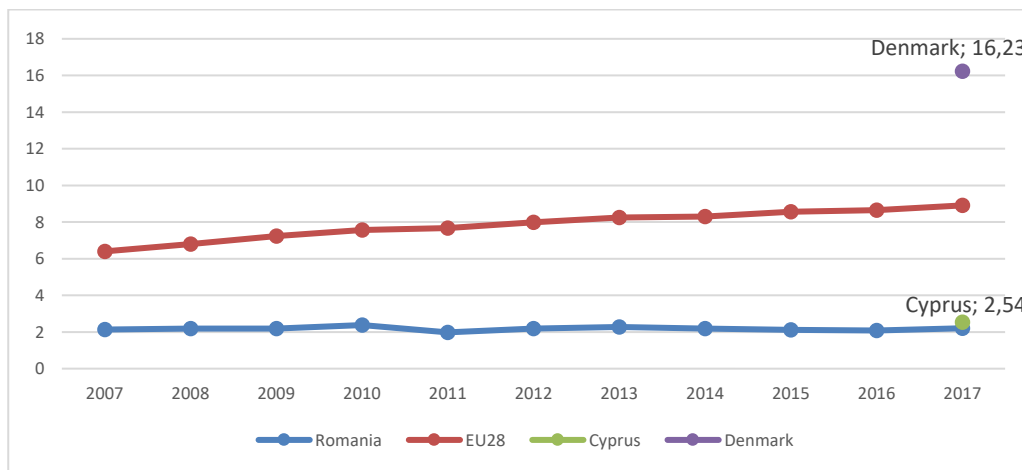


Figure 20 Number of researchers per thousands of employees in the country (2007- 2017), as compared to the second-lowest rate (Cyprus), the highest rate (Denmark) and EU

Source: EC 2019b

**The Romanian research system is balanced in terms of gender.** The proportion of women in total researchers has been, during the last 10 years, around 50%. According to the most recent data available from Eurostat, Romania was the fourth placed country in the EU in terms of this indicator, that reached 50.5% in 2019 (Figure 21). This proportion has been maintained across government, higher education, business enterprise and or private non-profit sectors. This is a very positive sign, but it must be evaluated whether it is because of equality policies and practices, or just a secondary effect of a less attractive job market. There are signs that the research sector in Romania is not attractive enough to attract competitive national or foreign researchers.

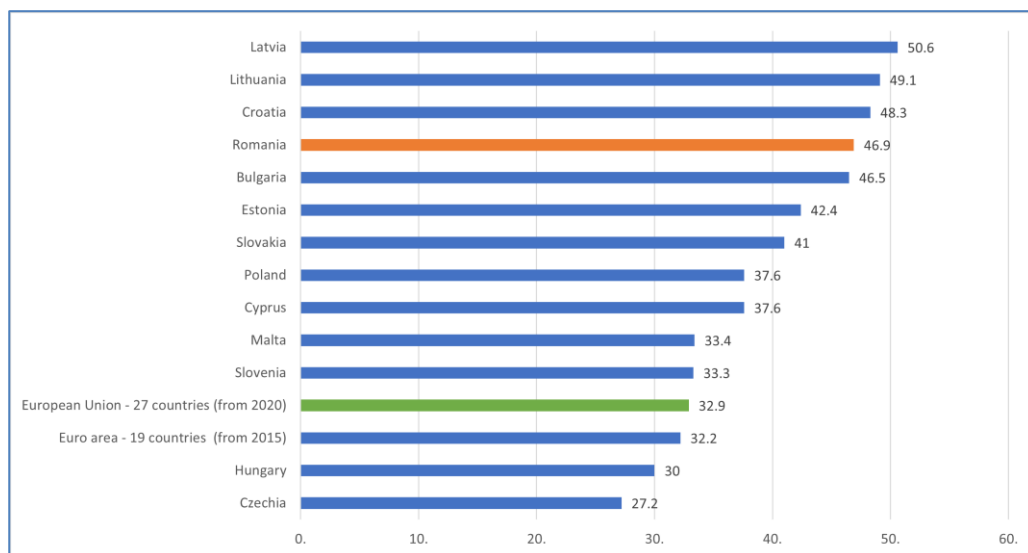


Figure 21 Proportion of women over total researchers. EU13 countries and EU27 average (2019)

Source: Eurostat

**The age-distribution of Romanian researchers is relatively balanced.** In 2019, the most recent year with data available on the age of research personnel, the largest age group corresponds to the age category 35-44 (35% in the case of universities and 28% for the Government sector (Figure 22). In addition, the proportion of younger researchers is larger than those over 55. However, a steady decline in the number of young researchers has occurred since 2003: from 26% in the HEI sector to the current 16%, and from 24% to 20% in the government sector.

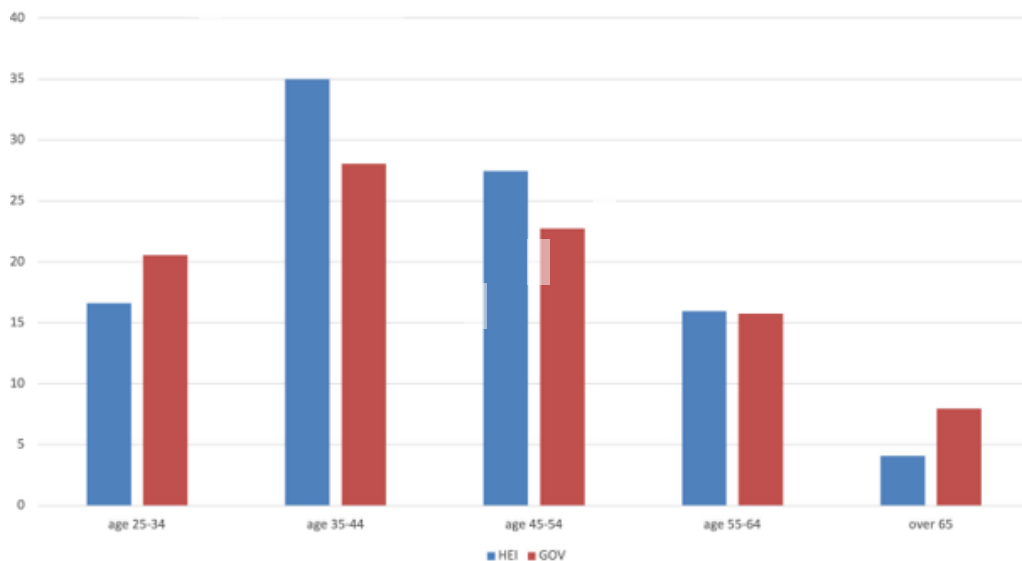


Figure 22 Age of researchers, as a percentage of total per sector 2019. R&D personnel, Higher Education and Government sectors

Source: Eurostat

4.2.2. *Regulations for Human Resources and the question of salaries and other remuneration of public sector research personnel*

**The management of human resources in the Romanian R&I system is highly regulated.** The regulations are very varied, from laws to government decisions and orders. This generates both complexity and dispersion in the working conditions, responsibilities and remuneration of personnel. However, an important effort has been made to classify personnel according to their scientific and technological development functions, the universities having their equivalent for teaching functions, with the understanding that their personnel also may perform scientific research or/and technological development.

For example, a Scientific Researcher 1<sup>st</sup> degree (CS I) working in a National Institute is equivalent to a University Professor. Radoi et al. (2021) provide a survey of the classification and the remuneration of human resources in Romanian R&I for institutions in the four pillars as defined in section 4.1 above, that we use as the main source for this report. The maximum monthly salary and hourly rates are also officially regulated, using the above-mentioned classification to distinguish 4 categories (Table 7).

Table 7 Maximum monthly rate – full time equivalent (FTE) and maximum hourly rate (gross income) under the 3rd PNCDI

Categories	Scientific/teaching functions	Max. monthly rate (FTE) (€)	Max. Hourly rate (€)
1	CS I, CS II, IDT I, IDT II, Professor, Associate professor	€4300	€50
2	CS III, IDT III, CS, IDT, Lecturer, Teaching assistant	€2900	€35
3	ACS, PhD student, Master student	€1900	€25
4	Technician (T I, T II, T III, TS), student, other	€1000	€15

Source: Radoi et al. (2021)

**At Romanian universities the amount of time spent in research is not specifically calculated.** The assignment of hours to specific duties (teaching, research, development, administration) may change during the academic career, and it is difficult specifically to calculate how much time is allocated to research. This should also affect opportunities for career advancement and should be adequately remunerated. This should not be in detriment to, but rather in favour of, research, so that monetary incentives and also other opportunities furthering prestige can be used to increase research output, as well as enhance the value and social recognition of research in Romania.

**There is an important degree of disparity in the remuneration of R&D personnel, as wages show high variability depending on the institution,** and this despite the fact that the maximum remunerations are legally stipulated. Although, on average, National Institutes, the Institutes of the Romanian Academy and the Universities are in a similar range, looking at the individual institutions differences are substantial. At the two extremes are the ASAS, with

the lowest average salary, and the ASM, with the higher average salary (Table 8).

Concerning the 41 National Institutes, even if the average gross salary is €1,741, in four of them it exceeds €2,000. However, the average is, in the majority of them, between €1,000 and €2,000. The range of potential differences in remuneration is due to the existence of other elements that are added to the base salary: indemnities for management positions (as well as for the management of the CORE programme) and incentives for participation in research projects, with substantial differences depending on the institute.

The personnel from the 37 Institutes of the Romanian Academy have an average gross salary of €1,249. In this case, the remuneration is more homogeneous than in the National Institutes, as the revenue from external sources is a smaller percentage than in the National Institutes.

The Academies (ASAS and ASM) have specialised activities that are complemented with indemnities and remuneration from external projects for both. However, the higher salaries in the ASM are explained by the additional salaries from universities or hospitals where the members of this institution are affiliated. Taking the highest level in the Romanian classification, CS I or Professor, the differences are more dramatic, especially in the case of the Academy of Medical Sciences.

For the universities, the range is also very wide: at the University Politehnica of Bucharest (UPB) an average professor had a remuneration of €2,240 (gross salary) in 2020, whereas the associate professor's was €1,560. At the Babes-Bolyai University (UBB), the remuneration is, respectively, €2,932 and €2,665. The highest salaries are found in those universities specialized in Medicine. For example, professors and associate professors at the University of Medicine and Pharmacy "Grigore T. Popa" (UMFIASI) receive an average salary of €6,680 and of €6,062, respectively.

Table 8 Average salaries by institutions and categories (gross income) in €

Average gross salary (€) 2020	INCD	I-AR	ASAS	ASM	UNIV
R&D personnel	1471	1249	1068	4665*	1461**
CS I or equivalent	2520	1980	1461	6800	-
CS II or equivalent	2220	1525	1321	5100	-

(\*) The R&D&I personnel of ASM is made of associated researchers having their primary position in a University or in a hospital.

(\*\*) The average salary took into consideration the wage for scientific functions as well as the wage for teaching functions.

Source: Radoi et al. (2021) and own calculations



**The large disparity of salaries in the universities can be attributed to the different sources of additional remuneration, as well as to the specific human resources policies adopted by the universities.** The Law of Education (2011) established four levels of university faculty and researchers that are equivalent in terms of years of experience. The faculty positions at the universities are related to teaching necessities, although more recently some universities are also hiring personnel only to do research, although their proportion, even in the larger universities is below 10% of the total.

The Romanian Academy has a more permanent research structure, linked to pre-existing capabilities that are maintained thanks to direct financing from the Romanian budget that covers most of their functioning expenses. Remunerations are also different depending on the institutions and their access to external resources. Access to competitive funds, both national and European, provides additional capabilities for temporary hiring. This possibility is used by all the institutions in the system.

#### *4.2.3. Doctoral schools and the funding of PhD students*

**Doctoral studies are offered as a third cycle of university studies,** organised in doctoral schools by universities or consortia of universities and other research establishments. However, in this case there is also a dual system, as the Doctoral School of the Romanian Academy exists as a separate entity. Nonetheless, all doctoral programmes follow a process of evaluation and accreditation. During 2021 all doctoral programmes in Romania were subject to an extensive external evaluation and subsequent accreditation process which also included international peers, and the results were published of ME by the end of the year. The Ministry approves the number of places or grants to each university with priority to advanced research and education universities. Doctoral students can teach 4 to 6 hours per week. The capacity to supervise doctoral theses is attributed by the administration based on evaluation criteria.

**The 3<sup>rd</sup> National Research Plan (PNCDI) finances PhD students through annual competitive calls.** The number of funded PhD students has increased since 2016, with the exception of 2019 (Table 9). However, the scholarship provides a stipend of only around €310 per month for the first two years, and €360 for the third year. In the majority of disciplines, the law stipulates that the dissertation has to be completed within three years, with the exception of the domains of Medicine, Dentistry, Pharmacy and Veterinary, lasting an additional year. The same stipend of €360 is provided in these cases. These grants are for students enrolled in doctoral programmes either at the universities (that may also develop their projects in National Institutes, with at least one supervisor being faculty member from a university) or the Romanian Academy.

The Romanian Academy has its own doctoral school, the School of Advanced Studies of the Romanian Academy (SCOSAAR). Every year there is a process of admission to the students that are ascribed to the Institutes of the Academy and, within the institutes, to a supervisor. In 2021, a total of 146 were admitted, some are paid a monthly stipend of around €250 (82) and the remaining 64 are admitted at their own expense. As in the universities or in the National Institutes, they can participate in research projects to finance their studies. Their salaries,

in this case, are regulated according to the classification in Table 8 above (category 3, for PhD students). A similar number of grants have been offered since 2016 to post-doc students. In these cases as well, the maximum salary is the one in category 2. However, taking into account the average salaries paid in the different institutions, the maximum levels are never attained.

Table 9 Number of PhD and post-doc positions (not FTE) funded each year through the National Research Plan

Funded positions	2016	2017	2018	2019	2020
PhD Students	184	898	1500	1069	1478
Post-doc	89	737	1384	1045	1422

Source: Radoi et al. (2021)

**Due to the low salary or stipend received by the PhD students, they have to complement their income with additional sources.** The two most evident are, first, teaching at the university where their programme is affiliated and, second, collaboration in research projects under the direction of their supervisors (sometimes in several projects). In both cases the experiences may be beneficial for their research but, most of the time, this means a heavy workload that may make it impossible for them to complete their dissertation in three years. Most of them end up finishing their thesis after 5 or even 6 years.

The low salaries of PhD students is possibly the main explanation for the very low graduation rate, despite the large number of PhD students that the Ministry of Education authorises and finances in the Romanian research universities. For example, some doctoral programmes in the Politehnica University of Bucharest or in Babes-Bolyai University have more than 300 students enrolled. Low wages are a problem common to all the personnel in the Romanian research system. As the economic conditions are not attractive, once hired, they try to complement their salaries with additional activities, at the expense of research. The first years as independent researchers are crucial to attain scientific excellence. Therefore, the new National Strategy (SNCISI 2021-2027) goes in the right direction, as it proposes, in action OS1. Competitive fellowships for PhD students, to ensure full-time involvement in research.

#### 4.2.4. Research career and incentives

**The R&I system as it stands does not provide a conducive framework for Romania's best researchers.** Very few researchers (12) have received ERC grants. Romania's meagre results from ERC's open and transparent competitions indicates a lack of competitiveness of Romanian research institutions. Further, the decline in the numbers of doctoral students by about 50% since 2010 is a serious warning signal. Romania may foresee further ageing and attrition of its human capital: this is a long-term risk for the system.

Human capital formation takes a sustained effort over very long time. The country needs a proactive strategy for the renewal of its advanced human capital, and a plan for empowerment of early career researchers is badly needed. In addition,

there is a weak tradition for professional research management and the administrative support remains inadequate. Individual researchers and research teams are forced to struggle with administrative issues beyond their experience and capacity.

**Even if the university system does not provide good conditions for researchers, a major percentage of Romania's academic research capacity rests within the universities.** However, as mentioned above, the role of universities in the country's R&I system is not clear and transparent, or at least not recognized in terms of budget allocations (see section 4.1). On one hand professors and prospective younger academics in universities are supposed to do research, and their promotion and careers depend on good research performance, such as in international practice. On the other hand, until recently, there is no dedicated public budget for research in universities. This led to underperformance because the young brains are forced into demanding teaching obligations. An innovative R&I system cannot perform in any country without a good (age-pyramid) of trained brains, a strategy must aim at a good blend of daring and flexible and experienced and strategic minds employed in its system.

**Individual or group incentives to do research are insufficient.** Both at the PROs and the HEIs, career advancement is based on research output or performance, but there are no other incentives to maintain standards once the position has been gained. Moreover, at the universities research performance is not directly linked to teaching hours. The minimum teaching hours per week is an average of 4. The workload per week is lower for Professors (7 hours) than for assistant lecturers and lecturers (10 hours). But teaching hours per week can reach a maximum of 16. This means that in practice, younger faculty (at the most productive stages of their research career) are assigned such high teaching obligations that it does not leave them enough time to maintain and develop the research activity.

The workload can be completed by doing other activities, including research, the hour of research being equivalent to 0.5 conventional hours. This is in sharp contrast to the institutes of the Academy, where the researchers have no teaching obligations, with the exception of those linked to doctoral programs. In addition to the general workload of teaching hours, some of the university positions are "open". This means that they can surpass the above-mentioned number of hours and their salaries are proportionally increased. This creates an incentive to teach more and do less research. Some universities, such as Babes-Bolyai, have created strategic plans to design individual careers, so that the faculty can choose a research-oriented or a teaching-oriented path.

**Research careers are not attractive for young graduates.** Compared to other European countries, new doctoral graduates are only 22% of the EU average. To recruit PhD students, the universities are in the best position, but lack the conditions to offer a clear career path based on research and performance. In addition, the universities have more limited research infrastructures to offer them and the positions at the universities depend on teaching necessities. Both universities and the Academy can offer doctorate studies, but the Academy has established research groups that provide a permanent structure to conduct research. However, the absorption capacity of

any of the research institutions is limited due to the uncertainty about funding and future positions. Moreover, salaries are low compared to alternatives in the private sector. This problem is especially acute in Engineering and Medicine. Furthermore, the Romanian labour market has difficulties in absorbing PhD graduates, as most of the companies are SMEs with no research or innovation departments, whereas innovative and knowledge-intensive start-ups are rare.

**The criteria to hire human resources differ among the PROs.** The requirements for career advancement are also different and not fully transparent for those outside the system. The researchers have internalized the culture of evaluation. There are well established requirements to advance in the research career and different accreditation agencies fulfil this role. However, the accreditation methods are bureaucratic and repeatedly require the recompilation of the same items (publications, research projects, PhD supervision, etc.). On the other hand, the use of accreditation procedures which are too automatic may not create the right incentives for the researchers to push for excellence. The Romanian research system can benefit for more integrated approaches to the requirements for career advancement as well as from coherent platforms to avoid paperwork and facilitate evaluation.

#### *4.2.5. Support measures for human resources*

**Different HR support measures were in place, for the 2014-2020 period, both under PNCDI and ESIF.** These cover (Table 10):

- Income tax exemption for R&D personnel.
- Public funding for doctoral schools provided by the Ministry of Education. In 2019, it represented about 6% of the total institutional funding received by the universities.
- PNCDI Sub-programme 1.1 Human Resources supports many types of projects, including postdoctoral research projects, research projects for young independent teams, fellowships for young researchers, rewarding research results such as articles and patents, mobility projects for researchers (including from the diaspora), and other types of research grants for young researchers. The main objectives are to increase the number of researchers and the attractiveness of the research career, most of the proposed instruments being targeted to young researchers.
- The OP Human Capital 2014-2020 (POCU) has a Specific Objective (S.O.) 6.13, which is aimed at increasing the number of university and non-university tertiary education graduates who find a job (including a research job) as a result of the access to learning activities. It has a focus on the sectors of competitive advantage identified in the National Competitiveness Strategies and the smart specialisation priorities of SNCDI. S.O. 6.13 provides ESF support to doctoral students and post-doctoral researchers to develop transversal and entrepreneurial skills. The financial support is granted to scholarships and for internal and transnational mobility. €84.7m has been allocated for support aimed at doctoral and postdoctoral researchers, to improve their transversal and entrepreneurial skills in support of research and innovation. This instrument has not been effective, because in spite of such substantial support, the number of Ph.D. candidates is still low and graduation often delayed.

In addition, a number of incentives are in place for attracting researchers from abroad, notably in the NRRP and the Cohesion Policy programmes (see Chapter 6)

Table 10 Policy mix to support human resources for research

Source	Funding scheme	Budget
PNCDI 2015-2020	Programme 1 by UEFISCDI: scholarships	€ 161m <b>€ 26.8m per year</b>
	Programme 1 by UEFISCDI: research projects	€ 187.7m <b>€ 31.3m per year</b>
ME	Funding for doctoral schools	-
ESIF	POCU (2014-2020)	€84.7m <b>€12m per year</b>
Tax incomes exemption		

Source: PSF Panel, based on (Serbănică and Pupinis 2021)

**Support measures for HR are foreseen in SNCISI and NRRP.** The SNCISI encompasses actions to support researchers. In the National Research Plan associated to SNCISI, a specific programme for Human Resources aims at increasing the number of researchers, improving their training and designing a more attractive research career. The objectives of the programme are aligned with the recommendations of this report: to make the research career attractive; to promote knowledge transfer; to reduce the brain-drain; and to increase the visibility of science.

Several sub-programmes were announced to support young researchers (including PhD students) and increase their mobility, other instruments to promote excellence in research, as well as additional measures to foster international mobility of senior researchers. It also includes a monitoring procedure based on performance indicators that aim at increasing full-time researchers in the system, but also the impact of Romanian research. The NRRP includes three specific actions: two of them are short-term (finishing in 2023) and are devoted to attract top international researchers, and to award certificates of excellence to Marie Skłodowska Curie Individual Fellowships. Finishing in 2026, the third measure aims at creating eight career guidance centres to attract young people to a researcher career.

**In addition, the draft Education and Employment OP (POEO) under the Cohesion Policy for 2021-2027 will provide support to doctoral schools.** The POEO foresees the development and implementation of interdisciplinary doctoral schools including in the fields of smart specialisation, and of doctoral and post-doctoral scholarships in these fields.

### 4.3 Infrastructures for R&I in the public sector

**The use of the term “research infrastructure” in the Romanian research environment is confusing.** It is widely used both to refer to individual pieces of research equipment (that are used by individual research groups and without any clear access policy that would be openly available) as well as to the real research infrastructures as stipulated by the definitions of ESFRI or European Commission (in Horizon 2020 or Horizon Europe programmes). In fact, it seems that the notion of research infrastructure as individual pieces of research equipment seems to prevail. Furthermore, there is no definition of research infrastructure in the Romanian legislation, which creates space for different interpretations. A sharper definition of what really is research infrastructure and what belongs to categories such as general instrumentation and investments in institutional networks, is needed.

**The country lacks an appropriate research infrastructure strategy.** During the last decade new initiatives in the field of research infrastructures have emerged or were reinforced, and led to an incoherent research infrastructure programme. Important initiatives have included funding of research equipment and research infrastructure investments from European Structural Funds, establishing the Romanian Research Infrastructures Roadmap in 2017, setting up the ERRIS database of research equipment and the IOSIN funding programme.

The research infrastructures narrative is incoherent. ERRIS database lists 2,136 research infrastructures (in Romania), while the 2017 Romanian Roadmap of Research Infrastructures lists only 59 research infrastructures, which is comparable to the numbers of Projects and Landmarks on the ESFRI Roadmap. For the underfunded Romanian research system, it is surprising to see so many research equipment and research infrastructures entries in the ERRIS database. Since the research equipment seems scattered in smaller facilities across many organisations, it is usually difficult to achieve the critical mass required for attracting high quality researchers and striving for excellence. In addition, the Romanian Research Infrastructures Roadmap became a long list, rather than a short list of priorities between the 2017 and 2022 editions, by increasing the number of research infrastructures by one third (from 59 entries to 94). The credibility of any prioritisation exercise conducted to date is very low.

**Romanian research organisations have been historically underfunded in terms of research equipment and research infrastructure, but Cohesion Policy Funds changed the picture.** This situation is fully in line with the situation in other countries of EU-13. With the accession to the EU and the use of EU Structural Funds, this has changed profoundly. Cohesion Policy funds for research have been strongly oriented towards funding research infrastructures.

In 2014-2020, over 45% of R&I Cohesion Policy funding under POC was allocated to investments in research infrastructures, and only 5% in research activities in the public sector (Table 3.2, see also Chapter 7). However, the emphasis on research infrastructure was less than that under OPIEC in 2007-2013, as restrictions were placed on such investments in the Bucharest-Ilfov region classed as ‘more developed’ for 2014-2020. Under OPIEC reallocations of budgets had allowed this category of expenditure to dominate. As a consequence, the

output indicators for that period were as follows: for a target set at 100, “New research infrastructures” achieved a value of 893, and “Modernized research infrastructure” a value of 367 (Serbanica and Pupinis 2021).

**The forthcoming POCIDIF for 2021-2027 includes specific actions** regarding the: (i) National Advanced Technologies Platform (PNTA); (ii) Romanian hub of Artificial Intelligence (HRIA); (iii) “Ioan Ștefănescu” Hydrogen Technologies Hub (HTH Ioan Ștefănescu); (iv) Roma Small Air Transport System (RoSATS); and (v) International Centre for Advanced Studies for River Systems – Seas (DANUBIUS-RI).

**An update of the 2017 Romanian Research Infrastructures Roadmap has been under preparation since the autumn of 2020.** As documented by the interviews the Roadmap update process is behind schedule. The initial time schedule as approved by MCID was over-optimistic in terms of the speed of the whole process which was started in September 2020, and should have been finished by December 2020. After consultations between MCID and CRIC the process was actually launched in mid-2021 with, again, a very optimistic deadline of August 2021.

The PSF panel was briefed that the Roadmap update process should be completed at the end of 2021 or the beginning of 2022. Due to timing and financial limitations only Romanian reviewers were engaged during the Roadmap preparation, which can create uneasiness in terms of conflict of interest. The involvement of international peers in the planning and implementation is desirable. Several downsides of the updated Roadmap have emerged from discussions with the CRIC representatives: the new Roadmap is not a short list, but is in fact a very long list of research infrastructures (up to 100 entries), and thus does not provide sufficient prioritisation to inform the relevant funders. Insufficient attention is paid to concentration and clustering that can result in establishing distributed research infrastructures supporting the integration of Romanian science. The updated Roadmap would need to be in place to inform the Managing Authorities of Structural Funds in their calls and funding decisions during the 2020-2027 period.

**The ERRIS database is an initiative of UEFISCDI which could serve as a matchmaking tool between providers of research equipment and possible users.** ERRIS website claims to cover 2,138 research infrastructures, 9,570 research services and 546 technological services and 29,339 pieces of research equipment. This creates confusion with the numbers of research infrastructures as included in the Research Infrastructures Roadmap (59 in the 2017 edition) or the IOSIN projects (31). ERRIS would need to provide for consistent implementation of the research infrastructures narrative as stipulated by the other instruments, and to be a platform to connect research equipment owners/operators and potential users (academics or companies).

For monitoring of usage and sharing research equipment, other tools and procedures need to be made available and consistently applied whenever new equipment is being funded (possibly integrated into ERRIS). ERRIS would also need to establish guidance on which equipment shall be included, how to reference belonging to national or European research infrastructures, and provide

regular updates of the listings. Proper attention has to be paid to making the portal user friendly so that researchers can easily find the much needed equipment.

**IOSIN funding run by MCID is the only funding instrument available to support the running costs of research infrastructures in Romania.** IOSIN stands for the list of installations and special objectives of national interest, financed from the funds of the Ministry of Education and Research. Established by a decree in 2014 there are 31 IOSIN installations currently being funded. The last evaluation for the inclusion of projects under IOSIN was conducted in 2013. A new call for IOSIN projects is foreseen for 2022.

Given it was started back in 2014 it does not correspond to the research infrastructures listed on the national roadmap of research infrastructures, though some roadmap infrastructures are funded by IOSIN. A significant amount of IOSIN funding (60%) is used by three national institutes: IFIN (Institutul National de Cercetare-Dezvoltare pentru Fizică și Inginerie Nucleară „Horia Hulubei”), ICSI RAMNICU VALCEA (Institutul Național de Cercetare-Dezvoltare pentru Tehnologii Criogenice și Izotopice) and INCAS (Institutul Național de Cercetare-Dezvoltare Aerospațială Elie Carafoli). Their share on IOSIN funding is increasing primarily due to the increased funding of operational costs of ELI-NP.

IOSIN funding and Romanian Research Infrastructures Roadmap would need to be aligned in the evaluation process and criteria. The way forward would be to have infrastructures listed on the national roadmap automatically funded by IOSIN and evaluated in regular intervals. Monthly reporting and ex-post funding of IOSIN projects creates an unnecessary administrative burden both on MCID and IOSIN beneficiaries.

**Funding for the operation of research equipment and research infrastructures is insufficient.** This became clear during the interviews of PSF panel with Romanian research organisations. The overall under-funding of research organisations to support just their basic functioning and the low availability of IOSIN projects (last evaluation in 2013) provides for a constant lack of funding for operating any of the relatively modern equipment available.

**Usage of research equipment and research infrastructures is not well monitored.** NRRP foresees under the reform 5 “Support to integrate the research, development and innovation organisations in Romania in the European Research Area” to stimulate all research organisations to share research infrastructure, facilities and equipment with the goal of 25% of research organizations achieving this. The goal itself is good, though it should also be accompanied by the required quality and the establishment of adequate reporting by the users of the research infrastructures when integrated in the M&E platform and future road mapping exercises. Having its equipment only listed on the ERRIS platform (without real users) does not fulfil the goal.

**Romania participates in 22% of ESFRI projects and landmarks, coordinates one large ESFRI infrastructure (Danubius-RI) and is having difficulties with a second one, ELI-Nuclear Physics.** Romania has a relatively high participation in ESFRI projects (33%), while its participation is



lower in ESFRI landmarks (16%) (EC 2019a). Romania hosted one of the three pillars of the Extreme Light Infrastructure (ELI) but problems in the delivery of the equipment contract to the ELI-Nuclear Physics site, and with its operational autonomy, led to Romania not being included in ELI-ERIC established in June 2021, which integrates the Czech and Hungarian sites of ELI. The situation of ELI-Nuclear Physics remains challenging due to uncertainty about the timely delivery of the gamma source, however dialogue with major stakeholders has been reinstated. Romania is also a member of several ERICs (CERIC, EMSO-ERIC, EPOS-ERIC).

**Responsibilities for funding participation in large international research organisations and infrastructures are split between MCID, IFA and ROSA.**

This participation is included under programme 5 of the PNCDI (see Table 11): it funds projects in international consortia ELI-RO, CERN-RO, EURATOM-RO, FAIR-RO, F4E-RO, CEA-RO, and STAR for space research in ESA, DANUBIUS and ALFRED. IFA manages Romania’s participation in CERN.

Table 11 Policy mix to support research infrastructures

Source	Funding scheme	Budget
MCID	IOSIN (2019-21)	€ 66.3m <b>€ 22.1m per year</b>
	PNCDI 5 Research in areas of strategic interest MCID+ROSA+IFA (2016-2021) (includes also other funding objectives)	€411m <b>€68.5m per year</b>
ESIF	OPC 1.1.1. Funding for large Research Infrastructure (2014-2020)	€355.45m <b>€50.8m per year (Planned rather than spent)</b>
	OPC 1.1.2. Funding for support networks (2014-2020)	€ 16m <b>€2.3m per year</b>
NRRP	Voucher for increasing participation in HE incl. access to ELI-NP infrastructure	Up to 500 vouchers that can be used for activities including 10 vouchers for ELI-NP

Source: PSF Panel, based on (Serbănică and Pupinis 2021), NRRP

## 5 Public - Private Partnerships in Research

This chapter examines the situation in terms of the connection between the public science and research base and the private sector. Firstly, an overview of the situation in terms of science-business links is provided (Section 5.1). The role of the 'science side' is explored with a focus on the third mission in Higher Education and Public Research Organisations, and its role in regional development (Section 5.2). Section 5.3 provides a critical analysis of the range of policies and tools at play in Romania to promote public-private partnerships in research.

### **PUBLIC-PRIVATE PARTNERSHIPS IN RESEARCH**

#### **Key conclusions and recommendations**

- **In Romania there is an underexploited opportunity for improvements in innovation performance based on science-industry collaboration.** In all knowledge-based economies public-private partnerships play a key role in an effective innovation system. This is not currently the case in Romania, and it could be further stimulated under the new national strategy 2021-27 (SNCISI). There is potential for alleviating system failures and improving structural conditions for such partnerships, both on the business side and on the public research side. On the business side, business demand for R&D and absorption capacity are not fully integrated in company strategies. There are excellent examples of cooperation between large companies and universities or institutes whose lessons are of wide interest, but there are no systemic incentives, or appropriate capacities in SMEs to enable them to take such lessons on board. In addition, no evidence of systematic technology transfer from academia to business or from multinationals to local companies was observed.
- **A series of instruments to promote science-industry collaboration are present in PNCDI, but their effectiveness should be improved.** The instruments include knowledge transfer projects (bridge grants), demonstration experimental projects, technology transfer projects, procurement of innovative solutions and innovative clusters. The calls which target businesses or science-business partnerships tend to be irregular, highly competitive and endowed with quite limited budgets, resulting in high over-subscription rates. There is a need for stability and regular sources of financing of applied and collaborative research in the public and private sectors. European Cohesion Policy Funds and Horizon 2020 projects provide a contribution to science-industry collaboration, but they cannot fully compensate for the gaps and inconsistencies in the national policy. Predictable sources of funding will enable a more strategic approach to public-private partnerships on both sides. SNCISI and Cohesion Policy Operational Programmes (OPs) for 2021-2027 provide a good framework for such an approach.

**Recommendation 8.1: Under Reform 4 in the NRRP, provide stable and regular sources of financing for collaborative research between the public and private sectors, including applied research and public-private partnerships in R&I, and enable access by large industrial companies to R&I grants for riskier and long-term R&I projects.** In addition, dialogue between policymakers in charge of R&I and R&I performers in the public and private sectors should be established to support better tailoring of incentives for science-industry collaboration.

- **The contribution to society and the economy - as the third mission of universities and public research institutions - is unrecognised and underdeveloped.** There is only ad hoc business involvement in the definition of curricula in higher education. Universities, INCs and Romanian Academy institutes vary significantly in terms of their orientation towards R&D collaboration, contract research and provision of services to private companies. Third mission activities do not contribute to career advancement. Cross sector mobility between academia and business is constrained by the lack of PhD graduates, as well as by a culture gap and the lack of incentives. For example, cross sector mobility can be facilitated through scholarships, industrial PhDs, knowledge transfer partnerships and so on, which can lead to better science-industry collaboration in research and innovation activities.

**Recommendation 8.2: Develop the third mission within academic institutions and strengthen the capacity of the public research sector to engage in collaboration with business, and integrate the third mission in research career advancement.** While reforming the public research system (see Chapter 4), it is also important to define optimal ways to involve universities and other public research institutions in third mission activities, and to take due account of this in career advancement.

- **Technology transfer is underfunded and weak, and there is little support for entrepreneurial activities for academics.** Intermediary institutions and incentives are not playing an effective role in bridging businesses and public research, and support to clusters is fragmented and limited. However, there are examples of resourceful and innovative cluster activity. The National Network for Innovation & Technology Transfer (ReNITT) seems to operate informally, without a clear mission and strategic direction for the network as a whole. There are different types of clusters, including research-driven clusters, industry-driven clusters, and clusters centred around regional development actors (Chioncel 2020), and the range of industries and sectors is wide – from textiles to automotive and ICT sectors. Some multinationals such as Renault have been active in the promotion of clustering. Although there is no coherent cluster policy, and support measures are limited to occasional programmes for innovative clusters, some clusters play a

positive role in the RDI ecosystem, as examples of long-term collaborative structures based on the interests of their partners.

**Recommendation 8.3: Make intermediary institutions more effective: provide them with basic and project funding and give ongoing support to innovative clusters which demonstrate viability and impact, including co-financing of operational expenditures, specific R&I projects and technology transfer activities.**

- **Investments into research and innovation infrastructures have been sizable, but they have rarely been adequately utilised in public-private partnerships.** Open access to existing research infrastructures and involving businesses in the planning of future research infrastructures is in the national plan. Targeted and needs-based public investments into research and innovation infrastructure (including platforms to share, pilot sites, living labs etc.) that could be used by SMEs and large companies, needs to be developed. Where appropriate, infrastructure utilisation should be encouraged in the selection of projects funded from national sources and Cohesion Policy OPs.
- **A reform of the research landscape on the basis of excellence and strategic focus is a key opportunity to foster public-private partnerships.** NRRP envisages the establishment and running of five competence centres, for the purpose of implementing Horizon Europe missions at the national level, tackling thematic fragmentation and mobilising both public and private funding in a strategic manner. If conducted properly such a development provides a promising pathway to bridge science and industry in Romania.

## 5.1 *State-of-play in science-business links*

**Business demand for R&D and absorption capacity is still low, but there are signs of improvement.** BERD intensity has been increasing, but that mostly applies to larger companies that can undertake in-house R&D, and which have the administrative capacity to take advantage of publicly financed projects and tax incentives introduced after 2017. SMEs are still among the lowest EU R&D performers. Furthermore, the share of applied research has also been increasing, therefore expanding the potential scope of science-industry collaboration.

However, both the level and the efficiency of public spending on innovation is low. According to data from the Community Innovation Survey 2018, Romania scores particularly high (more than 30%) in the share of non-innovative enterprises that received public funding for R&I activities. Moreover, most companies using tax incentives for R&I do not report innovations. Although the current performance in patenting is insufficient, there are some encouraging signs. According to Eurostat, the cumulative growth in the number of EPO patent applications between 2012 and 2017 was 39% (4<sup>th</sup> in the EU). Romania is ranked 4<sup>th</sup> in business patents per million € R&D spent by the business sector, which indicates solid productivity, but insufficient investments into R&D.

**R&D performance is also affected by low overall figures related to science-industry collaboration.** The situation is particularly concerning in the case of SMEs, as innovative SMEs in Romania are still the least likely in the EU to collaborate with others (Figure 23), even though the situation has been improving. On the other hand, universities and public research institutions are not adequately incentivised to seek industry collaborators, as they neither possess in-house resources that could be devoted to such collaboration nor have stable access to public funding for collaborative projects. There are no incentives for individual researchers related to career advancement, which could induce them to seek collaborations.

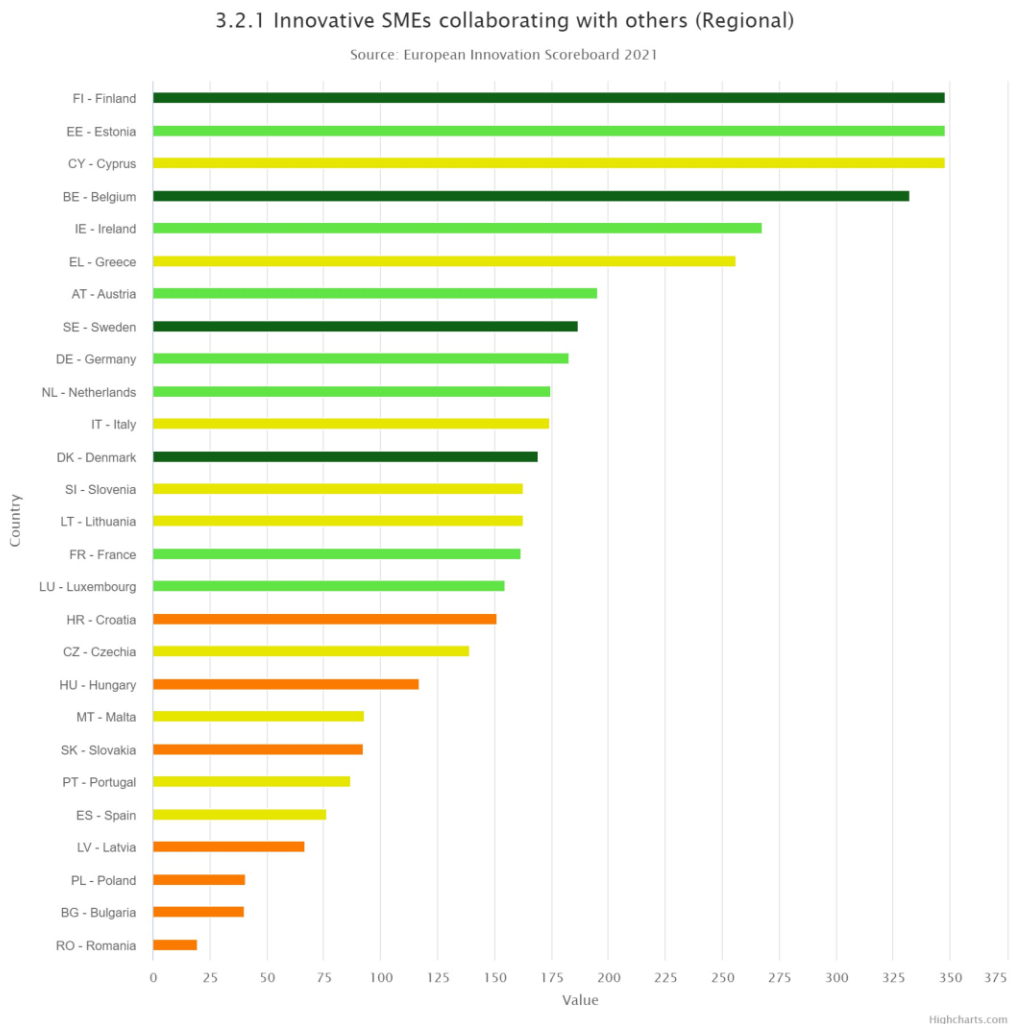


Figure 23 Innovative SMEs cooperating with others (2021)

Source: European Innovation Scoreboard, 2021 – EC (2021)

**Public-private cooperation is weak both due to system failures and structural conditions.** Romania lags behind neighbouring countries (emerging innovators) in terms of percentage of enterprises cooperating with public R&D organisations. In 2018 only 3.5% of Romanian innovative enterprises cooperated with universities or public research institutions, this is the lowest figure for the whole EU (Eurostat, Community Innovation Survey). As in other EU countries, most collaborations occur in the country, which confirms the importance of the national R&I ecosystem. Community Innovation Survey 2018 data indicate a low contribution of existing science-industry collaborations to innovation activities, as Romania has a particularly high number of collaborations between non-innovative enterprises and universities and research institutes.

**Poor science-industry links are exacerbated by the weaknesses of intermediary institutions and processes, resulting in a limited ability by the HEI to participate in the entrepreneurial ecosystem.** There is a gap between academic and business sectors regarding staff circulation, collaborative platforms, and advisory support and networking events that could bridge the culture gap and build trust between business and academia (cf. Chioncel 2020 and Serbănică and Pupinis 2021). Intermediary institutions and potential system integrators such as technology transfer offices, clusters, incubators and science and technology parks, particularly suffer from the fragmentation of the overall RDI system and from limited access to finance, which is further burdened by low predictability and transparency.

There is a significant degree of bottom-up networking and self-organisation between specific researchers (or research groups) and selected companies, which bring about positive examples of science-industry collaboration: for example, through clusters or activities of intermediary organisations such as science and technology parks. However, these activities are unlikely to reach critical mass that would lead towards systemic changes of the R&I system.

**Large companies cooperate more with universities or institutes than SMEs, but there is no evidence of systematic technology transfer from multinationals to local companies.** There are some good practices in which larger RDI-performing companies (often local subsidiaries of multinational companies such as Bosch, Renault and Continental) engage in real partnerships with universities, and also create spill-over effects in local ecosystems through networking, collaboration with local companies and standard imposition.

Research capacities and access to student population make universities attractive to such companies. However, it seems that examples of this kind are rare. Such companies are often characterised by organisational cultures which are more conducive to RDI, have significant in-house capacities, and are more internationally oriented. There are also examples of R&D-intensive international companies such as Infineon who, while already having strong partnerships with technical universities, advocate for more investments into infrastructure and human resources in their partner institutions as a means to build their collaboration further.

Moreover, some public research institutes, often focused on engineering seem more capable and motivated for collaboration. There is above-average collaboration performance in the ICT sector, with more spinoffs and public-private partnerships, which seems to be related with the lower requirements in terms of large research infrastructures or research groups.

**There is occasional business involvement in the definition of curricula, but it is not systematic and comprehensive.** The alignment of curricula with the required skills and competencies is an issue in fast-changing innovative sectors such as ICT, although technological and other developments are not matched by accreditation procedures (cf. Chioncel, 2020). The businesses that are more active in collaboration with universities may also value specific skills and competencies of students which are attained in extracurricular activities, such as innovation competitions and similar activities which receive some business support. Some companies provide scholarships and support to MA/PhD research of specific students.

**Cross sector mobility between academia and business is constrained by the low numbers of PhD graduates, as well as by a culture gap and the lack of incentives.** Most PhDs are purely academically oriented, and the current supply of PhD holders does not match the demand and absorption capacity of the RDI labour market (Chioncel, 2020). In addition, the number of PhD graduates per capita followed a positive trend until 2013 (due to ERDF funding of doctoral programmes) but since then has fallen towards the lowest in the EU (see Chapter 4). Even the increased numbers of new PhD holders in the past have not been reflected in increased number of researchers or human resources in science and technology (HRST).

Recruitment of PhD students or scientists is the most sustained mechanism of science-industry cooperation. The National Plan for Research, Development and Innovation (PNCDI III) 2015–2020 envisioned the implementation of industrial doctorates with the aim of overcoming the low level of collaboration and cross sector mobility, but this scheme has not been implemented. According to Eurostat, job-to-job mobility of human resources in science and technology in Romania is the lowest in the EU (2%, whereas EU average is 7.8%). Opportunities for forming personal and cross sector linkages between science and industry at early career stages are limited, which hinders bridging the culture gap between the sectors.

**The utilisation of R&I infrastructures by private sector entities and by public-private consortia on the basis of open access is underdeveloped.** Another channel for business-science interaction, developed in Chapter 4, is though the shared use of research infrastructure. However this channel is underdeveloped in Romania. As recommended above, future plans for investments into R&I infrastructures need to take into account the needs of all user groups, and in particular the needs of the business sector.



## 5.2 Third mission in Higher Education and Public Research Organisations

### **The third mission of universities is unrecognised and underdeveloped.**

Such a situation is in part due to the emphasis on teaching and inadequate organisation and the lack of funding of the research mission of the universities (see Chapter 4), as well to their complex organisation and lack of interfaces with both business and society. The activities related to the third mission are mostly unrecognised within university strategies. At the policy level the third mission is regulated unevenly and the incentives are weak or non-existent (cf. OECD/EC 2019). Some universities are working towards developing their third mission. For example, the University of Bucharest has included companies on its Board to this aim, and companies are supporting PhD theses in ICT at the Babes Bolyai University. Collaboration with external stakeholders is rarely strategic and often depends upon external sources of funding, which limits the scope and impact of collaboration activities, especially in the context of regional development.

**Third mission criteria are currently not included in career advancement in academia.** Currently, the engagement in third mission activities does not yield career benefits for the researchers involved, as only publications are relevant for career advancement. Consequently, much depends upon the intrinsic motivation and ability of individual researchers, research groups and departments. The National Recovery and Resilience Plan proposes the reform of the research career, including a new legislative framework that might involve a broader set of criteria for advancement. Examples from foreign countries, such as the Netherlands can provide inspiration for integrating third mission into HEIs (Box 3).

#### Box 3 Supporting entrepreneurship and innovation at HEIs in the Netherlands

The Netherlands provides an example of good practice in bringing innovation and entrepreneurship to the forefront of higher education. It has strengthened the business environment for start-ups, improved co-operation between HEIs and cities, diversified career options for higher education staff, and enabled higher education institutions to monitor and report on their engagement activities. The main features of the Dutch system include:

1. **Leadership and governance.** Entrepreneurship is a major part of the strategy of higher education institutions. Entrepreneurial activities are integrated into the education provision. Higher education institutions support their faculties and units to act entrepreneurially.
2. **Organisational capacity.** HEIs are open to engaging and recruiting individuals with entrepreneurial experience and mind-sets. They invest in staff development and provide incentives to staff that actively support entrepreneurship education. Institutions also have access to a range of funding and investment sources to support their entrepreneurial objectives.
3. **Entrepreneurial teaching and learning.** Entrepreneurship is integrated into the education and research missions of HEIs, which design and deliver entrepreneurial curricula in collaboration with enterprises and provide formal and informal learning opportunities to help students develop entrepreneurial skills.

4. **Entrepreneurship support.** Entrepreneurship support is made available to students, graduates and staff who aim to start a business. They have access to funding, mentoring and training on how to start, finance and develop a business.

5. **Knowledge exchange and collaboration.** HEIs are actively involved in collaboration and knowledge exchange with enterprises, incubators and science parks. They provide staff and students with opportunities to participate in innovative activities.

6. **Internationalisation.** Internationalisation is an integral part of the entrepreneurial agenda of HEIs. They support the international mobility of students and staff, recruit international staff, and embed an international dimension in teaching and research.

7. **Measuring impact.** HEIs monitor and evaluate entrepreneurial teaching and learning, support for start-ups and activities to promote knowledge exchange undertaken at their institutions.

Source: OECD (2018)

**National institutes (INCDs), Romanian Academy institutes, and Branch Academy institutions vary significantly in terms of their orientation towards R&D collaboration, contract research and provision of services to private companies.** As analysed in Chapter 4, Romanian public research organisations are often under-funded and badly funded. In particular, the level of institutional funding of the research system is too limited, which also affects their approach to science-industry collaboration. In several national institutes, ESIF and Horizon 2020 funding accounts for more than a third of the annual budget, with services accounting for another 10%. Even in these cases, most funding to INCDs comes from CORE/NUCLEU programme and national competitive funding sources.

The Romanian Academy institutes receive more than half of their budget from the Academy, often through internal grants, and also compete for additional funding. However, they seem to be less flexible in the adjustment of their research focus towards emerging topics, which also somewhat constrains the scope of their projects and their ability to attract business partners in RDI.

### *5.3 Policies and tools to promote public-private partnerships in research*

**Policy instruments to support public-private collaboration in R&I are funded both from national and EU funds.** The PNCDI includes one programme dedicated to this objective, and two OPs of the Cohesion Policy in 2014-2020 support this objective (Table 12).

Table 12 A detailed view on the policy mix for public-private collaboration

Instruments	Source	Agency	Target group	Budget (m€) 2015-2020 (national) 2014-2020 (ESIF)
<b>National Funds</b>				
Collaborative research programmes <i>(PCCDI) Complex projects carried out in RDI consortia</i>	PNCDI		PROs, HEIs, companies	<b>€88.2m</b> (only 2017)  (Success rate 23%)
Transfer to the economic operator (PTE)			PROs, HEIs, companies	<b>€32.2m</b> (only for 2016 and 2019)  (Success rate 23%)
Bridge grants			Researchers	<b>€11.3m</b> (only for 2016)  (Success rate 27%)
Demonstration Experimental projects (PED)			PROs, HEIs, companies, researchers	<b>€66.4m</b> (only for 2016 and 2019)  (Success rate 13.5%)
Innovation checks/ vouchers		UEFISCDI	Companies	<b>€5.2m</b> (only for 2017 and 2018)  (Success rate 48%)
Inter-sectorial mobility schemes - <i>Mobility projects</i>				<b>€993K</b>  (Success rate 22%)
(Research-driven) Clusters <i>Cluster organization and development</i> -			Clusters	<b>€845K</b> (only for 2017)  (Success rate 75%)

Instruments	Source	Agency	Target group	Budget (m€) 2015-2020 (national) 2014-2020 (ESIF)
<i>Innovative Cluster (CLS)</i>				
<b>Cohesion Funds</b>				
Actions funded under ROPs	ESIF	ROPs	RDAs and regional actors	<b>€133m</b> (2015-2021)
Knowledge Transfer Partnerships	ESIF	OPC	Public research organisations, enterprises	<b>€95.6m</b> (2014-2020)
Technological Innovative Project	ESIF	OPC	Enterprises, Public research organisations	<b>€58m</b> (2014-2020)

**The main instruments for co-financing science-industry collaboration in the PNCDI III, managed by UEFISCDI, include knowledge transfer projects (bridge grants), demonstration experimental projects, technology transfer projects, procurement of innovative solutions and innovative clusters.**

- Bridge grants (Transfer of knowledge to companies) aim to assist companies in the development of, and the use of, new technologies with the support of experts from academia.
- Demonstration experimental projects entail the development and testing of demonstration models for new products, services or processes. The projects are implemented either by single research organisations or by consortia coordinated by the public research organisations and many also include companies.
- Technology to the economic operator (technology transfer) projects facilitate transfer of RDI results from research organisations to businesses, resulting in research commercialisation.
- Innovation cheques/vouchers support SMEs by financing innovative projects whose implementation requires services offered by research organisations.
- Procurement of innovative solutions is focused on offering solutions in the form of an innovative product, service or process, in response to the need and specifications identified in the public sector. The leader of the consortium offering the solution needs to be a public research organisation.

- Innovative clusters are supported to conduct collaborative RDI activities.

**European Cohesion Policy Funds make an important contribution to science-industry collaboration, but the impact of these funding schemes has limits** (analysed in detail in Chapter 7). The main Competitiveness programmes OPC supports both Knowledge Transfer Partnerships and Technological Innovative Projects. The Regional Operational Programme supports intermediaries and initiatives launched by RDAs, notably under the S3s. In the case of these programmes, it is understood from interviews carried out with Intermediate Bodies and Beneficiaries that innovative businesses are often discouraged by the complexity of administrative procedures, intense competition and the duration of project preparation and appraisal.

These obstacles are more easily managed by medium-sized and larger businesses with strong administrative capacities, which also tend to have stronger RDI capacities. However, such a situation also means higher risk of deadweight losses and the lower availability of public R&D investments. Slow implementation of calls funded under ROP Priority Axis 1 also creates a risk of the underutilisation of funds and their reallocation to standard SME development projects.

These challenges are now being addressed. The new POCIDIF has an enhanced focus on public-private partnerships in R&I projects tackling national S3 domains, as opposed to single-beneficiary R&I projects, whereas the ROPs will also favour collaborative approaches. These efforts should lead to stronger incentives and a sustainable commitment to science-industry collaboration (see also Chapter 7).

**Horizon 2020 projects provide complementary budgets for cooperative projects, on a competitive basis.** Research institutions with more exposure to industry and international research collaborations are in a good position to utilise EU competitive funds (see Chapter 6). However, the low predictability of success in acquiring Horizon funding cannot adequately compensate for the lack of stable national financial support.

**The PNCDI III calls which target businesses or science-business partnerships tend to be irregular, highly competitive and with rather limited budgets.** For example, demonstration experimental project proposals have a success rate below 15%. Innovation voucher proposals, which should be designed as an entry-level instrument for science-industry co-operation do not reach a success rate of 50%. Such a situation is not conducive to business R&I in general and science-industry collaboration in particular. The administrative burden related to project application and administration costs not only prevents many SMEs from taking advantage of available R&I funding, but also engenders even higher costs in larger companies.

Businesses are also indirectly affected by problems with the continuity of ongoing projects, for example due to reduced budgets of their public sector partners which also affect their activities. Instability and irregularity of national funding may in some cases provide incentives to internationalisation but is also likely to have a wider negative effect on science-industry collaboration. For instance, when funding from national sources is unpredictable, research performers may be induced to seek other sources of funding (such as Cohesion Policy and Horizon

Europe). It also hinders the strategic and operational planning of R&I activities including collaborative projects with the business sector.

**Technology transfer and academic spin-offs receive neither proper recognition nor stable financial and advisory support.** PSF Specific Support to Romania (EC, 2017) recommended setting up an Intellectual Property Law for Romanian universities to regulate the transfer of intellectual property, define criteria for the evaluation of university entrepreneurship activities, establish a common technology transfer office structure for all universities, and provide international training and coaching for technology transfer office personnel.

However, technology transfer activities still do not have any stable funding streams from public sources. There is some project funding available and everything else depends on market-based sources. Technology transfer offices are founded primarily because of funding opportunities and are often not designed strategically. Consequently, there is need for external expertise to build up technology transfer activities.

Technical universities tend to be more advanced in this regard because of previous collaboration with industry. IPR related to research results belong to universities, which also usually finance the IPR protection and maintenance, often through projects. However, the rules are not harmonized across universities and other institutions. Overall, technology transfer is underfunded and weak. Although there is some financial support for entrepreneurial activities for academics (which was also recommended by EC (2017)), university cultures are predominantly technical and not conducive to entrepreneurship. Recent changes in regulation have made it easier to create a spin-off and there is some ESIF support available, the attraction of additional finance remains an issue. Spin-offs also face administrative hurdles and knowledge gaps related to business development.

**Public procurement of innovative products is still rarely used, although the calls are becoming more frequent and generate solid interest.** There is a framework for public procurement for innovation, but specific good practice examples have not been identified so far. It seems that there is a preference for top-down procurement even in the case of innovative products. The only available programme supports the development of innovative products, services or processes only in response to the needs and specifications defined by the public sector. The calls for such "Solutions" have been intermittent, and in 2016-2017, 9 competitions were launched, with 1 financed project. There was some intensification due to the Covid-19 pandemic in 2020. In 2021 there were 12 competitions, usually with 3-4 bids out of which one winner was selected.

**The National Network for Innovation & Technology Transfer (ReNITT) seems to operate without a clear mission and strategic direction for the network as a whole.** ReNITT is made up of 49 accredited or authorised entities. Its members tend to be a loose consortia which are rarely legally entities and often have limited operational capability. Some ReNITT network members are organised as clusters. Other ReNITT members are collaborative constellations which comprise universities (or departments), intermediary institutions, SMEs, corporations, regional development agencies and local administrations. The

extent of their collaboration varies in accordance with the interests of partners and available funding.

The ReNITT network receives no direct public support. Network members adopt different strategies and business models to cope with their particular challenges and facilitate long-term sustainability. Key funding sources include project (ESIF and national) funding, membership fees, in-kind contributions from local administration, intermediary institutions and universities, and the provision of services. Opportunities to revamp this network need to be scrutinised, taking advantage of good examples from foreign countries (see an example from Spain in Box 4).

**Support to clusters is fragmented and limited, but there are various examples of resourceful and innovative cluster activity.** There are over 70 registered clusters in Romania, out of which 47 are members of the Romanian Cluster Association - CLUSTERO. There are different types of clusters, including research-driven clusters, industry-driven clusters and clusters centred around regional development actors (Chioncel 2020), and the range of industries and sectors is wide – from textiles to automotive and ICT sectors.

Some multinationals such as Renault have been active in the promotion of clustering. Although there is no coherent cluster policy and support measures are limited to occasional programmes for innovative clusters, several clusters play a positive role in the RDI ecosystem, as examples of long-term collaborative structures based on the interests of their partners.

Box 4 Supporting SME innovation through centres of competence: REDIT network in Spain

REDIT is a network of Technological Institutes in Valencia, Spain which is considered as one of the most successful SME innovation support networks in the country.

The network model of support for business innovation is adapted to the reality of local industrial fabric that is largely made up of SMEs and micro-companies, which are geographically dispersed and represent different sectors. The 11 institutes serve as centres of competence covering the main productive sectors (including ICT, food, biomedicine and metalworking), as well as technologies and areas of knowledge of cross sector application. Their objective is to help companies, especially SMEs, boost their competitiveness through RDI. As companies have a central role in institutes as members, the RDI carried out is based on the needs of industry.

Technological institutes offer to industry a wide range of R&D capabilities used in collaborative and contract research. They also provide for laboratory tests and the future needs of their membership base, and also take part in RDI projects that will facilitate technological development and innovative activities for their members, advanced services and specialised training programmes.

The main funding sources for institutes are membership fees together with project funding. Therefore, in order to prosper, the institutes must pay close attention to the current and future needs of their membership base, as well as to be engaged in projects that will provide technological opportunities to their members in the long term.

Institutes also act as think-tanks in their respective areas by producing reports and studies on industry and innovation.

REDIT also helps SMEs and other companies in the internationalisation of their business activities, both within and outside the European Union. That is done through participation in international networks such as EARTO, and by utilising a variety of platforms and tools to expand the internationalisation opportunities available to members.

For more information visit <https://www.redit.es/en/inicio/>



## 6 The Internationalisation of the Romanian Research and Innovation System

This chapter provides an assessment of the extent of internationalisation, as well as of efforts deployed to promote the openness of the Romanian R&I system. The general overview of the state-of-play is provided in Section 6.1 while the assessment of support and funding mechanisms available to promote and stimulate internationalisation is the subject of Section 6.2. Sections 6.3 reviews the situation and incentives for international researcher mobility. The international dimension of research infrastructures is covered in Chapter 4.

### THE INTERNATIONALISATION OF THE ROMANIAN RESEARCH AND INNOVATION SYSTEM

#### Key conclusions and recommendations

- **There are some areas of excellence in the Romanian research community, able to succeed in competitive EU-funded research programmes.** Overall, Romanian participation in EU research is low quantitatively, but some research actors display good success rates in the EU competition. While private companies are the most active participants in EU-funded research, HEIs also perform relatively well, given the lack of dedicated funding for research activities in Romanian universities. Research in the “Food, sustainable agriculture and forestry” domain, and to a lesser extent in the energy and security domains, appear as relative strengths of the Romanian research community in EU funding calls. In relative terms, EU funds play an important role in supporting R&I in Romania. The structural weaknesses in the public research sector are reflected in low achievements under the “research excellence” pillar of the EU FP (ERC and MSCA grants), and in the low scores achieved in terms of international co-publications and open access publications from Romanian researchers. Addressing the fragmentation of scientific and research efforts, and ensuring more directionality and impact-oriented governance of the research system, as advised before, are the first steps to enhance visibility and build a stronger internationalisation capacity of the Romanian R&I system. The development of critical mass of excellent research in the public sector, open to collaboration with the private sector as well as to international collaboration, is necessary to establish the Romanian research community on the European and international scenes. The way forward to address this critical issue is further developed in Chapters 4 and 5.
- **Romanian authorities acknowledge the importance of internationalisation in their R&I strategy.** International collaboration in R&I is placed high on the government agenda, and the SNCISI and PNCDI devote particular attention to this objective. Policy instruments to support international collaboration are present

in the National SNCISI, the PNCDI and in Cohesion Policy OPs. The new NRRP investments primarily target the internationalisation of the Romanian R&I system. As a result, there is a multiplicity of internationalisation support schemes available from different funding sources, with unclear synergies.

- **The internationalisation dimension in the Romanian R&I strategy appears unfocused.** Significant public budgets are reserved for international cooperation, and public-public partnerships in particular (joint programming initiatives, ERA-NETS, etc.). Romania is involved in a large number of such partnerships, as well as in many bilateral and multilateral agreements, some of them remaining dormant. Overall, the returns obtained from these participations are disappointing. Absorption rates of budgets devoted to many transnational initiatives are low, and successful funded applications are concentrated in a just a handful of organisations.

**Recommendation 9.1: Develop an internationalisation strategy with indicators and realistic quantified targets, aligned with national priorities (Strategic Research Agendas and S3 priority domains), which is more selective in terms of countries and topics for international cooperation/EU partnerships and builds on policy intelligence for a better understanding of Romanian areas of excellence.** Policy intelligence (to be integrated into the proposed R&D Observatory and M&E system proposed in Chapter 3) should be used to acquire a better understanding of the areas of excellence, drawing lessons from successful and unsuccessful attempts to internationalise and from impact of funding schemes. More evidence is also needed to pinpoint success factors, or reasons of failure, for projects that went through the EU competition. Proposals are evaluated according to excellence, quality of implementation and impacts, which are three different and complementary characteristics of winning projects. This knowledge would serve as a basis to develop an internationalisation strategy with clear targets (quantified indicators). Realistic targets for the internationalisation objective of the R&I strategy need to build on such evidence, for example, distinguishing between Pillars – or programmes - of Horizon Europe. The strategy should be more selective in terms of countries and topics for international cooperation/EU partnerships, based on clear national-level priorities. The decision to participate in new Horizon Europe partnerships should rely on the prioritisation exercises carried out to define Strategic Research Agendas and S3 priority domains, and be informed by key stakeholders from these priority areas. The presence of major research infrastructure of EU-level importance is another criterion for prioritising between countries and topics for international cooperation. Focusing efforts on areas of excellence will also help building capacity in UEFISCDI and MCID by gradually developing thematic expertise and better knowledge of the Romanian landscape active in these fields, in these bodies.

- **There are open opportunities for better positioning of the Romanian R&I community in EU circles.** There is room for

improvement in the way Romania is involved in the EU. While Romania is formally participating in many EU-level Committees linked to the EU FP, the voice of the Romanian R&I community is not strong due to a lack of active participation of experts from the field. The National Contact Point (NCP) distributed model, based on a part-time assignment for advisers, has not demonstrated its effectiveness.

**Recommendation 9.2: Devote efforts to improve the position of Romania in European Institutions, moving from a passive to a more active role, concentrating on priority areas and involving experts with forward-looking views.** A better organisation of the domestic R&I system would imply the setting up of fora to follow-up on the S3 domains and Strategic Research Agendas. These fora would include key stakeholders in the relevant fields with a strategic vision on current situation and future developments. Stakeholders would provide a pool of experts on which Romanian delegates involved in the institutions could draw to build up official positions in EU circles, as well as contacts with relevant EU networks.

**Recommendation 9.3: Reform the National Contact Point (NCP) model, moving towards a more integrated, more professional and adequately funded NCP network.** The current NCP model relies on part-time work by officials and members of the research community, who carry out the NCP function in addition to their normal duties, without adequate funding and with minimal joint activities. While this is likely to bring in learning effects for the individuals in charge, it is insufficient to ensure the required diffusion effects on the whole system. There is no single good practice model for NCPs concerning the choice between centralisation and decentralisation. A more realistic option at this stage for Romania would be to establish a well-resourced central node, with good expertise in specific issues such as IP management, which could serve a network of decentralised antennas established in the 12 support centres for international projects.

- **Curbing the brain-drain and enhancing inwardly migrating researchers' mobility stands at the top of the policy agenda.** The balance between the outward and inward migration of talents in Romania remains negative, and this is nurturing the acute brain drain problem faced by the Romanian R&I system (depicted in Chapter 4). However outward mobility of young PhD researchers is extremely low in comparison of other researchers, and there are neither incentives nor public funding schemes for this purpose. In addition to the poor general conditions for conducting research in Romania, linked notably to the lack of funding for research and unattractive research careers, the limited use of Euro-access, and non-compliance with the European Charter for Researchers and the Code of Conduct for the recruitment of researchers in many institutions, further impede inward mobility. Attracting talent from abroad is seen as an acute necessity by Romanian authorities and several policy instruments exist to attract foreign researchers. There

is a need to deploy more policy intelligence in order to understand reasons for success and failures in the Widening programme, which is supposed to target “the cream” of research in Romania.

**Recommendation 9.4: Develop ‘intermittent brain circulation’ rather than ‘brain attraction’ strategies, as a more realistic path given the current conditions for conducting public research in Romania.**

In addition to the schemes aimed at attracting researchers from abroad, there is a need to foster outward mobility for young PhD researchers, as this is necessary for the quality of research training and raising capacity for international networking. Rather than focusing on traditional inward mobility schemes, it is proposed to capitalise on the possibilities offered by new virtual work models for flexible brain circulation models. With its large diaspora and sense of urgency to re-build the human resources dimension of its research system, Romania stands in an excellent position to design such new models, which would involve any combinations of virtual and real mobility over flexible timelines. The brain circulation should be a two-way process, where young researchers in particular are given the opportunity to move.

## 6.1 State-of-play in internationalisation of the R&I system

**The participation of the Romanian research community in EU-funded research is limited but remarkably successful.** More precisely the *intensity* of participation by Romanian R&D actors in H2020 is low. Very few proposals were submitted, very low funding was attracted, and the funded projects are small.<sup>4</sup> However, the overall *success rate* of Romanian proposals is particularly high<sup>5</sup>, even on par with the EU average. Such high success rates are noteworthy, given that the country is at the bottom of the list for most country rankings on R&I (see Chapter 2). This points towards the existence of a few areas of excellence, able to succeed in the highly competitive EU Framework programme. That is a good asset to capitalise upon.

**Amongst EU sources of funds for R&D in Romania, R&D funds (H2020) play a significant role (relative to Cohesion Policy Funds).** It was mentioned before that EU Funds taken together accounted for one-third of total public funds allocated to R&D in Romania in the period 2014-2020 (Chapter 3). Within these EU sources of funds, the ratio of H2020 funds versus Cohesion Funds for that period was close to 30-70 (Figure 24). This ratio is unexpected given the difficulty to access the highly competitive H2020 funds and the large absolute amounts of total Cohesion Funds allocated to Romania. It might however primarily reflect the remarkably low share of Cohesion Funds dedicated to R&D in Romania (see Chapter 7).

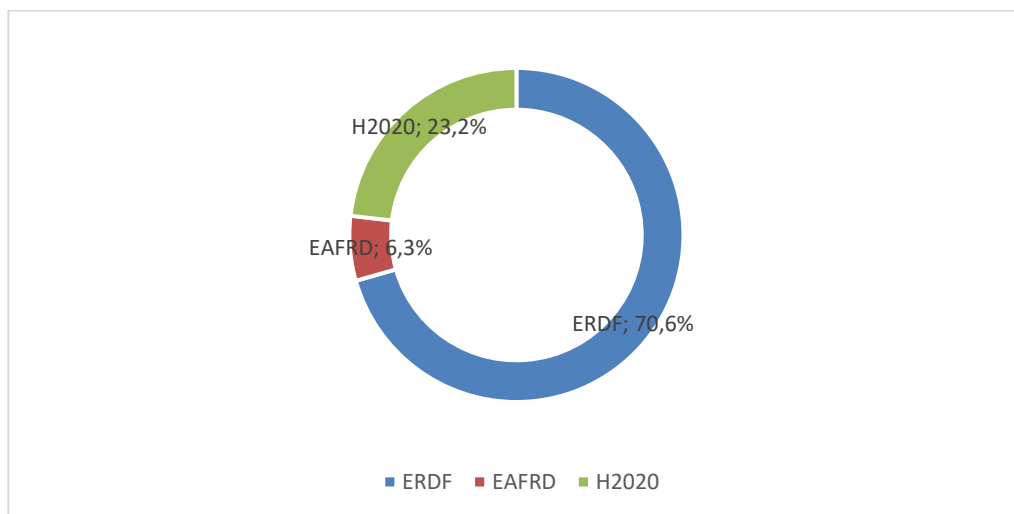


Figure 24 EU contribution to R&D to Romania 2014-2020: Cohesion Funds and Horizon 2020

Source: Horizon2020 Dashboard, extract February 2022

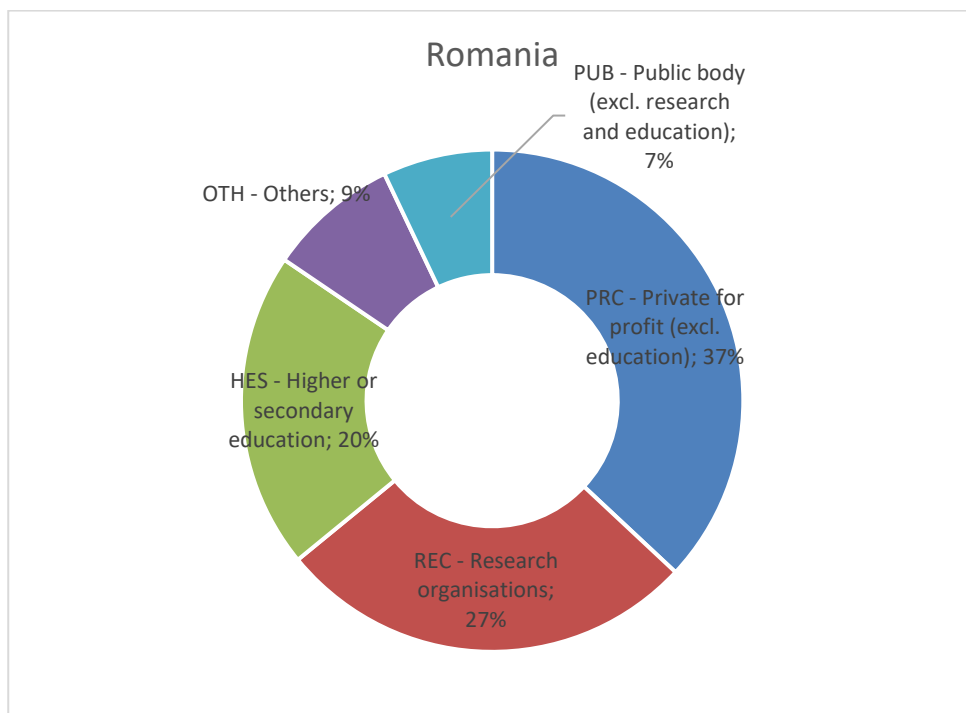
<sup>4</sup> The amount of H2020 funds attracted by Romanian R&D players is very small: Romania ranks 28th out of 28 countries in terms of EU contribution from H2020 per inhabitant. Funded projects are small: Romania attracts 3.18% of total EU grants but only 0.48% of total EU funds; average EU contribution by project for Romania is 278K€, compared to EU average: 1.9m€. Unless other sources are indicated, all H2020 data mentioned in this chapter are from H2020 Dashboard: 08.10.21.

<sup>5</sup> The overall success rate of Romanian proposals to H2020 is on par with EU average: 12.09%, compared to EU average 11.97%.

**The first barrier to a higher level of participation in EU research programmes lies in the intrinsic deficiencies of the Romanian R&I system.** These deficiencies were outlined in previous chapters: there are governance and funding issues as well as poor framework conditions, resulting in low effectiveness and low productivity of the public R&I system. Another barrier comes from the lack of collaboration and fragmentation within the R&I system, and weak public-private collaboration which hampers access to EU programmes, which have a strengthened focus on impact of research. Addressing such problems is the first way forward to enhance participation of the Romanian research community in EU-funded research opportunities.

**Despite receiving no dedicated funding for their research activities, universities emerge well in H2020 competition.** Universities received one-fifth (20%) of total H2020 funds allocated to Romania (Figure 25) during the programming period 2014-2020. This is lower than the average share for HEIs at EU level (39%) but it is a good performance given the extremely limited funds for research allocated to HEIs in Romania.

The EU funds are highly concentrated in a small number of universities: 3 universities are in the top-10 league of winners of H2020, receiving more than €6m each (Table 13). The same situation exists for INCDs: 2 of them are in the top-10 league. The Academia Romaniaa’s performance in H2020 competition is weaker, and none of their institutes appears in the Top-10 league. This situation confirms the discussion on the need for differentiation in funding streams for R&D according to the various types of HEIs and PROs (see Chapter 4).



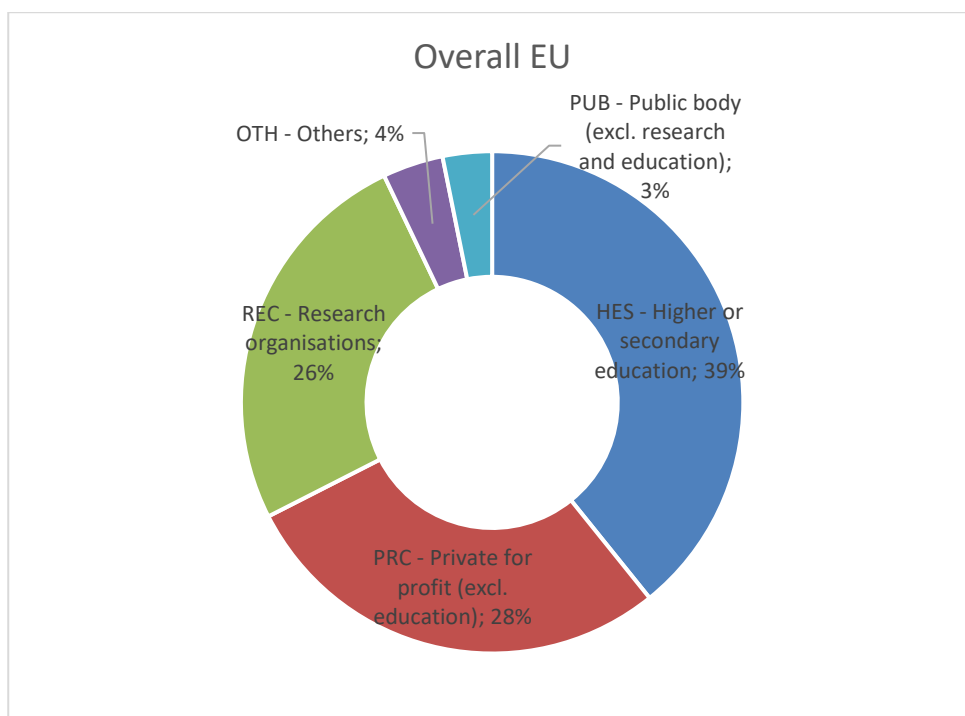


Figure 25 H2020 contribution 2014-2020 by type of beneficiary: Romania (top) – EU (bottom)

Source: Horizon2020 Dashboard, extract February 2022

Table 13 H2020 contribution 2014-2020: top 10 beneficiaries

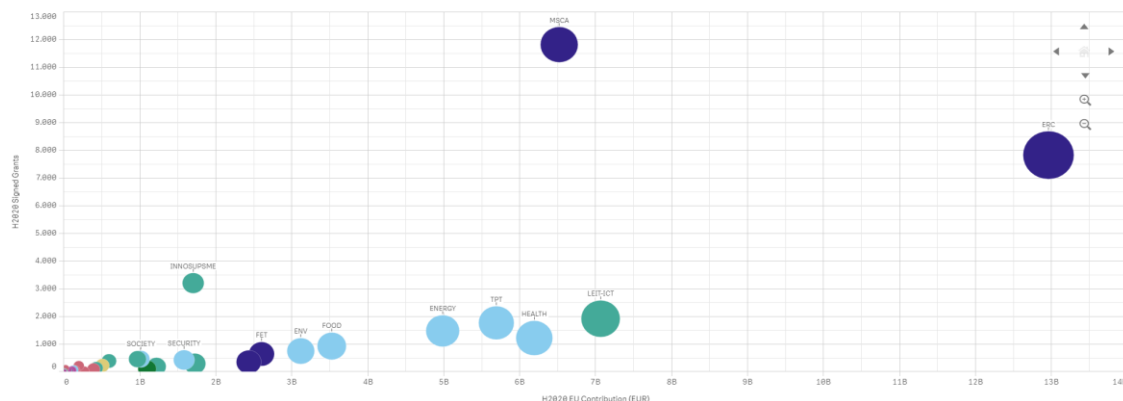
Beneficiary	Net EU contribution from H2020
CLARIANT PRODUCTS RO SRL	19791860,39
SOFTWARE IMAGINATION & VISION SRL	14889467,03
UNIVERSITATEA POLITEHNICA DIN BUCURESTI	12977224,48
UEFISCDI	12311177,49
UNIVERSITATEA TEHNICA CLUJ-NAPOCA	7343094,51
UNIVERSITATEA BABES BOLYAI	6549331,84
INSTITUTUL NATIONAL DE CERCETARE-DEZVOLTARE AEROSPATIALA "ELIE CARAFOLI"- INCAS BUCURESTI	6540891,69
INSTITUTUL NATIONAL DE CERCETARE-DEZVOLTARE PENTRU FIZICA SI INGINERIE NUCLEARA-HORIA HULUBEI	6405389,86
SIVECO ROMANIA SA	5204350,91
ROMAERO SA	5156469,4

Source: Horizon2020 Dashboard, extract February 2022

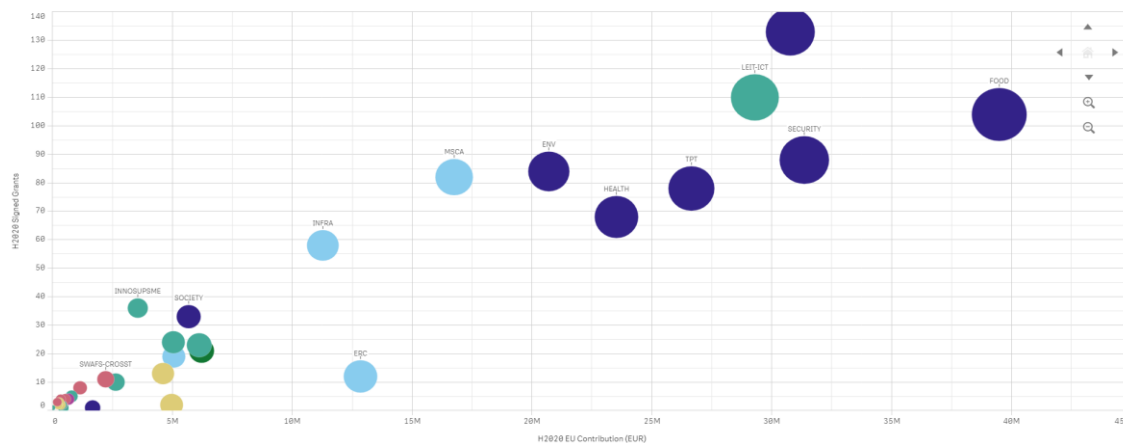
**Despite the low proportion of researchers working in the private sector, private actors' participation in H2020 is higher in Romania than for other EU MS.** The share of H2020 budget acquired by Romanian private sector actors in FP (37%) is higher than the EU average (28%) (Figure 25) and 4 Romanian companies are in the top-10 league of H2020 winners (Table 13). This stands in contrast with the particularly low concentration of Romanian researchers in the private sector, which is 25% against an EU mean of 51%, data from 2017 (EC 2019b). These companies are active in biofuel, software development and aerospace/defence.

**Romania is not performing well on the 'scientific excellence' pillar of H2020.** The performance of Romanian researchers in terms of ERC and MSCA grants<sup>6</sup> is poor (Figure 26). Romania receives only 0.17% of EU funds for ERC principal investigators. This poor performance is not unexpected given the low overall scientific performance of the public research system, as highlighted in Chapter 2.

Signed Grants/Participant EU Contribution by Thematic Priority/Keyword



Signed Grants/Participant EU Contribution by Thematic Priority/Keyword



<sup>6</sup> See section 6.3.



Figure 26 H2020 contribution 2014-2020 by thematic priority/keyword, Romania (top) – EU (bottom)

Source: Horizon2020 Dashboard, extract February 2022. For Romania dark blue ball hidden above at 31M€ = energy

**Romanian areas of strengths emerge from EU-level competitions: the “Food, sustainable agriculture and forestry” domain ranks best in H2020 competition.** Also, to a lesser extent, security and energy stand out as areas of *relative* strengths of the Romanian R&D system, as compared to EU figures (Figures 26 and 27). Romanian research is also well placed in the ICT field but this is a strong research area for EU as a whole, hence the performance of Romania is not particularly distinctive in this domain. In ERA-NET transnational calls, the strongest area is eco-nanotechnologies and advanced materials.

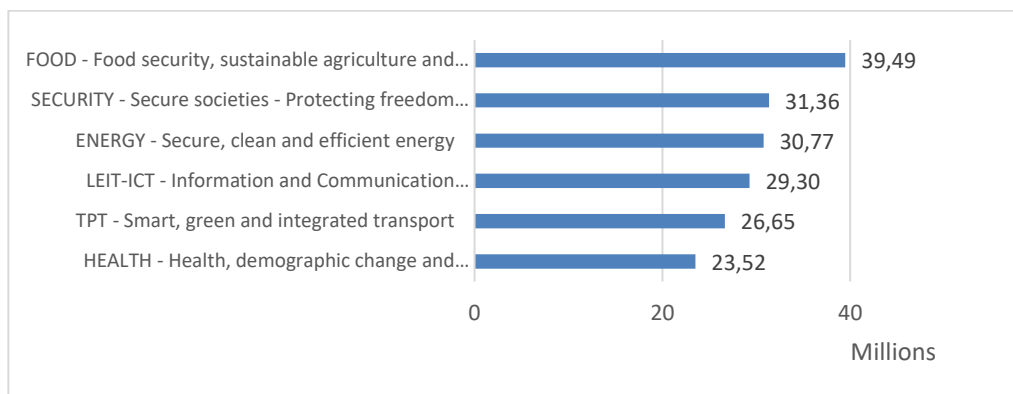


Figure 27 H2020 contribution 2014-2020 to Romania by pillar/thematic priority

Source: Horizon2020 Dashboard, extract February 2022

**Romania faces unused opportunities to benefit from the EU Widening programme, tailor-made and reserved for less R&D-advanced countries.**

The Widening programme (including the Teaming, Twinning and ERA-Chairs actions), a sub-programme of H2020 (further expanded in Horizon Europe), distributes funds to 15 EU MS with a weaker R&I system, protecting them from the tough competition from better performing MS. In this restricted competition, Romania has been performing very poorly so far. While Romania was fairly active in submitting proposals for Teaming and Twinning, the returns were poor<sup>7</sup>. In particular, none of the two Teaming proposals – which aim at establishing centres of excellence – that passed the first stage, succeeded in the second stage (full proposal). With the new ambition of the SNCISI to establish such centres, such opportunities through the Widening programmes should be more within reach.

**International co-publications are scarce.** Romania has the lowest rate of international co-publications in the EU (Figure 28). However, the number of co-publications has been increasing recently.

<sup>7</sup> Romania obtained only 2 ERA-Chairs (out of 53 funded projects allocated to the 15 eligible countries), 3 Teaming projects (out of 77 projects) and 13 Twinning projects (out of 191 projects). This places Romania at the bottom of the league of the countries eligible to these programmes.

**The share of papers published in open access in Romania is increasing over time, but is still low.** In 2018, this share was 40.4%, a figure that places Romania on the 24<sup>th</sup> position of MS regarding open access achievements (according to the EC Open Access Monitor website).

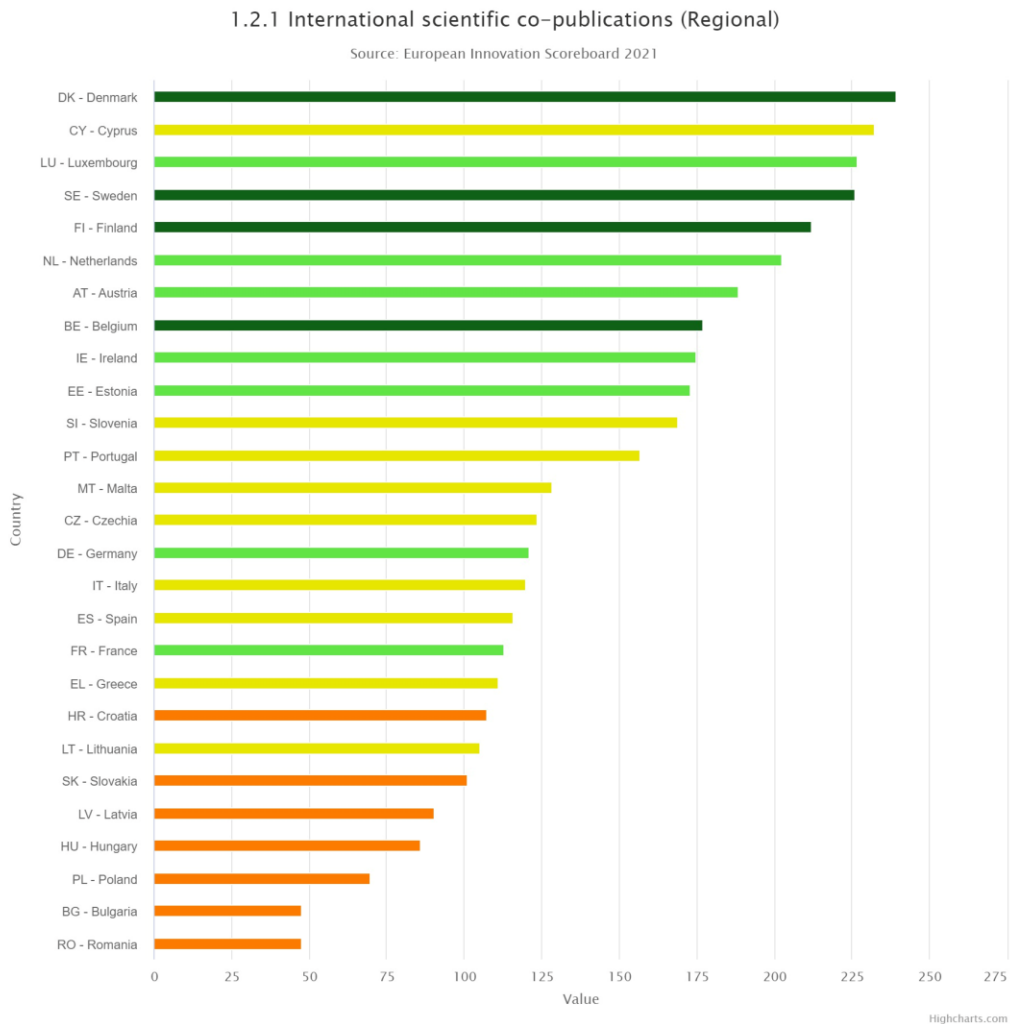


Figure 28 International scientific co-publications

Source: European Innovation Scoreboard 2021

**Romania participates in a large number of international organisations, opening opportunities for the participation of domestic research actors.**

Romania is member of and contributes financially to the European Space Agency (ESA), European Organisation for Nuclear Research (CERN, managed by IFA), the Facility for Antiproton and Ion Research (FAIR) and the Joint Institute for Nuclear Research (IUCN DUBNA). There has been an issue recently with respect to the non-payment of fees to ESA by the Romanian State.

*6.2 Support and funding mechanisms for internationalisation*

**The internationalisation of the R&I system stands high on the agenda at governmental level. However, this is not likely to be achieved without a profound reform of the landscape of HEIs and PROs.** Romanian authorities rightly see the internationalisation of research as a way forward to improving the quality and attractiveness of the system. Integrating Romanian researchers in the ERA and in European research networks is stated as an important component of the two consecutive national strategies, SNCDI and SNCISI. Reaching this goal requires a high level of excellence as well as research agendas that fit with those of the international research community. However, without good governance of the public research system, it is unlikely that the government can influence the quality and direction of research in the four types of public research organisations and to align priorities with those at play at the EU level.

**Romania stands out as a country devoting high budgets to, and participating in, a significant number of EU public-public and public-private partnerships, with however meagre returns<sup>8</sup>. This raises a question of the rationale for the selection of partnerships.** Romania allocates 6.85% of total GBARD to transnationally coordinated R&D, which is the third highest share after Belgium and Latvia in the EU27 (2019 data from Eurostat)<sup>9</sup>. The strong public commitment by the Romanian authorities to EU public-public partnerships, matched with budgetary means (Figure 29), and the large range of partnerships in which Romania is committed (Figure 30), reveal the great level of attention paid to participation in European research networks<sup>10</sup>. This points to a need to better manage such participation to maximise the benefits for the research community.

While concentration of participation with the main funding agency is a normal feature for EU partnerships, the high number of networks in which UEFISCDI is engaged raises the question of the ability to ensure effective follow-up of all of

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<sup>8</sup> Romania is an active participant in public-to-public (P2P) cooperation. As of June 2018, Romania participated in 41 cooperation programmes. This is well above both the EU13 average (22 participations) and the EU28 average (34 participations). UEFISCDI participates in 79 EU Networks, amongst them 34 are active Networks (source: [www.era-learn.eu](http://www.era-learn.eu)).

<sup>9</sup> Romania stand much lower in EU comparison in terms of € per habitant for that type of research: the country stands at the 23th place on this indicator, due to low absolute amounts.

<sup>10</sup> If all types of transnational cooperation are taken into account, Romania does not stand out prominently: GBARD devoted to all kinds of transnational cooperation amounts to 1,840€/researcher, compared with 3,739€ for the EU average (EC 2019a). However Romania is catching up with EU average on this front.

them<sup>11</sup>. The process for selecting the most relevant partnerships in which to invest public money needs to be clarified: with unclear prioritisation in the national R&D strategy (several competing priorities seem to be at play, see Chapter 3) the risk is that this selection takes place in too ad hoc a manner, with unclear expected returns.

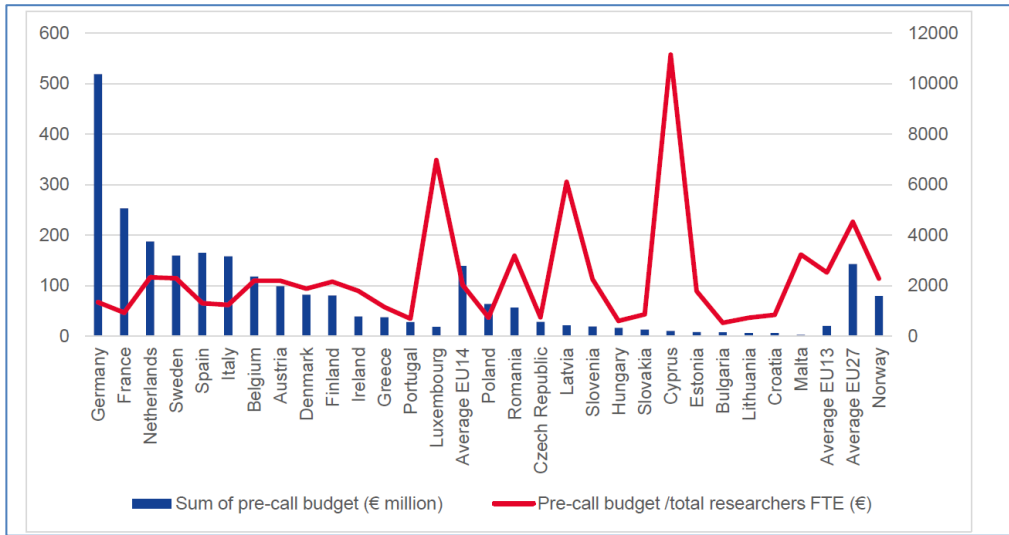


Figure 29 Pre-call national commitments (€m) and per FTE researcher (in €) in partnerships by country in Horizon 2020 – EU27 – average 2014-2020 – situation April 2020

Source: ERA-LEARN (2020)

<sup>11</sup> The Netherlands Organisation for Scientific Research is involved in 64 networks; the Estonian Science Foundation in 37 networks; the Slovene Ministry of Education, Science, Culture and Sport in 48 networks; the Danish Agency for Science, Technology and Innovation in 36 networks and Innovation Fund Denmark in 15 networks.

According to the PSF self-assessment report, “Romania, while taking part in many calls, does not have a correspondingly high number of supported projects” (MCID 2021). Indeed, in terms of €/inhabitant actually disbursed by the government to transnationally coordinated R&D, Romania does not stand out (Figure 31), and the returns from the engagement in these partnerships are not (yet) visible. To date 29 Romanian organisations are participating to networks funded by the partnerships, most of them being part of 1 to 3 networks<sup>12</sup>: UEFISCDI concentrates the participation, being itself involved in 63 networks.

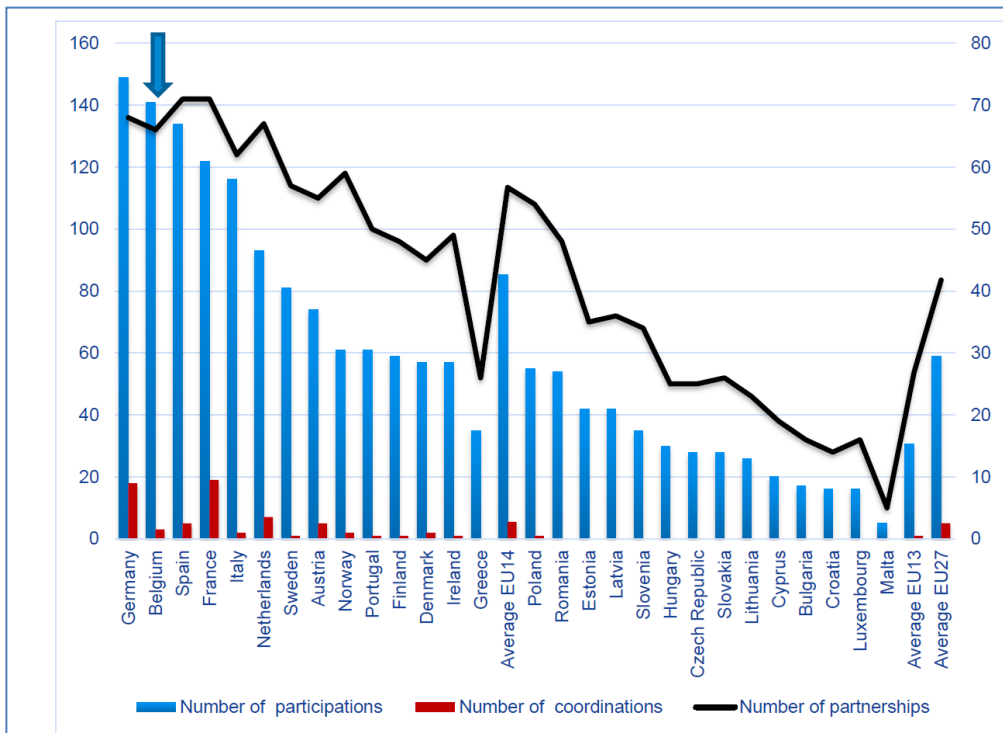


Figure 30 Participations and coordination of partnerships by country and number of partnerships by country in Horizon 2020 – EU27 – situation April 2020

Source: ERA-LEARN (2020)

<sup>12</sup> Except the Ministry of Education and Research, involved in 13 networks.

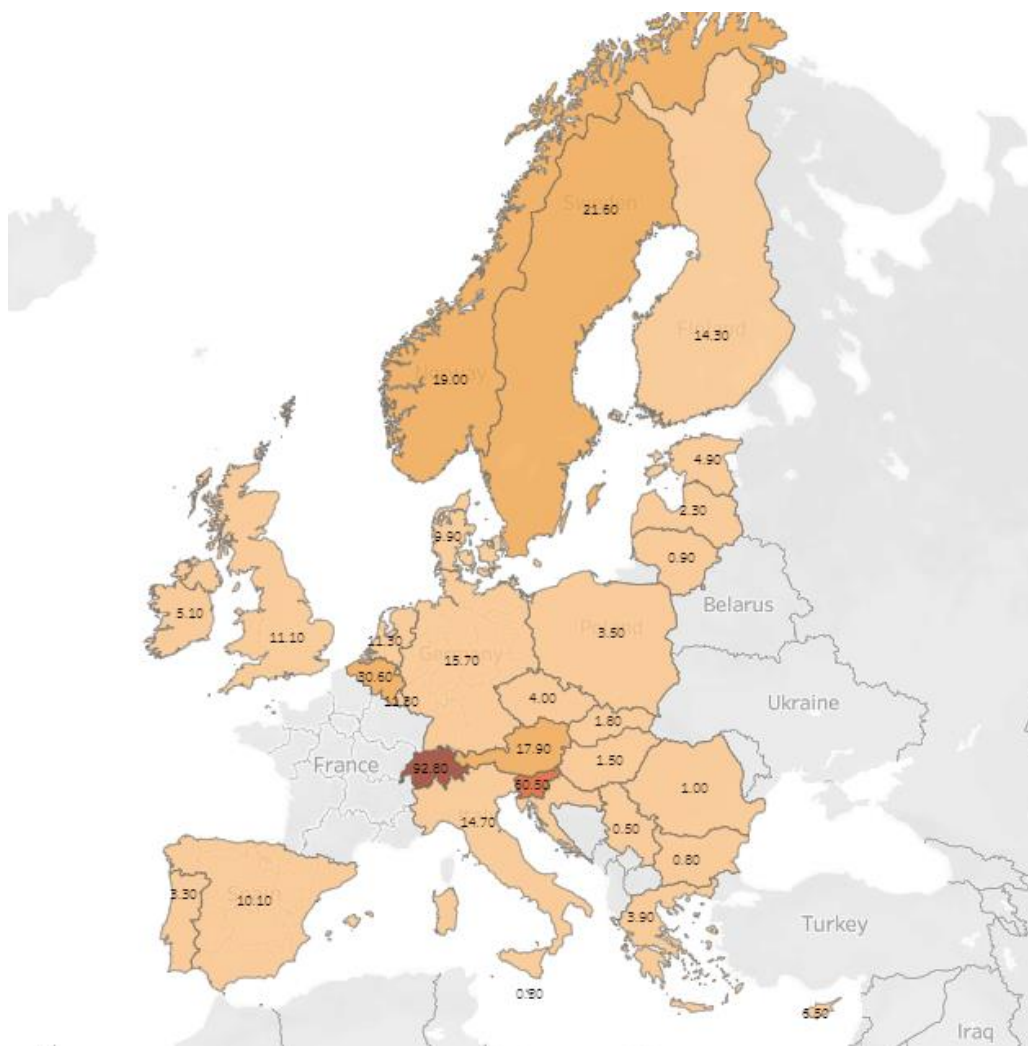


Figure 31 National public funding to transnationally coordinated R&D – EU28 – 2019 – €/inhabitant

Source: Eurostat data extraction 04.01.21

**It is remarkable that *all* investments foreseen in the R&D chapter of the NRRP focus on internationalisation, or at least have a strong international dimension.** Out of the 6 investments foreseen for R&D, 5 are directly targeting internationalisation: Horizon Europe mentoring programmes; funding for Romania’s participation in partnerships and missions in Horizon Europe; grants to attract foreign-based researchers; Seal of Excellence funding for Marie Skłodowska Curie; and regional career guidance centres for researchers. One investment targets this objective indirectly, and is the establishment and operating of Centres of Competence to support implementation of Horizon Europe missions at the national level. The latter is discussed in Chapter 5, as those centres have a primary mission to develop public-private partnerships (see Tables 14 and 15).

**Financial public support for internationalisation is included in PNCDI III, Cohesion Policy OPs and NRRP.** There are many instances where (seemingly) similar instruments are funded by both national and EU funds (Table 14). This raises the question of the complementarity between these funding sources. In some cases, one source of funds might be used to build upon the action pursued by another (topping up: more money for the same action). In others the various schemes may complement each other by funding different actions (sequential funding or parallel funding). An example of the latter could be Investment 7 under the NRRP, which aims at funding “*complementary projects with the purpose to increase the impact of H2020 projects that are already funded (ongoing or recently finalised)*”.

**Funding is available to ensure the presence of Romania’s research community in EU networks and partnerships.** The National programme PNCDI has budget lines for participation in a wide variety of EU-level initiatives (ERA-NETs, JPIs,). For the ERA-NETs, success rates are high and absorption is low as only 54% of the reserved funds could be allocated (UEFISCDI data). A similar situation as that of participation in Horizon calls.

Absorption rates are low for many programmes: EUREKA (73%); EUROSTARS (38%) and NATO (22%). They are high only for the AAL (Active Assisted Living Programme) (90%). No funding was allocated to JU/JTI. Prizes awarded for Horizon winners are a welcome stimulus for strong research teams. PNCDI also has lines of funding for participation in major international organisations and projects (EURATOM, CERN, FAIR, CEA, ESA, etc.).

Budgets planned under the Cohesion policy (OPC) display absorption capacity problems. Due to the weak performance in the Widening programme, only one ERA-Chair project was funded (€3.5m). A total of 16 projects were funded under the ECSEL JU (€9m, 10 out of the 16 projects are allocated to Polytechnic University of Bucharest), two under Clear Sky (€5m), and infrastructures and EIT (€6.5m, only one project).

Capacity in the public research sector is funded through the establishment of 12 support centres for international projects (6 at universities and 6 at INCDs) (€6m). Such investments are planned under NRRP Investment 7. Funding is also allocated for participation of Romanian representatives in EU networks and Committees. The NRRP will support the Seal of Excellence for Marie Skłodowska Curie actions won by 2023 (see Table 15) while POCIDIF intends to support the Seal of Excellence for other types of activities.

Table 14 Policy mix to support internationalisation of research (not including researchers' mobility, covered in Table 15 below)

Source	Funding scheme	Budget - period (success rates)
PNCIDI by UEFISCIDI (Programme 3) 2014-2020	3.2. EU ERA-NETs 3.3. EU JPI 3.4. EU JTI/JU (funded under POC) 3.5. EU Partnerships, EUREKA, EUROSTARS, NATO 3.6. Prize for Horizon projects, participation in meetings and cooperation frameworks	3.2 €39m -2015-2020 (29%) 3.3. €58K (2020 only) 3.5 €21.6m (2014-2020) 3.6. €13m - 2016-2021 (81% to 85%)
PNCIDI by IFA 2014-2020	3.1 Participation in international programmes CERN-EURATOM	€10.4m (2014-2020)
PNCIDI by ROSA, IFA and MCID 2014-2020	5. Research in areas of 'strategic interest'. Allocations to international and EU organisations and infrastructures. Participation of researchers to international scientific programmes.	€68.5m (2016-2021) fluctuating budgets on a yearly basis
POC UEFISCIDI 2014-2020/	1.1.3: Co-funding of EU projects (Widening), JTIs + EIT, creation of support centres for international R&D&I projects	€32.7m for 2014-2020 €3.5m ERA-Chair; €16.8m Ecsel and Clean Sky JU; €6.5m for infrastructures and EIT; €6m for centres
POCIDIF 2021-2027	Funding for Widening projects Funding for European Institute of Innovation and Technology (RO-EIT) Support for applicants and potential applicants to Horizon Europe Seal of excellence for Horizon Europe projects	No funding decided yet
NRRP	Investment 5 – Centres of Competence: 5 centres	€25m planned until 2025
	Investment 6 – Horizon Europe mentoring programme: vouchers	€5m planned until 2026
	Investment 7 – Horizon Europe partnerships & missions: co-funding	€31m planned until 2023
EEA Norway grants 2014-2020	Funding for joint research with partners in Norway, Iceland and Liechtenstein	€52m 2018-2019 (6%-9%)

Source: PSF Panel, based on data from PSF Unit, NRRP, UEFISCIDI website and POC MA website (download November 21)

**Romania has signed numerous bilateral and international cooperation agreements, of which the oversubscribed EEA and Norway Grants**



**programme stands out.** Many agreements (34 according to self-assessment report (MCID 2021)) are concluded between Romania and various countries, more are under preparation, but none of them seem to be active, with the exception of the EEA-Norway grant programme. The latter programme, operated by UEFISCDI with MIPE as National Focal Point, aims at enhancing collaboration between beneficiary (15 countries with less developed R&I systems) and donor state entities (Iceland, Norway, Liechtenstein) involved in the programme.

In the R&D field, the 2014-2021 programme allocated €52m to 42 Romanian projects in two calls (2018 and 2019) to support collaborative research projects in basic and applied research in six thematic areas: partnerships between academia and companies to ensure the application of research results; capacity building in research, including support for women in research and young researchers; research targeting societal challenges and social innovation; support for the beneficiary countries' participation in Horizon 2020; and ERA multilateral research cooperation.

The programme was excessively oversubscribed with success rates as low as 6% and 9% in the two calls. In the field of innovation, the 2018-2020 Programme 'Business Development, Innovation and SMEs' managed by Innovation Norway (€45m) supports 33 Romanian's SMEs projects in green industry innovation, blue growth and ICTs. In all cases these projects involve cooperation with EEA partners. Romania is also a participant in the EU Strategy for the Danube Region and in the Black Sea common maritime agenda.

**Participation of Romania in EU RDI Committees is not optimal.** According to interviews, there is room for improvement and increased professionalism in the participation of Romanian delegates in the EU Committees, in order to ensure higher visibility and more effective presence of the Romanian research community in EU-level initiatives and programming committees. The main issue reported by the Romanian Office for Science & Technology to the EU in Brussels is the difficulty to find adequate domestic experts available to prepare positions at a strategic level for the participation in the various Committees and working parties, with adequate support from the national authorities.

**Soft support through National Contact Points (NCP) needs to be upgraded.** Romania has, like all Member States, a support services for applicants to EU research programmes in the form of an NCP system. This system is clearly underperforming, with the NCP function being allocated on a part-time basis to either civil servants in the Ministry or to researchers in public research institutes, with little chance to carry out such a function effectively<sup>13</sup> and too scarce resources (Buzu 2021).

Overall, the support offered is meagre and benefits from learning about the European landscape may not diffuse much beyond the NCP part-time officers themselves. There is no analysis of NCP's effectiveness, such as the extent to which it contributes to raising the success rates or quantity of proposals submitted to the EU FP. Romania can take inspiration from other countries in

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<sup>13</sup> This lack of effectiveness of NCP had already been put in evidence in (Curaj and Chioncel 2015).

their work with NCPs (Box 6.1), for example noting the importance of the client-centred approach as experienced in Austria or the need to ensure good complementarity and lack of conflict of interest with TTOs: NCPs located at universities are more likely to serve their internal communities than a wider range of research actors.

Box 5      Lessons for NCPs

Success factors for NCPs were examined during a mutual learning exercise conducted under the Policy Support Facility. While no 'one-size-fits-all' good practices have been found, several lessons were learned from the exchanges.

One NCP network which is an example of good practice is the **Austrian** NCP network. An evaluation of 4 regional NCPs in Austria was conducted in 2013. These display considerable heterogeneity in terms of types of customers targeted – companies versus researchers in PROs and universities, and in terms of depth of service. In addition to traditional NCP functions, they also have strategic tasks, such as providing strategy advice and strategic input to local governments. Overall, the NCPs were rated as effective in terms of meeting the goals assigned to them, primarily because they took a holistic approach to service delivery. Key findings from this evaluation are:

Key success factors:

- The client-centred approach rather than one of 'selling' (FP) programmes;
- The presence of committed and well-trained advisors/staff;
- The regional character of the service delivery.

Problems:

- The treatment of the European dimension needed to be deepened and the target group further defined in order to reach those actors that have the right profile to participate in the EU programmes.

Another important issue arises with respect to the relationship between NCPs and university transfer offices. The value-added of NCPs depends on the main features or specialisation profiles of PROs and HEIs. The background of NCPs and their relationship with the public system is another factor to be taken into account. When universities have implemented their own information and advisory structures internally, the relevance of external structures decreases and the issue of good synergies between the various structures become prominent.

In the case of the **Swiss** NCP, a problem of potential conflict of interest was identified, since universities were members of the NCP network. It was difficult for these to serve their own university researchers as well as external actors, in particular SMEs. This issue of conflict of interest is a relevant issue that should be better taken into account in the process of establishing NCPs.

In the **Netherlands**, closer interaction between NCPs and university support offices is taking place alongside efforts to introduce a clearer division of labour, with the latter taking on more administrative tasks, while national NCPs take on 'strategic intelligence' tasks, providing information (e.g. maps of FP participation performance by university department) to senior management in universities and research centres that could feed into strategy development.

### 6.3 *International researchers' mobility*

**Brain drain and emigration of talent are recognised by authorities as one, if not *the* major bottleneck for the R&I system in Romania.** As explained in Chapter 2, Romania is the European country most affected by emigration of talent. As a response to this huge challenge, attracting talent to the country has been set as a major objective of Romanian R&D policies. Attracting researchers from abroad is an objective that features strongly in the national strategies, the two successive OPs under Cohesion Policy and the new NRRP.

**Romania faces difficulties to attract foreign PhD students and researchers in the country.** Romania is the third least popular destination for PhD students in the EU after Greece and Poland (Figure 32). However, the attractiveness index has been growing since 2014, where it was 17.7. Concerning the Marie Skłodowska-Curie grants holders, the figure for outward mobility of Romanian researchers (125 over the period 2015-2020) is higher than that of inward mobility (93 over the same period, Serbănică and Pupinis 2021, p. 109-110).

Source: MLE on National Practices in Widening Participation and Strengthening Synergies: Thematic Report No 4 – Skills development, information, communication and training, European Commission (2018).<sup>14</sup>

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<sup>14</sup> <https://ec.europa.eu/research-and-innovation/en/statistics/policy-support-facility/mle-national-practices-widening-participation-and-strengthening-synergies>

### 1.2.3 Foreign doctorate students as a % of all doctorate students

Source: European Innovation Scoreboard 2021

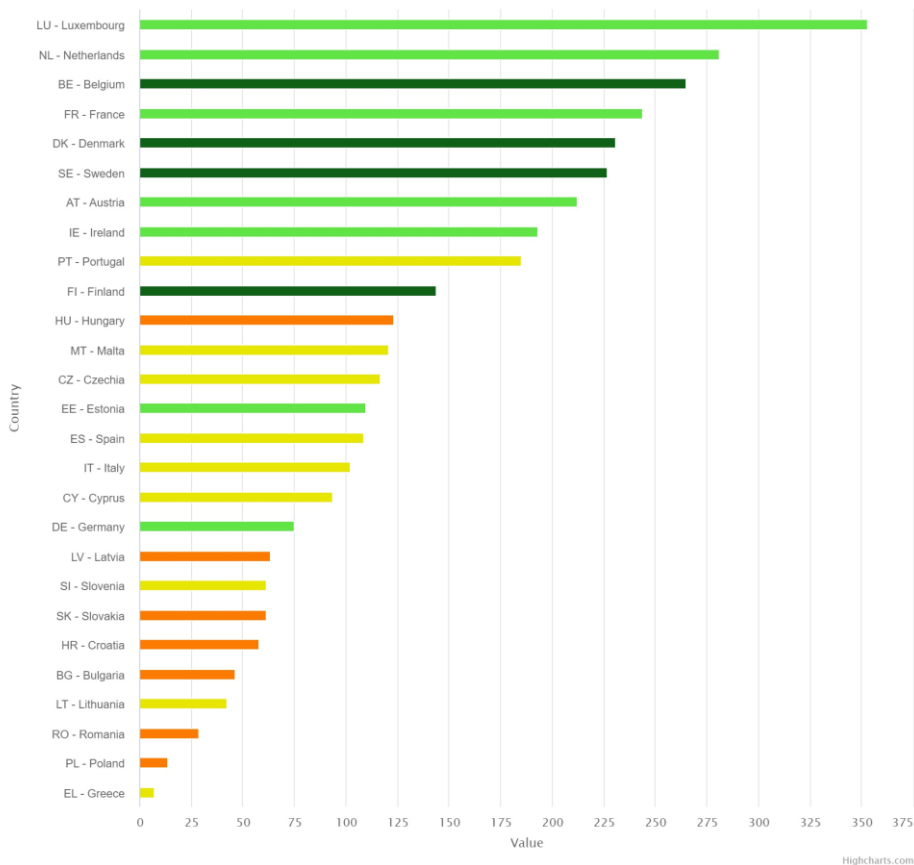


Figure 32 Foreign doctorate students as a share of all doctorate students – EU (2021)

Source: European Innovation Scoreboard 2021

**Outward mobility of Romanian researchers (post-PhD) is particularly high, while outward mobility for PhD candidates is extremely low.** Romania ranks *first* in the EU for short-term outward mobility<sup>15</sup> of post-PhD researchers, and *last* of the EU for PhD mobility (Figures 33 and 34).

<sup>15</sup> Romania also ranks above the EU average for share of researchers engaged in long-term mobility (more than 3 months).

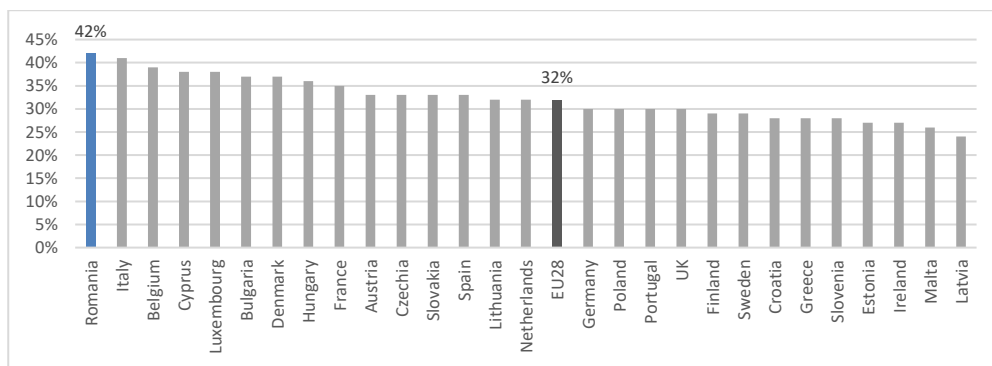


Figure 33 Share of researchers (post PhD) that have worked abroad as a researcher for less than 3 months in the last ten years, 2019

Source: Serbănică and Pupinis 2021, p.106, based on (EC 2019b)

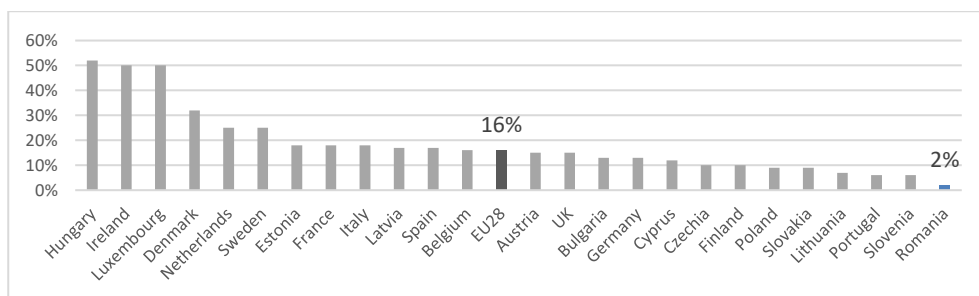


Figure 34 The proportion of mobile PhD candidates as a measurement of international mobility at early career stages (R1-R2 PhD degree mobility), 2019

Source: Serbănică and Pupinis 2021, p.107, based on (EC 2019b)

**There is a limited use of Euraxess.** The number of adverts for researchers posted on Euraxess is 24.4 per 1,000 researchers for Romania, compared to an EU mean of 42.1 (2016 data, EC 2019a). The upcoming ERA Talent Platform, broadening Euraxess, will provide further opportunities to support researchers' mobility.

**Few research organisations have signed the European Charter for Researchers and the Code of Conduct on the Recruitment of researchers.**

This is, in addition to the intrinsic problems related to the framework conditions for doing research in Romania, described in Chapters 3-4, one of the barriers impeding incoming international mobility of researchers. The NRRP, under its Reform 2, appropriately includes the setting up of incentives for public research organisations to implement the European Charter for Researchers and Code for the Recruitment of Researchers. This should also act as a criterion for evaluation and funding for HEIs and PROs.

**Financial and soft support for inward mobility is widespread and will be reinforced further under the NRRP.**

Table 15 shows that in 2014-2020 the Cohesion programme OPC provided financial support for the mobility of researchers with a good absorption rate. The scheme for attracting researchers

was oversubscribed, and only 37% of applications were funded (52 researchers). A larger amount of funding (double than the one funded under OPC in 2014-2020) is foreseen under the NRRP for such schemes as well as for advice provided by career guidance centres located at universities throughout the country (these centres also have a science popularisation mission).

The EEA-Norway grants programme for mobility offers an additional (very limited) source of funds for the mobility of researchers to/from partner countries (Norway and Iceland). National funding sources provide only a very limited amount, under bilateral agreements with a few countries, supporting mostly travel expenses. Inspiring examples from Croatia and Hungary may help fine-tune these schemes towards more effectiveness, for example by tapping into the potential of the Romanian diaspora through the creation of research networks, broadening the schemes to integrate a public-private mobility dimension, and establishing an impact-oriented monitoring system as in Croatia (Boxes 6 and 7).

Table 15 Policy mix to support international researcher’s mobility

Source	Funding scheme	Budget - period (success rates)
PNCDI 2014-2020 (programme 3)	3.1. International mobility (Belgium-France-Moldova-China)	€1m - 2016-2020 (BE: 55%; 79%; FR: 25%; 39%; CN: 34%; MD: 9%)
POC 2014-2020	POC 1.1.4 - Attracting high-skilled personnel from abroad is aimed at creating competence centres within the Romanian R&D organisations (universities, R&D institutes, companies) led by outstanding specialists from abroad, who are hired by the host institution at least for the duration of the project.	€90.8m planned and €86.3m allocated for 2014-2020 (one call only) (37%)
EEA-Norway grants	Mobility schemes	€160K - 2018-2019 (75%; 86%)
NRRP	Investment 8 – grants to attract researchers from abroad	€183m planned until 2023
	Investment 9 –MSCA Seals of Excellence	€8m planned until 2023
	Investment 10 – career guidance centres	€4m planned until 2026

Source: PSF Panel, based on NRRP, UEFISCDI website and PSF unit data

Box 6 Inspiring example from Croatia: the multi-faceted mobility scheme Unity through Knowledge Fund

Using funding from the World Bank (loans), **Croatia** established the Unity through Knowledge Fund (UKF – [www.ukf.hr](http://www.ukf.hr)) in 2007, a multi-faceted mobility scheme aiming at reinforcing the country’s research system. During the period 2007-2017, the Fund financed 128 scientific and technological projects, targeting research that is internationally competitive, innovation-oriented and likely to aid the development of the Croatian research infrastructure. UKF

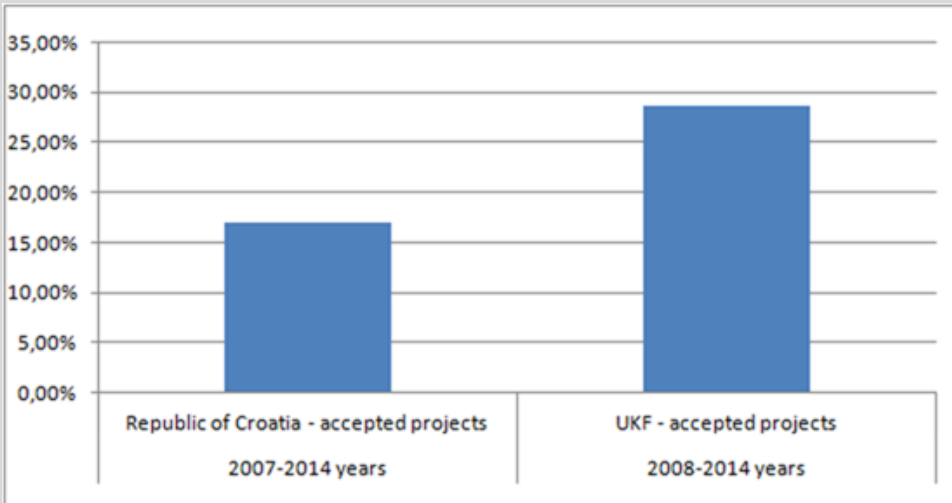
includes six sub-programmes that encourage all forms of mobility, including mobility involving industry.

During the programme, 65 foreign scientists were attracted to Croatia and 175 Croatian scientists moved location, during short and long-term mobility stays. Out of 218 collaborations, 35 involved the private sector; out of the 316 organisations involved, 60 were from the private sector; and 19% of the total funding involved came from the private sector. As a consequence of the projects, 62 partners from private sector invested €800m.

The UKF benefitted from a monitoring system that collected not only outputs but also outcomes of projects (publications and further R&D projects emerging from the UKF support).

The projects financed within the Fund realized great success among the applications for call for proposals in the EU FP7 programme for research and technological development – success thereof is in the 28% range. The Fund invested €4.6m in projects, and an additional €9m was attracted by Croatian partners from FP7. In addition to the financing, success of the Fund's projects within FP7 provided Croatian research groups with international recognition, visibility and competitiveness in a worldwide scope.

**Success rates of projects funded under UKF (right) versus general success rates of Croatia in FP7**



Source: Policy Support Facility, Mutual Learning Exercise on National Practices in Widening Participation and Strengthening Synergies: Thematic Report No 1 – Attracting qualified R&D staff in the public and private sectors, European Commission (2018)

Box 7

Inspiring example from Hungary: the Momentum programme of the Hungarian Academy of Sciences to alleviate brain drain

The Momentum Programme<sup>[1]</sup> of the **Hungarian** Academy of Sciences (HAS) aims to alleviate brain drain by attracting internationally acclaimed young scientists either from abroad, or keeping them in Hungary. Calls for applications have been published annually since 2009, and are open to promising young (typically under 38 years of age) researchers as well as leading researchers

under 45. In the selection process, preference is given to researchers active abroad but wishing to return to Hungary, and usually 20-30% of the successful applicants are repatriates. International excellence is sought within both categories. Applications must be submitted in English, and the programme explicitly requires that successful applications to European Research Council (ERC) funding shall be targeted by the applicants within 3-5 years.

Successful applicants may establish research teams in host institutions (both within the HAS research network, or universities since 2011) to work on new research themes rather than promote existing ones. Annual funding for the teams is €65,000 – €200,000 for 5 years. Around 10-15 new research teams are established every year (with the exception of 2012, when 37 Momentum grants were awarded). In total 121 research teams (68 in HAS institutes and 53 in universities) have been supported, and the programme's annual budget is around €10-12 million in total since 2013.

The performance of a research team is evaluated thoroughly after 3 years, and as a result the grant can be terminated or continued. For successful research teams (only for those operating in HAS institutes) there is even the possibility to be finalized, which means their annual financing is permanently added to the institutional financing of the host institute. Experience with the Momentum programme shows that it effectively contributes to a dynamic renewal of the research institutions which host the fellow, and that researcher mobility is promoted.

Lessons learned:

- To alleviate the brain drain, not only researchers already abroad should be targeted.
- Managing personal research ideas and establishing independent research teams is an important milestone in a career, and therefore an effective incentive for young scientists to stay/return home.
- Even small scale programmes promoting excellence, mobility and new research themes bring about considerable modernising effects at the institutional level.

Sources: <http://mta.hu/english/lendulet-momentum-programme-106053>. Cited in PSF Peer Review of Ukraine



## 7 The Role of Cohesion Policy Funds

This chapter provides a critical analysis of the past performance of EU Cohesion Policy Funds in promoting R&I in Romania, together with a discussion of future plans for these Funds, and suggestions on how they can better encourage the development of Romania's R&I system. After an overview of Cohesion Policy support for R&I in Romania in Section 7.1, Section 7.2 examines the efficiency, effectiveness and impact of the 2014-2020 European Structural and Investment Funds (ESIF) on the PNCDI 2015-2020, as requested by the Romanian authorities at the beginning of this PSF process.

Section 7.3 then discusses the absorption of Cohesion Policy programmes to date and prospects for the future. Section 7.4 goes further by looking at the design process for the next generation of Cohesion Policy programmes 2021-2027 and of the NRRP, while Section 7.5 assesses potential synergies within the policy mix presented by the 2021-2027 programmes and NRRP. Section 7.6 discusses crucial issues of coordination and administrative capacity to derive maximum benefit from these new programmes. Finally, Section 7.7 looks at the perspective of applicants for and Beneficiaries of EU Cohesion Policy Funds in Romania and related administrative burdens might be streamlined and simplified.

The key conclusions arising from the chapter are summarised in the box below, together with broad recommendations for the implementation of R&I interventions in Romania's Cohesion Policy programmes for 2021-2027.

### THE ROLE OF EU COHESION POLICY FUNDS

#### Key conclusions and recommendations

#### ***Securing the share of Romania's EU Cohesion Policy financial allocation, which the country devotes to R&I***

- **EU Cohesion Policy funding currently accounts for around a quarter of total public financing for research in Romania.** The figure illustrates both the sector's high dependency on EU Funds and the low level of national funding it receives. Although it is a recipient of one of the largest Cohesion Policy allocations in the EU, Romania successively chooses to direct only a small percentage of the total towards R&I – proportionally around 2-3 times less than most other EU13 Member States.
- **Tangible results have been slow to materialise for the 2014-2020 programme period,** making it politically difficult to justify increased allocations for R&I when the country has many other urgent priorities for EU funding. The initial financial allocations are already as good as decided for Romania's 2021-2027 programmes, so the PSF can have no tangible influence in this regard at the present time.

**Recommendation 10.1: Mobilise all forces, from the highest level, to fight more convincingly for R&I in the country's Cohesion Policy budget context over the medium to long term.** This is imperative if Romania is to even begin to move towards the target of 1% public R&D investment in GDP. During implementation of the 2021-2027 programmes, the

R&I sector needs to resist any threats to its existing Cohesion Policy budget from other fields of intervention, where it is *easier* to spend EU money. Moreover, performance on new R&I interventions must be robust and visible enough to enable the sector to achieve its full potential from the mid-term 'flexibility amount' award in 2025. This will be a key stepping-stone towards justifying substantially increased Cohesion Policy allocations to R&I for what follows post 2027. The recommendation has a deliberately political dimension in its call for decisive leadership. It is also intended as the overall focal point for the more operational recommendations made in this section – on improving coordination and synergy between programmes, building implementation quality and eliminating delay, and providing better support to R&I applicants and Beneficiaries.

### ***Improving coordination and synergy between programmes***

- **R&I interventions will feature in more Cohesion Policy Operational Programmes (OPs) for 2021-2027 than during previous phases** - including the OP Smart Growth, Digitalisation and Financial Instruments ('POCIDIF') and eight separate Regional OPs (ROPs), the new Health OP 'POS', the ESF+ OP Education and Employment ('POEO') and to some degree the Just Transition OP (JTOP). In addition, there is the National Recovery and Resilience Plan (NRRP), which includes system reforms and investments in R&I. The multiplication of R&I-relevant OPs brings a clear need for substantially enhanced coordination between them to maximise implementation efficiency and the collective value of their results.
- **Synergies between EU Cohesion Policy OPs and between them and the NRRP have been so far addressed only in terms of demarcation of funding**, rather than proactive identification of potential target areas for joint OP intervention, which appears as an opportunity missed to obtain more valuable results. Synergies between Romania's Cohesion Policy OPs and the Horizon programme appear strengthened for 2021-2027, with specific measures to support Horizon Europe Beneficiaries and 'Seal of Excellence' projects in 'POCIDIF' and the majority of ROPs and a focus on Horizon Europe 'missions' in NRRP.

**Recommendation 10.2: Ensure that enhanced coordination of EU Cohesion Policy OPs and between them and NRRP and the PNCISI is a principal attribution of the single R&I Coordination Structure to be established (Recommendation 1.2).** The key tasks of the coordination structure should include identification of areas of synergy between programmes (national-national, national-regional and regional-regional) and development of action plans for pursuing these proactively during the implementation phase, with the aim of gaining maximum R&I impact from EU funding.

### ***Building implementation quality and eliminating delay***

- **Romania needs a comprehensive long-term drive towards building implementation quality for R&I under its Cohesion Policy programmes** - above all to eliminate the types of delays which have characterised the 2014-2020 phase, if it is to justify higher R&I allocations in the future.

- **Many of the necessary conditions are currently being put in place for 2021-2027** and the Romanian authorities should be commended for this. National and regional S3 approaches are better harmonised, and DP processes at regional level are significantly improved, even if at national level EDP remains more top-down. The draft 2021-2027 OPs are more closely aligned with SNCISI objectives and have monitoring indicators with better focus on results, in line with evolutions in the EC's common indicator system. The new monitoring platform foreseen under the SNCISI promises more efficient data collection and more effective use of indicators to determine R&I outcomes across national and EU programmes (see Recommendation 3.1).
- **'POCIDIF' itself has a distinctly stronger emphasis than OPC 2014-2020 did on partnership between public research institutes and private companies** in its R&I interventions targeting national S3 domains. The eight new ROPs will feature project eligibility/selection criteria to favour collaborative approaches over single-institution R&I projects, with the main focus on technology transfer for businesses in the regional S3 domains. Both 'POCIDIF' and the ROPs will exploit new possibilities to use ERDF to support S3-related skills development, as both stand-alone interventions and as part of integrated solutions.

**Recommendation 10.3: Adopt a more forward-looking anticipatory approach to programme management for R&I interventions under Cohesion Policy OPs and ensure interoperability between IT platforms between national institutions.** This recommendation is mainly about adopting a conscious management style and undertaking operational measures to help make the foreseen improvements actually work better in practice. The relevant OP Managing Authorities (MAs) and Intermediate Bodies (IBs) should plan R&I Calls much further in advance than was the case for 2014-2020, making sure that potential applicants are fully aware of the timetable and have sufficient time to prepare and submit their applications. They should use Technical Assistance effectively to ensure suitable expertise is always available at the right time to appraise project applications destined for national and regional levels. They should anticipate public procurement and other technical delays and always have back-up plans in place, seeking help from EU institutions where necessary. MAs/IBs should participate actively in work underway to improve the performance of Romania's Cohesion Policy management information system, MySMIS, and its linkage with the new monitoring platform envisaged for SNCISI. Internal capacities should be built up well in advance and proactively maintained in the event of staff turnover to avoid delays in contracting and other key implementation tasks.

#### ***Supporting applicants and Beneficiaries further***

- **Applicants and Beneficiaries reported over-complexities in application processes and high administrative burden of project implementation** for R&I during the 2014-2020 phase. This anecdotal evidence accords with findings of the recent World Bank assessment of Romanian's monitoring and evaluation system across all OPs (World Bank 2021), apparently exacerbated by the specificities of R&I

intervention types. It is understood that work is underway to enhance the user-friendliness of MySMIS, to enable increased automation for users in application and reporting processes in all fields.

- **'POCIDIF' and the eight ROPs contain new provisions to help with project preparation and support project implementation** by certain R&I delivery structures, such as technology transfer offices. At the regional level, R&I culture is still at an early stage of development. Its success, particularly in the less advanced regions, will depend on the ability of local innovation actors to change mind-sets in local business communities. Under the auspices of Romania's national RDA Association, the RDAs are about to begin a joint project with OECD to build their capacities as R&I advisory hubs, not only in terms of supporting future ROP project applications, but also to encourage creative R&I interface with society.
- **Some limited experience was gained during the 2014-2020 phase with Simplified Cost Options (SCOs)**. OPC in particular used flat rates for indirect project costs in the R&I field and the approach is said to be likely to continue under 'POCIDIF' and the new ROPs.

**Recommendation 10.4: Support applicants and Beneficiaries of R&I interventions more proactively and be bolder in simplifying the requirements they need to fulfil.** Taken together, the measures proposed to support applicants and Beneficiaries for R&I interventions under 2021-2027 OPs at national and regional level appear promising. The relevant MAs and IBs should implement the measures foreseen, but also be prepared to go the extra mile for applicants and Beneficiaries and adopt ever more proactive approaches. Additional animation and handholding for applicants and Beneficiaries, in addition to financial support, can be worthwhile investments if project results improve and become timelier overall. Such actions will have resource implications for implementing bodies, and will need to be recognised from the outset. MAs and IBs should aim for a radically simpler approach to procedures and processes to be followed when interfacing with applicants and beneficiaries. In particular, they should go further in the deployment of SCOs, broadening their use wherever possible. Constructive prior engagement with the Audit Authority on SCO use could help to reduce reticence in this regard.

## 7.1 Overview of EU Cohesion Policy support for R&I in Romania

**Romania is about to enter its third seven-year EU Cohesion Policy phase, with each phase providing large-scale EU funding support to the country – including for investment in R&I.** Since the country's accession, EU Cohesion Policy has made available wide-ranging structural-type funding to Romania. During the 2014-2020 phase, these European Funds have supported nearly 50% of Romania's public investment overall, and represented 25 % of total national public financing for research in the country (See Chapter 3). Now Romania is preparing for the 2021-2027 phase of EU Cohesion Policy, for which it has the third highest financial allocation after Poland and Italy (equating to some €25.2bn) to be co-financed and disbursed by the end of 2029. R&I has higher Cohesion Policy prominence at EU level for 2021-2027 than for the previous two phases.

**Romania persistently directs remarkably low proportions of its EU Cohesion Policy allocations towards the promotion of R&I, compared to other EU13 countries.** Indeed, Romania's Cohesion Policy allocations to R&I rank among the lowest in the EU. For 2007-2013 the amount which Romania allocated to R&I was just 5.9% of the total, and for 2014-2020 this fell to only 2.9% of the total. All EU13 countries allocated more Cohesion Policy funds for R&I per inhabitant than Romania for 2014-2020 (Table 16). For 2021-2027 (based on December 2021 drafts of the new programmes, therefore still subject to change), the overall indicative allocation Romania makes to R&I is €1.92bn (without JTF), approximately 6.1% of its total EU Cohesion Policy envelope. Whilst this is appreciably higher than the 2014-2020 allocation of €1.08bn, it is still very low.

**The National Recovery and Resilience Plan (NRRP) will provide a substantial additional EU funding boost for Romania, including for reforms and investments focused on the R&I system, although Romania's chosen financial allocation to these is again comparatively low.** Romania's extra funding from the EU, under its NRRP approved in September 2021, is almost as much as its Cohesion Policy allocation. Romania will receive RRF support totalling over €29bn (€14bn grant and €15bn loan), to be disbursed by the end of 2026. Four reforms and six investments relevant for R&I are foreseen in the NRRP accounting for EU funding worth €314m . Again this is low, at only 1% of the total NRRP allocation<sup>16</sup>.

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<sup>16</sup> These figures are extracted from the EC Recovery and Resilience Scoreboard, published in April 2022. They differ from the detailed Panel calculations found in Table 20, which were based on data available in September 2021. [https://ec.europa.eu/economy\\_finance/recovery-and-resilience-scoreboard/assets/thematic\\_analysis/scoreboard\\_thematic\\_analysis\\_research\\_and\\_innovation.pdf](https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/assets/thematic_analysis/scoreboard_thematic_analysis_research_and_innovation.pdf)

Table 16 Allocated R&I-related investments under the European Structural and Investment Funds  
€/inhabitant – EU13 – 2014-2020

Country	ESIF R&I-related investments - €/inhabitant
Estonia	€125
Latvia	€64
Lithuania	€63
Slovenia	€62
Poland	€59
Hungary	€45
Czech Republic	€42
Malta	€33
Cyprus	€26
Croatia	€21
Bulgaria	€15
Slovak Republic	€14
Romania	€7

Source: R&I Regional Viewer, S3 Platform, accessed 25.10.21  
<https://s3platform.jrc.ec.europa.eu/synergies-tool>

**Like the majority of EU13 countries, Romania has traditionally directed the bulk of its Cohesion Policy R&I allocations towards investment in research infrastructures, whilst research in its public research institutes accounts for a considerably lower share than in most other EU13 countries.** Except for Romania, EU13 countries generally allocate the second highest share of their Cohesion Policy budgets to fund research in public research centres. In Romania’s case, the highest shares of Cohesion Policy Funds, after research infrastructures, have so far gone to technology transfer and university-SME cooperation. Research in Romanian public research centres has received the lowest shares of this EU funding.

#### *7.1.1 Governance of current R&I interventions under Cohesion Policy in Romania*

**R&I interventions are currently financed under the 2014-2020 generation of Cohesion Policy programmes.** Out of Romania’s total of 19 2014-2020 OPs, three contain interventions relevant for R&I (two financed by ERDF and one by ESF): respectively OP Competitiveness (OPC), OP Regional Development (ROP) and OP Human Capital (OPHC / ‘POCU’). There is also the National Rural Development Plan, financed by EAFRD, which is part of the ESIF framework at EU level for 2014-2020 only.

Each programme has its own governance structure, comprising a Managing Authority (MA), which may delegate implementation tasks to Intermediate Bodies (IBs), or in the case of EAFRD to the Paying Agency. An OP can have different IBs for its different Priorities/Priority Axes and/or for different geographical areas. The implementation tasks most frequently delegated to IBs usually concern

design of Calls, project appraisal and selection, project level monitoring and control. For Romania, a summary of the R&I-relevant Priorities and governance structures of the 2014-2020 programmes in question is presented in table 17. Romania's new programmes for the 2021-2027 phase of Cohesion Policy are still under negotiation with the EC.

Table 17 ESIF 2014-2020 programmes and related governance structures for supporting R&I promotion in Romania

Programme / Fund	Managing Authority	Relevant Intermediate Body	Relevant Priority	EU Funds allocation (€m)
<b>OP Competitiveness (OPC) / ERDF</b>	Min. European Funds	Min. Education & Research	PA1 - Research, development and innovation supporting economic competitiveness and the development of businesses	780.4
	<i>Later</i>	<i>Later</i>		
<b>OP Regional Development (ROP) / ERDF</b>	Min. Investments & European Projects	Min. Research, Innovation & Digitalisation	PA1 – Promotion of technology transfer	133.2
	Min. Development, Public Works & Administration	8 Regional Development Agencies		
<b>OP Human Capital (OPHC - 'POCU') / ESF</b>	Min. European Funds	Min. Education & Research	PA6 – Education and Competencies  (Only SO 6.13 - Increasing the number of university and non-university tertiary education graduates who find a job, including a research job)	89.8
	<i>Later</i>	<i>Later</i>		
<b>National Rural Development Plan (NRDP) / EAFRD*</b>	Min. Investments & European Projects	Min. Education	<i>P1 - Knowledge transfer and innovation in agriculture, forestry and rural areas</i>  <i>(Measure 16 - Cooperation, clusters and networks, EIP operational groups for agricultural productivity)</i>	81.3
	<i>Min. Agriculture &amp; Rural Development</i>	<i>EAFRD Paying Agency</i>		
<i>*EAFRD part of ESIF framework for 2014-2020 period only</i>				
			<b>Total for 2014-2020</b>	<b>1,079.6</b>

## *7.2 Efficiency, effectiveness and impact of the European Structural and Investment Funds in connection with the National RDI Plan (PNCDI) 2015-2020*

**There is unanimous agreement among key actors in Romania's R&I system that the progress made in promoting R&I in the country, since EU accession, would not have been possible without the support of Cohesion Policy Funds.** Senior officials interviewed in MCID and other Ministries, RDAs and the wider research community all agreed that ESIF have so far played an essential role in the undeniable progress which Romania has made with promoting R&I since accession – albeit from a low base. This general consensus encompasses Cohesion Policy R&I investments over the last 14 years, starting with the OP Increasing Economic Competitiveness (OPIEC) 2007-2013, with its heavy emphasis on research infrastructure, despite serious implementation difficulties encountered (Technopolis 2012).

For the 2014-2020 period, the finding is borne out by the recent First Evaluation of Priority Axis 1 of OPC (Ernst & Young 2021), which highlights positive effects of OPC interventions so far, including on the transfer of knowledge and technology and the numbers of researchers employed in improved infrastructures. The evaluation draws special attention to the collective recognition of research organisations and companies it interviewed, that in the absence of EU funding achieving the same research results would have required many more years, or might never have been possible (Șerbănică and Pupiniș 2021).

### *7.2.1. The question of impact – use of indicators and evaluation*

**The impact of ESIF from Romania's 2014-2020 generation of programmes will not be known until 2024 at the earliest.** In line with the relevant EU Regulations, expenditure under OPC, ROP, 'POCU' and other relevant 2014-2020 programmes, including the National Rural Development Plan (NRDP), may occur up to the end of 2023. There are many projects still under implementation under these programmes, from which results will only become visible after that date. The two 2014-2020 OP evaluations of relevance to R&I completed so far are the First Evaluation of Priority Axis 1 OPC 2014-2020 (Ernst & Young 2021), referred to above, and Evaluation of ROP 2014-2020 Technology Transfer interventions (Lattanzio 2019). The evaluations were not able to comment greatly on impact, due to the current stage of implementation and instead relate mainly to process.

It is therefore not feasible for this report to provide a comprehensive assessment of the impact of ESIF on the PNCDI 2015-2020 at the current time. Further evaluation exercises for R&I interventions under the OPC and ROP 2014-2020 will take place later in 2022 and 2023, by which time there should be more evidence on outcomes achieved. A final determination of the impact of these programmes will require evaluation studies that are carried out at a later stage.



**There is a certain lack of linkage between the indicators and targets of the PNCDI 2015-2020 and those of the 2014-2020 ESIF programmes.** It is challenging in any case, to provide a full picture of impact of ESIF in Romania on the PNCDI, because their respective indicators do not fully relate to each other. Indeed, out of 12 quantified result indicators in the PNCDI, only four can be said to correspond directly with indicators from the relevant ESIF OPs. There is no linkage at all between the PNCDI result indicators and the EAFRD indicators for relevant measures (chiefly Measure 16) of the NRDP 2014-2020, which are all basic outputs. Most importantly, the result indicators have different timescales associated with the achievement of target values set. In the PNCDI the target date for achievement of results is end-2020, whilst for the ESIF programmes - in line with completion of the relevant expenditure, as described above – it is end-2023.

### *7.2.2. Efficiency and effectiveness of implementation*

**Both national and regional ESIF R&I interventions of the period 2014-2020 have experienced efficiency problems, which have led to severe implementation delays.** What can be clearly concluded is that achievement of results from R&I interventions under OPC and particularly the ROP 2014-2020 has been considerably less than ideal. For OPC, the First Evaluation of Priority Axis 1 (Ernst & Young 2021) highlights implementation delays related to high levels of bureaucracy in the management of the programme, long duration of project appraisal and procurement procedures, as well as of processing of reimbursement requests. The evaluation of ROP 2014-2020 technology transfer interventions (Lattanzio 2019) further points to frequent changes in Applicant Guides and inadequate guidance on the interpretation of indicators as key problems for implementation.

**Project selection processes have been an important source of delay in the implementation of R&I interventions under 2014-2020 ESIF programmes, due to the need to mobilise appraisers with high levels of specialist knowledge.** Under OPC 2014-2020, the technical appraisal of projects has been carried out by independent external appraisers with specialist competencies related to the investment fields in question, and with financial backgrounds. For the period 2015-2016, the appraisers were selected from the 'Brain map' database of independent evaluators, and from the EC Evaluators Database, both of which contain Romanian and international experts.

However, for 2017-2021, MIPE insisted that a public procurement procedure be launched for external project appraisal services, since it considered that using databases of external expert evaluators was not in line with national procurement law. The procedure launched was severely delayed, in turn delaying project appraisal under OPC. Similar issues of delay were reported by the MA for the NRDP, given the relative novelty of R&I interventions in rural development and the resultant need to procure specialist project appraisers.

The ROP was fortunate to be able to use external appraisers provided by JRC under the Lagging Regions initiative described below. However, they were only available until the end of that project in December 2020. The EC then provided for external experts to appraise R&I projects under the ROP, but their mobilisation also suffered delays and the experts did not arrive until November 2021. Consequently, there was a hiatus of almost one year in the appraisal of R&I interventions under two of the PA1 Calls under the ROP. From the interviews carried out, there does not appear to be any problem with quality in project appraisal under these programmes, only with delays related to their dependence on external appraisers.

**Further delays have been experienced in contracting and other aspects of implementation under the 2014-2020 programmes.** Interviewees from implementing bodies for both OPC and ROP 2014-2020 pointed to several occasions where submission deadlines under R&I project Calls had to be extended following pressure from applicants – by up to six months under OPC and in one case even by one year under the ROP. In the first Call under Priority Axis 1 of the ROP, many applicants entirely misunderstood the requirements for collaboration, and the Call had to be re-launched. Under OPC in 2018, there were negative EC audit findings, highlighting incorrect reporting against indicators and storage of information for OPC in Romania’s MySMIS system, which covers all of its Cohesion Policy programmes. The error necessitated modification of the OPC monitoring system and the complete revision of a large number of contracts to avoid payment suspension by the EC.

As regards the ROP, RDAs interviewed complained about the persistent long delays in the signature of R&I project contracts by the national MA. Interviewees from implementing bodies for OPC and ROP referred to simplifications introduced during the implementation period, like relaxation of the need for institutional applicants to obtain formal letters of intent for the first stage of applications (OPC). The ‘POCU’ MA reported significant delays with ESF interventions due to COVID-19 restrictions. Some COVID-related simplification measures were introduced under different programmes, such as a reduction in the numbers of on-site visits for expenditure verification purposes.

**The greatest implementation delays for R&I interventions for 2014-2020 occurred under the ROP, during introduction of the Smart Specialisation approach, but the result has been generally positive for regional innovation ecosystems.** In order to open implementation of R&I interventions under the ROP 2014-2020, the EC insisted on S3 approaches in each region concerned, as part of the ex-ante conditionality related to Priority Axis 1. This was the starting point for the introduction of quadruple helix EDP exercises in the regions as a basis for regional-level S3. However, for a number of RDAs and many regional actors, the process was said to be somewhat alien at the beginning, and its relevance and suitability were questioned. There were particular difficulties in reconciling national and regional S3 priorities.

Romanian regions received substantial EU support to improve their EDP during this period. North-West and North-East Regions participated as pilot regions in EC-DG Regio/JRC project 'Targeted Support to Smart Specialisation Romania' (2016-2020). The exercise gave rise to new integrated project proposals (e.g. university-SME collaborations on experimental research across different TRLs) from certain regions, but these did not fit into existing ROP Calls. As a result, the ROP MA had to set up an entirely new type Call, which took over a year.

All Romanian regions also benefitted from the EC-DG Regio/JRC 'Targeted Support to RIS3 in Lagging Regions' initiative (European Commission 2020). The evaluation of ROP 2014-2020 Technology Transfer interventions (Lattanzio 2019) acknowledged tangible benefits stemming from these initiatives for EDP in the regions. The role of Regional Innovation Consortia and the evolution of permanent Working Group structures were highlighted, in particular, as positive features of the system at regional level.

**Despite the many difficulties highlighted above, Cohesion Policy programmes have delivered positive results for R&I in Romania.** Low implementation efficiency has indeed hampered the effectiveness of R&I interventions under the 2014-2020 programmes, as it did under OPIEC during the 2007-2013 period (Technopolis 2012). Nevertheless, building upon the enhancement of research infrastructure, the research job creation and support for start-ups finally delivered under the 2007-2013 programme, OPC has provided valuable support to the R&I effort in Romania and still has just under two more years to run.

OPC interventions have so far assisted the employment of new researchers and increased the number of companies collaborating with research institutions, as well as creating the first entrepreneurship accelerators in Romania (Șerbănică and Pupinis 2021). The results of R&I interventions under the ROP are not visible to date, with no project yet completed. However, the RDAs and other regional actors have undergone a substantial mentality-changing exercise and have emerged from it with growing acceptance of the importance of S3.

### *7.3 Demand for and absorption of EU Cohesion Policy funding for R&I*

**Overall, there is strong private sector demand for EU Cohesion Policy resources for R&I.** Under OPC 2014-2020, actions promoting technological innovation in enterprises have received applications worth 587% of allocation. For start-ups and spin-offs it was 628%, newly established innovative enterprises 285%, and Knowledge Transfer Partnerships 125% (Ernst & Young 2021).

Bucharest-Ilfov region represents a special case, attracting the largest share of resources under OPC 2014-2020, while not having a financial allocation for R&I under the ROP 2014-2020. A large proportion of the ERDF available under OPC 2014-2020 has gravitated towards Bucharest-Ilfov, given its concentration of universities, research centres and large companies. In Cohesion Policy terms, the region is classed as 'more developed' (unlike all the other Romanian regions

which are 'less developed'), so it has not been possible for ERDF to support investment in research infrastructure there under the ROP 2014-2020.

**Increasing co-financing requirements are beginning to limit public sector demand for EU funding support for R&I interventions.** Bucharest-Ilfov's 'more developed' regional classification remains for 2021-2027, which was said to be lowering interest from public bodies in the limited EU funding possibilities still open in that region, because of the increased co-financing requirement. Many of the RDAs interviewed highlighted State Aid as a factor similarly reducing interest in EU support for R&I projects. Universities seem to be particularly adversely affected, reportedly due to their classification as 'large undertakings' for certain types of investments. Some regional actors interviewed said that they had participated in consultations on the current revision of the State Aid rules at EU level. The new EU State Aid rules are expected to be adopted in spring 2022.

**The most serious challenges for potential absorption are observed in the less developed regions.** In the regions outside Bucharest-Ilfov, or outside those without major university cities, such as Cluj in North West region and Iasi in North East, or high incidence of multinationals like West region, private companies are generally less receptive to innovative product and process approaches. Even if higher levels of EU grant support are potentially available to them, companies in such regions are far less likely to naturally look to R&I support for development of their business. Such difficulties were highlighted in interviews conducted with the RDAs for South West Oltenia and South East regions in particular, and should not be underestimated.

#### *7.4 Preparation of R&I-relevant interventions under EU Cohesion Policy programmes 2021-2027 and NRRP*

##### *7.4.1. Strategic framework*

**The new overarching national strategy SNCISI for 2021-2027 is central to the Cohesion Policy programming process for 2021-2027.** In addition to national R&I programmes and the relevant parts of the NRRP, the new strategy encompasses both the national and regional S3s and forms the basis for programming of R&I interventions under 'POCIDIF', 'POEO', the new Health OP and the eight ROPs for 2021-2027. Finalisation of the SNCISI, however, has been substantially delayed. Although the SNCISI was supposed to be adopted much earlier to guide Cohesion Policy programming, the two processes have instead been proceeding in parallel. Interviewees from MCID emphasised that, although unanticipated and unorthodox, the parallel processes for SNCISI and OP development have delivered satisfactory results overall.

**National Ministries and RDAs have participated together since mid-2019 in the Coordinating Committee for Smart Specialisation (CCSI) in order to agree on complementarities between national and regional specialisation domains in the context of SNCISI.** Most RDAs interviews expressed satisfaction with the CCSI forum and the way it has allowed

constructive dialogue and increased trust between national and regional levels on S3 formulation. Others, however, pointed to the significant differences in national and regional EDP methodologies followed and branded the reconciliation between S3 domains between the two levels as somewhat artificial.

The interviewee from DG Regio felt that there were still many claimed 'complementarities' between national and regional S3 domains about which national and regional CCSI members need to provide further clarification. The CCSI Vice President (Director of RDA North East) pointed out that despite the different EDP methodologies, the initial 80% 'overlap' in resulting S3 focus between national and regional levels provided a certain validation of the domains chosen. The detailed demarcation discussions which followed were said to be valuable in enhancing understanding between national and regional partners. There appears to be general agreement that the S3 preparation process for 2021-2027 has genuinely improved compared to the previous phase.

**At the level of each region, S3 development for 2021-2027 has benefitted from a marked enhancement in the quality of EDP.** RDAs interviewed generally highlighted improving EDP as a result of experience recently gained, as well as the methodological support provided by JRC and EC guidance material for S3 2021-2027. Positive views were expressed about EDP progress even by weaker regions from the R&I perspective, noting, for example, that businesses in their regions were actually asking for EDP sessions to be convened, rather than being somewhat passive and reluctant participants, as had been the case for 2014-2020.

Box 8 Selected conclusions of R&I-relevant evaluations of 2014-2020 OPs: ROP

### Evaluation of ROP 2014-2020 Technology Transfer interventions

(Lattanzio 2019)

#### Main findings:

The OP has made a visible contribution to the implementation of the smart specialisation concept in regions, involving all relevant stakeholders and businesses in the planning process.

The OP gave technical support to the development of the strategic planning methodology in line with EC Guidelines for RIS3, but not with that adopted at national level for research and innovation planning. RIS3 therefore runs parallel to regional development planning but is not fully integrated.

The added-value from the OP consists of increased knowledge acquired by companies and research organisations, a clearer vision of the links with education and the labour market, and the need for cooperation between companies and research centres.

The barriers to technology transfer include access to finance, the high costs of transfer, intellectual property issues and State Aid rules.

Implementation was delayed, contracts have not been signed and a large number of projects submitted have been rejected. All of this may deter participation of companies and research centres in smart specialisation measures in the regions.

**Key recommendations:**

Harmonise the procedures for devising the National Strategy for Smart Specialisation with those of the RIS3.

Consolidate institutional capacity for promoting innovation in the regions, creating a network of Councils for Regional Innovation, and providing support for strengthening capacity of the MA, RDAs and potential recipients of funding.

Simplify the project selection process, reducing the administrative burden, adapting funding conditions to potential recipients and adjusting the applicability of the State Aid rules using the Horizon programme experience.

Ensure more flexibility in applying the JRC methodology for RIS 3 implementation.

*7.4.2. Use of evaluation evidence in programming for 2021-2027*

**Key lessons learned from the evaluation of 2014-2020 R&I interventions appear to have been taken into account in preparation of the relevant OPs for 2021-2027.** Findings from the two R&I-relevant evaluations referred to above - First Evaluation of OPC Priority Axis 1 (Ernst & Young 2021) and Evaluation of ROP 2014-2020 technology transfer interventions (Lattanzio 2019) - are mentioned respectively in the draft 'POCIDIF' and ROPs for 2021-2027, as required in the relevant section of each.

Lessons learnt from these evaluations, although limited in terms of impact, can also be seen in the content of the R&I interventions in these draft OPs. For 'POCIDIF', such lessons include the need to strengthen interventions to support Horizon Europe applicants and beneficiaries, extend support for Knowledge Transfer Partnerships. A key recommendation from the Evaluation of ROP 2014-2020 technology transfer interventions (Lattanzio 2019) to harmonise the procedures for devising the national and regional S3 is visibly addressed in the workings of the CCSI described above.

Box 9 Selected conclusions of R&I-relevant evaluations of 2014-2020 OPs: OPC

**Evaluation of OPC 2014-2020 Priority Axis 1**

(Ernst & Young 2021)

**Main findings:**

The OP is in line with the need for increased and more regionally dispersed R&D.

The delay in the adoption of national strategies on R&D and the inadequate institutional framework contributed to the late implementation of the OP.

Researchers using R&D infrastructure financed under IP 1.1 published more than others in 2019-2020. The interventions helped develop technologies and products which were potentially marketable.

IP 1.1 interventions for internationalising R&D helped to increase the participation of Romanian R&D centres in Horizon 2020 and the number of patent applications and to facilitate the inclusion of young researchers in international research groups.

Counterfactual analysis of support for business investment under IP 1.2 indicates that it had a modest positive effect on profitability and patent applications in 2018 and 2019, but no effect on employment. Support for venture capital helped create business accelerators in Romania for the first time.

According to R&D centres and SMEs, without the support for knowledge transfer under IP 1.2, achievements would have taken more time and cooperation would have been more difficult.

Success factors include good collaboration between beneficiaries and financing bodies and simplification of administrative procedures, but lengthy selection procedures and lags in payments were limiting factors.

#### **Key recommendations:**

It is recommended to increase the financial allocations for synergies with Horizon 2020, for innovative start-ups and spin-offs and for knowledge transfer partnerships, for which the interest of the beneficiaries was very high and the results obtained were very relevant.

Actions are further needed to improve the legislative and institutional framework, to increase the attractiveness of the research career or to support the implementation of 'open science' principles.

Developing a more detailed indicator guide for beneficiaries is highly recommended, in order to avoid incorrect reporting by beneficiaries.

Also: make project selection and implementation procedures more flexible; improve monitoring; make payments procedures more rapid; and continue measures with the same objectives in the future.

**Further evaluations of R&I interventions under the 2014-2020 Cohesion Policy phase in Romania are foreseen in the Evaluation Plans of the OPs concerned and at Partnership Agreement (PA) level covering all relevant OPs.** The Evaluation Coordination Unit of MIPE confirmed that, in addition to the 2022 and 2023 evaluation exercises mentioned earlier, for R&I interventions under the OPC and ROP 2014-2020 there will also be an evaluation of the entire 2014-2020 Thematic Objective 1 in Romania, 'Strengthening research,

technological development and innovation'. This evaluation is expected to be finalised in summer 2022 and will cover R&I interventions across all relevant OPs, including the EAFRD programme.

**Independent evaluations are also planned in relation to R&I interventions under Romania's 2021-2027 generation of OPs, as well as for national and regional S3 and the SNCISI overall.** That aim is to have at least an interim evaluation of each relevant OP up to March 2025, and a final evaluation of each at the end of the implementation period in 2029. Evaluations of SNCISI and its national S3 framework, as well as of each regional S3 are also foreseen for 2025, 2027 and 2029. After the 2025 and 2027 evaluations, a differentiation of S3 sub-domains in relation to progress achieved will take place to help guide the later stages of implementation.

#### *7.4.3. NRRP design process*

**The design of the NRRP was carried out in particularly close collaboration between MCID and MIPE, the overall coordinating body for Cohesion Policy in Romania.** At the national level MIPE is designated to coordinate all matters relating to programming and implementation of the NRRP. At the European level, MIPE liaises with the EC's Recovery and Resilience Task Force (RECOVER) and DG ECFIN, which involve other DGs as required. The R&I Reforms and Investments in the NRRP were all proposed by MCID. MIPE's role was to ensure that the proposals retained for the NRRP were in line with the EC Country Specific Recommendations (CSRs).

The NRRP represented an additional and previously unexpected programming task, which national level interviewees generally said was responsible for delaying the preparation of 'POCIDIF' and the SNCISI. Programming deadlines were strict, and consultations are understood to have been somewhat compressed as a result. All RDAs interviewed stated that consultation with the regional level on the NRRP was minimal.

**The Inter-Ministerial Committee for Monitoring the NRRP - chaired by the Prime Minister and led by MIPE – will have powers of decision on NRRP implementation.** Discussions between the Romanian authorities and the EC on the operational arrangements for the NRRP have recently begun. The aim is to detail the steps for achieving each milestone, as well as related control mechanisms. In this context, MCID will draw up the guidelines for the R&I sector, relating to eligibility, cost, procedures etc., which will be adopted by Ministerial Order.

### *7.5 Potential synergies within Romania's policy mix for R&I promotion in the 2021-2027 period*

#### *7.5.1. Synergy between 2021-2027 Cohesion Policy OPs*



**The role of the regions is significantly enhanced for the 2021-2027 generation of Cohesion Policy in Romania with regard to R&I investment.**

The move towards regional level OPs for 2021-2027, and the transformation of the RDAs into Mas, represents a major step for the regions in terms of responsibility for development policy implementation generally, and for R&I interventions in particular. Table 18 shows the indicative regional-level ERDF allocations for R&I interventions in 2021-2027, in relation to the total allocations foreseen for the ROPs, based on December 2021 drafts of these programmes.

The weight of planned R&I interventions as a proportion of total ROP allocation varies between 5% and 9% depending on the region, with an average of 6% overall. Particularly worthy of note is the collective total indicative R&I allocation to the new ROPs of over €570m - more than four times the R&I allocation to the ROP 2014-2020.

Table 18 Indicative allocations to R&I interventions in Romania’s ROPs for 2021-2027 (€ million)

<b>Indicative ROP allocations for 2021-2027</b>									
Based on drafts of December 2021									
<b>R&amp;I-relevant allocations</b>	<b>All ROPs</b>	<b>NE</b>	<b>NW</b>	<b>W</b>	<b>SW</b>	<b>Centre</b>	<b>S</b>	<b>SE</b>	<b>B-I</b>
P1 - SO a (i) [R&I inv.]	529.2	124.7	60.5	41.2	52.5	82.2	80.5	43.5	44
P1 - SO a(iv) [R&I skills]	41.9	2.9	1.7	12	5.7	8	5	5	1.5
<b>Total for R&amp;I</b>	<b>571</b>	<b>127.6</b>	<b>62.2</b>	<b>53.2</b>	<b>58.3</b>	<b>90.2</b>	<b>85.5</b>	<b>48.5</b>	<b>45.5</b>
Total ROP allocation	8,811.3	1,488.4	1,220.2	1,002.2	1,019.3	1,176.8	1,340.3	977.5	586.6
<b>R&amp;I as % of total</b>	<b>6%</b>	<b>9%</b>	<b>5%</b>	<b>5%</b>	<b>6%</b>	<b>8%</b>	<b>6%</b>	<b>5%</b>	<b>8%</b>

**The question of synergy between national and regional R&I interventions has so far only been addressed in terms of demarcation between the OPs concerned – rather than proactive joint targeting of potential synergies.** 'POCIDIF' targets the national smart specialization areas identified by SNCISI, while the ROPs consider the regional smart specialization areas identified by regional S3. According to the interviewee from MIPE, the two types of interventions are intended complement each other, with POCIDIF supporting research organizations to enter the market, while at regional level the ROPs will support technology transfer entities in developing their capacities and service provision.

ROP investments in research infrastructure will be closely related to the needs of the business environment, while 'POCIDIF' will mainly promote use of existing infrastructures and modernising or upgrading of infrastructures only where appropriate. As regards health, the Health OP will finance public R&I interventions in the sector, whilst 'POCIDIF' intends to finance complementary investments with private sector beneficiaries. Health is one of the smart specialisation subdomains at the national level identified in the SNCISI.

**Both 'POCIDIF' and the eight ROPs intend to make use of the new possibility for 2021-2027 to use ERDF to support human resource development and skills for innovation and S3.** This possibility, available under Specific Objective (S.O .iv) in the new ERDF/CF Regulation, should bring substantial benefits for integrated approaches. Based on the December 2021 versions of the draft 2021-2027 programmes, 'POCIDIF' plans to allocate €50m and the ROPs collectively almost €42m ERDF to this new kind of human resource development investment (see Table 19).

Some RDAs propose to include an automatic percentage (e.g. 5-10%) of skills development within their technology transfer interventions, whilst others will have separate ERDF Calls for skills, or do both. ESF+ support under 'POEO' 2021-2027 will complement these ERDF interventions by adapting research and tertiary education programmes to the needs of the innovative businesses – with emphasis on high level qualifications particularly in the S3 domains. However, the volume of R&I-relevant ESF+ support for 2021-2027 is substantially reduced, at €33m (based on December 2021 draft POEO), compared to €89.8m ESF under 'POCU' 2014-2020.

Table 19 Romania’s draft Cohesion Policy OPs 2021-2027 with R&I relevant content

Programme / Fund	Relevant Priority	EU Fund Specific Objective	Outline content	Indicative EU allocation (€m)*
<b>OP Smart Growth, Digitalisation and Financial Instruments (OPSGDFI – ‘POCIDIF’) / ERDF</b>  (Draft Dec 2021)	P1 - Supporting and promoting an attractive and competitive R&I ecosystem in Romania	S.O. a (i) Development and growth of research and innovation capacities and adopting advanced technologies	Action 1. Integration of the national R&I ecosystem into the European and International Research Area  Action 2. Creating and encouraging the collaboration of actors in the public and private system in the field of R&I  Action 3. Support for projects in advanced technologies	820
		S.O. a (iv) Developing skills for intelligent specialization, industrial transition and entrepreneurship	Detachments of R&I staff in institutes and universities in enterprises (max. 6 months)  Building competencies for IPR management.  Training for personnel involved in R&I / technology transfer, including maintenance of specialist equipment	50
	P3 - Boosting access to finance for SMEs through the use of Financial Instruments	S.O. a (i) Development and growth of research and innovation capacities and adopting advanced technologies	Venture capital financial instrument combined with grant: accelerators, seed and scale-up – with focus on SME innovation projects contributing to smart economic transformation	100
<b>8 x Regional OPs (ROPs) / ERDF</b>  (Drafts Dec 2021)	<i>Variously named – e.g.</i> P1 - A competitive region through innovation, digitization and dynamic enterprises	S.O. a (i) Development and growth of research and innovation capacities and adopting advanced technologies	<i>Amalgam of 8 ROPs – for illustration only</i>  R&I structures for the benefit of businesses in the regional S3 domains - technology transfer and innovation ecosystem  Accelerating technology transfer between research organizations and businesses  Support for innovation in SMEs / clusters  Support for science and technology parks ( <i>certain regions only</i> )	529
		S.O. a (iv) Developing skills for intelligent specialization, industrial	Amalgam of 8 ROPs – for illustration only  Developing competencies for EDP	42

Programme / Fund	Relevant Priority	EU Fund Specific Objective	Outline content	Indicative EU allocation (€m)*
		transition and entrepreneurship	<p>Training employees of innovation and technology transfer entities</p> <p>Technical skills including for maintenance of equipment</p> <p>Skills useful for creating new value-added products through experimentation</p>	
<p><b>OP Health (OPC – 'POS') / ERDF</b></p> <p>(Draft Dec 2021)</p>	P5 - Innovative approaches in medical research	S.O. a (i) Development and growth of research and innovation capacities and adopting advanced technologies	<p>Innovative approaches in medical research - implementing research solutions with medical applicability</p> <p>Adoption of innovative and advanced medical technologies</p> <p>Research in non-transmissible diseases (e.g. cancer)</p> <p>R&amp;D infrastructure in genomic field</p>	350
<p><b>OP Just Transition (JTOP) / JTF</b></p> <p>(Draft Oct 2021)</p> <p>Geographically targeted</p>	P1 - A just transition through the development of entrepreneurial spirit of SMEs through research and innovation and digitization	S.O. JTF - Allowing regions and people to address the social, economic and environmental impact of the transition to a climate neutral economy	<p>Promoting the transfer of technologies and supporting cooperation between industry and research</p> <p>Creating new businesses, including spin-offs and start-ups</p>	-
<p><b>OP Education and Employment ('POEO') / ESF+</b></p> <p>(Draft Dec 2021)</p>	4 - Increasing quality of education and training to ensure equity of the system and better adapt to dynamics of the labour market and challenges of innovation & technological progress	SO 4.e.6. Development and implementation of university programs, at the request of economic agents, <u>RDI organizations</u> , in order to adapt the offer of universities to the demands of the labour market	<p>Development of applied degrees / professional doctorates, including in S3 domains</p> <p>Interdisciplinary doctoral programs in the relevant fields on the labour market;</p> <p>Doctoral/postdoctoral scholarships in S3 domains</p> <p>Development of open, online courses, e-learning platforms for skills required by the labour market and digitization of blended courses</p> <p>Vocational training / internships for teachers involved in developed courses</p>	33
			<b>Total (without JTF)</b>	<b>1,924</b>

\* 2021-2027 OPs still under negotiation, allocations may be subject to change

**Currently there are no joint R&I interventions between regions foreseen under the ROPs, although a joint initiative is now underway to build broader R&I advisory capacities in all regions.** However, one RDA (Centre) expressed interest in the possibility to support distributed research infrastructure initiatives with other regions in which applications for integrated projects could be made simultaneously to different ROPs. The RDA also keeps open the option of financing interventions, or aspects thereof, outside of the eligible area of its regional programme.

RDA South Muntenia is keen to link with the Bucharest-Ilfov region, which it surrounds, with a view to encouraging research institutes to set up new branches beyond the Ilfov boundary. Some RDAs questioned whether Financial Instruments planned under 'POCIDIF' would be adequate for provision of capital to riskier SME and start-up investments in their regions. Discussions have taken place between West, North West, North East and Centre regions with a view to establishing a joint Financial Instrument to meet this need, but these are understood to only have been exploratory discussions at this stage.

In a broader context, Romania's national RDA Association is just beginning a joint project with OECD in which all RDAs will participate. The project will help the RDAs build their capacities as R&I advisory hubs in a more general sense - not only in terms of supporting future ROP project applications, but also to encourage creative R&I interface with society. West region is planning to build this capacity outside of the RDA itself. The CCSI Vice-President voiced strong support for this initiative, emphasising the largely untapped potential of community participation in innovation, in Romania - particularly harnessing the creativity of young people.

Box 10 Poland: "Regional Research Agendas" - merging regional needs with national R&D potential

Similar to Romania's plans for the 2021-2027 phase, **Poland** has had - for 2014-2020 - a national OP and separate Regional OPs (ROPs), which all contain R&I interventions. During the implementation period, following a review seeking to strengthen R&I potential at regional level, a new Measure entitled "Regional Research Agendas" was introduced under the national Smart Growth OP. Its aim was to encourage companies in regions to partner with R&I actors in other regions, where there was evidence this could significantly improve the quality of R&I results.

R&I interventions in the 2014-2020 national Smart Growth OP and the ROPs have been guided respectively by national and regional level Smart Specialisation Strategies (S3). There has also been a strict demarcation between the two levels, based mainly on S3 domains and size of the project Programme (e.g. over €5m for national level). The new "Regional Research Agendas" measure was designed to align R&I activities in fields determined as regional S3 domains by more than one region. The measure operated using national level criteria and resources from the Smart Growth OP, and the scope of the projects was much broader than usual under the ROPs.

The new measure was implemented via agreements between regional authorities and National Centre for Research and Development (NCBR), which is the Intermediate Body for the national Smart Growth OP. Based on these agreements, a common Steering Committee was established, which defined the following eligible support domains: sustainable energy; transport and mobility; health; bio-economy; environmental technologies; and industry 4.0.

Selection of projects was carried using criteria agreed by the Monitoring Committee of the national Smart Growth OP. Key criteria were experimental research, research excellence and conformity with regional S3 domains.

The central novelty of the Measure was the preference for applications to be made by consortia, with members from different regions, each being led by a research performing organisation (RPO), with the obligatory participation of at least one entrepreneur and a maximum membership of five entities. NCBR prepared a guideline on the required provisions of consortium agreements, covering project management, technology transfer, cash-flows, and monitoring obligations.

Co-financing of the EU grant was covered by the enterprises in each consortium, in line with State Aid rules. The enterprise contributions had to be at least 30% of total eligible project costs. Through this arrangement, public research organisations effectively received 100% EU grant for R&D activities. The measure contained no domestic public co-financing.

Three Calls for proposals were launched (2016-2018). Over 300 applications were submitted and 70 projects were selected, with total value of €70m - consuming the full planned allocation. The mid-term evaluation (2020) shows that most of the projects have been implemented according to schedule. Monitoring in 2021 nevertheless confirmed some delays due to the COVID-19 pandemic.

Overall, the Measure "Regional Research Agendas" enabled financing of projects of better research quality, with broader implementation partnerships than previously possible under the ROPs.

Key success factors:

Opening of traditional regional networks to actors from other regions, bringing new competences and resources to bear, not usually available in the regions individually.

Mixed consortia (RPOs and business actors) with better capacity for successful project implementation.

Cooperation between regional authorities and national coordinator based on detailed description of conditions and competences, to build the level of trust needed at both levels.

### 7.5.2. Synergy between Cohesion Policy OPs and the NRRP

**As with potential synergies between Cohesion Policy OPs, the Romanian authorities have treated the question of synergies between the OPs and NRRP largely as one of demarcation.** The NRRP has a shorter expenditure timescale than the Cohesion Policy 2021-2027 OPs, as well as strict deadlines by which milestones must be reached, for both reforms and investments, in order to trigger the release of payments from the EC. The system is designed to exert pressure on Member States – if just one milestone is missed, payment of an entire national funding tranche can be put in jeopardy.

Synergy can be viewed initially in terms of the NRRP’s four planned Reforms to Romania’s R&I system and the dependence upon their successful implementation of Cohesion Policy and NRRP investments to come slightly later. The four R&I Reforms in the NRRP appear to match closely the mandate of this PSF. Moreover, implementation of a proportion of the PSF recommendations themselves represent an important milestone of the NRRP (see Table 20).

Table 20 Romania National Recovery and Resilience Plan (NRRP) – September 2021 (Calculation PSF panel, preliminary figures)

NRRP Reforms and Investments most relevant for R&I	EU funding allocation (€m)
<b>Reform 2.</b> Streamline governance of research, development and innovation	3.43
<b>Reform 3.</b> Reform of research career	-
<b>Reform 4.</b> Enhanced cooperation between business and research	-
<b>Reform 5.</b> Support to integrate the research, development and innovation organisations in Romania in the European Research Area	-
<b>Investment 5.</b> Establishment and operation of Centres of Competence	25
<b>Investment 6.</b> Development of Horizon Europe mentoring programmes	5
<b>Investment 7.</b> Strengthening excellence and supporting Romania’s participation in partnerships and missions in Horizon Europe	31
<b>Investment 8.</b> Development of a programme to attract highly specialised human resources from abroad in research, development and innovation activities	183
<b>Investment 9.</b> Support for the holders of certificates of excellence received in the Marie Skłodowska Curie Individual Fellowship Award	8
<b>Investment 10.</b> Establishment and financial support of a national network of eight regional career guidance centres as part of the European Research Area Talent Platform	4
<b>Total</b>	<b>259.43</b>

### *7.5.3. Synergy with Horizon Europe*

**In terms of programme content, synergy with Horizon appears strengthened for the 2021-2027 period.** As mentioned in Chapter 6, most of the NRRP investments focus on internationalisation of Romanian research. In particular, NRRP Investment 7 is designed to supporting Romania's participation in partnerships and missions in Horizon Europe. 'POCIDIF' will support synergies with ERA Chairs, Teaming (Widening) actions, participation in ESFRI-ERIC infrastructures and actions of the European Institute of Innovation and Technology (RO-EIT).

'POCIDIF' will also support applicants and potential applicants to Horizon Europe in preparing project proposals, as well as providing on-going assistance to successful Horizon Europe applicants in project implementation. In addition, 'POCIDIF' will finance unsuccessful Horizon Europe projects, which gain a seal of excellence, without further appraisal stages.

### *7.5.4. Monitoring provisions for R&I in Cohesion Policy OPs 2021-2027*

**Romania's 2021-2027 OPs will largely use the EC common indicators for R&I interventions.** The new EC framework is seen as a distinct improvement over that for 2014-2020. The framework for 2021-2027 proposes both common output and result indicators for ERDF, whereas only common ERDF output indicators were previously available. For ESF+ in 2021-2027, the indicator framework is not dissimilar to that for ESF in 2014-2020. Interviewees from 'POCIDIF' and certain RDAs indicated that they may also develop additional specific ERDF indicators for individual Calls, but there is little appetite to do so at OP level.

This is generally in line with customary EC advice to keep things simple and avoid multiplication and possible duplication/overlap of OP indicators. Moreover, the MIPE Evaluation Coordination Unit is pushing forward a drive to harmonise the approach towards indicators across all OPs in all sectors. This includes a requirement for the preparation of comprehensive guidance on the interpretation and use of indicators by OP MAs/IBs to be available from the outset of the implementation phase, in line with the evaluation recommendation above. Using only the EC common indicators will clearly make the production of this guidance a simpler task.

**Nevertheless, certain key data needed for monitoring specific aspects of regional S3 is currently not available at that level.** Beyond the indicators in the planned SNCISI platform for measuring regional S3 contributions to national S3 objectives, most of the RDAs interviewed are looking to make improvements to additional sets of specific indicators for their regional S3. The regional S3 are intended as more fluid documents and are not bound by the same constraints in this respect as the new ROPs. All RDAs interviewed, however, complained that the necessary data for monitoring such regional S3 specificities is not currently available at the regional level.



## 7.6 Coordination and administrative capacity

### 7.6.1. Need for enhanced coordination for 2021-2027

**The multiplication of Romania's OPs featuring R&I interventions for 2021-2027, in addition to the R&I Reforms and Investments foreseen under the NRRP, bring significantly increased needs for coordination.**

Compared to the 2014-2020 phase, where R&I interventions featured essentially in two ERDF OPs (OPC and ROP), parts of one ESF OP (OPHC), plus certain EAFRD measures of the NRDP, the 2021-2027 generation will see many more programmes with R&I interventions.

Twelve Cohesion Policy OPs for 2021-2027 fall into this category - 'POCIDIF', the eight separate ROPs, the new Health OP 'POS', the ESF+ OP Education and Employment ('POEO') and to some degree the Just Transition OP (JTOP) - in addition to the R&I Reforms and Investments of the NRRP. The multiplication of R&I-relevant OPs, plus the NRRP, brings a clear need for substantially enhanced coordination, to maximise implementation efficiency and the collective value of R&I results.

The stronger regional dimension for 2021-2027, with eight individual regional level MAs, presents a particular coordination challenge. Previously, this was handled by the national MA ROP in the Ministry of Development Public Works and Administration (MDPWA). For 2021-2027, the EAFRD leaves the Cohesion Policy framework at EU level, but R&I in the context of rural development will still be important for Romania in the context of a future NRDP.

**The question of coordination of R&I interventions across 2021-2027 Cohesion Policy OPs and NRRP cannot be divorced from plans for enhanced coordination of the R&I sector generally.** Specifically for R&I coordination, during negotiations on the NRRP, the EC pushed for a single structure to rationalise the existing wide variety of advisory bodies and other committees. This now translates into NRRP Reform 2's Milestone 2 (Sequential No. 273) '*Entry into force of a Government Ordinance establishing a single body that encompasses the existing councils, ensures inter-ministerial coordination and reaches out to the private sector established and operational*'. It is also visible in the Governance section of the new SNCISI.

These two documents state that the new coordination structure is to be headed by MCID. However, given the crucial need for better coordination of R&I across Cohesion Policy OPs and NRRP, it would seem that MIPE should also have a leading role. The recent World Bank Assessment of Romania's M&E system for Cohesion Policy (World Bank 2021) notes that coordination across OPs by MIPE has been strongest during programming process, but seems less effective during implementation phases, with particular regard to monitoring. Establishment of the new R&I coordination structure presents an important opportunity to achieve the dual objective of better coordination of the sector and of its related EU-funded interventions.

**CCSI could have a stronger role in S3 implementation under the 2021-2027 programmes, as part of the overarching coordination structure.**

CCSI was set up primarily in the context of meeting part of the Enabling Condition for EU Cohesion Policy's PO1 for 2021-2027. Its value in bringing together national Ministries and RDAs, and reconciling national and regional S3 approaches, has been broadly appreciated.

Currently CCSI exists for mainly for programming purposes, as outlined in the SNCISI. It is not clear what its role will be once the new OPs have been approved. However, it does appear a positive element, which could be built upon to help guide the implementation phase – possibly including identification of synergies to be exploited through cross-OP action.

In the last CCSI meeting, for example, UEFISCDI offered help to the RDAs with certain implementation aspects (Call design, project selection, access to expert database etc.), which was apparently well received. Persons interviewed from national Ministries described CCSI largely as a validation committee at present, without the proactivity or power needed to contribute to implementation. The CCSI Vice President highlighted that the executive structure for the CCSI, foreseen in the MCID organisation chart as part of the Directorate for Technology Transfer and Smart Specialisation, has not yet been activated. This executive structure, it was said, would be vital if CCSI were to assume more of an implementation role.

*7.6.2. Administrative capacity at national and regional levels*

**National level R&I administrative capacity appears improved for 'POCIDIF', but lacking for the new Health OP, whilst in the regions there is wide variation between the RDAs.** The 'POCIDIF' IB has a permanent staff of 61 persons and also has the flexibility to be able to draw upon a pool of 40 external persons, via temporary contracts, when needed. The Ministry of Health has little implementation capacity and will need to rely heavily on MIPE. Most RDAs have a total staff of 140-150 persons, with the smaller Bucharest-Ilfov RDA has a staff of 98.

Implementing R&I interventions, however, is not the main business of the RDAs and their specific R&I capacities vary considerably. RDA North East, for example, has a dedicated R&I structure of ten persons. Most RDAs can identify four to five persons who work specifically on R&I interventions for most of their time - the weaker RDAs only one or two – although R&I interventions are also handled by horizontal units in the RDAs, along with interventions in other sectors. In addition, the RDAs are able to mobilise external expertise when needed.

**Administrative capacity development for management of R&I interventions will be integrated into the different relevant OPs for 2021-2027.** Due to regulatory changes at EU level for 2021-2027, there will no longer be stand-alone Administrative Capacity OPs, of the kind Romania benefitted from in the 2007-2013 and 2014-2020 phases. Many key actions for the R&I sector,

mentioned in this report with the code 'SIPOCA', were financed under an Administrative Capacity OP, as will the development of the new SNCISI monitoring platform.

Instead, for 2021-2027, capacity building actions for R&I are supposed to be integrated into the relevant OP measures. For 'POCIDIF' and the Health OP, where the MA is MIPE, there is no dedicated Technical Assistance budget. These OPs will need to access additional support needed from the Technical Assistance OP for 2021-2027, which is also to be managed by MIPE. RDA Bucharest-Ilfov is likely to be in a similar position as its Technical Assistance budget is restricted by the relatively small size of its new ROP allocation. This more fragmented approach to capacity building is likely to engender its own needs for enhanced coordination, particularly between national and regional levels.

### *7.7 Administrative burden for applicants and Beneficiaries*

**The heavy administrative burden associated with applying for and using Cohesion Policy funds for R&I in Romania was frequently highlighted by past applicants and Beneficiaries interviewed during the PSF exercise.**

This was a common criticism made by persons interviewed from research institutes, universities and private companies. It related mainly to application and project monitoring and reporting processes under the 2014-2020 programmes OPC, ROP and OPHC and the operation of the MySMIS system in particular. The administrative burden was said to be exacerbated by the complexities specific to of R&I intervention types.

This anecdotal evidence matches findings of the World Bank assessment of Romanian's monitoring and evaluation system across all OPs (World Bank 2021). Past Beneficiary interviewees contrasted their experience with project management under Cohesion Policy OPs unfavourably with that under Horizon 2020 and EEA/Norway Grants.

**Certain improvements in administrative burden for applicants and Beneficiaries are foreseen under 2021-2027 OPs.**

It is understood from the interviews with MIPE, that work is underway to enhance the user-friendliness of SMIS/MySMIS generally for 2021-2027. Greater interoperability with national registers, for example, should enable increased automation for users in application and reporting processes in all fields, not only R&I. 'POCIDIF' and the eight ROPs contain new provisions to help fund with project preparation.

Most of the RDAs stated that they intended to move towards more of a two-stage project application process for R&I in which key appraisal steps could be completed prior to full application. RDA North East mentioned an intention to provide technical assistance type support to project implementation by certain R&I delivery structures. Some limited experience was gained during the 2014-2020 phase with Simplified Cost Options (SCOs). OPC, for example, used flat rates for indirect project costs in the R&I field and the approach is said to be likely to continue under 'POCIDIF' and the new ROPs.

**The introduction of simplifications for Romanian R&I applicants and Beneficiaries, for the 2021-2027 Cohesion Policy phase, looks likely to be incremental rather than radical.** The overall impression gained is that although undoubted simplifications are on the way for 2021-2027 OPs, they are unlikely to be ground-breaking in the early implementation stages. RDA West was the only RDA to express an intention to introduce a radical root-and-branch simplification of reporting procedures for beneficiaries, to be facilitated largely by increased digitalisation. Others were more cautious, suggesting first waiting for central horizontal guidance on simplification before moving forward, including the new developments of SMIS/MySMIS to be fully implemented. RDA South Muntenia pointed to the lack of historical cost data for R&I interventions to help establish new SCOs, because of their slow implementation under the ROP 2014-2020, saying they were hopeful of receiving help from MCID in this regard.

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**Overall – in the transition between 2014-2020 and 2021-2027 EU Cohesion Policy phases – the Romanian authorities have planned a number of creditable steps to help bring about a positive evolution in R&I performance.** These notably include a better linked national-regional S3 approach, certain crucial reforms to the R&I system foreseen in the NRRP as a precursor to key investments, OPs more closely aligned to R&I needs, a dedicated monitoring platform for SNCISI and enhanced IT systems, as well as promised reductions in administrative burden for applicants and Beneficiaries. The challenge for 2021-2027 will be to ensure that what is established on paper now is actually implemented in practice.

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# ANNEX 1: LIST OF MEETINGS AND INTERVIEWS

## First mission: 27 to 29 September 2021

Time (EEST)	<b>Monday, 27th September</b> <b>Venue: Ministry of Research, Innovation and Digitalization, Mendeleev Street nr. 21-25</b> <b>Room 301 – 3rd floor</b>
09:00 – 10:45	<b>Panel Discussion with Representatives of the Ministry of National Education and Research (Secretaries of State and Chiefs of various Departments)</b> <ol style="list-style-type: none"> <li>1. <b>Mr. Iulian Popescu</b> (Secretary of State, Ministry of Research, Innovation and Digitalization)</li> <li>2. <b>Mr. Valentin Popescu</b> (General Director of General Directorate for Strategic Management and Public Policies- Ministry of Education)</li> <li>3. <b>Mrs. Eugenia Jianu</b> (Counselor of Public Policy Unit -Ministry of Education)</li> <li>4. <b>Mrs. Octaviana Marincaș</b> (General Director, Research, Innovation and Digitalization Policies and Strategies Directorate, Ministry of Research, Innovation and Digitalization)</li> <li>5. <b>Mrs. Letiția Pavelescu</b> (Head of Sector, European Partnerships and International Relations Directorate, Ministry of Research, Innovation and Digitalization)</li> <li>6. <b>Mrs. Mihaela Guda</b> (Head of Sector, Institutional Management Directorate, Ministry of Research, Innovation and Digitalization)</li> <li>7. <b>Mrs. Lucia Popescu</b> (Head of Sector, Strategic Research Agenda Directorate, Ministry of Research, Innovation and Digitalization)</li> <li>8. <b>Mrs. Oana Craioveanu</b> (Innovation Advisor, Ministry of Research, Innovation and Digitalization)</li> <li>9. <b>Mrs. Ioana Ispas</b> (Head of PSF Unit, Ministry of Research, Innovation and Digitalization)</li> </ol>
10:45-11:00	<b>Coffee Break</b>
11:00-13:00 <i>hybrid meeting</i>	<b>Panel Discussion with Secretaries of State and Chiefs of Departments with an important role in various domains of research: Economy, Finance, Health, Agriculture, Environment, Defence, Internal Affairs, The General Secretariat of the Government</b> <ol style="list-style-type: none"> <li>1. <b>Mr. Bogdan Ghelbure</b> (Deputy General Secretary of the General Secretariat of the Government)</li> <li>2. <b>Mr. Aurel Simion</b> (Secretary of State in the Ministry of Agriculture and Rural Development)</li> <li>3. <b>Mr. Popescu George Stelian</b> (Subinspector of police representant of Ministry of Internal Affairs)</li> <li>4. <b>Dr. Andrei Luca</b> (Counsellor for European Affairs, Ministry of Health)</li> <li>5. <b>Mrs. Stefania Deak</b> (Sustainable Development from the General Secretariat of the Government)</li> </ol>
13:00-14:00	<b>Lunch break</b>
14:00-15:00	Discussions with <b>Mrs. Ligia Deca</b> (Presidential Counsellor, National Education and Research Direction, Presidential Administration) and <b>Prof. Dr. Sorin Costreie</b> (State Counsellor, Office of the Prime Minister)
15:00- 16:00	<b>Panel Discussions with the Representatives of Research Funding Agencies:</b> <ol style="list-style-type: none"> <li>1. <b>Prof. Dr. Adrian Curaj</b> (General Director, Executive Unit for Financing Higher Education, Research, Development and Innovation – UEFISCDI)</li> <li>2. <b>Dr. Florin Buzatu</b> (Director, Institute of Atomic Physics – IFA)</li> <li>3. <b>Mr. Ion Nedelcu</b> (Romanian Space Agency – ROSA)</li> </ol>
16:00-16:15	Coffee break



<p>16:15-17:15</p> <p><i>hybrid meetings</i></p> <p>Session 2: Room 619-6th floor</p>	<p><b>Parallel sessions</b></p> <p><b>Session 1:</b></p> <p><b>Panel Discussion with Representatives of the Ministry of Investment and European Projects, the Ministry of Development, Public Works and Administration, Regional Development Agencies and Intermediate Bodies:</b></p> <ol style="list-style-type: none"> <li>1. <b>Mrs. Carmen Dobrotă</b> (General Director, Intermediate Research Body, Ministry of Research, Innovation and Digitalization)</li> <li>2. <b>Mrs. Gabriela Macovei</b> (North-East Regional Development Agency)</li> <li>3. <b>Mr. Ovidiu Vladoi</b> (Public manager within the General Directorate for European Programs Administrative Capacity, AM POCA)</li> <li>4. <b>Mr. George Cărpuşor</b> (Public Manager at the Ministry of European Funds, General Directorate for European Competitiveness Programs)</li> <li>5. <b>Mrs. Ancuța Popa</b> (Senior Public Manager at European Competitiveness Programs, Managing Authority Operational Program Competitiveness AM POC)</li> </ol> <p><b>Session 2.</b></p> <p><b>Panel Discussion with Innovation Intermediates</b></p> <ol style="list-style-type: none"> <li>1. <b>Mr. Daniel Coşniță</b> (CLUSTERO)</li> <li>2. <b>Mr. Răzvan Rughiniș</b> (Innovation Lab)</li> <li>3. <b>Mr. Mădălin Ioniță</b> (Măgurele Science and Technology Park)</li> <li>4. <b>Mrs. Octavia Căruntu</b> (INCDMTM)</li> <li>5. <b>Mrs. Adela Bara</b> (ICPE-CA)</li> <li>6. <b>Mrs. Gabriela Coman</b> (Technopolis Park in Iasi)</li> <li>7. <b>Mr. Marian Ilie</b> (INCDMTM)</li> <li>8. <b>Mr. Sergiu Nicolae</b> (ICPE-CA)</li> </ol>
<p>17:15-18:00</p>	<p><b>Panel Discussion with the Representatives of the Agricultural and Silvical Sciences Academy and of the Agricultural Research Stations</b></p> <ol style="list-style-type: none"> <li>1. <b>Mr. Aurel Badiu</b> (Agricultural and Forestry Sciences Academy - ASAS)</li> <li>2. <b>Mrs. Elena Brândușa</b> (INCD ECOIND Valea Călugărească)</li> <li>3. <b>Mr. Dinu Gavojdian</b> (Research and Development Institute for the Breeding of Cattle Balotesti)</li> </ol>
<p><b>Time (EEST)</b></p>	<p><b>Tuesday, 28th September</b>  <b>Venue: Ministry of Research, Innovation and Digitalization, Mendeleev Street nr. 21-25</b>  <b>Room 301 – 3rd floor</b></p>
<p>09:00-10:00</p>	<p><b>Panel Discussions with Representatives of Medical Sciences Academies and Institutes</b></p> <ol style="list-style-type: none"> <li>1. <b>Prof. Dr. Andrei Luca</b> (Counsellor for European Affairs, Ministry of Health)</li> <li>2. <b>Prof. Dr. Mihail-Eugen Hinescu</b> (National Institute of Pathology Victor Babeș)</li> </ol>
<p>10:00-11:15</p> <p><i>hybrid meeting</i></p>	<p><b>Panel Discussions with the Representatives of National Institutes for Research and Development</b></p> <ol style="list-style-type: none"> <li>1. <b>Dr. Mihaela Doni</b> (Senior Scientist, ICECHIM Institute)</li> <li>2. <b>Dr. Florin Oancea</b> (General Director, National Institute Cantacuzino)</li> <li>3. <b>Dr. Carmen Moldovan</b> (Representative, National Institute for Research &amp; Development in Microtechnology – IMT)</li> <li>4. <b>Dr. Mihai Radu</b> (Horia Hulubei National Institute for Physics and Nuclear Engineering)</li> <li>5. <b>Dr. Adrian Stănică</b> (General Director, National Institute Geoecomar)</li> <li>6. <b>Dr. Ionuț Enculescu</b> (General Director, National Institute for Research &amp; Development in Materials Physics)</li> <li>7. <b>Prof. Dr. Nastasia Belc</b> (General Director, National Institute for Research &amp; Development for Alimentary Bioresources)</li> <li>8. <b>Prof. Dr. Mihaela Păun</b> (General Director, National Institute for Research &amp; Development for Biological Sciences)</li> <li>9. <b>Dr. Ing. Doru Darabont</b> (General Director, National Institute for Research &amp; Development for Labor Protection)</li> </ol>

11:15-11:30	<b>Coffee break</b>
11:30-12:45	<p><b>Discussion with universities with performance in the field of research</b></p> <ol style="list-style-type: none"> <li>1. <b>Prof. Dr. Monica Szeles</b> (The National Council of Rectors)</li> <li>2. <b>Prof. Dr. Maria Carmen Loghin</b> (Gheroghe Asachi Technical University of Iași)</li> <li>3. <b>Prof. Dr. Simona Ruță</b> (Carol Davila University of Medical Studies and Pharmacy of Bucharest)</li> <li>4. <b>Prof. Dr. Florin Oniga</b> (Technical University of Cluj-Napoca)</li> <li>5. <b>Prof. Dr. Alin Sava</b> (West University of Timișoara)</li> <li>6. <b>Prof. Dr. Sorin Costreie</b> (University of Bucharest)</li> <li>7. <b>Prof. Dr. Adrian-Olimpiu Petrușel</b> (Babes-Bolyai University Cluj-Napoca)</li> </ol>
12:45-14:00	<b>Lunch break</b>
14:00-16:00 <i>hybrid meeting</i>	<p><b>Parallel sessions</b></p> <p><b>Session 1:</b></p> <p><b>Discussions with personalities in the field of research, winners of ERC grants, and young researchers, Ph.D. students (industrial PhDs), foreign researchers, MSCA holders, some beneficiaries of H2020 and full members of the Romanian Academy</b></p> <ol style="list-style-type: none"> <li>1. <b>Prof. Dr. Acad. Nicolae Zamfir</b></li> <li>2. <b>Prof. Dr. Acad. Bogdan Simionescu</b> (On-line)</li> <li>3. <b>Prof. Dr. Acad. Nicolae Panin</b></li> <li>4. <b>Dr. Ioana Feodorov</b> (Institute of South-Eastern Studies)</li> <li>5. <b>Dr. Andrei Dan Terian</b> (Lucian Blaga University of Sibiu)</li> <li>6. <b>Dr. Alexandra Baneu</b> (Babes-Bolyai University of Cluj-Napoca)</li> </ol> <p><b>Session 2:</b></p> <p><b>Discussions with personalities in the field of research, winners of ERC grants, and young researchers, Ph.D. students (industrial PhDs), foreign researchers, MSCA holders, some beneficiaries of H2020 and full members of the Romanian Academy</b></p> <ol style="list-style-type: none"> <li>1. <b>Prof. Dr. ing Cristina Isabela Stancu</b> (Politehnica University of Bucharest)</li> <li>2. <b>Dr. Alina Mihaela Bădescu</b> (Politehnica University of Bucharest)</li> <li>3. <b>Conf. Dr. Costin Raiciu</b> (Politehnica University of Bucharest)</li> <li>4. <b>Dr. Ionuț Epurescu-Pascovici</b> (University of Bucharest)</li> </ol>
Room 619-6th floor	
16:00-18:00	<p><b>Discussion with the Romanian Academy and its institutes</b></p> <ol style="list-style-type: none"> <li>1. <b>Prof. Dr. Acad. Ileana Mânduțean</b> (Nicolae Simionescu Institute of Cell Biology and Pathology)</li> <li>2. <b>Prof. Dr. Acad. Valeria Harabagiu</b> (Petru Poni Institute of Macromolecular Chemistry)</li> <li>3. <b>Prof. Dr. Acad. Stefana Petrescu</b> (Institute of Biochemistry)</li> </ol>

<b>Time (EEST)</b>	<b>Wednesday, 29th September</b>
10:00-12:00 Parliament of Romania, Izvor Street 2-4, Bucharest	<b>Meeting with the members of the reunited commissions on science and education (Senate and Chamber of Deputies) of the Parliament</b>
12:00-14:00	<b>Lunch break</b>
14:00-15:00 Ministry of Research, Innovation and Digitalisation, Bucharest, room 301- 3rd floor	<b>Discussions with the members of The NCP network</b> <ol style="list-style-type: none"> <li>1. <b>Mrs. Iulia Mihail</b>, NCP coordinator, CEO of ROST</li> <li>2. <b>Mrs. Letitia Pavelescu</b>, NCP coordinator</li> <li>3. <b>Mrs. Corina Abraham Barna</b>, NCP Marie Skłodowska-Curie Actions</li> <li>4. <b>Mrs. Laura Urdeş</b>, NCP Marie Skłodowska-Curie Actions</li> <li>5. <b>Mrs. Andreea Fazakas</b> (IFA)</li> </ol>
15:00-16:00 Room 301- 3rd floor <i>online zoom meeting</i>	<b>Discussions with private partners with high investments in RDI ,</b> <ol style="list-style-type: none"> <li>1. <b>Mr. Boicea Nicolae</b> (Manager of the Research and Innovation Department, Renault)</li> <li>2. <b>Mr. Ionuț Muntean</b> (Project Manager at the Engineering Center, Bosch)</li> <li>3. <b>Mr. Vlad Vinatu</b> (Public Private Partnerships - Public Funded Projects Coordinator at Continental)</li> </ol>
16:00-16:30 Room 301- 3rd floor	<b>Discussions with Prof. Dr. Mariana Chioncel, University of Bucharest, author of the last RIO report in Romania and of the 2020 analysis of obstacles to innovation diffusion</b>
16:30-17:00 Room 301 – 3rd floor	<b>Discussion with experts regarding the favourable condition - strategy, barriers in the way of diffusion of innovation</b> <ol style="list-style-type: none"> <li>1. <b>Mr. Ionel Andrei</b> (IFIN-HH) Mr. Ionel Andrei (SIPOCA 592 expert)</li> <li>2. <b>Mr. Alexandru Corlan</b> (SIPOCA 592 expert)</li> </ol>

## Second mission: 13 to 15 December 2021

<b>Monday, 13th December</b>			
<b>Venue: Ministry of Research, Innovation and Digitalisation, Mendeleev Street nr. 21-25</b>			
09:00-10:30	<u>Responsible for the National R&amp;D&amp;I Strategy (SNCDI and SNCISI) / Coordinator for stakeholder participation</u> <b>1) LUCIAN VERESCIAGHIN, Director MCID (Directorate-General for R&amp;D and Digitalisation Policies and Strategies)</b> <b>2) VIOREL VULTURESCU, Director MCID (European and International Partnerships Directorate)</b> <b>Room 301 – 3<sup>rd</sup> floor</b>		
10:30-11:30	<u>PSF Unit Head</u> <b>ANTONIO RADOI, Director MCID (UIR PSF)</b>  <b>Room 619 A - 6<sup>th</sup> floor</b>	<u>MCID</u> <b>1) IULIAN VASILE POPESCU, State Secretary</b> <b>2) OANA CRAIOVEANU, Minister Adviser</b> <b>Room 301 – 3<sup>rd</sup> floor</b>	
11:30-11:45	<i>Coffee time</i>		
11:45-13:00	<u>Responsible for INCD</u> <b>1) SILVIA GERGELY (Institutional Management Directorate)</b> <b>2) VIOREL MILEA (Institutional Management Directorate)</b> <b>Room 619 A - 6<sup>th</sup> floor</b>	<u>Responsible for infrastructures IOSIN</u> <b>1) CAMELIA MARINESCU (Institutional Management Directorate)</b> <b>2) CORINA MUSAT (Institutional Management Directorate).</b> <b>Room 619 B - 6<sup>th</sup> floor</b>	
13:00-14:00	<i>Lunch time</i>		
14:00-16:30	<u>U.E.F.I.S.C.D.I.</u> <b>1) ADRIAN CURAJ - Director</b>  <b>Room 619 A - 6<sup>th</sup> floor</b>	<u>U.E.F.I.S.C.D.I.</u> <b>1) MAGDA RESIGA - Deputy General Manager</b> <b>2) NICOLETA DUMITRACHE - Head of service</b> <b>3) RADU GHEORGHIU - expert</b> <b>4) OCTAVIAN BUIU - expert</b> <b>5) MARIUS MITROI – expert</b>  <b>Room 619 B - 6<sup>th</sup> floor</b>	
16:30-16:45	<i>Coffee time</i>		
16:45-18:00	<u>Responsible for NUCLEU</u> <b>1) LUCIA POPESCU, Director MCID (Directorate - Funding for Strategic Research Agendas)</b> <b>Room 301 – 3<sup>rd</sup> floor</b>	<u>Responsible for public-private partnerships</u> <b>1) CARMEN DOBROTA, Director MCID (Directorate-General Intermediate Body for Research)</b> <b>2) ANTONIO RADOI, Director MCID ( UIR PSF)</b> <b>Room 619 A- 6<sup>th</sup> floor</b>	<u>Top 2 INCDs</u> <b>1) NAE CATALIN, National Institute for Aerospace Research "Elie Carafoli" – INCAS, Director INCAS</b> <b>2) NICOLAE MARGINEAN, Horia Hulubei National Institute for R&amp;D in Physics and Nuclear Engineering, Director IFIN-HH</b> <b>Room 619 B- 6<sup>th</sup> floor</b>
<b>Tuesday, 14th December</b>			
<b>Venue: Ministry of Research, Innovation and Digitalisation, Mendeleev Street nr. 21-25</b>			
09:30-11:00	<b>1) LIGIA DECA - Advisor to President, Presidential Administration</b> <b>2) SORIN COSTREIE - Advisor to Prime Minister, Romanian Government</b> <b>Room 301 – 3<sup>rd</sup> floor</b>		
11:00-11:15	<i>Coffee time</i>		
11:15-13:30	<u>M.E.</u> <b>ALIN SAVA - Department in charge of doctoral studies organisation</b> <b>RODICA STANCU - Responsible for the 2030 vision and action plan "Educated Romania"</b>	<u>M.E.</u> Department in charge of research and technology transfer at universities Department in charge of internationalisation of universities <b>Room 619 - 6<sup>th</sup> floor</b>	<u>C.C.S.I.</u> <b>VASILE ASANDEI – CCSI Vice-president (on-line)</b>  <b>Room 301 – 3<sup>rd</sup> floor</b>

13:30-14:30	<i>Lunch time</i>		
14:30-16:30	<u>Head of TTO</u> a) USAMV Cluj <b>1) DAN CRISTIAN VODNAR Vice-rector, Research / TTO</b> <b>2) SANDA ANDREI Vice-dean, Research</b>  b) UBB Cluj <b>GABRIELA IUDITA CRISAN – Director TTO</b> c) AR <b>VLAD SOCOLIUC</b> d) INCAS <b>IONUT BRINZA – Director, TTO and Innovation</b> e) IFIN_HH <b>MARIUS JURCA - TTO &amp; Innovation expert</b> <b>Room 619 A - 6<sup>th</sup> floor</b>	<u>Head of finance administration</u> <b>DIANA CODRUTA MURESAN</b>  <b>ALEXANDRU MARIN</b> d) INCAS <b>ALEXANDRU MARIN – Director, Financial Dept. &amp; HR</b> e) IFIN_HH <b>ALEXANDRU POPESCU - Director, Economics</b>  <b>Room 619 B - 6<sup>th</sup> floor</b>	<u>Head of HR</u> a) USAMV Cluj <b>1) ANDREA BUNEA - Vice-rector, Quality Ensurance</b> <b>2) ADELA PINTEA - Director, Center for Doctoral Studies</b> b) UBB Cluj <b>1) MIRCEA RAȚIU - Director, HR</b> <b>2) ZOLTAN NEDA - Head of the Doctoral Studies Institute</b> c) AR  <b>RALUCA OANA ANDONE</b>  <b>Room 301 – 3<sup>rd</sup> floor</b>
16:30-16:45	<i>Coffee time</i>		
16:45-18:00	<u>Advisory bodies</u> <b>1) RUTA SIMONA, CCCDI president</b> <b>2) MIHAELA FLOREA, CNCS - member</b> <b>3) RALUCA-OANA ANDONE, CNECSDTI - member</b>  <b>Room 619 A- 6<sup>th</sup> floor</b>	<u>Advisory bodies</u> <b>1) ANDREI IONEL, CRIC president</b>  <b>Room 619 B - 6<sup>th</sup> floor</b>	<u>PhD students</u> <b>1) PAUL ANDREI UNGUR - USAVM Cluj</b> <b>2) PATRICIA ANDREEA LIA MUNTEAN - USAVM Cluj</b> <b>3) MARIA HUDREA - UBB Cluj</b> <b>4) DIANA FELICIA BOGDAN – UBB Cluj</b> <b>5) RARES PETRU MIHALACHE – AR</b> <b>6) LIA CUCOS – AR</b> <b>Room 301 – 3<sup>rd</sup> floor</b>
<b>Wednesday, 15th December</b>			
<b>Venue: Ministry of Research, Innovation and Digitalisation, Mendeleev Street nr. 21-25 and site visits</b>			
9:00-10:30	<u>Universities, Full professors / Senior researchers</u> <b>1) DANIEL DAVID, Rector, UBB Cluj (on line)</b> <b>2) BALINT MARKO, Vice-Rector, competitiveness, UBB Cluj (on line)</b> <b>3) CHRISTIAN SACAREA, Vice-Rector, socio-economic, UBB Cluj (on line)</b> <b>4) ALEXANDRA MUȚIU, Vice-Rector, HR, UBB Cluj (on line)</b> <b>5) ANDREI MIHALCA, Vice-Rector, International relationships, USAVM Cluj</b> <b>Room 619 A - 6<sup>th</sup> floor</b>	<u>Innovative clusters &amp; Innovative start-ups/SMEs, including research-based start-ups and domestic corporations active in RDI</u> <b>1) IOAN DEAC –Director Compa SA-Sibiu, <a href="https://compa.ro/">https://compa.ro/</a> (on line)</b> <b>2) ALEXANDRU IOVANOVICI – Manager</b> <b>Airview SRL-Timisoara - <a href="https://www.airview.ro/">https://www.airview.ro/</a> (on line)</b> <b>3) GÜNTER KRASSER - Infineon Romania: - Vice President &amp; Managing Director</b> <b>Infineon Technologies Romania &amp; CO SCS, <a href="http://www.infineon.com">http://www.infineon.com</a></b> <b>Room 619 B - 6<sup>th</sup> floor</b>	<u>Ministry of Finance - Responsible budget office</u> <b>1) LILIANA MICU, Counsellor (on line)</b> <b>2) RALUCA MANASTIREANU, Counsellor (on line)</b> <b>3) GHEORGHITA TOMA Counsellor on line</b>  <b>Room 301 – 3<sup>rd</sup> floor</b>

11:00-12:15	<b>Institute of Biochemistry, Romanian Academy – site visit</b>
12:15-13:15	<b>National Institute of Research and Development for Biological Sciences – site visit</b>
13:15-13:30	<i>Snap/Bait</i>
13:45-15:45	<b>University POLITEHNICA of Bucharest - site visit</b>
16:10-16:45	<i>Lunch</i>
16:45-18:00	<p>Responsible for large research infrastructure</p> <p>a) Danubius RI</p> <ol style="list-style-type: none"> <li>1) <b>ADRIAN STĂNICĂ, Director GEOECOMAR</b></li> <li>2) <b>MIHAELA PĂUN, Director INCDSB</b></li> <li>3) <b>NICOLAE PANIN, Romanian Academy</b></li> <li>4) <b>MANUELA SIDOROFF, INCDSB</b></li> </ol> <p>b) Interdisciplinary Innovation Center of Photonics and Plasma for Echo-Nano Technologies and Advanced Materials – IN2-FOTOPLASMAT</p> <ol style="list-style-type: none"> <li>1) <b>TRAIAN DASCĂLU – Director IN2-FOTOPLASMAT</b></li> <li>2) <b>CRISTIAN MIHĂILESCU - Director INFPLR</b></li> </ol> <p>c) „Petru Poni” Institute of Macromolecular Chemistry – Interdisciplinary pole of intelligent specialization through research, innovation and technological transfer in bio (nano) polymeric materials and (eco) technologies (InoMatPol)</p> <p><b>VALERIA HARABAGIU – Director “Petru Poni” Institute</b>  <b>Room 301 – 3<sup>rd</sup> floor</b></p>

## Additional virtual meetings and contacts October 2021 – February 2022

Date	Interviewee (virtual)	PSF Panel Member
27.10.21	Carmen Dobrota Ministry of Research Development and Innovation (Intermediate Body OPSGDFI ('POCIDIF')) <i>Plus subsequent written exchanges</i>	Richard Harding
27.10.21	Claudia Magdalena Central Evaluation Unit - Ministry of Investments and European Projects (MIPE)	Richard Harding
28.10.21	Radu Luca and Corina Crăcană Ministry of External Affairs (MAE) -Directorate for European Semester	Richard Harding
02.11.21	Madalina Istrate Ministry of Development Public Works and Administration (MDPWA)  <i>Plus subsequent written exchanges</i>	Richard Harding
02.11.21	Dan Nicula RDA Bucharest-Ilfov	Richard Harding
04.11.21	Iva Maric European Commission DG Regio	Richard Harding
15.11.21	Mirela Dobre Ministry of Investments and European Projects (MIPE) - Coordination of OPs covering R&I sector	Richard Harding
16.11.21	Gabriela Macoveiu RDA North East	Richard Harding
16.11.21	Iulia Mihail Romanian Ministry of Research and Digitalisation (MCID), Romanian ESFRI Forum delegate	Ondřej Hradil
17.11.21	Marilena Alecu and Magda Lungu RDA South West	Richard Harding
17.11.21	Carmen Antonie and Bogdana Toader General Directorate for NRRP - Ministry of Investments and European Projects (MIPE)	Richard Harding
18.11.21	Ioan Levitchi RDA Centre	Richard Harding
26.11.21	Gilda Niculescu and Stefan Oachesu RDA South	Richard Harding Domagoj Račić
30.11.21	Cristian Otgon RDA North West	Richard Harding Domagoj Račić
02.12.21	Diana Gradea RDA South East	Richard Harding Domagoj Račić
02.12.21	Sorin Maxim and Adrian Mariciuc RDA West	Richard Harding Domagoj Račić
9.12.21	Roman Hvězda ELI Beamlines	Ondřej Hradil
10.12.21	Andrei Avram IMT Bucharest - National Institute for Research and Development in Microtechnologies	Ondřej Hradil
06.01.22	Iulia Mihail Romanian Ministry of Research and Digitalisation (MCID), Director Romanian Office for Science & Technology to the EU	Claire Nauwelaers

	<b>Email exchanges</b>	
December 2021 – February 2022	Roxana Matei and Antonio Radoi Romanian Ministry of Research and Digitalisation (MCID), PSF Unit	Claire Nauwelaers
January-February 2022	Monica Alexandru, Viorel Vulturescu Ministry of Research, Innovation and Digitalization, (MCID), Unit for European and International Partnerships	Claire Nauwelaers
January-February 2022	Irina Nichifor, Alina Mirea Ministry of Investments and European Projects (MIPE) – Coordination ESF / ESF+	Richard Harding
January-February 2022	Ministry of Agriculture and Rural Development (MARD), Managing Authority NRDP	Richard Harding
January-February 2022	Mihaela MANOLE UEFISCDI	Claire Nauwelaers
February 2022	Ministry of Investments and European Projects (MIPE) – Managing Authority 'POCU'	Richard Harding



## **ANNEX 2: THE LANDSCAPE OF HIGHER EDUCATION**

### **INSTITUTIONS AND PUBLIC RESEARCH**

#### **ORGANISATIONS**

**There are four main categories of institutions that make up Romania's R&D system:** (i) Accredited higher education institutions; (ii) National R&D institutes (INCDs); (iii) Institutes, centres or research units of the Romanian Academy; and (iv) The branch academies. In addition, a fifth category of research units of highly uneven character exists: (v) R&D institutes or centres organised within the national societies, national companies or independent facilities of national interest.

**Universities, Research, and Academy Institutes are governed under separate rules and regulations.** It is common in other countries that each unit develops its own individual strategy for R&D, either as stand-alone documents or as part of other strategic documents for the institution (e.g. University Charter, Rector's management plan, HEI strategic plan etc.). However, in most HEIs, the strategies are not accompanied by planning documents and budgetary projections.

#### *Universities and Higher Education Institutions*

**The Romanian higher education sector** in 2020 comprised 55 public higher education institutions (407 faculties) and 35 private higher education institutions (139 faculties). About a third of the faculties are located in the capital region, Bucharest-Ilfov. These institutions cover all fields of science. Higher education is offered from universities, academies of studies, institutes, post-university study institutions whose mission is education and research or only education. Law 1/2011 refers to three categories of universities: education-focused universities, education and scientific research universities (or education and arts universities) and advanced research and education universities. Only 12 HEIs were included in the category of advanced research and education universities following the classification exercise in 2011-2012 (ME 2020).

**Universities and other higher education institutions are autonomous by law.** Higher Education Institutions are governed within a framework of autonomy and have the right to implement their own development policies and to manage the funds from the state budget and other sources according to the provisions of the law and personal accountability. Starting with the 2005/2006 academic year, all higher education institutions in Romania implemented the 3-cycle structure: Bachelor, Master and Doctorate. HEIs have full freedom to decide their research agendas, develop new study programmes, engage in regional involvement, and in internationalisation.

Institutional and academic freedom is guaranteed by law. Universities may set up research activities and engage in research projects. Proposals from research units are being approved by the university Senate, within own resources and

based on an internal budget procedure for both revenue and expenditure budgets. The R&D activity is organised and operated on the basis of national and European legislation in the field and in accordance with the individual grant conditions. Each research university must have a supportive administrative structure and facilitate management of their research activities.

**Until 2020, universities did not receive direct institutional funding for R&D.**

Public higher education institutions are financed from the state budget, based on financing contracts between the Ministry of Education and the institutions. The financing of higher education has different components: core financing, which is calculated based on average costs per student; complementary funding, such as grants for accommodation, endowments, funds allocated on competitive basis for scientific research; and additional funding.

Since 2016, universities have been able to submit projects to finance specific institutional development objectives, such as the development of new study programmes, regional involvement, and internationalisation. This additional funding is allocated based on the criteria and quality standards established by the National Higher Education Funding Council (CNFIS) and approved by the Ministry of Education.

There are four classes (C) of quality indicators: C1: Teaching/ Learning (30%); C2. Scientific activity/ artistic creation (40%); C3: Internationalisation (10%) and C4: Regional involvement/ social equity (20%). Consequently, the high-performing universities (and especially those who aim at achieving research university status comparable to other European research universities) receive higher levels of financial resources from the state budget. Some competitive funds for R&D activities are open for universities to university participation. The new Institutional Development Fund, launched in 2020 had an annual budget on average of €13.5m (2019-21). In 2021 its allocation was €14m disbursed to 239 projects.

*National Research Institutes (INCDs)*

**Romania currently has 49 National Research Institutes (INCDs).** The total staff (FTE) of INCDs is 11,986. The majority (43) of INCDs are under the coordination of MCID, most of which operate in technical and engineering fields. Few INCDs are under the coordination of other ministries. For example, the National Institute for Labour and Social Protection functions under the Ministry of Labour and Social Protection, the National Institute for R&D in Informatics is organised within the General Secretariat of the Government, and the National Institute for Land Improvements functions under the Ministry of Agriculture.

A reorganisation of the national research system took place at the end of 2014. It resulted in 43 out of 46 INCDs formerly subordinated to various other Ministries becoming institutes coordinated by MCID. This was an important step in reducing the fragmentation of the R&D system. INCDs are legal entities organised according to the Law on Research, whose main activity is R&D. They operate on the rules of economic management and financial autonomy, manage public and private state-owned assets, have their own assets, and may carry out commercial

and production activities, which are recorded separately from R&D activities in accounting records.

**Most National Research Institutes are governed under MCID regulations,** and MCID is represented at administrative boards of INCDs. MCID organizes competitions for the position of general directors, approves the revenues and expenditure budgets, initiates and validates the results of the periodical evaluations for the accreditation of the INCDs. The national institutes do not have independent scientific advisory boards, but some institutes have occasionally involved (international) peers.

**The CORE/NUCLEU Programme is the main public funding source for the INCDs’ R&D agendas.** The MCID funding under CORE/NUCLEU for 2016-2020 was €433.4m (Table 21). This programme makes use of a hybrid allocation mechanism which in reality became a kind of funding formula based on historic performance. The Ministry applies individual evaluation sheets similar to evaluations sheets used in competitive funding. MCID takes the decision on the prioritisation of INCD’s “core” programmes based on the analysis of the previous performance of the institutes and the estimated results and impacts, including the contribution to the achievement of SNCDI objectives.

Each institute has a “core” portfolio of projects reflecting its own R&D strategy, as well as the specific objectives related to the development of the economic and social fields in which the INCDs operate. According to the Law on Research, the annual allocation from the CORE programme of an INCD may not be less than 20%, and may not exceed 70% of the average revenue from R&D&I in the last 3 years. The share of the Programme in the total budget of MCID is at present about 30%. Further activities are needed to clarify the conditions and criteria for staff remuneration within the Core Programme. Investments in INCD’s infrastructure also need clearer procedures and greater transparency.

Table 21 Institutional funding for INCD (CORE/NUCLEU): planned and spent (millions €)

CORE allocation	2016	2017	2018	2019	2020
Planned	€76.3m	€71.4m	€104m	€99m	€84.5m
Spent	€75.9m	€71.4m	€103.7m	€98.6m	€83.8m

Source: MCID

**In the period 2016-2018 about 37% of the total funding sources attracted by the INCDs came from the CORE Programme,** and about 10% came from the state budget related to INCDs’ investments and operation of R&D facilities and special objectives of national interest. Only 26% of the funds were attracted from the competitions organised within the National R&D&I Plan (15%) and from ESIF sources (11%). About 17% of total INCDs budget came from private sources.

**More than half of the 2016-2018 budget of the CORE Programme went to only seven national R&D institutes,** while the remaining INCDs (about 40

entities) have received the other half. The "Horia Hulubei" National Institute for Physics and Nuclear Engineering (IFIN-HH Bucharest), the National Institute for Laser, Plasma and Radiation Physics (INFLPR Bucharest), and the National Institute for Aerospace Research "Elie Carafoli" were the recipients of the majority of the CORE Programme allocations.

### *The Romanian Academy*

**The role of the Romanian Academy is** to: (i) promote science and culture in all fields; (ii) cultivate the Romanian language, and to set out the mandatory orthographic rules; (iii) manage the cultural heritage owned or administered by the Academy; (iv) organise scientific and cultural events, scientific research and superior professional qualification activities, post-graduate courses and doctoral studies in collaboration with ME and MCID; and (v) coordinate the scientific research carried out at academy institutes and centres.

**The Romanian Academy has 14 scientific sections, and the Academy's research institutes conduct their activity independently within each section.** According to the Statute of the Romanian Academy the sections are: Philology and Literature, Historical Sciences and Archaeology, Mathematical Sciences, Physical Sciences, Chemical Sciences, Biological Sciences, Geo Sciences, Engineering Sciences, Agricultural and Forestry Sciences, Medical Sciences, Economic, Law and Sociological Sciences, Philosophical, Theological, Psychological and Pedagogical Sciences, Arts, Architecture and Audio-Visual, Information Science and Technology (Art. 14 – Statute of the Romanian Academy).

The sections decide on the topics of the research projects, organise and guide the scientific work, supervise, control and evaluate the activity of the members and of subordinated units.

### **51 research institutes and 18 research centres belong to the Academy.**

The Academy was reorganised in 2007. Total research staff (FTE) amounts to 2,230 people. The Romanian Academy is autonomous and administers its assets independently, according to Law 752/2001 on the organisation and functioning of the Romanian Academy. There are 181 active members (academicians and associate members), all of them being elected for life, and 135 honorary members. The R&D institutes under the Romanian Academy are established by Government decision, at the proposal of the General Assembly of the Academy. Academy research institutes may have subunits in university centres and may sign research contracts using public resources assigned to the Academy.

**In the period 2016-2020 the share of allocations from the state budget in the total R&D budget of the Romanian Academy varied between 65% (2018) and 74% (2020).** The Academy has its own budget line in with the State budget, and the Academy operates independently of the Government. The budget allocation for 2019 was €77m, and for 2020 €80m. The share of competitive funding obtained from competitions organised within the National R&D&I Plan varied between 17% (2020) and 29% (2016).

ESIF shares varied between 3% (2016) and 17% (2018) in the total R&D budget of the Romanian Academy. Some of the institutes are able to obtain a significant part of their funds from research projects. This is notably the case of the Research Institute on Artificial Intelligence that reached 56% in 2020 or the Institute of Archaeology Vasile Pârvan (43% in 2019). The Institute of Mathematics, Simion Stoilow, and the Astronomic Institute are also notable examples. Therefore, the ability to obtain external resources in the Academy's Institutes does not depend on the discipline. It would be desirable to consolidate and extend these good practices using incentives to both the institutions and the individual researchers.

**Research contributions of the Romanian Academy account for 7.4% of total publications and 5.2% of highly cited papers, and the Academy contributes to graduate studies and research training.** The Romanian Academy also organises postgraduate, doctoral and postdoctoral studies, and in-roll doctoral student in parallel to the universities. Examples of joint (with universities) doctoral schools occur, and there is scope for expanding and formalise such activities.

#### *Institutions of the Branch Academies*

**The Academy of Agricultural and Forestry Sciences (ASAS) has 4 national institutes, 13 branch institutes, and 45 agricultural research units.** The research staff totalled about 800 researchers in 2019. ASAS is autonomous and administers its assets independently. ASAS research activities overlap with the Ministry of Agriculture and Forestry's outreach activities. ASAS has 181 acting members and 40 honorary members according to the Law 45/2009 on the organisation and functioning of the Academy of Agricultural and Forestry Sciences, and of the R&D system in agriculture, forestry and food industry.

ASAS has scientific sections that coordinate, monitor and control the R&D activity of the research units. The financing of the current and capital expenses of ASAS and of its research institutes and units is comprised of its own revenues and subsidies from the state budget, through the budget of the Ministry of Agriculture and Rural Development.

**The Academy of Medical Sciences has 95 units with R&D activities.** This includes clinical institutes and research activities at hospitals, regional centres for public health, and research centres. The Academy of Medical Sciences is regulated by Law 264/2004. AMS research activities are intertwined with the Romanian health system in particular hospitals. For this reason, a variety of organisational research structures exists under the auspices of the Academy of Medical Sciences: for example, research groups (including part time medical doctors), clinical laboratories, research sections, departments, institutes for medical assistance, education and medical scientific research and institutes of scientific research with legal personality and subordinated/coordinated by the Ministry of Health, institutions without legal personality organised within the clinics or sections that carry out medical scientific research.

When concluding medical scientific research contractors, the institutions are obliged to directly inform the Academy of Medical Sciences about the results of the research for which they were funded. The financing of the Academy of Medical

Sciences is composed of its own revenues and from subsidies from the state budget, through the budget of the Ministry of Health.

**The Academy of Technical Sciences (ASTR) was established by Law as a forum for scientific research in the field of engineering.** (Law 230/2008 on the functioning of the Academy of Technical Sciences). The financing of the Academy is composed of its own revenues and from subsidies from the state budget, through the budget of the National Authority for Scientific Research. However, funding has not met budget expectations, and has been substantially reduced to only cover basic operating expenses.

**The Academy of Romanian Scientists** is the successor of the Academy of Sciences of Romania. It was an NGO until 2007 when it was established as a public institution by Law 31/2007. The Academy is a national forum for the advancement of science, and its activities promote, develop, support and protect science in all its aspects. By law, the financing of the Academy should be ensured from its own revenues and from subsidies from the state budget. In 2021, the Academy was not granted funds from the state budget, although this decision was later declared as unconstitutional by the Constitutional Court.

*Other public R&D units*

**A number of other R&D institutes and research centres exist in addition to the above categories.** In the case of the Universities, these research groups do not have institutional independence but are becoming an additional source of research contracts in the HEIs. However, the salaries in these institutes are lower, as they frequently are excluded from teaching activities. The Romanian R&D system includes centres and R&D institutes organised within the national societies or established by national (or supported by international) companies in addition to independent facilities of national interest. Furthermore, a variety of public institutions carry out R&D activities.

There is no comprehensive overview of these entities and the activities carried out. Some information is available in the "Organisations Registry", which is part of the Brain Map platform managed by UEFISCDI. This lists about 20 national companies/autonomous administrations involved in R&D activities: the National Meteorology Agency, the Autonomous State Owned Company Technologies for Nuclear Energy (RATEN), and a variety of public institutions with substantial contributions to R&D projects (including the Ministry of National Defence/The Military Equipment and Technologies Research Agency, the Scientific Research Centre for CBRN Defence and Ecology, and the Romanian Space Agency).

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The EU Open Data Portal (<http://data.europa.eu/euodp/en>) provides access to datasets from the EU. Data can be downloaded and reused for free, for both commercial and non-commercial purposes.

The Horizon Europe Policy Support Facility (PSF) has been set up by the Directorate-General for Research & Innovation (DG RTD) of the European Commission. It supports Member States and countries associated to Horizon Europe in reforming their national science, technology and innovation systems.

The Country Review of the Romanian Research and Innovation system was carried out between June 2021 and February 2022 by a dedicated PSF panel, consisting of eight independent experts and national peers. The aim of the Country Review is to support the Romanian authorities in designing and implementing reforms in the public science base in order to improve the quality and performance of the R&I system and accompany the country's integration into the European Research Area. The PSF review has a focus on the public science base.

The PSF panel arrived at a set of 10 Key Policy Messages highlighted upfront in the report, each one supported by detailed recommendations. The core of the report outlines the rationale supporting each of these policy statements and elaborated on the specific recommendations proposed by the panel.

*Studies and reports*

