**REVISED RESEARCH INFRASTRUCTURE ROADMAP OF REPUBLIC OF NORTH MACEDONIA**

**2022-2024**

***Ministry of Education and Science***

ACRONIMS AND ABBREVITIONS

CESAER – Conference of European Schools for Advanced Engineering Education and Research

CESSDA – Consortium of European Social Science Data Archives

CSIC – The Spanish National Research Council

E-CRIS – Current Research Information Systems

EOSC – European Open Science Cloud

ERA – European Research Area

ERIC – European Research Infrastructure Consortium

ESFRI – European Strategy Forum on Research Infrastructures

ESS – European social survey

EuroHPC JU – European High Performance Computing Joint Undertaking

FASF – Faculty of Agricultural Sciences and Food

FCSE – Faculty of Computer Science and Engineering

FEEIT– Faculty of Electrical Engineering and Information Technologies

FP7 – Seventh Framework Programme

GARR – Italian National Computer Network for Universities and Research

GDP – Gross Domestic Product

GERD – Gross Domestic Expenditures on Research and Development

HE – Horizon Europe

HPC – High Performance Computing

HPDA – High Performance Data Analytics

INCF – International Neuroinformatics Coordinating Facility

IZUM – Institute of Information Science in Maribor

JRC – Joint Research Centre

MARNet – Macedonian Research and Academic Network

MASA - Macedonian Academy of Sciences and Arts

MVDSI – Max van der Stoel Institute

NOSCI – National Open Science Cloud Initiative

NRENs – National Research and Education Networks

R&D – Research and Development

RCC– Regional Cooperation Council

RI – Research Infrastructure

R&I – Research and Innovation

S3 – Smart Specialisation Strategy

SEE – South East Europe

SEEM – Southeast Europe and the Eastern Mediterranean

VRE – Virtual Research Environment

NPAA - National Programme for Adoption of the European Union Acquis

FOREWORD

The Republic of North Macedonia recognizes the importance of investing in the modernization of its research infrastructure to enhance its competitiveness within the global scientific community. This initiative entails a sustained increase in funding for research equipment, the support of ongoing activities, and the recruitment of specialized personnel.

In 2024, the Ministry of Education and Science initiated a comprehensive mapping of the entire research infrastructure available throughout the Republic of North Macedonia. The national research infrastructure reflects the North Macedonia’s potential to contribute to the European Research Area. The insights gained from this revision will provide invaluable data for the Ministry of Education and Science, offering a detailed overview of the current state of laboratories. This will enable informed predictions regarding future investments of public funds and provide strategic directions for integrating into international research infrastructures. The assessment of the current state and the overall current research infrastructure available in the country will serve as the basis for the development of a new Research Infrastructure Roadmap that will align with the objectives and priorities outlined in the Smart Specialization Strategy and will include an action plan detailing specific activities, implementation period, timelines, responsible institutions and funding requirements for infrastructure development.

These measures are intended to strengthen international partnerships and support Macedonian researchers in the global scientific and research community, thereby facilitating research cooperation, knowledge sharing, and access to advanced facilities.

The revision of our current Roadmap presents an opportunity to align our scientific development with European and global trends, ensuring a proactive approach to emerging challenges. This effort will lay a strong foundation for the new Roadmap that will guide our efforts from 2025 to 2029.

Minister of Education and Science

Prof. Dr. Vesna Janevska

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# INTRODUCTION

The first version of the Research Infrastructure (RI)[[1]](#footnote-1) Roadmap was adopted by Decision of the Minister of Education and Science on 2 February 2022, and published on the Ministry’s website. The primary goal of the Roadmap was to present the existing research potential of the Republic of North Macedonia in order to establish the principles for the future development of research infrastructure and to propose recommendations for strengthening the research sector, thus contributing to broader social development. Therefore, the Roadmap serves as a valuable resource for decision-makers and public fund providers, helping them to more effectively leverage investments in research infrastructures to ensure their national and international relevance, while also facilitating their accessibility for the entire research and business community within the national economy and beyond.

The document content outlined the state of the research sector in the Republic of North Macedonia as of 2021. It indicated that total government investments in research and development were not very high, and that there was limited progress in developing large research infrastructures.

Given the Republic of North Macedonia's modest participation in large pan-European research infrastructures, this document is organized to map the research equipment, capacities, and laboratories that operate within universities and research institutes. Additionally, it highlights the research potential as demonstrated by participation in international research projects that are relevant for the development of research infrastructure.

The existing Roadmap serves as a solid foundation for further analysis. This document contains information on capital equipment up to the year 2021, and there is an urgent need for this information to be updated, while the new research infrastructure will be documented in the forthcoming Roadmap. Furthermore, laboratories and equipment that serve a Science2Business purpose will also be included in the new Roadmap.

# Need for revision/update

The adoption of the Smart Specialization Strategy for 2024-2027 entails the identification of the country's potential and priority areas that are considered as directions for strategic interventions within the specified development segments of the overall research, science, and innovation system. It is essential to align the Roadmap with this Strategy to ensure conformity with these determined priorities that establish a new trajectory for national investments aimed at enhancing research and innovation potential, thereby facilitating rapid economic development.

The data included in the Roadmap was gathered in 2021 through a comprehensive process of data collection and analysis for mapping the equipment. As more than three years have elapsed, it is understandable that the condition and status of the equipment and laboratories may have changed. In light of this, at the end of 2024, the Ministry of Education and Science initiated a revision of the Roadmap to ensure it is adequately reflects the current situation.

The new data analysis will facilitate optimized utilization of our existing infrastructure, promote the rational utilization of laboratories, and support the future development of planned research capacities. The insights gained from this revision will provide invaluable data for the Ministry of Education and Science, offering a detailed overview of the current state of laboratories. This will enable informed predictions regarding future investments of public funds and provide strategic directions for integrating into international research infrastructures. The assessment of the current state and the overall current research infrastructure available in the country will serve as the basis for the development of a new Research Infrastructure Roadmap. This Roadmap will align with the objectives and priorities outlined in the Smart Specialization Strategy and will include an action plan detailing specific activities and measures, implementation period, timelines, responsible institutions and funding requirements for infrastructure development.

In line with the EU Framework Programme for Research and Innovation, the Republic of North Macedonia has international obligations stemming from its European integration process. The science policy is continuously aligned with the requirements for accession to the European Union, particularly Chapter 25: Science and Research[[2]](#footnote-2). During the screening conducted with the European Union in 2023, it was concluded that this chapter has a "soft" acquis[[3]](#footnote-3), and that North Macedonia has generally harmonized its legal and strategic framework with the European Union. The current obligations under this chapter focus on the final integration of EU standards in this field. One of these obligations is the adoption of the Research Infrastructure Roadmap. In addition, the obligations concerning the role of science and innovation in enhancing competitiveness and the economy are also related to Chapter 20: Entrepreneurship and Industrial Policy, where the provision of support for small and medium-sized enterprises to develop innovative solutions is of particular importance.

In December 2021, the Republic of North Macedonia joined the European Union's Framework Programme for Research and Innovation "Horizon Europe." The signing of this international agreement presents a valuable opportunity for the scientific and research community, companies with capacity for innovation, segments of civil society, and local government/public administration to access funds from the EU for science and innovation on an equal footing with EU member states. A specific section of this Programme is dedicated to research infrastructures, as follows: a segment reserved for infrastructures listed in the European Research Infrastructures Roadmap (ESFRI), support for an open and fair access policy through the European Open Science Cloud (EOSC) and support for infrastructure projects in the fields of health, green transition, and digital transition.

# What are research infrastructures?

According to the European Commission's definition[[4]](#footnote-4), 'research infrastructures' means facilities that provide resources and services for the research communities to conduct research and foster innovation in their fields, including the associated human resources, major equipment or sets of instruments; knowledge-related facilities such as collections, archives or scientific data infrastructures; computing systems, communication networks and any other infrastructure of a unique nature and open to external users, essential to achieve excellence in research and innovation.

Research infrastructure can be classified into several groups:

Traditional ‘single-sited’ physical facilities (a single resource at a specific location), ‘distributed’ (a network of distributed resources across multiple locations), or virtual infrastructures (where services are provided electronically). Geographically, they can be national, regional, macro-regional and pan-European.

In addition, research infrastructures can be classified according to their capabilities for conducting scientific research, as follows:

1. Large research infrastructures that enable the implementation of all research activities in the research process in a specific scientific field (for example, the infrastructure planned under the SEEIIST project)[[5]](#footnote-5).

2. Medium-sized research infrastructures that enable the implementation of individual or part of the phases in the research process and

3. Small research infrastructures that enable the execution of individual tasks within the research process.

The main characteristic of research infrastructures is their central role in the model of inclusion of four sectors: the state, academia, civil society and the business sector, because they facilitate the generation of knowledge through research, promote knowledge transfer, and support the application of this knowledge in the innovation process in the business sector. This, in turn, has a direct impact on overall social development.

Pan-European research infrastructures are typically highly specialized for specific types of research and the development of particular technologies. They utilize advanced technologies and equipment that allow for the implementation of sophisticated experiments and analyses. Pan-European research infrastructures are generally accessible to users and research communities, often through participation in national and international projects or by membership in these initiatives. These infrastructures play a crucial role in fostering new knowledge, innovations, and technologies. They are essential for research and development as they facilitate experiments and data collection that would be difficult or impossible to achieve otherwise. Due to these characteristics, such infrastructures require substantial capital investment during their design, construction, and implementation phases.

According to the new ERA (European Research Area) Action 8, the ESFRI Landscape Analysis 2024 provides the framework for the next ESFRI Roadmap. In 2024, the European Union will initiate the development of a new ESFRI Roadmap, employing a slightly revised methodology. This new approach involves two distinct phases: first, conducting an analysis of the current state (landscape analysis), followed by the development of the new Roadmap based on the findings from the analysis.

The European Strategy Forum on Research Infrastructures (ESFRI)[[6]](#footnote-6) Roadmap is a strategic document that identifies existing research infrastructures (RIs) and prioritizes the development of new ones. Its goal is to promote interdisciplinary research and achieve outstanding scientific results within the European Union. The ESFRI Roadmap is an ongoing initiative. In the 2021 update of the ESFRI Roadmap, a total of 63 RIs known for their scientific excellence were included.

Over the past decade, most EU Member States within the European Research Area have prepared and are currently updating their national RI Roadmaps in line with the ESFRI guidelines. Following this trend, the Western Balkan countries have also acknowledged the significance of RI for their national research ecosystems and economic development, and they have completed the process of development of their national RI Roadmaps.

# Basis and methodology for the revision of the Research Infrastructure Roadmap

The revision of the RI Roadmap was prepared by applying two research methods: desk review and field research.

The desk review was conducted through the analysis of existing strategic documents related to science, research, technological development, and innovation in the Republic of North Macedonia. This analysis encompassed both official, approved government documents that are publicly accessible and draft versions currently in process of preparation. Key strategic documents pertinent to scientific and research activities include the Education Strategy for 2018-2025, the Smart Specialization Strategy of the Republic of North Macedonia 2024-2027 along with its Action Plan 2024-2025, the Human Capital Strategy 2024-2030, the Industrial Strategy 2018-2027, and the National Development Strategy 2024-2044[[7]](#footnote-7). Additionally, the review considered the annual national programmes dedicated to scientific and research activities.

In the context of the draft version, the National Council for Higher Education and Scientific Research Activities has drafted a Proposal of a National Programme for Scientific and Research Activity for 2024, which includes a series of recommended measures[[8]](#footnote-8).

The field research involved the distribution of a survey questionnaire to the research community to gather information about the current status of existing research infrastructures and equipment that hold national and international significance.

In the Republic of North Macedonia, the network of public and private research institutions consists of: state universities (total 6), public scientific institutions (total 9), private universities (total 11) and higher education vocational schools (total 7), foreign higher education institutions (total 3), private scientific institutions (total 29) and independent researchers (total 6).

The Ministry of Education and Science of the Republic of North Macedonia submitted questionnaires to all public universities, which include: University "Ss. Cyril and Methodius" - Skopje, University "St. Kliment Ohridski" - Bitola, Mother Teresa University, University of Tetovo, University "St. Apostle Paul" - Ohrid and University "Goce Delchev" - Shtip.

Additionally, questionnaires were sent to public scientific institutions (PSI), such as: PSI Institute of Old Slavic Culture, PSI Institute of Macedonian Language, PSI Institute of Macedonian Literature, PSI Institute of National History, PSI Institute of Intellectual Property, PSI Institute of Film, PSI Institute of Folklore, PSI Hydrobiological Institute and PSI Institute of Cultural and Spiritual Heritage of Albanians.

Furthermore, the questionnaire was distributed to all private scientific institutions and private universities in the Republic of North Macedonia.

A total of 17 entities engaged in scientific and research activities submitted responses to the questionnaires distributed, namely: University "Ss. Cyril and Methodius" - Skopje, University of Tetovo, University "St. Kliment Ohridski" - Bitola, University "Goce Delchev" - Shtip, Mother Teresa University, University of Southeast Europe, Macedonian Academy of Sciences and Arts, PSI Institute of Macedonian Language, PSI Institute of Macedonian Literature, PSI Institute of Cultural and Spiritual Heritage of the Albanians, PSI Hydrobiological Institute, PSI Institute of Folklore, PSI Institute of Old Slavic Culture, American College, International Balkan University, MIT University and the private scientific institute Institute for Advanced Composites and Robotics - Prilep.

For reference, the Questionnaire is presented in Appendix 2.

# Current legal and policy framework for the development of research infrastructure

The Ministry of Education and Science is responsible for the development of scientific research, higher education system, and technological development in the Republic of North Macedonia. The legal framework governing research activities is delineated by the Law on Scientific and Research Activity. This Law establishes the principles, objectives, and procedures for conducting scientific and research activities, identifies the entities engaged in these activities, and specifies the mechanisms for financing of scientific and research activities. Article 2 of this Law provides a definition of the term "research infrastructure," as follows:

“Scientific and research infrastructure includes facilities, laboratories, experimental stations, innovation centres, computing centres, scientific equipment, library-information and referral centres, archival and publishing documentation, as well as any other elements that contribute to scientific research.”

The legal framework consists of the Law on Scientific and Research Activity - adopted in 2008 and amended 14 times so far ("Official Gazette of the Republic of Macedonia" No. 46/08, 103/08, 24/11, 80/12, 24/13, 147/13, 41/14, 145/15, 154/15, 30/16 and 53/16 and "Official Gazette of the Republic of North Macedonia" No. 257/20, 163/21, 64/24 and 235/24), the Law on Higher Education ("Official Gazette of the Republic of Macedonia" No. 82/2018) and the Law on the Macedonian Academy of Sciences and Arts ("Official Gazette of the Republic of North Macedonia" No. 13/96, 13/96, No. 5/2009 and 59/2012).

In the context of international cooperation, both multilateral and bilateral, the Law on the Conclusion, Ratification, and Execution of International Agreements ("Official Gazette of the Republic of Macedonia," No. 5/98) is also relevant.

With regard to innovations and patents, the legal framework consists of the Law on Innovation Activity ("Official Gazette of the Republic of Macedonia" No. 79/13, 137/13, 41/14, 44/15, 6/16, 53/16, 190/16 and 64/18 and "Official Gazette of the Republic of North Macedonia" No. 235/24) and the Law on Industrial Property ("Official Gazette of the Republic of Macedonia" No. 21/2009, 24/2011, 12/2014, 152/2015, 53/2016, 83/2018 and 31/2020).

The legal framework is complemented by by-laws, including the Rulebook on the Standards and Norms for Establishing Scientific Institutes and Conducting Scientific Research Activities ("Official Gazette of the Republic of North Macedonia," No. 245/22) and the Rulebook Determining Professional and Scientific Titles (Official Gazette 125/2023, dated 15 June 2023, and Official Gazette 194, dated 18 September 2023). Several rulebooks in this area, such as the Rulebook on the Method and Procedure for Election to a Higher Scientific Title, the Rulebook on the Procedure and Detailed Criteria for Early Election to Scientific Titles, the Rulebook on the Procedure and Detailed Criteria for Co-financing Publishing Activities, the Rulebook on the Method and Procedure for Financing Scientific Research Projects or Programmes, the Rulebook Amending the Rulebook on the Method and Procedure for Financing, Creating, and Developing Scientific and Research Personnel (all published in the Official Gazette of the Republic of Macedonia, No. 82 of 2009), and the Rulebook on the Special Criteria for Declaration and External Evaluation of Scientific Centres of Excellence (published in the Official Gazette of the Republic of Macedonia, No. 35 of 2014) are not fully harmonized with the new Law on Higher Education or with the new by-laws that have been adopted in the meantime.[[9]](#footnote-9)

In light of the aforementioned developments, on 25 November 2024, the Minister of Education and Science Prof. Dr. Vesna Janevska issued a decision to establish a working group comprised of distinguished professors for the purpose of drafting a Law on Scientific and Research Activity.

The Fund for Innovation and Technological Development and the Ministry of Education and Science have successfully implemented the National Innovation Strategy for the period 2012-2020. Building upon this foundation, the Smart Specialization Strategy has been developed as the next phase of this strategic framework.

# Smart Specialisation Strategy

Smart specialisation is an innovation policy concept that aims to boost regional innovation, contributing to growth and prosperity by focusing on regional strengths. Smart specialisation is based on partnerships between businesses, public institutions and scientific institutions.

The EU Regulation defines smart specialisation strategy as follows: ‘Smart specialisation strategy’ means the national or regional innovation strategies which set priorities in order to build competitive advantage by developing and matching research and innovation own strengths to business needs in order to address emerging opportunities and market developments in a coherent manner, while avoiding duplication and fragmentation of efforts. A smart specialisation strategy may take the form of, or be included in a national or regional research and innovation strategic policy framework.

In response to the necessity for a transition towards new growth opportunities and social advancement, as well as the imperative to address economic challenges and enhance the quality of life for all its citizens, North Macedonia initiated the development of the Smart Specialization Strategy (S3) in 2018. This Strategy represents a comprehensive framework for advancing the innovation ecosystem, emphasizing robust support for research, development, and innovation to foster sustainable economic growth and development by leveraging the capabilities of industry, science, and society. The identification of key domains with strong economic, innovative, and research capabilities, along with increased investments to enhance their excellence, will promote research, development, and innovation tailored to the specific needs of the business sector. This approach is expected to enhance competitiveness and lead to the creation of new products and services with added value, generate new business opportunities, open up new markets, and create new jobs. Additionally, it will promote a multidisciplinary approach and foster cross-sector cooperation, contributing positively to the establishment of a knowledge-based and innovation-driven economy. The Smart Specialization Strategy plays a crucial role in nurturing the growth of emerging and rapidly developing industries and enterprises, while also stimulating the green and digital transition. The Smart Specialization Strategy of the Republic of North Macedonia 2024-2027 (S3-MK)[[10]](#footnote-10) is the outcome of an in-depth analytical process and extensive consultations with stakeholders, following the quadruple helix model. Employing a bottom-up approach that encouraged collaborative dialogue among all participants, the strategic vision, key priorities, and proposed activities were established, which are expected to accelerate the transformation and the transition towards a more innovative economy and a knowledge-based society.

The Smart Specialization Strategy is promoting smart growth by defining high-priority domains that possess the most significant potential for economic development, innovation, and research and development and creating additional value.

Through careful analysis and dialogue, four vertical and two horizontal priority domains have been identified:

* Smart Agriculture and Food with Higher Added Value
* Information and Communication Technologies (ICT)
* Electro-Mechanical Industry – Industry 4.0
* Sustainable Materials and Smart Buildings

The horizontal domains, "Energy for the Future" and "Tourism" are interrelated with the vertical domains and have potentials for cross-innovation.

S3-MK is intended to replace the expired Competitiveness Strategy 2016-2020 and Innovation Strategy 2012-2020. This new Strategy aims to add value to the national strategic framework and create synergies with other relevant strategic documents, including the Industrial Strategy, the Strategy for Small and Medium-sized Enterprises, the Accelerated Growth Plan, and other strategic documents related to research, development, and innovation. Additionally, it seeks to improve the process of approximation to the EU, facilitating the participation of national entities in the common European market, the common European research area, and the common European innovation area.

The mapping of research infrastructures plays an important role as it establishes a framework for the analysis of research potential and indicates how key national research infrastructures can significantly contribute to the enhancement of research and innovation as essential components of national development. Therefore, the process of mapping of research infrastructures is an important element of the S3 implementation that also provides a solid foundation for establishing links with relevant instruments in this area.

# Participation of the Republic of North Macedonia in European Union research programmes

The Republic of North Macedonia is actively involved in the 9th Framework Programme of the European Commission for Research and Innovation - Horizon Europe.

As North Macedonia has the status of an associate member state, this Programme provides an important platform for researchers, innovators, and institutions from North Macedonia to participate in Horizon Europe projects on an equal basis with their counterparts in EU Member States. Such participation is vital for fostering integration into the European Research Area and enhancing national research capabilities.

The performance of the Republic of North Macedonia in Horizon Europe has shown significant improvement compared to the previous programme, Horizon 2020. So far, local entities have participated in 394 eligible project proposals out of a total of 535 submitted, demonstrating the country's increasing commitment to utilizing international research opportunities. Regarding eligible project proposals, 34 Macedonian entities submitted 71 successful projects, resulting in 62 grant agreements (source: R&I Country Profile, published on 21 January 2025).

The Republic of North Macedonia has achieved a notable success rate of 12.52% in securing funding amounting to 12.25 million euro for its research community for the period from 2021 to 2024. To date, the most successful participants in the Programme include the University of Ss. Cyril and Methodius - Skopje (21 projects), and AG FUTURA Technology DOOEL (9 projects).

The Republic of North Macedonia's participation in Horizon Europe plays a vital role in enhancing the country's research and innovation ecosystem. Through advanced research cooperation with leading organizations in the European Union, North Macedonia is developing its scientific research capabilities while simultaneously fostering economic growth.

The funded projects cover important research areas, including food, agriculture, the environment, culture, inclusive society, climate change, clean energy, mobility, health, digital transformation, and civil security. In addition, significant progress has been observed in hydrogen energy based on an ERC grant. These projects not only align with national priorities but also contribute to addressing the global challenges outlined in the Horizon Europe Programme.

# Funding of research activities and research infrastructures in the Republic of North Macedonia

Developed countries within the European Union aim to achieve gross research and development expenditure (GRDE) of 3% of their GDP. In contrast, the Republic of North Macedonia's total investment in research and innovation (R&I) was only 0.37% of GDP in 2020. This figure increased slightly to 0.38% in both 2021 and 2022, indicating a consistent level of investment over the years. Most investments in research and development primarily consist of funding allocated by the public sector (the Government and the higher education and science sector), while the private sector contributes 0.10% of GDP.

The Ministry of Education and Science has noted substantial growth in the budget for scientific research activities in 2022 and 2023. It is particularly important to emphasize that the projected budget for science for 2025 has doubled compared to the budget funds in 2024 (Table 1).

Table 1. Budget for scientific research activities (SRA) of the Ministry of Education and Science (MES) and the budget of the Ministry in the period from 2020 to 2025

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year**  | **А. MES budget for SRA (71)** | **MES budget for science (7)** | **B. MES budget**  | **Share of A in B in %** |
| 2020 | 82.120.000 | 288.294.000 | 22.802.983.000 | 0,36 |
| 2021 | 80.500.000,00 | 405.347.000,00 | 23.144.000.000 | 0,34 |
| 2022 | 218.060.000,00 | 414.135.000,00 | 24.675.377.000 | 0,88 |
| 2023 | 225.406.000,00 | 412.236.000,00 | 28.356.886.000 | 0,79 |
| 2024 | 158.939.000 | 391.595.000 | 33.005.111.000 | 0,48 |
| 2025 | 277.927.000 | 676.031.000 | 38.475.070.000 | 0,72 |

The Ministry of Education and Science consistently encourages and financially supports the publication of scientific papers in international peer-reviewed journals, including Web of Science and Scopus.

Researchers from the Republic of North Macedonia have historically lacked access to the world’s largest scientific databases, such as Web of Science and Scopus. However, the Ministry actively works to improve access to the electronic databases of various scientific journals. By 2019, access to 14 databases had been established, with Academic Search being one of the most notable. In that year, access was further enhanced by adding the Academic Complete database. Thus, access was granted to a total of 14 databases containing electronic scientific journals with an impact factor, which collectively include over 57,000 titles, of which, more than 22,000 are fully accessible electronic journals in PDF format, and over 5,000 are highly cited journals with impact factors. These resources are available to researchers and students of the higher education institutions and public research institutions in the Republic of North Macedonia. In 2022, the Ministry also provided access to the Computers & Applied Science Complete database, thereby providing access to highly cited journals in the fields of computer science, electrical engineering, and information technology.

It is important to highlight the project titled "Equipping Laboratories for Scientific Research and Applied Activity," which was implemented by the Ministry of Education and Science in 2010 to strengthen the research infrastructure capacities of public higher education institutions and research institutes. The specific objectives of this project included:

* Equip and strengthen universities and other public educational institutions with state-of-the-art technical equipment.
* Support research institutions in the implementation of their scientific research projects.
* Support the organization of practical classes for students.
* Encourage collaboration with the private sector to generate additional revenue for the involved institutions to ensure the sustainability of the laboratories and the institutions in general.

As a result of this project, a total of 80 research laboratories were equipped with research equipment of a total value of approximately 23 million euros. The final beneficiaries of this project represent various research fields, including computer sciences, technical and technological sciences, medical sciences, natural sciences and mathematics, biotechnical sciences, as well as humanities and social sciences.

Research laboratories operating within the University of Ss. Cyril and Methodius in Skopje received the largest share of funding for their research laboratories/institutes (77%), which was expected given that this University is the largest and most important higher education institution in the Republic of North Macedonia. About 11% of the funds were allocated to the University of Goce Delchev, while other universities received 5% or less (Chart 1).

Chart 1: Share of allocated funds per university under the project "Equipping laboratories for scientific research and applied activity"

 Source: calculations based on the data provided by the Ministry of Education and Science

Considering the role of scientific research in the overall development of the country, evaluating the critical necessity of funding projects aimed at developing laboratory resources as an area of ​​special and public interest, and introducing a funding system to support the development of laboratory resources and, for this purpose, ensuring a greater allocation of the research and development budget that would encourage greater investments in research activities, on 06.08.2021, the Ministry of Education and Science published a Competition on its official website for funding scientific research projects that are of special and public interest for the year 2021 (support for development of laboratory resources) that were funded in the period 2021, 2022, and 2023. This Competition for funding focused on projects of particular public interest to support the development of laboratory resources:

* Projects from project line 1: Support for the formal recognition of laboratory competence (formal recognition of the capability to perform laboratory activities or technical competence of testing laboratories, calibration laboratories and inspection bodies)
* Projects from project line 2: Support for the maintenance of technical competence and the introduction of new analytical methods
* Projects from project line 3: Support for the modernization and development of laboratory resources (purchase of equipment)

As a result of this Competition, a total of 41 research laboratories were equipped with research equipment with a total value of approximately 220 million denar. The final beneficiaries of the project represented the following research areas: Natural sciences and mathematics: biochemistry; physics; chemistry (analytical chemistry, organic and inorganic chemistry), materials science; Technical and technological sciences: civil engineering and water management (geotechnics, earthquake engineering, mechanics of solid buildings); food technology; environment, (energy, water, air and soil); Medical sciences and health: fundamental medical sciences (microbiology, genomics, reproductive genetics, forensics, medical genetics); nutrition; Biotechnical sciences: plant protection; crop production; fruit growing; viticulture; wood processing (testing of furniture, glass and builders joinery and carpentry); food technology (food quality and safety control): technology of agricultural products, livestock production and Humanities: historical sciences (history, cultural studies); archaeology.

In accordance with the Decision on funding of projects subsequent to the published Competition for funding scientific and research projects of special and public interest for the year 2021 (support for development of laboratory resources) to be funded in the period 2021, 2022, and 2023, a total of 44 projects were approved for funding. This includes 5 projects from project line 1, 25 projects from project line 2, and 14 projects from project line 3.

Total approved funds for the projects: 317,843,947.00 denar.

Total amount of approved funds from the budget of the Ministry of Education and Science: 224,654,896.00 denar.

Contribution of project beneficiaries: 93,189,051.00 denar.

Total amount of funds requested from the MES budget for 2021: 10,914,585.00 denar.

Total amount of funds requested from the MES budget for 2022: 178,315,717.00 denar.

Total amount of funds requested from the MES budget for 2023: 35,424,594.00 denar.

Total funds disbursed in 2021: 10,792,585.00 denar.

Total funds disbursed in 2022: 113,823,597.00 denar.

Total funds disbursed in 2023: 86,461,932.00 denar.

# 4.2 Concluding observations

The research laboratories, faculties, and institutes in the University "Ss. Cyril and Methodius" in Skopje have secured the predominant share of funding allocated for research laboratories, accounting for 84% of the total. This outcome was anticipated, given that this University is recognized as the largest and most significant higher education institution in the Republic of North Macedonia. Among the total of 44 projects that received funding, 37 projects of the University "Ss. Cyril and Methodius" (UKIM) Skopje were approved, 1 project of the University "Goce Delchev" Shtip (about 2%), 5 projects of the University "St. Kliment Ohridski" Bitola (about 11%), and 1 project of the Macedonian Academy of Sciences and Arts (about 2%), as presented in Chart 1 and 2. A further analysis of the distribution of awarded projects by faculty or institute reveals that the Faculty of Natural Sciences and Mathematics, UKIM, has the highest representation with 13 awarded projects, followed by the Faculty of Pharmacy, UKIM, with 5 projects, and the Faculty of Medicine, UKIM, with 4 projects, among others, as illustrated in Chart 3.

Chart 1: Share of awarded projects by University and MASA in response to the Competition for funding scientific and research projects of special and public interest for 2021 (support for development of laboratory resources) announced by the Ministry of Education and Science

Chart 2: Total awarded projects by University and MASA

Chart 3: Total awarded projects by faculty/institute

In terms of the interest presented by project beneficiaries, the most approved funds are in the field of Natural Sciences and Mathematics with a total of 16 projects, the same number of projects are approved in the field of Medical Sciences and Health with a total of 10 projects and in the field of Technical and Technological Sciences with a total of 10, a total of 7 projects are approved in the field of Biotechnical Sciences, and only 1 project is approved in the field of Humanities, as illustrated in Chart 4.

Chart 4: Approved projects by scientific field

# 5. Recommendations and measures

# 5.1 Establish a link between the ESFRI Roadmap and the Smart Specialisation Strategy

Тhe activities listed under objective 1.2.: Improvе research infrastructure, of the Action Plan 2024-2025[[11]](#footnote-11) for the implementation of the Smart Specialization Strategy of the Republic of North Macedonia 2024-2027 provide for funding for the establishment or upgrade of laboratories in universities and research institutions (URIs) and infrastructure for field experiments and testing. The results indicators related to this activity include: number of laboratories offering new services to companies; number of universities and research organizations capable of verification, validation and demonstration of new products and technologies; number of companies using laboratories; and development and publishing of a laboratory roadmap for the period 2024-2025.

The result indicator for activity A3. Mapping of laboratories and services provided to companies, encompasses the development and publication of a study that maps laboratories along with their capacities and the services they provide.

To ensure better coordination of all activities related to the development of science and innovation in the country, it is essential to link the ESFRI Roadmap with smart specialization. This will improve the relations within the academic community and between academia and the business sector, which is expected to lead to a more favourable environment for the development of innovations. Furthermore, all activities outlined in the Roadmap and its Action Plan will be positioned within the framework of smart specialization, making them strategically significant and a top priority for funding both from the government budget and from various creditors and donors.

# 5.2 Develop an action plan for development of research infrastructures

One of the recommendations made in the first version of the Roadmap, which mapped the existing research infrastructures and research infrastructure projects, was to prepare an action plan for implementation of measures and activities necessary to guarantee the continued development of research infrastructures. One of the shortcomings of the current Roadmap is that an action plan was never adopted at all, which means that the Roadmap did not have a significant impact, taking into account that the action plan's purpose is to outline the essential steps that must be taken to carry out the activities and accomplish the objectives of the Roadmap and to present the financial implications. The steps that should be immediately taken to fully implement the Roadmap's recommendations is to develop a new Roadmap with an Action Plan that includes specific activities and measures, implementation period, time limits, competent institutions and required funding for infrastructure development.

# 5.3 Increase investments in research infrastructures

Because the majority of the country's funds for science and research are public, with the Government holding the largest share, it is important to note that the Republic of North Macedonia's budget has seen significant increases and growth in terms of research and development expenditures.

From a chronological perspective, the Government's major support for procurement of research laboratories in 2010 was followed by the Ministry of Education and Science's implementation of a second major support in 2021–2023 through the approval of 44 projects for purchase of laboratory equipment, which allowed the research community to apply the most up-to-date equipment in its activities. The third framework for financial support should be implemented as soon as practicable.

If the Republic of North Macedonia wishes to ensure the successful implementation of S3 and capitalize on existing opportunities, it should improve the existing or build new research infrastructures by implementing the third framework for funding and investment in projects of national importance. This will assist the further development of the research and innovation potential and contribute to reducing the development gap with developed EU member countries.

In this context, it is important to take into account the recommendations of MASA, specifically:

* establish a capital national research centre for exact sciences of the type of Vincha, Rugjer Boshkovikj, Jozhev Shtefan, etc. which will possess the most up-to-date capital equipment used in various fields as well as specific know-how for its use, which would be made available for use by all interested researchers on the basis of previously defined principles. Alternatively, several centres of excellence in specific scientific fields could be established, all of which would operate according to the aforementioned principles for the usage of capital equipment.
* implement the procurement of new equipment based on the competitions for funding announced by the Ministry of Education and Science within the framework of specific scientific research projects which, apart from the funds for equipment, will also include funds for consumables for the equipment, funds for staff training and equipment maintenance. It would be beneficial if these projects envisaged (mandatorily) the involvement of (our) renowned researchers from abroad, to facilitate faster transfer of knowledge and reduce the gap between our scientific and research activities and those of developed countries.

# 5.4 New Research Infrastructure Roadmap

The current Roadmap is a good starting point for further analysis, however, the data on capital equipment included in the document refers to the situation in 2021 and needs to be updated, while the new research infrastructure is to be incorporated in the new Roadmap. The new Roadmap will also map laboratories/equipment with a Science2Business function. Given that research progress is highly dynamic, the RI Roadmap should be considered as a living document, which will lead to a more comprehensive incorporation of the existing research infrastructure in the future.

The revision of the first version of the Roadmap and the data analysis will provide a complete overview of the present situation and allow for the development of a Roadmap based on the findings. The new Roadmap will also make it possible to link its objectives and priorities with the Smart Specialization Strategy as a prerequisite for targeted investment by the Government and access to European funds, defining strategic directions and priorities for the future development of research activities in Macedonia, optimized use of existing infrastructure, rational use of laboratories and future development of planned research capacities, as well as defining strategic directions for joining international large research infrastructures.

# 5.5 Improve the policy framework

The Republic of North Macedonia's research system is distinguished by the lack of a science and research development strategy. The lack of this strategic document poses a potential challenge to the implementation of the Research Infrastructures Roadmap, because there is no strategic foundation or framework in place. Taking into account the significance of this strategic document in determining the strategic directions and priorities, as well as the future development of research activities in the Republic of North Macedonia, the National Council for Higher Education and Scientific Research Activity has prepared a Proposal of a National Programme for Scientific Research Activity of the Republic of North Macedonia, which is presently in a draft form and is expected to become effective in near future.

The term “research infrastructure” is recognized and clearly defined in the current version of the Law on Scientific Research Activity; however, in future amendments to this Law, it is desirable to include a definition for the “Research Infrastructure Roadmap” that would clearly capture its purpose and provide a legal basis for the development and adoption of this policy document.

The Ministry of Education and Science should also consider adapting the national legal framework for assessing academic progress and aligning it with current EU trends, which are strongly based on the principles of open science and FAIR (findable, accessible, interoperable and reusable) data.

# 5.6 Support the development of e-infrastructure

The foundation and prerequisite for the future development of the research system in the Republic of North Macedonia is a robust and high-quality e-infrastructure. From a strategic standpoint, the Republic of North Macedonia should support e-infrastructure considerably more than it has up to this point. Better plans are needed for the coordinated development of e-infrastructure in order to ensure the timely allocation of the necessary funds. The Republic of North Macedonia should introduce measures to encourage research institutions to express their interest in developing e-infrastructure through partnerships and joint investments in this area.

The Ministry of Education and Science should encourage the initiative to identify and digitize various collections of records held in research centres.

Additional recommendations include the following:

* Intensify digitalisation of research and innovation sector, in particular the process of identification and digitalisation of various collections and other contents of national importance;
* Intensify the work on creating prerequisites for open access to research data;
* Improve information and strengthen user support for open access and maximum use of existing infrastructures.

# 5.7 Participation in Large European Research Infrastructures

The Republic of North Macedonia's involvement in major European research infrastructures is extremely low. A lack of knowledge about the existence of these infrastructures, the complicated joining procedures, and financial considerations (high membership fees or requirements for large government investments in the relevant national infrastructures) are some of the reasons for this.

One exception is the area of digital infrastructures, where there is a notable level of active collaboration and involvement, particularly from UKIM's Faculty of Computer Science and Engineering (FINKI), which is the largest provider of digital services to the nation's and the region's research community.

According to the latest ESFRI (landscape) analysis, our country is a member of:

* Data, Computing and Digital Research Infrastructures.
	+ GEANT - the pan-European association of national research and education networks. The National Academic and Research Network MARNET is a member of GEANT, however, due to the lack of technical and human capacities, FINKI - UKIM provides full support of MARNET and participates in the projects coordinated by GEANT.
	+ EOSC - European Open Science Cloud. FINKI - UKIM has been a member of EOSC since its establishment in 2020, and in 2023 it became a mandated member with a mandate from the Ministry of Education and Science.
	+ PRACE - Partnership for Advanced Computing in Europe. With the change in the membership arrangement in 2024, FINKI - UKIM became an associate member of this infrastructure as a partner of the Greek Academic and Research Network (GRNET).
	+ EGI - European Grid Initiative. The Macedonian Grid Initiative, coordinated by FINKI - UKIM, has been a member of the EGI since its inception in 2010, an active participant in a large number of projects, and also a provider of some of the basic services of this large digital infrastructure. A procedure to promote the EGI to an ESFRI infrastructure is currently underway.
	+ EuroHPC JU. The Republic of North Macedonia is an equal member of the European High Performance Computing Joint Undertaking. Within the framework of the mandate received from the Ministry of Information Society and Administration (Ministry of Digital Transformation), FINKI - UKIM has effectively contributed to several projects of this organization. In this context, FINKI - UKIM has become a partner in the DAEDALUS supercomputing system, which is being established in Greece, by contributing human resources for support.
	+ OpenAIRE is a European organization for the promotion of open access to research results, in which UKIM is an equal member.
* Social Sciences and Humanities
	+ CESSDA ERIC – the Consortium of European Social Science Data Archives is a distributed research infrastructures serving as a large-scale, integrated and sustainable platform for data services relevant to the social sciences. The Institute for Sociological, Political and Juridical Research (ISPPI) is a member of this infrastructure and an active participant in the projects implemented within its framework.
* Health and Food
	+ METROFOOD-RI - the Infrastructure for promoting metrology in food and nutrition by enhancing quality and reliability of measurement results and making available and sharing data, information and metrological tools, is a candidate for ESFRI infrastructure. The Institute for Public Health is a member of this infrastructure from our country.

The Republic of North Macedonia does not participate in any major research infrastructure in the areas of Energy, Environment and Physical Sciences and Engineering.

To improve the representation and access of RNM researchers to these and similar infrastructures, relevant efforts must be undertaken, especially aimed at:

* Raising awareness and familiarization with the potential of these infrastructures.
* Conducting training and capacity building for the use of these infrastructures.
* Providing political support for access to these infrastructures (mandate).
* Providing financial assistance for membership in major European infrastructures.
* Supporting the development of national infrastructures that are compatible with European ones, as well as their integration with European infrastructures.
* Co-funding projects led by our researchers and organizations, which are expected to grow into pan-European infrastructures.

# 5.7.1 Proposals for the potential participation of institutions from the Republic of North Macedonia in major European infrastructures

In accordance with the latest ESFRI analysis, the following potential infrastructures and institutions from the Republic of North Macedonia could potentially benefit from involvement or cooperation with ESFRI infrastructures, primarily in areas where Macedonian institutions exhibit minimal or no participation whatsoever.

* Energy:
	+ EU-Solaris – the European Solar Research Infrastructure. Potential institutions from the Republic of Macedonia are the technical faculties of the universities, the Research Centre for Energy and Sustainable Development of the Macedonian Academy of Sciences and Arts, etc.
* Environment
	+ DiSSCo – Distributed System of Scientific Collections. Potential beneficiaries: faculties of natural sciences and mathematics at the universities, the Research Centre for Environment and Materials of MASA, the Natural Science Museums in Skopje, Struga, etc.
	+ EPOS – the European Plate Observing System. Potential beneficiaries: the Institute of Earthquake Engineering and Engineering Seismology, the Seismological Observatory of the Faculty of Natural Sciences and Mathematics, etc.
	+ EURO-AGRO - European contribution to the global Argo programme. Potential beneficiaries: faculties of agriculture in universities, Institute of Agriculture, etc.
	+ LifeWatch – biodiversity and ecosystem. Potential beneficiaries: faculties of natural sciences and mathematics in universities, Research Centre for Environment and Materials of MASA, etc.
* Health and Food
	+ ECRIN – European Clinical Research Infrastructure Network. Potential beneficiaries: medical faculties in universities, university clinics, Research Centre for Genetic Engineering and Biotechnology, Centre for Public Health, etc.
	+ ELIXIR – distributed infrastructure for life-science information. Potential beneficiaries: medical and pharmaceutical faculties in universities, university clinics, Research Centre for Genetic Engineering and Biotechnology, Centre for Public Health, etc.
	+ EMPHASIS – European Infrastructure for Multi-scale Plant Phenomics and Simulation. Potential beneficiaries: faculties of natural sciences and mathematics in universities, the Research Centre for Environment and Materials of MASA, etc.
* Physical Sciences and Engineering
	+ ELI – European Laser Infrastructure. Potential beneficiaries: faculties of natural sciences and mathematics in universities, research centres of MASA, etc.
* Social Sciences and Humanities
	+ CLARIN – European Language Infrastructure. Potential beneficiaries: Faculty of Philosophy and Faculty of Philology, Institute of Macedonian Language, Lexicographic Centre and Research Centre for Areal Linguistics of MASA, etc.
	+ DARIAH – Digital Research Infrastructure for the Arts and Humanities. Potential beneficiaries: faculties of arts in universities, public scientific institutions in the field of cultural heritage protection, museums, Faculty of Philosophy, Lexicographic Centre and Research Centre for Areal Linguistics of MASA, etc.
	+ ESS – European Social Survey. Institute for Sociological, Political and Juridical Research (ISPPI) participated in this infrastructure, however, despite its importance, its participation is no longer possible due to a lack of funding.
	+ OPERAS – Research Infrastructure supporting open scholarly communication in the social sciences and humanities. Potential beneficiaries: faculties of economics and law in universities, Institute of Economics, ISPPI, Centre for Strategic Research of MASA, etc.

Although it is not all-inclusive, the list above serves as a starting point for connecting the Macedonian research community with important European research infrastructures.

# 5.8 Create a national portal for research infrastructures

The European Union places a high value on open science because it enables free and rapid access to research data, findings and knowledge for all citizens and researches. This accelerates scientific innovation, promotes cooperation between researchers from various fields and countries, and helps to effectively address global challenges like climate change, health crises and sustainable development.

According to the most recent ESFRI methodology, the EU is creating a living registry for continuous monitoring of research infrastructures, which will also serve as a platform for businesses to learn about what academia has to offer and how they can collaborate.

The National Portal for Open Research Infrastructures will include the research infrastructures, laboratories and equipment available to institutions, the utilization and usefulness of each infrastructure and the services they offer to the scientific research and business community.

Appendix 2

SURVEY QUESTIONNAIRE

This survey questionnaire contains several sets of questions that serve as an input for the identification and evaluation of research infrastructures potential in the Republic of North Macedonia. The aim of the questionnaire is to revise the mapped research infrastructure as an indispensable step in the process of revising the Research Infrastructure (RI) Roadmap.

According to the definition of European Commission, Research Infrastructures (RI) are facilities that provide resources and services for research communities to conduct research and foster innovation. They include:

* major scientific equipment or sets of instruments;
* collections, archives or scientific data;
* computing systems and communication networks;
* any other research and innovation infrastructure of a unique nature which is open to external users.

Research infrastructures can be centralised, that is, based in a single location. They can also be distributed or virtual, and can form mutually complementary wholes and networks.

Please note that the questionnaire is designed for research centres, laboratories and departments operating within public and private organisations (universities and faculties, public and private research institutes) accredited for research and innovation. If your institution has more than one research infrastructure, please complete the questionnaire for each infrastructure individually entering all data and descriptions for the specific infrastructure that is the subject of the questionnaire!

**1. General information**

**1.1. Data about respondent**

|  |  |
| --- | --- |
| Full name |  |
| Name of your institution |  |
| Institution’s address |  |
| Your position in the institution |  |
| Your email address |  |
| Institution's website address |  |

**1.2. General information about research infrastructure or important research equipment and facilities**

|  |  |
| --- | --- |
| Name of research infrastructure |  |
| Host institution |  |
| Research Infrastructure’s address |  |
| Research infrastructure’s website |  |
| Thematic categorisation of RI by field of science\* |  |
| Type of RI\*\* |  |
| Main scientific domain |  |
| Other scientific and technological domains served by RI |  |
| Total number of RI users |  |
| Name and position of a person responsible on behalf of research infrastructure: |  |
| Year of establishment of RI: |  |
| Founder | Institution(s) | Ownership share (%) |
|  |  |
|  |  |  |

\*Thematic categorisation of RI types by field of science. The ESFRI sets the following 6 thematic areas:

1. energy;
2. environment;
3. health and food sciences;
4. engineering and technology;
5. social sciences and humanities;
6. digital e-infrastructures.

E-Infrastructure for scientific research–provides computing services for the scientific community.

\*\*Four types of RI are commonly distinguished:

1. single-site facilities;
2. distributed facilities;
3. mobile facilities;
4. virtual facilities.

**1.3. Description of Research Infrastructure. Please provide basic information and objectives of the research infrastructure.**

|  |
| --- |
|  |

**1.4. Please list the services provided to research infrastructure users**

|  |
| --- |
|  |

**2. Data on research equipment**

**2.1. Estimated value of research equipment**

|  |
| --- |
| **Total estimated value of research capital equipment (in EUR):**  |
|  | – purchase value: |  | EUR |  |  |
|  |
|  | – current value (amortisation): |  | EUR |  |  |

**2.2. List of capital equipment at purchase price higher than EUR 50.000**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Name of research equipment** | **Purchase Price (EUR)** | **Year of Purchase** | **Source of funds for the purchase of equipment** | **Estimated Duration of Equipment (yrs.)** | **Estimated Number of Users**  | **Price of services** |
| 1. |  |  |  |  |  |  |  |
| 2. |  |  |  |  |  |  |  |
| 3. |  |  |  |  |  |  |  |
| 4. |  |  |  |  |  |  |  |
| 5. |  |  |  |  |  |  |  |
| 6. |  |  |  |  |  |  |  |
| 7. |  |  |  |  |  |  |  |
| 8. |  |  |  |  |  |  |  |
| 9. |  |  |  |  |  |  |  |
| 10. |  |  |  |  |  |  |  |
| … |  |  |  |  |  |  |  |
| … |  |  |  |  |  |  |  |
| ... |  |  |  |  |  |  |  |

**Instructions for completing Table 2.2:**

Please enter only the equipment the purchase value of which is above EUR 50,000.

In the column “Source of funds for the purchase of equipment” please enter the funding source. If there are two or more sources, please indicate each one with the participation share:

a. Own funds

b. Resources of the Ministry of Education and Science

c. Resources of other ministries

d. Public Funds

e. Donations

f. Funds from international projects

g. Funds / international donations

h. Other sources - specify which!

In the column "Price of Services", please enter the prices of services for using the research equipment.

**2.3. List of research equipment purchased based on the Competition for the allocation of funds for funding scientific and research projects of special and public interest for 2021 (support of laboratory resources) by the Ministry of Education and Science**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Name of research equipment**  | **Purchase price (denar and euro)** | **Year of purchase**  | **Source and amount of funds for the purchase of equipment**  | **Estimated duration of the equipment (years)** | **Number of users to date** | **Price and description of services** |
| 1. |  |  |  |  |  |  |  |
| 2. |  |  |  |  |  |  |  |
| 3. |  |  |  |  |  |  |  |
| 4. |  |  |  |  |  |  |  |
| 5. |  |  |  |  |  |  |  |
| 6. |  |  |  |  |  |  |  |
| 7. |  |  |  |  |  |  |  |
| 8. |  |  |  |  |  |  |  |
| 9. |  |  |  |  |  |  |  |
| 10. |  |  |  |  |  |  |  |
| … |  |  |  |  |  |  |  |
| … |  |  |  |  |  |  |  |
| ... |  |  |  |  |  |  |  |

**Instructions for completing Table 2.3:**

In the column “Source and amount of funds for the purchase of equipment” please enter the funding source, enter the funds provided by the Ministry of Education and Science as the full amount and percentage. If there are two or more sources, please indicate each one with the amount and the participation share:

a. Own funds

b. Resources of the Ministry of Education and Science

c. Other sources - specify which!

In the column "Price and description of services" please enter the price and a brief description of the services for research and development purposes (applies to both accredited and non-accredited laboratories). If more elements of the listed equipment are required to provide the service (for example, rows 1 to 6), then please enter the integrated price of the service in the last row of the group (in this case, row number 6).

**2.3.1. Access policies to research infrastructures**

|  |
| --- |
|  |

**Instructions for completing Table 2.3.1:**

Regarding the research infrastructures purchased based on the Competition for the allocation of funds for funding scientific and research projects of special and public interest for 2021 (support for laboratory resources) by the Ministry of Education and Science, please explain the access policies to the laboratory resources in place. The access policy in the form of an adopted document can be attached as a separate attachment.

**3. Information on access, collaboration and impact**

**3.1. Information on access**

A brief description of the policy and procedures for user access to this research infrastructure. The access policies and procedures in the form of an adopted document can be attached as a separate attachment.

|  |
| --- |
|  |

**3.1.1. Information on external users**

|  |  |
| --- | --- |
| **Users of RI** | **Please specify the name of Institution, department**  |
| Research groups from your economy |  |
| Research groups from Western Balkan economies  |  |
| Research groups from EU and other countries |  |

**3.2. Information on cooperation**

Please list the international co-operation agreements and partnerships in which this RI has been involved.

|  |
| --- |
|  |

**3.2.1. Integration into larger RIs**

Is RI connected or integrated into larger RIs (international) or is it a member of any European RI?

|  |
| --- |
|[ ]  Yes |
|[ ]  No |

If yes, please specify the details:

|  |  |
| --- | --- |
| The name of larger RI: |  |
| Membership conditions: | [ ] Active | [ ] Joined |
| Membership fee, who finances it: |  |
| Additional information: |  |

Please add new rows if necessary.

**3.3. Engagement in projects related to research infrastructure development**

Have you been engaged in a project aiming at the development of research infrastructure?

|  |
| --- |
|[ ]  Yes |
|[ ]  No |

If yes, please specify the details:

|  |  |
| --- | --- |
| Title of the project: |  |
| Time duration: |  |
| Link to web address: |  |
| Provider of financial resources for the project: |  |

Please add new rows if necessary.

**3.4. Plan for the Future**

Please describe in detail the plan for the next period, at least for 2-5 years:

|  |  |
| --- | --- |
| Future investments in research equipment: |  |
| Is integration into larger research infrastructures considered: |  |
| Other relevant information: |  |

1. https://mon.gov.mk/download/?f=1%20RI%20Roadmap\_NMCD\_FINAL\_-MKD.docx [↑](#footnote-ref-1)
2. NPAA | Secretariat for European Affairs (sep.gov.mk) [↑](#footnote-ref-2)
3. European Commission gives recommendation, opinion and no special legislation is required. [↑](#footnote-ref-3)
4. Regulation (EU) 2021/695 of the European Parliament and of the Council of 28 April 2021 establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination, and repealing Regulations (EU) No 1290/2013 and (EU) No 1291/2013 (<https://eur-lex.europa.eu/eli/reg/2021/695/oj>) [↑](#footnote-ref-4)
5. https://seeiist.eu/ [↑](#footnote-ref-5)
6. <https://www.esfri.eu/> [↑](#footnote-ref-6)
7. <https://www.nrs.mk> [↑](#footnote-ref-7)
8. [www.nacionalensovetzavoinid.com.mk/images/dokumenti/Предлог-Национална%20програма%20за%20Н.И.Д..pdf](http://www.nacionalensovetzavoinid.com.mk/images/dokumenti/%D0%9F%D1%80%D0%B5%D0%B4%D0%BB%D0%BE%D0%B3-%D0%9D%D0%B0%D1%86%D0%B8%D0%BE%D0%BD%D0%B0%D0%BB%D0%BD%D0%B0%20%D0%BF%D1%80%D0%BE%D0%B3%D1%80%D0%B0%D0%BC%D0%B0%20%D0%B7%D0%B0%20%D0%9D.%D0%98.%D0%94..pdf) [↑](#footnote-ref-8)
9. Source: Proposal of a National Programme for Scientific and Research Activity and Proposed Measures, <https://www.nacionalensovetzavoinid.com.mk/images/dokumenti.pdf> [↑](#footnote-ref-9)
10. <https://mon.gov.mk/download/?f=Mk_%20S3_MK%20%2020.12.2023.doc> [↑](#footnote-ref-10)
11. <https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fmon.gov.mk%2Fstored%2Fdocument%2FMk_%2520S3-AP%252020.12.2023_MK.DOC&wdOrigin=BROWSELINK> [↑](#footnote-ref-11)