Romanian Roadmap of Research Infrastructures

2017

Contents

Abbreviations:

RI – Research infrastructure

CRIC - Romanian Research Infrastructure Committee

SNCDI - National Strategy for Research, Development and Innovation

ANCS – the National Authority for Scientific Research

MCI – Ministry of Research and Innovation

SIPOCA 27 - Project - "Developing the administrative capacity of MCI to implement some actions set in the National Strategy for Research, Technological Development and Innovation 2014-2020".

POC – The Operational Program for Competitiveness

POR – The Regional Operational Program

Foreword by the Romanian Minister of Research and Innovation

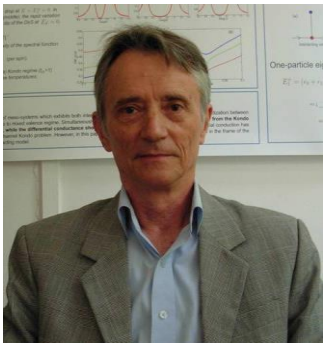
Scientific research infrastructures are one of the most important tools for generating knowledge. In recent years, Romania has succeed to be an important partner or lead some of the most important pan-European infrastructures, which proves the exceptional professional quality and the abnegation of the experts who believed in the work they are doing. It is important to emphasize that this area should act as an engine for economic development and as much of the researchers' results are rapidly transferred to users and ultimately to society as a whole that contributes financially to its operation. At this time, focusing and optimizing the use of existing resources are key factors for the development of the field, and this Report is an important tool for medium and long term strategic planning of Research Development Innovation domain.

I am convinced that the interconnection of Romanian and European infrastructures will bring value to both Romania and the European Union as a whole, and our efforts will be an important impulse to the Romanian economy and society in general.

Puiu-Lucian GEORGESCU
Minister of Research and Innovation

Bucharest, September 2017

Foreword by the President of CRIC



The Romanian Research Infrastructure Committee - CRIC was created in August 2016 by ANCSI's Decision, with the task of coordinating the review of the roadmap for research infrastructures.

Starting from the analysis of the current situation, the National Roadmap for Research Infrastructures in Romania aims to highlight the volume, quality, utilization of the Research-Development-Innovation equipment, installations and laboratories of Research-Development-Innovation with significant relevance for their fields, developed by national and / or European programs.

A special aspect is the participation of the Romanian scientific community in pan-European projects ESFRI, as one of the essential sources of identification of national research infrastructures, in line with the provisions of the National Strategy for Research, Development and Innovation (2014-2020).

The CRIC Committee thanks for the support of the Ministry of Research and Innovation team for the realization of this document.

Alexandru Emil ALDEA
President of CRIC

Bucharest, September, 2017

The composition of the Romanian Research Infrastructure Committee (CRIC)

- **Alexandru Aldea**, PhD, President
- Prof. **Bogdan Simionescu**
- Prof. **Anton Anton**
- Prof. **George Darie**
- Prof. **Adrian Săftoiu**
- Prof. **Nicolae Victor Zamfir**
- **Ionel Andrei**, PhD
- Prof. **Adrian Duşa**
- Prof. **Daniel David**
- **Darius Georgel Voda**, representative of the Minister of Economy
- **Marian Sebe / Claudiu Chiriac**, representatives of the Ministry of Internal Affairs
- **Mihaela Guda**
- **Daniela Gheorghian**
- **Adrian Pascu**

Team of implementation

The team of SIPOCA 27 experts responsible for the elaboration of the National Roadmap:

- **Narcisa - Melania Tănase**, PhD – Project Manager
- Prof. **Alexandru Marin**, PhD – Results Coordinator
- Prof. **Adrian Dușa**, PhD – Expert for infrastructures analysis and Expert for the elaboration of the National Roadmap
- **Rareş Medianu**, PhD – initial Results Coordinator
- **Ioana Spanache (Borcan)**, PhD – Methodology Expert and Expert for the elaboration of the National Roadmap (UEFISCDI)
- Lecturer **Radu Herman**, PhD – Expert for the elaboration of the National Roadmap (UEFISCDI)
- the **84 evaluation experts** from the 7 panels.

1. The role of the Romanian Research Infrastructure Committee

The Romanian Research Infrastructure Committee (CRIC) was established by the ANCSI President's Decision no. 9311 of 5th of August 2016 with the mission to update the national roadmap for research infrastructures. Initially, CRIC carried out its activity during 2007-2008, when it developed the first Research Infrastructure Report in Romania (2008).

In order to implement the National Research-Development-Innovation (RDI) Strategy (2014-2020), it is necessary to identify and set national priorities as well as to formulate recommendations for the development of research infrastructures. This approach aims to achieve the strategic objectives, respecting and valorizing Romania's commitments in the construction and operation of research infrastructures, from which derives the proposed approach, which aims to be based on a prospective substantiation of needs and a process of identifying areas of specialization and future development with economic and social impact.

In the second semester of 2016, CRIC elaborated the Romanian Research Infrastructure Strategy Report, which was approved by ANCSI in December 2016, as a result of the debates and analyzes carried out in order to start the process of prioritizing public investments for research infrastructures.

The report made strategic recommendations on the Roadmap, including recommendations for guidelines on activities funded under the SIPOCA 27 project under the ongoing Operational Capacity Program (POCA). It also provided a timetable for roadmap finalizing activities based on a working methodology, by the end of 2017.

On the basis of this calendar and on the basis of the methodology proposed by the SIPOCA 27 project and endorsed by the CRIC in March 2017, a process for the identification and evaluation of research infrastructures in Romania was carried out, which provided also a submission session of specific documentation in August 2017, for new research infrastructure, that can be included in the Roadmap.

2. The National Strategy for Research Infrastructures within SNCDI 2014-2020

2.1. The current situation

Romania is in the process of implementing the Research-Development-Innovation Strategy, as a result of a broad participatory exercise of consultation of all those interested or involved in RDI. The National RDI Strategy (2014-2020) provides investment priorities for the research infrastructures, as well as the training and development of human resources, to ensure the good use and operation of these infrastructures.

The National RDI Strategy, updated in February 2017, identifies the challenges of the next strategic programing period, mainly related to the continued strengthening of research infrastructures and their proper use at their optimum level. The aim is to ensure that research infrastructures provide transparent access to resources and provide to the economic, academic and research environment high quality value added services, compatible with the European and global standard of each research sub-area for which each infrastructure is developed.

2.2. Vision and strategic objectives of the Report (National Roadmap)

According to its Research-Development-Innovation vision[1], Romania builds and operates research infrastructures that respond to the requirements of major science and technology research initiatives and programs and provide data and information to help finding solutions to the social and economic current challenges.

Unfortunately, the RDI sector in Romania is under-funded and under-sized. The development of this sector must, on the one hand, take account of these realities and, on the other, to ensure its development on the basis of values and principles that offer efficiency and effectiveness of public investment. Hence, follows the necessity for prioritization, especially in the field of research infrastructures.

The National Roadmap aims to develop a comprehensive list of research infrastructures of national interest, in a process based both on the analysis of the current landscape and a prospective substantiation of the needs of the sector. An exercise for mapping of existing research infrastructures and equipment, as well as existing services in Romania accompanied by their degree of usage has been carried out previously, corresponding data and information being available through the ERRIS portal ("Engage in Romanian Research Infrastructures System", http://www.erris.gov.ro) and a call for proposals for research infrastructures, as mentioned above, took place within the SIPOCA 27 project.

The result of the evaluation process is included in the Report on Research Infrastructures in Romania, which has the role of:

- a strategic planning tool and reference document for decision-making process on the construction, operation and decommissioning of research infrastructures;
- a tool for monitoring and evaluating the progress made by Romanian research infrastructures of national, European and international relevance;
- an identification and prioritization tool for public investment in research infrastructures, to be implemented in the current financial programming cycle.

One of the major characteristics of research infrastructures is given by the long needed time for their planning, implementation and operation, so this Roadmap for Research Infrastructures in Romania aims to cover the period 2017-2025. When implementing the facilities included in the Roadmap, in addition to the financing from the state budget, complementary sources of funding will be used, such as national research programs or operational programs (POC, POR etc.), financed by European funds etc.

2.3. Strategic Objectives

General objectives

The Romanian National Roadmap for the 2017-2025 interval aims to provide a comprehensive list of research infrastructures that qualify for benefiting of national support. Its elaboration was in accordance with national and European policy papers from the field (e.g. RDI National Strategy), with European and international commitments of Romania (e.g. participation in pan-European

[1] *"In 2020, Romania will become competitive at a regional and global level, through innovation fed by R & D, generating wealth for citizens", HG 929/2014 for approving SNCDI 2014-2020*

research infrastructures included in the ESFRI roadmap.), and was based on a process of identifying the existing development needs in the RDI sector.

Specific objectives

- Optimizing Romania's participation in pan-European infrastructures and their inclusion in the list of priorities in the field of research infrastructures; participation to these pan-European infrastructures should represent a firm commitment from Romania's part, that needs to be respected and from which, the scientific community and potential users (including companies) to extract maximum of benefit;
- Identifying new major areas of investment: Romania must continue to invest in research infrastructures, where there is a critical mass of active specialists; these actions can contribute to the process of smart specialization and/or to support scientific excellence; Romanian RIs can then be integrated into large research programs, focused around pan-European and international research infrastructures;
- Increasing management capacity of research infrastructures: attracting funding to support research infrastructures is the responsibility of research institutions or higher education organizations (universities) that coordinate them. State institutions are responsible for financing the relevant national research infrastructures, as same as for Romania's participation in the coordinated research infrastructures from European and international level. Therefore, the institutions and organizations that coordinate research infrastructures have the responsibility to initiate steps to attract users and funding from sources other than the national public budget;
- Ensure the proper functioning of already existing infrastructures, including those of national and regional interest (the latter can serve as regional development poles); in order to benefit from the fiscal facilities and optimize the financial operating efforts, it is encouraged to merge research infrastructures following the ERIC[2] (European Research Infrastructure Consortium) model, by creating national research consortia (RoRIC – Romanian Research Infrastructures Consortium).

This synthetic report was generated following the analysis of the "landscape" of proposed Research Infrastructures (RIs), covering the 7 thematic domains defined in SNCDI 2014-2020, being at different stages of development in Romania, and taking into account both the ESFRI (European Strategy Forum on Research Infrastructures) principles and the specificities of Romanian research system. As a general line, it was considered that the life cycle of a RI comprises the following stages: feasibility - construction - operation - decommissioning. The pre-feasibility phase (defining of the research program, coagulation of the scientific community, users identification) is not considered as part of an RI's life cycle, and being usually addressed through research programs and projects that may or may not lead to a viable RI proposal.

A National Roadmap must embrace the whole variety of RIs, in order to determine long-term coherent effects and avoid syncope, given that some flexibility in addressing new research directions is needed to keep up with the progress of science and technology. Thus, mature and operational RIs are very important in stimulating current research, but also important are RIs under construction and/or feasibility evaluation, for stimulating future research. Generally, the

[2] Council Regulation (EC) No 723/2009 of 25 of June 2009 concerning the Community legal framework applicable to a European Research Infrastructure Consortium (ERIC)

implementation phase (feasibility and construction) of an RI is expected to be completed within maximum 10 years from the proposal's launch, till reaching the RI landmark stage. The operational phase of the landmark RIs extends over 25-40 years, while fully developing its scientific program and impacting not only the scientific community but also society and the economy, in general.

Throughout their lifecycle, RIs have different characteristics and needs depending on the stage they are in, thus monitoring progress and support receiving should be tailored to the specificity of the development phase. Although the most important investments are made in the construction phase of a RI, the periodic upgrades of RIs in operation should not be neglected, because only by technological upgrade and modernization they can preserve their leadership position in their scientific field.

3. The Role of Research Infrastructures

3.1. Definition

Research infrastructures are defined in this Report, following the recommendation of the CRIC's Strategic Report in December 2016, in line with the definition given in EU Regulation no. 651/2014 of 17th of June 2014 declaring certain categories of state aid compatible with the internal market pursuant to Articles 107 and 108 of the Treaty, published in the Official Journal of the European Union no. L 187 of 26th of June 2014, as follows: "Research Infrastructure means facilities, resources and related services used by the scientific community to carry out research in its respective fields and comprises the main equipment or sets of scientific instruments, knowledge resources such as collections, archives or structured scientific information, generic infrastructures based on information and communication technology such as networks, information material, software programs and communication tools, as well as any other means necessary for the conduct of research activities. Such infrastructures can be "localized" in one site or "distributed" (an organized resource network)".

3.2. Features

- are located in a single location or having “mobility” by taking into account the possibility of geographical and thematic distributed repartition;
- are pan-European, of national interest, regional (intra and cross-border) and addressable to user communities identified by utility criteria;
- have an open access character;
- have a critical mass of specialists able to support the operation anddevelopment of high-quality research activities, that involve the acquisition of new breakthrough knowledge

3.3 Types of Infrastructures

Organized according to their level of maturity:

- **Emerging RIs**: RIs in the phase of synchronization with the stated objectives (feasibility studies, implementation/construction plans and cost-benefit analysis) with a relatively low degree of maturity, being in the process of structure and governance establishing and having high potential to reach active/landmark status until the next roadmap revaluation;
- **Active RIs**: RIs that are in the design and/or construction stage, on the basis of the realized feasibility study, with a high degree of maturity and a well-defined structure and governance;

- **Landmark RIs**: RIs that are already operational and need to support technological upgrades and/or to be maintained in an appropriate state of operation.

Organized according to the area of relevance/ interest:

- International / European, ESFRI / ERIC ;
- National
- Regional, serving a remarkable unique objective in its region of origin, which contribute to th developmentof the latter, but which areat the same time unique from a national perspective.

The following are not considered research infrastructures: individual equipment, universities or research institutes, research programs, research networks.

3.4 Benefits of research infrastructures

Romania is in the process of implementing its Strategy in the field of RDI, as a result of a broad consultation process that involved all relevant stakeholders from the field. The National RDI Strategy (2014-2020)[3] states that research infrastructures are an investment priority, as same as the development of human resources capacities, capable to ensure the proper use and operation of these infrastructures.

The National RDI Strategy (SNCDI 2014-2020), updated in February 2017, identifies the challenges of the 2014-2020 period of strategic programming, mainly related to the continuous process of strengthening the research infrastructures capacities and to their proper use to an optimal level. The aim is to ensure that research infrastructures provide transparent access to resources and provide to the economic, academic and research environment high quality value added services, compatible with the European and global standard of each research sub-area,

The benefits of developing RIs through the efficient and shared use of resources, dedicated to R&D and innovation activities, belong mainly to the technical and scientific domains, by contributing directly to the drive for innovation through new discoveries, technological process optimizations, product, services and technologies development, but also in the field of education, by helping to train new generations of specialists both for the needs of a specific knowledge field and for complementary economic and social domains.

In the medium to long term approach, the beneficial impact of investment in research infrastructure becomes visible across society, by creating new jobs and economic growth in related sectors.

The Report "*The Economic Rationale for Public R&I Funding and its Impact*"[4] brings strong arguments in support of the clear contribution of investment in research and innovation to productivity and growth, quantifying RDI contribution to productivity growth in Europe by 15%, in the time period 2000-2013. Also, according to a recent study[5], an average 10% increase in investment in research would lead to productivity gains between 1.1% and 1.4%. Starting from the

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[3] Government Decision 929/2014 on National RDI Strategy 2014-2020

[4] *https://bookshop.europa.eu/en/the-economic-rationale-for-public-r-i-funding-and-its-impact-pbKI0117050/?CatalogCategoryID=Gj0KABst5F4AAAEjsZAY4e5L*

[5] *Koopmans, C C and Donselaar P (2015). Een meta-analyse van het effect van R&D op productiviteit. Economisch Statistische Berichten, 100 (4717), 518-521.*

European average investment in research of 2.03% of GDP in 2015, a 10% increase in RDI investment represents 0.2% of GDP and a 1.1% increase in labor productivity would mean an increase of 1.1% of GDP. In conclusion, this means a GDP growth in absolute terms from 0.2% to 1.1%, thus a multiplication effect of more than 5 times of the research investment reflected in GDP growth, as an average percentage across the EU countries.

Beside the quantifiable economic impact, research infrastructures are also expected to prove a societal impact, especially those which assume major construction and operation investments. On the short term, part of this impact materializes through aligning the Romanian research community to the highest international standards, and through the possibility gained by the Romanian researchers to collaborate with their foreign peers. Such research infrastructures provide opportunities to participate in common projects, funded nationally and/or though the EU's Framework Programs, such as Horizon 2020.

On the long term, the Romanian society at large benefits from the results of the research performed by these research infrastructures, sometimes developing new patented technologies (for those from the Eco-Nanotechnologies and Advanced Materials domain) and in most other situations by performing comparative studies to reveal Romania's situation compared to the other European, participant countries. At national level, it is easy to demonstrate the correlation between the investments in research infrastructures and the general level of societal welfare, while the products resulted from the research activity contribute to the general wellbeing of individuals, for instance the mobile phones and access the GPS are two of the most visible products that have already become indispensable. In this direction, it is vital for the research infrastructures to be used through an open access principle, to facilitate the quick circulation of research results in the national and international research community.

3.5. Time duration envisaged

2017 - 2025

3.6. Sources of financing

- National investment funds or included in the Strategy implementation tools (PNCDI 3, for example);
- European funds (POC, for example);
- Private funds;
- Other funds.

4. Methodological approach

The methodological approach was correlated with the areas of smart specialization and other three areas of public priority from the National Strategy of Research, Development and Innovation 2014-2020, both through the themes selected for the panels of experts and the evaluation grid.

The process of evaluation was structured as follows:

2 Stages of identifying research infrastructures

1. gathering a list of pre-identified RIs (included in previous documents of CRIC and national legislative documents)
2. organizing a new call for proposals of RIs

2 Stages in the process of evaluation

1. the self-evaluation stage
2. the evaluation stage

4.1. Chronology

December 2016	•Building the first version of the Methodology for elaborating the National Roadman and a report on the status of Romanian RIs (SIPOCA 27 experts); publishing of the Strategy Report regarding RIs in Romania by CRIC
April 2017	•Elaboration of the final version of the Methodology and of (self-evaluation instruments => which are afterwards approved by CRIC
May-June 2017	•Pre-identified RIs were asked to fill in the self-evaluation grid and provide all the necessary documents for their application – **the self-evaluation stage**
July - August 2017	•Forming the panels of experts (7panels x 12 experts) •Launching the call for new proposals of RIs (who are asked to fill in the self-evaluation grid and provide all the necessary documents - continuation of the self-evaluation stage) •All RIs are evaluated by the panels of experts – **the evaluation stage**
September – November 2017	•Elaboration of the National Roadmap by using the reports produced by the panels of experts.

4.2. Involved actors

- **CRIC** – the Committee had the role of supervising the implementation of the entire process;
- **The Romanian Ministry of Research and Innovation**, who is also the beneficiary of the SIPOCA 27 project, managed the team of experts, organized the call for proposals of new RIs and the panels of experts, as same as providing the financing all necessary actions;
- **UEFISCDI** – The Executive Agency for Higher Education, Research, Development and Innovation Funding – involved as partner in the implementation of SIPOCA 27 project; provided two experts;
- **RI representatives**, who provided all the required documents for evaluation;
- **the 84 experts** that applied the previously built instruments and evaluated the research infrastructures.

4.3. Evaluation criteria

No. crt.	Criteria	Explanation
1	**Conformity with the definitions of research infrastructures**	• the extent to which the proposed proposal is in line with the RI definitions formulated by ESFRI and EU Regulation no. 651/2014 of 17 June 2014 (definitions also assumed by the CRIC members in the 2016 Strategic Report); * elimination criterion - if this criterion is not met, the proposal would not go further in the evaluation process.
2	**National relevance**	• the RI's capacity to contribute to the achievement of certain strategic objectives included in the RDI Strategy of Romania; • whether the RI is included in the Strategy Report, developed by CRIC in December 2016;
3	**Scientific relevance**	Added-value from a scientific point of view or potential in this regard. Sub-criteria • the unique character at national level of the proposed RI (elimination criterion); • the RI's capacity to produce dramatic changes in the scientific field to which it belongs; • the RI's capacity to operate at the highest international standards (eg affiliation to international research organizations/ programs);
4	**Feasibility and sustainability**	• RI' s capability to generate additional revenue comparable to its operating and maintenance costs; • if the RI disposes of human resources with recognized experience and expertise in international projects;
5	**Utilization**	• RI's open access character (but not necessarily free); • the existence of expressions of interest from other organizations/ researchers from Romania or from abroad; • the existence of expresions of interest from the private environment;
6	**Socio-economic relevance**	• RI's relevance in the context of big societal challenges; • RI's potential for major economic impact on the development region where it is built; • the existence of socio-economic impact studies.

4.4. Evaluation instruments

1. **the Research Infrastructure fiche** – As part of the RI's set of documents for evaluation, this instrument was built on the model of the ESFRI Roadmap, but without imposing on a number of characters limit, which allowed RI representatives to broadly give arguments on topics such as: the chronology of events, the type(s) of services provided or that they will provide, context of RI, steps in implementation etc.
2. **The self-evaluation grid** – This instrument is similar to the evaluation grid, but it does not contain the fields for giving ratings. In the Excel document, RI representatives could give arguments in support of their answers to the evaluation questions built on the above-

mentioned criteria;

3. **The evaluation grid** - This instrument was used by the 84 evaluation experts on the basis of the information provided by RI representatives in the self-evaluation grid and through the rest of requested documents.
4. **The research infrastructures file** (see below all its components).

Each RI was analyzed and evaluated on the basis of a file with documents filled in or provided by RI representatives. The RI files were comprised of the following documents:

- the RI fiche filled in by representatives of each RI;
- the self-evaluation grid filled in by RI representatives;
- impact study (if there is any);
- Europass CVs for all members of the permanent research team;
- expressions of interest – to support the answers given to questions 11 and 12 from the self-evaluation grid;
- supporting documents that can demonstrate the open access character;
- other supporting documents that can support the answers offered to the questions from the self-evaluation grid.

4.5. Organizing the panels of experts

The purpose of these panels was to evaluate the research infrastructures involved in the process and to identify national research and development priorities. Panel members participated in online and, where appropriate, face to face (consensus) meetings, to conclude on the research infrastructures to be included in the National Roadmap for their field of work.

Panel fields:

1. **Energy, Environment and Climate Change** (field of smart specialization from the National Strategy) – correlated with the Energy and Environment fields of the ESFRI Roadmap;
2. **Bioeconomy** (field of smart specialization from the National Strategy) – correlated with the Health and Alimentation field of the ESFRI Roadmap;
3. **Eco-Nanotechnologies and Advanced Materials** (field of smart specialization from the National Strategy) – correlated with the Physical Science and Engineering field of the ESFRI Roadmap;
4. **Information and Communication Technology, Space and Security** (field of smart specialization from the National Strategy) - correlated with the E-Infrastructure field of the ESFRI Roadmap;
5. **Health** (public priority area of the current SNCDI strategic cycle) - correlated with the Health and Nutrition field of the ESFRI Roadmap;
6. **Social and Cultural Patrimony** (public priority area of the current SNCDI strategic cycle) - correlated with the Social and Cultural Innovation field of the ESFRI Roadmap;
7. **New and Emerging Technologies** (public priority area of the current SNCDI strategic cycle) - Correlated to Physics and Engineering in the ESFRI Roadmap.

The aim of the panels of experts was to evaluate the RI proposals in order to establish which ones

are eligible for being included in the National Roadmap with research infrastructures. Thus, 7 panels were organized, one for each field named above. And the members of each panel had to evaluate the proposals under its field on the basis of the document files provided by the representatives of each RI, and by using the evaluation grid as instrument.

5. List of Romanian Research Infrastructures, organized according to their level of maturity and to 7 fields of research

After the evaluation process that took place between July and August 2017, the following Research Infrastructures resulted:

5.1. Energy, Environment and Climate Change

(SNCDI field of smart specialization - correlated with ESFRI's "Energy" and "Environment" domains)

RI Type	ESFRI Domain	Mode of intervention	RI acronym	Area of relevance
Emerging RIs	Energy	Feasibility studies, implementation / construction plans and cost-benefit analysis	ALFRED	European (potential ESFRI)
			CCAP	National
	Environment	Feasibility studies, implementation / construction plans and cost-benefit analysis	REXDAN	Regional cross-border
			ECOCIM	National
			CERNESIM	Regional intra-border
Active RIs	Energy	Construction and operationalization according to feasibility studies and implementation plans	COMTERGAZ	National
			RENEWS	National
	Environment	Construction and operationalization according to the commitments assumed through participation in ESFRI / ERIC and / or feasibility studies and implementation plans	EPOS	European (ESFRI)
			DANUBIUS-RI	European (ESFRI)
			ACTRIS	European (ESFRI)
			ICOS	European (ERIC)
			LIFEWATCH	European (ERIC)
			DECENEU	National
Landmark RIs	Energy	Technology refurbishment, upgrading and extension of existing facilities	PESTD	National (HG 786/2014)
	Environment	Technology	EMSO-EUXINUS	European (ERIC)

		refurbishment, upgrading and extension of existing facilities	RO-RSN	National (*HG 786/2014*)
			CAART	National (*HG 786/2014*)
			Mare Nigrum 2	National (*HG 786/2014*)
			Steaua de Mare2	National (*HG 253/2015, HG 579/2015*)

5.2. Bio-economy

(SNCDI field of smart specialization correlated with ESFRI's "Health & Food" domain)

RI Type	ESFRI Domain	Mode of intervention	RI acronym	Area of relevance
Emerging RIs	**Health & Food**	Feasibility studies, implementation / construction plans and cost-benefit analysis	RoRIC-NeXT-BioNAN	National
			AnimBio	National
			FoodStream	National
			AqRI	National
Active RIs	**Health & Food**	Construction and operationalization according to commitments assumed through participation in ESFRI	EU-OPENSCREEN	European (ESFRI)
			METROFOOD	European (ESFRI)
			MIBIRO	European (ESFRI)

5.3. Eco-Nanotechnologies and Advanced Materials

(SNCDI field of smart specialization, correlated with ESFRI's "Physical Sciences & Engineering" domain)

RI Type	ESFRI Domain	Mode of intervention	RI acronym	Area of relevance
Emerging RIs	**Physical Sciences & Engineering**	Feasibility studies, implementation / construction plans and cost-benefit analysis	INOVABIOMED	National
			INFRATECH	National
Active RIs	**Physical Sciences & Engineering**	Construction and operationalization according to the commitments assumed through participation in	KM3NeT 2.0	European (ESFRI)
			CERIC – ERIC	European (ERIC)
			HL-LHC	European (ESFRI)
			SPIRAL 2	European (ESFRI)
			FAIR	National

		ESFRI / ERIC and / or feasibility studies and implementation plans	RiTecC	National
			CENASIC	National
			CSSNT-UPB	National
			CoSMoS	National
			ReCAST	National
			UNIREM	National

5.4. Information and Communication Technology, Space and Security

(SNCDI field of smart specialization, correlated with ESFRI's "E-Infrastructures" domain)

RI Type	ESFRI Domain	Mode of intervention	RI acronym	Area of relevance
Active RIs	***E-Infrastructures***	Construction and operationalization according to commitments undertaken according to feasibility studies and implementation plans	DISTRICT	National
Landmark RIs	***E-Infrastructures***	Technology refurbishment, upgrading and extension of existing facilities	AEROSPAȚIAL	European ESFRI
			IMT-MINAFAB	International/European

5.5. Health

(Public Priority Area of the current SNCDI strategic cycle, correlated with the "Health & Food" domain of ESFRI Roadmap)

RI Type	ESFRI Domain	Mode of intervention	RI acronym	Area of relevance
Emerging RIs	**Health & Food**	Feasibility studies, implementation / construction plans and cost-benefit analysis	GE_NANOBIOMED	National
Active RIs	**Health & Food**	Construction and operationalization according to the commitments assumed through participation in ESFRI / ERIC and / or feasibility studies and implementation plans	RITM EATRIS	European (ERIC/ESFRI)
			RoBI	National
			CAREVASC	National
			CONCEPT	National
			INSPIRE	National
			CRCBABI	National

5.6. Social and Cultural Heritage

(Public Priority Area of the current SNCDI strategic cycle, correlated with ESFRI's "Social & Cultural Innovation" domain)

RI Type	ESFRI Domain	Mode of intervention	RI acronym	Area of relevance
Emerging RIs	**Social & Cultural Innovation**	Feasibility studies, implementation / construction plans and cost-benefit analysis	E-RIHS RO	Europeană (ESFRI)
			CINETIc	National
Landmark RIs	**Social & Cultural Innovation**	Technology refurbishment, upgrading and extension of existing facilities	CESSDA-RODA	European (ESFRI)
			ESS-RODA	European (ESFRI)

5.7. New and Emerging Technologies

(Public Priority Area of the current SNCDI Strategic Cycle, correlated with ESFRI's "Physical Sciences & Engineering" domain)

RI Type	ESFRI Domain	Mode of intervention	RI acronym	Area of relevance
Emerging RIs	**Physical Sciences & Engineering**	Feasibility studies, implementation / construction plans and cost-benefit analysis	EcoDPD	National
			MobA	National
			INFRACITMP	National
			ECOSIN-MECATRON	National
			RO-OMICS	National
Active RIs	**Physical Sciences & Engineering**	Construction and operationalization according to the commitments assumed through participation in ESFRI / ERIC	ELI-NP	European (ESFRI)

* Fact sheets of these research infrastructures included in the National Roadmap are presented in Annex 2.

6. Recommendations

6.1. The funding of research infrastructures, grouped on the three relevant categories outlined above, will be made through specific programs, from national and European funding sources, differentiated and appropriately individualized, with adequate selection criteria, targeting to ensure fair competition within of each functional category (type of RI).

Thus, for **emerging infrastructures**, funding tools would be useful to develop the project preparation phases and documentation for the feasibility and economic & social impact of developing the specific RI.

For **active infrastructures**, funding tools should address the construction expenses and procurementof equipment, experimental facilities, research tools, or if these doesn't exist their design and manufacturing costs.

For **landmark infrastructures**, funding tools should cover the upgrading costs of installations, equipment and research tools, to reach the state-of-the-art functional parameters, and part of their operating costs.

6.2 The financing of the costs of maintenance and operation of research infrastructures in Romania must be a primary objective of R & D and innovation programs, as they prove to be knowledge-generating, interconnected (or having potential for interconnection) with similar infrastructures in the EU or in the world.

6.3 The construction of new research infrastructures must address certain specific needs, identified by the scientific community, in close cooperation with user communities of data and scientific information.

6.4 In the particular case of building / upgrading research infrastructures that participate directly (as a node / partner or other form of organization) in pan-European research projects, funding should be provided with priority. Subsequently, research-innovation projects that contribute to the knowledge development of certain Romanian scientific community or serve the user community in corresponding specific scientific areas must also be funded with priority.

6.5 European and international commitments (referring to participation in research infrastructures) previously undertaken by our country must be respected and receive major attention in the design of national research and innovation programs. Users (companies, national agencies, other researchers, general public) should be able to benefit without restriction of the results generated by scientific research infrastructures, with the corresponding protection of intellectual property rights and copyright.

7. Conclusions (CRIC)

It is recommended that funding for the costs of building (or upgrading) the research infrastructures contained in this Roadmap to be achieved in successive stages, depending on the financial resources obtained from European or national programs, by valorizing certain specific opportunities at any time. The operational costs should be partially covered from the national budget. It is also recommended to set up tools to develop the set of principles and the practical framework for maximizing the knowledge benefits offered by the research infrastructures national ecosystem.

CRIC notes that the lack of predictability in funding and excessive bureaucracy has led to delays in the implementation of research infrastructures development policy and raised difficulties in their performances maintenance and capacity to efficiently operate.

CRIC believes that future investments in research infrastructures, to be realized through different funding channels, should be fully and coherently designed to ensure complementarity, avoid the redundancies and especially target the progress of research results in scientific areas where Romania is competitive or has opportunities to become competitive. It is also advisable to develop the research infrastructures ecosystem by consortia, mainly collaborating on the basis of multidisciplinary thematic approach.

It is recommended to revise the national roadmap of RIs every three years, making a detailed analysis of all types of RIs (emerging, active, landmark) in order to:

a) Maintain in the roadmap those RIs that show real progress;
b) Passing RIs from one category to another depending on the attaining of the indicators assumed in the operational plan;

c) Excluding from the roadmap of those RIs that do not show progress (according to the operational plan) or do not anymore prove their scientific viability.

The review of the national roadmap will be based on the quantitative and qualitative assessment of the achievement of the reported performance indicators, which should address scientific-technical parameters and socio-economic impacts.

CRIC will review the Roadmap implementation methodology by:

- Organizing "info days" to explain the principles ruling the activity of an efficient RI, as well as the selection methodology for being included in the national roadmap;
- Develop of a complete set of better-organized forms containing information about RIs, in order to allow a proper evaluation of their activity reports and/or proposals for creating new RIs;
- More clear structuring of the Research Infrastructure Sheet, with clear filling instructions (templates) and text limitations, eliminating redundancies and requiring a mandatory English abstract (for public promotion);
- Imposing a mandatory chapter containing a detailed RI operational plan (with yearly key performance indicators mentioned explicitly).

All research infrastructures in the current National Roadmap are open to collaboration with private partners, relevant to all five existing European Innovation Partnerships[6] (EIPs). However, their participation in the EIPs is premature because the EIPs are not yet operational, according to the independent expert report: "The Expert Group recommends improvements in the implementation of the current EIPs and calls for a second iteration of EIPs based on modified targets and approach ".

In this situation, we do not recommend targeting and allocating resources to participate in existing EIPs.

For the research infrastructures mentioned in the current National Roadmap, which are not unique in Romania, exists the possibility and we recommend to develop ERIC-RO type consortia, establishing truly unique networks with very high scientific potential, by means of consortia of funding agencies from Romania (analogous to ERIC structures at European level).

This can be done also by re-activating jointly sector plans of the Ministry of Research and Innovation, the Ministry of Environment and the Ministry of Energy, in order to ensure financial sustainability and the take-up of research results from identified RIs.

[6] https://ec.europa.eu/research/innovation-union/index.cfm?pg=eip

Energy, Environment and Climate Change

ROADMAP 2017

Energy, Environment and Climate Change

ALFRED

Advanced Lead-cooled Fast Reactor European Demonstrator Infrastructure

Type: European, single-sited

Coordinator: RO
Participants: IT

Coord. Institution in RO: State Owned Company "Technologies for Nuclear Energy - Institute for Nuclear Research" (RATEN ICN)

Estimated costs in RO:
- construction: 1405 MIL EUR (65 MIL EUR up to 2023, 1340 MIL EUR after 2023)
- operation: 5.5 MIL EUR/ year up to 2027; 35.8 MIL EUR/year after 2027

Locations (coordinator & RO)

RO: RATEN ICN
Str. Campului, nr. 1
POB 78, 115400
Mioveni, Argeș

Website/s:
www.nuclear.ro
www.alfred-reactor.eu

Strategic Research, Development and Innovation infrastructure of pan-European relevance to demonstrate the Lead-cooled Fast Reactor technology

Description

ALFRED is a unique research infrastructure gathering a pan-European interest and support from academia, research, industry and safety authorities, aiming to prove the technical and economic viability, as well as the safety and sustainability of the Lead-cooled Fast Reactor (LFR) technology for the new generation of nuclear systems, including Small Modular Reactors designs.

The ALFRED Project includes a demonstration reactor, and a kernel of support facilities: ATHENA, ChemLab, ELF, HELENA2, Hands-ON and Meltin'Pot, complemented by the HUB and Lead School - Center of Excellence (CoE).The Hub, located also at RATEN ICN premises in Romania, will coordinate the research activities in synergy with a network of additional facilities distributed in Europe. The CoE will deliver world-class education and training to researchers, technicians and students, as well as information to the general public.

Scientific context and relevance

Sustainable, secure, safe and affordable energy supply is the main challenge presently faced worldwide. Europe in particular is strongly committed to lead the scenes, with extremely ambitious targets and policies. In this scenario, nuclear will play an important role in the energy mix, provided it demonstrates its capability to face the main challenges of the energy market.
Boosted by research and innovation, Generation-IV nuclear energy systems are materializing as a sound, competitive and mature answer. For this reason, Romania shares the EU vision in selecting the Lead-cooled Fast Reactor (LFR) as one of the most promising Generation-IV technologies, and supports ALFRED as a mandatory strategic step, serving a three-fold purpose::
demonstrate the performances achievable by the LFR technology, as a cornerstone for the deployment of next generation nuclear energy systems;
provide the largest and most relevant experimental environment, accessible to European scientists and technicians for basic to applied nuclear research and development;
support, in the long-term, innovation for the safe and sustainable operation of future plants, sustaining the continuous upgrade of nuclear standards to higher and higher scores.
The whole research infrastructure will boost innovation towards higher levels of technological readiness, also in a number of other sectors, sharing cross-cutting aspects determined by the use of lead and Heavy Liquid Metals (HLM).
The key areas embraced by the ALFRED Project will be:
basic materials science and engineering in HLM environment;
basic HLMs physics and chemistry;
HLM technology development;
advanced components engineering for HLM-based systems (including development, testing and qualification);
advanced operation, inspection and maintenance procedures development and qualification for HLM-based systems.

Stage of implementation in Romania

ALFRED achieved a political commitment at national, regional and local levels. The roadmap for ALFRED implementation is structured in 4 phases: Viability, Preparation, Construction and Operation, with the first one planned for completion in 2018. Notably, several milestones were achieved in 2017:

renewal of the Fostering ALFRED Construction (FALCON) consortium between RATEN ICN, Ansaldo Nucleare and ENEA, coordinating the European efforts on the Project;

involvement of the Romanian industry (through a cooperation with ROMATOM - Romanian Atomic Forum Association) in the supply chain for engineering and construction of the infrastructure;

dialogue with the Romanian safety authority to identify the applicable licensing process and the required safety demonstration program;

consociation key Romanian education and training actors to timely qualify the required human resources.

ROADMAP 2017

Energy, Environment and Climate Change

CCAP

The Advanced Propulsion Research Center

Type: national IC

Coordinator: RO
Participants: RO

Coord. Institution in RO: Research and Development Institute for Gas Turbines COMOTI

Estimated costs in RO:
- construction: 6 mil. EUR ,endowment cost 7.5 mil. EUR
- operation: approx. 1.3 mil. EUR/year

Locations (coordinator & RO)
RO: Research and Development Institute for Gas Turbines COMOTI, 220 D Iuliu Maniu Bd., sector 6, code 061126, OP 76, CP174, Bucharest, Romania.

Website/s:
https://erris.gov.ro/Gas-turbines-and-jet-engines

Coordinating institution:
http://www.comoti.ro

The Advanced Propulsion Research Center will be a pole of excellence in concepts for aeronautical, naval and space propulsion.

Description

The Advanced Propulsion Research Center (APRC) is designed to provide an environment suitable for visionary researchers to create and develop innovative concepts for propulsion systems in aeronautics, naval and space. The research activity is geared towards providing knowledge to scientists, being able to conribute to boosting the competitiveness of European transportation and space industries.

ARPC will provide fundamental research services, CFD analysis, FEA analysis, 3D modeling, applied research, design, development, technology transfer and will train researchers in the field of propulsion systems for aeronautics, naval, ground and space propulsion, mechanics, electrical and gas dynamics for power groups, electricity generation and environmental protection.

CCAP supports the sustainable development of a knowledge-based society.

Scientific context and relevance

The need for the initiation of the Advanced Propulsion Research Center has emerged as a natural outcome of the research activities carried out by the Romanian Research and Development Institute for Gas Turbines COMOTI. Thus, in 2000, the Romanian Research and Development Institute for Gas Turbines COMOTI developed and commissioned two cogeneration lines for the production of electric and thermal energy with an aero-derivative gas turbine, and in the period 2002-2003 two cogeneration lines, using an industrial gas turbine. Since 2000, the Romanian Research and Development Institute for Gas Turbines COMOTI has been constantly involved in projects funded by the European Commission in the field of aeronautical propulsion and by the European Space Agency in the field of propulsion and space exploration. At present, COMOTI performs research activities in the field of naval propulsion systems modernization and is involved in ground based propulsion systems research.
Between 2008 and 2013 the modernization and development of the experimental base for turbo engines was carried out. The new infrastructure includes three test cells for turboshafts and micro-gas turbine engines, a command and control room, engine preparation chambers for testing, a water cooling tower for test rig installations, enclosures equipped with installations for supplying liquid and gas fuel, as well as the metal infrastructure of the turbo engine test bench.
The test cells and the control room have been equipped with modern, high-tech equipment, comparable to those of other similar facilities in countries with a tradition in the field.
APRC will provide research activities focused on societal needs related to security, energy efficiency and well-being, in synergy with the European Research Area, and will help to increase European cohesion through openness and collaborative initiatives in projects of community interest which target aeronautical, naval, ground and space propulsion.

Stage of implementation in Romania

So far, the feasibility study for the investment project in developing the logistics research base of the Romanian Research and Development Institute for Gas Turbines COMOTI, with the objective of creating an Advanced Research Center for Propulsion, and the architecture project on the implementation of the required anteproject for the urbanism certificate have been completed, as well as feasibility study for the research administrative building of the Advanced Propulsion Research Center. In order to secure financing and continue the implementation, it is intended to participate with a project proposal at the next call for proposals under the 2014-2020 POC Program, Priority Axis 1, Action 1.1.1., and also to identify other national and / or European financing sources, and the continued endowment of the test cells using own and other financing sources.

Socio-economic impact

The project will lead to a significant increase in the volume of intellectual property and an appropriate development of technological transfer possibilities to industry, contributing to increased economic competitiveness and helping to attract the new generation of researchers, creating the material conditions for a significant scientific career in Romania.

ROADMAP 2017

Energy, Environment and Climate Change

REXDAN

Integrated System for Complex Research and Monitoring of the Danube River Area

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: "Dunarea de Jos" University of Galati

Estimated costs in RO:
- construction: 31.1 MIL. EUR
- operation: 3.3 MIL. EUR/ year

Locations (coordinator & RO)
RO: :"Dunarea de Jos" University of Galati, Domneasca Street, no. 47, 800008, Galati, Romania

Website/s:
www.ugal.ro

A Pan-European Interdisciplinary Research Infrastructure which aims at a comprehensive research and monitoring of the Danube River area.

Description

Creating a complex research infrastructure (RI) consisting in: A Reasearch Centre made up of excellence research laboratories, storage and data delivery services, experimental facilities with state-of-the-art equipment, conference rooms, and a river research ship. The RI will operate along the Danube (the research ship will cover the Danube in the Romanian territory being able to navigate for research purposes approx. 2000 km), in the pre- and deltaic areas and in the tributaries confluence areas.

The results of the research and development activities will consist in modelling, obtaining forecasts and determinations of the economic and social human activities impact which will be transformed into research services for carrying out environmental impact studies, adequate evaluations for complex ecosystem monitoring and will be associated with various investment projects in the investigated area.

Scientific context and relevance

The field of research approached through the project is of national and international priority, the problem of environment and climate change being one of the most pressing issues of the contemporary era, and the area of application targetted is the Danube basin. The REXDAN project is a reference RI in an interdisciplinary research field in the followibg domains: environment and climate change and optimal use of unconventional water resources. The proposed research infrastructure has a unique character for surface waters in Romania and especially for the Danube.
The novelty of this project results from: the scientific research (methods, integrated approaches, large-scale simulations, etc.) and the use of newly created infrastructure by interested companies and institutions.

The RI aims at using world-class multidisciplinary analytical methods, but also at supporting research in order to find new, worldwide specific methods validated during the implementation of activities.
The basin approach is a novelty for Romania. The project aims at ensuring the determination of biodiversity in coastal areas by conducting water, soil and sediment extractions from adjacent flood plains, as well as by making research on biodiversity at plant and animal levels, flow regime, complex modelling of the evolution of the Danube bed.
This is the first integrated system project at national and European levels which allows the correlation of systematic research with a holistic, multidisciplinary approach, the institutionalization of impact studies and appropriate evaluations for economic and social purposes in the riverside areas, the establishment of a scientific and strategic bases for the Danube basin. The project offers the possibility of expanding the research with international teams in different sectors of the Danube.

Stage of implementation in Romania

Efficiency in solving environment-related issues is of utmost importance nowadays. and obtaining innovative results from research activities is conditioned by access to high-quality technical conditions.

At present, "Dunarea de Jos" University of Galati, with its research infrastructure, carries out activities of the type proposed by the project on limited research areas (about 200 km).The experimental determinations are made after the transportation of the samples, aspect which affects the quality and continuity of the results. The activities carried out in the laboratories of the research ship will allow new approaches in the field of environment and climate change and the optimal use of unconventional water resources targetted on the Danube. This will lead to the development of the RDI activities carried out by the University, providing openness for interdisciplinary research in Romania and a solid basis for international partnerships.

Socio-economic impact

REXDAN will provide scientific basis for the development and modernization projects of the Danube riverside area which will fit into the objectives of the Danube Strategy.The results of the research will be used by over 800 companies/institutions which are subject to the Corporate Responsibility Directive 2014/95/EU. The RI corresponds to the priorities defined at the UGAL level.

ROADMAP 2017

Energy, Environment and Climate Change

ECOCIM

Integrated Center for Environmental Research

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: National Research and Develoment Institute for Industrial Ecology - ECOIND

Estimated costs in RO:
- construction: 8.18 MIL EUR
- operation: 1.53 MIL EUR/year

Locations (coordinator & RO)
RO: National Research and Develoment Institute for Industrial Ecology - ECOIND, Drumul Podul Dambovitei Street, no. 71-73, sector 6, Postal Code 060652, Bucharest, Romania

Website/s:
http://www.incdecoind.ro

Complex and Open access Research Infrastructure targeted on environmental protection and industrial ecology. The Research Infrastructure will be complementary to the one already existing in ECOIND and will facilitate the approach of breakthrough and emergent topics in environmental protection and control in a complex and integrated way.

Description

The Research Infrastructure will be comprised of 5 related inter-disciplinary laboratories in order to achieve a consistent trans-disciplinary approach with high scientific impact covering the most recent environmental topics.

Laboratory of Emergent Contaminants Detection will be targeted on identification of unconventional pollutants (emergent contaminants and their biotranformation products) which are currently discovered in all environmental factors with adverse effects on the environment and the human population health which are not entirely known.

Laboratory of Biodegradation Mechanisms and Metabolites aims to expand the high-quality research on biodegradability / bioaccumulation / biotransformation of chemicals / products and materials resulted from anthropogenic activities, focusing on recalcitrant metabolites.

Laboratory of Environmental Microbiology and Biosensors will focus on two complementary pathways based on microbiological models and proteomic technics, as well as on the development of matrices for microbiological biosensors.

Laboratory for Research and Evaluation of Emergent Emissions in Interior Air will concentrate the information in open access data bases and will allow the development of complex and complete studies concerning air quality.

Laboratory of Integrated Technologies for Wastewater Treatment will comprise a unique material base at national level including equimpments used to optimize wastewater treatment processes and also the development of new chemical and biological processes.

Scientific context and relevance

The research topics which will be approached by the Laboratory of Emergent Contaminants Detection are focused on determination of emergent contaminants and their biodegradation products from environmental factors (water, sediments) and also from living organisms (biota) with the aim of establishing the transfer and bioaccumulation mechanism in the latter and also the mechanism of biotransformation of parent compounds to metabolites. In this context there will be an extension in the number of monitored biological matrices: aquatic vegetation, invertebrates, fish, etc. In order to determine emergent contaminants from these complex matrices there will be developed advanced analytical methodologies based on high-performance analytical techniques such as On-line SPE, PLE, UAE coupled with LC-MS/MS and GC-MS/MS separation and detection techniques.
The Laboratory of Biodegradation Mechanisms and Metabolites aims to analyze at the molecular level the biological processes involved in biodegradations and their metabolites. In this lab, a multidisciplinary approach will correlate the presence of specific metabolites (identified by physicochemical technics) with particular biodegradation pathways (identified by biochemical and molecular biological approaches).
The research carried out in the Laboratory of Environmental Microbiology and Biosensors will allow, among other aims, to monitor the presence and the toxic potential of pollutants on aquatic organisms through bacterial biosensors based on bacterial biomarkers induced at transcriptional and translational levels. Obtaining bacterial biosensors for the detection and monitoring of environmental pollutants is based on the correlation between the specificity of the bacterial defense response (the type of biomarkers expressed) against a particular pollutant.
Currently the research and evaluation activities on the topic of interior air emergent emissions is underdeveloped and divised being mainly targeted on different topics like public health, air quality, thermal efficiency of buildings without a proper link between these topics and without the possibility to share individual experience of the research groups and existent databases. The Infrastructure will allow the increase in the number of identified and quantitated compounds in interior air of buildings, the evaluation of emissions produced from materials, mathematical modeling of smell dispersion and the evaluation of olfactive disconfort produced inside buildings and will facilitate the development of unified open access databases.
Laboratory of Integrated Technologies for Wastewater Treatment shall be endowed with equipments which will allow testing of both classical and hybrid technological variants used in wastewater treatment processes in order to determine the technological configurations and to optimize the process parameters in real-life functioning conditions. The laboratory will allow testing of homogeneous / heterogeneous advanced oxidation, sonolysis, microwaves, UV-LED processes, and also new materials for micro and nano-strucutred semiconductors with respect to their photocatalytic properties, usage of membrane separation processes (MF, UF, RO/NF) in continuous flow, synthesis of bio-preparations (pro-biotics, pre-biotics, eubiotics) with applications in environmental biotechnolgies.

Stage of implementation in Romania

The presented Research Infrastructure is currently in a project phase.

The new infrastructure was generated on the basis of the POS CCE INFRAECO and MEDIND projects, co-financed by the European Fund for Regional Development, which allowed the development of new research directions inside INCD-ECOIND, such as: advanced research for ecotoxicological characterization of prioritary/hazardous pollutants, xenobiotic and emergent substances, micropollutants and the integral evaluation of the risk generated for aquatic and terrestrial ecosystems; characterization of the different industrial waste types for their classification according to current legislative requirements; alternative methods to express the biodiversity degree in ecologic systems and ecosystemic services; evaluation of the smell levels generated by industrial processes through implementation of dynamic olfactometry method, etc.

Socio-economic impact

By promoting the multidisciplinary collaborations with other national or European research institutes and private enterprises the proposed Infrastructure can achieve a highly competitive status in Environmental research.

ECOCIM
CENTRU INTEGRAT DE CERCETĂRI PENTRU MEDIU

ROADMAP 2017

Energy, Environment and Climate Change

CERNESIM

Integrated Environmental Studies Center for the North-East Development Region

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: Alexandru Ioan Cuza University of Iași

Estimated costs in RO:
- construction: 7.10 MIL EUR
- operation: 0.350 MIL EUR/year

Locations (coordinator & RO)
RO: Integrated Centre of Environmental Science Studies in the North East Region/CERNESIM, 11 Carol I, 700506, Iasi, Romania

Website/s:
https://uaic.ro;
http://cernesim.uaic.ro/index.php

The CERNESIM Center performs integrated environmental research studies and assesses the anthropic impact on climate change at regional level.

Description

Through its organizational structure and infrastructure the CERNESIM Centre enables an integrated systemic approach of various environmental issues for a better understanding of the natural and social phenomena occurring in the environment, involving climate change by following causes and impacts, prevention and mitigation of unwanted changes in the environment at both long and medium term levels. The CERNESIM Centre of "Alexandru Ioan Cuza" University of Iasi is a research unit structured in 5 research laboratories: L1 Laboratory of physico-chemical analyses; L2 Laboratory of bio-monitoring and bioremediation of environmental quality; L3 Laboratory for the investigation of physico-chemical processes from atmosphere and for testing new ecological technologies for gaseous pollutants sinks; L4 Laboratory of environmatic; L5 Laboratory of environmental economics investigation and analysis.

Scientific context and relevance

The ability to predict the behaviour of pollutants in the environment in different contexts (calamities, accidental pollution) and time periods (hours, years) can bring great benefits to society and the economy. Pollutant monitoring programs running at international level aim at assessing their level in air, water and soil. At European level, precise and sufficiently comprehensive information on the distribution of many pollutants is collected and stored. Unfortunately, Romania's contribution to the achievement of the European Atlas presenting the synoptic picture of the concentration of pollutants in the environment throughout Europe is almost insignificant, unsystematic and arrhythmic. This action is vital to the efforts of the European nations, which is also underlined in the Paris 2015 United Nations Framework Convention on Climate Change Conference. Trustworthy, objective and highly reliable data at European level should be provided to the local, national and European community in terms of the identified and quantified species. This will allow responsible actors to take appropriate action and to ensure that the population is correctly and in time informed on the real state of the environment. The enormous diversity of pollutants in all compartments of the environment makes their identification, quantification and control as complex and diverse as their huge number. The CERNESIM Centre, through its facilities, in a unique assembly at national and Eastern European level, can provide new data on the distribution of pollutants characteristic for the north-eastern region of Romania. CERNESIM can help increase the quality of environmental research. The newly created laboratories provide researchers suitable tools to carry out analyses, studies and simulations on environmental issues such as pollution levels, to investigate the applicability of clean technologies, investments and environmental projects, and the economic modelling of environmental processes.

CERNESIM

Stage of implementation in Romania

CERNESIM Center is a newly created center at "Alexandru Ioan Cuza" University of Iasi, accessing European funds through the project no. 901 (SMIS / CNRS 13984, Contract no. 257 / 28.09.2010) in POS CCE-AP2 / D2.2 / O2. 2.1 programme. The CERNESIM project aimed at modernizing and endowing laboratories at the "Alexandru Ioan Cuza" University of Iasi, allowed realizing a new research unit, namely CERNESIM Center. The new structure is equipped with over 770 RD equipementa, IT and other tangible and intangible RD assets, of which 16 RD equipments are worth over 100,000 euros, including the ESC-Q-UAIC infrastructure, some of them unique at national and Est-European level. At the moment, almost four years after the end of the implementation period, the CERNESIM Center is involved in 8 research projects and managed to hire 10 researchers and 4 laboratory staff.

Socio-economic impact

The CERNESIM Center supports and promotes multidisciplinary and multinational collaborations through cooperation with other European initiatives. In the last two years, CERNESIM has been involved in the European ENVIREE (ERANET) project and since 2016 ESCQ-UAIC-CERNESIM is a partner in the EUROCHAMP-2020 consortium, one of the most advanced atmospheric simulation chamber in Europe.

ROADMAP 2017

Energy, Environment and Climate Change

COMTERGAZ

Thermo-gas Dynamic Complex

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: Research and Development Institute for Gas Turbines COMOTI

Estimated costs in RO:
- construction: 13.6 MIL. EURO
- operation: approx. 1 MIL. EUR/year

Locations (coordinator & RO)
RO: Research and Development Institute for Gas Turbines COMOTI, 220 D Iuliu Maniu Bd., sector 6, code 061126, OP 76, CP174, Bucharest, Romania.

Website/s:
https://erris.gov.ro/Thermo-Gas-Dynamics-Complex

Coordinating institution:
http://www.comoti.ro

Development and improvement of research and innovation infrastructure for gas turbine engine components.

Description

Currently, the existing infrastructure may be used for experimental measurements and performance and vibration tests on compressors and combustion chambers at medium pressure and flow rates, including the combustion of non-conventional and renewable gaseous and non-conventional fuels (gasification, biomass, bio-fuels).

The expansion aims to create conditions for additional services such as: experimental measurements and testing of combustion chambers at pressures up to 30 bar and flow rates of up to 10 kg/s, the expansion of the capabilities in the area of unconventional fuels combustion (Hydrogen, acetylene), very high speed LASER measurements, high-precision measurements in gas turbine bladings, prototype manufacturing using 3D print of metallic materials, defectoscopic investigation of turbine engine components by industrial tomography techniques.

Scientific context and relevance

The economic and political security of Romania and of the E.U. depend critically on a safe and continuous production of energy. From the environmental impact point of view, in 2009, the burning of fossil fuels for energy production caused 74.6% of the total greenhouse gas emissions in Europe. In this context, a major reduction of these emissions and a significant improvement in efficiency are needed. The generation of energy through gas turbine engines accounts for a very large proportion of the total energy produced by burning fossil fuels. Therefore, it is necessary to improve their performance, which requires in-depth and detailed analysis of the relevant processes and phenomena. Current research in the field of aviation and industrial gas turbine engines mainly focuses on the development of gas turbine engines with a high degree of air compression and very high dilution ratios, the development of new combustion technologies, the development of materials capable of withstanding extreme thermal loads and increasing the efficiency of compressor and turbine bladings. These directions require an integrated scientific and technical approach, based on a high-precision and accurate experimental and numerical infrastructure, close to the fundamental research requirements.
With the proposed extension, the following relevant areas are considered: optimization of the flow in highly aerodynamically loaded compressor bladings; reduction of secondary flows and aerodynamic losses in compressor and turbine bladings; reduction of mixing losses, increasing flame stability in the fuel-lean mixture zone, uniformizing and stabilizing the thermal and aerodynamic field in the secondary combustion turbine bladings; analyzing the effects and characteristics of detonating combustion and reducing the noise and vibration level it produces.

Stage of implementation in Romania

The Threrm o - Gas Dynamic Complex is included in the National Interest Installations list. Currently, it is intended to expand the existing infrastructure with a building, auxiliary spaces and related equipment and utilities, located in the immediate vicinity of the existing Complex. COMOTI elaborated, using internal financing sources, the architectural pre-project and the preliminary documentation, based on which the Urban Planning Plan for regulating the buildings and related facilities placement and construction was approved. The expansion plan is currently in the design phase.

Given the value of the investment, it is intended to participate with a project proposal at the next Call for Proposals under the 2014-2020 POC Program, Priority Axis 1, Action 1.1.1., as well as the identification of other national and / or European financing sources, including in synergy with other projects.

Socio-economic impact

The project will lead to a significant increase in the volume of intellectual property and an appropriate development of technological transfer possibilities to industry, contributing to increased economic competitiveness and helping to attract the new generation of researchers, creating the material conditions for a significant scientific career in Romania.

ROADMAP 2017

Energy, Environment and Climate Change

RENEWS

Research Center in Energy-Environment-Water-Systems

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO:
University POLITEHNICA from Bucharest

Estimated costs in RO:
- construction: 15 MIL. EUR
- operation: approx. 2 MIL. EUR/year

Locations (coordinator & RO)
RO: University POLITEHNICA from Bucharest, Splaiul Independenței, no. 313, District 6, Bucharest, RO-060042;
National Institute for Research and Development ICPE – CA, Splaiul Unirii no. 313, District 3, Bucharest, RO-030138;
National Institute for Research and Development for Energy ICEMENERG, Blvd. Energeticienilor, No. 8, District 3, Bucharest, RO-032092;
National Institute for Research and Development for Cryogenic and Isotopic Technologies ICSI, Str. Uzinei no. 4 , Rm. Vâlcea, County Vâlcea, RO-240050.

Website/s:
https://
www.energ.renews.pub.ro

Integrated Research Infrastructure for Energy-Environment-Water Applications, RII - RENEWS (Research Infrastructure in ENergy-Environment-Water-Systems).

Description

The development and consolidation of RII - RENEWS allows the creation of a national research infrastructure of excellence in the field of energy, environment and water, in which research facilities grouped on laboratories with a certain degree of flexibility in data processing, storage and provisioning services will allow a positive evolution in addressing specific themes, assessing the sustainability of critical infrastructure in energy, assessing and monitoring the quality of environmental factors, the climate change mechanism, and modeling and forecasting greenhouse gas emissions. The research activities are directed towards the determination of the technical state of the energetic equipment in order to determine their remaining lifetime, the creation of new materials with advanced properties for applications in the energy industry and environmental protection, the development of innovative processes for reducing the effects of pollution.

From the point of view of the research themes, as well as of the potential of capitalizing on the obtained results, the development of high-quality laboratories aims to attract specialists from the country and abroad who will participate with their own research staff in international projects. On the other hand, the development of the integrated multidisciplinary research infrastructure aims at: a) identifying new solutions in the areas concerned, b) obtaining concrete results, applicable in the socio-economic environment, and c) transferring technologies / processes to the private environment. Also, by maintaining and extending the Romanian Accreditation Association - RENAR accreditation fields of the RII-RENEWS laboratories, new services will be developed for the interested companies, but also for the interested RDI organizations in the country and abroad.

Scientific context and relevance

The development of the RII-RENEWS research infrastructure meets the requirements of EU Regulation no. 651/2014 of the EC - June 17, 2014, of the European Strategy Forum on Research Infrastructures (ESFRI) and follows the recommendations of the Romanian Committee for Research Infrastructures (CRIC).
As regards the priorities of the National RDI Strategy (SNCDI) and the National R&D and Innovation Plan 2014-2020 (PNCDI), RII-RENEWS complementarily covers the field of Intelligent Specialization "Energy, Environment and Change Climate ", expanding the sector approach to a systemic approach.
Regarding EC and ESFRI requirements, RII-RENEWS is a unique feature in the Romanian context, because at national level there are no functional, modernized research structures with such complex character - the associated energy-environment-water approach. The opportunity to develop RII - RENEWS results also from the need to interact with similar pan - European or regional structures, in line with Objective 1.2. of ESFRI, which refers to the modernization of energy and environment research infrastructure, targeting the connection to international networks. The structure and objectives of the RII-RENEWS are convergent with the modifications of the national road map, set up by CRIC in terms of "ex-ante" analysis: prospective substantiation and prioritization of needs, respectively avoidance of duplication.

Stage of implementation in Romania

RII - RENEWS is a benchmarking research infrastructure with a unique and innovative approach at national level and with international integration perspectives to ensure that the EU 2020 Strategy for Energy Efficiency (20%), increasing the share of renewable energy sources (20%), reducing greenhouse gas emissions compared to 1990 levels (20-30%), energy objectives of the Water Framework Directive and the directives in environmental protection.

The research carried out has an interdisciplinary character, so that although the main field of research is Energy, Environment and Climate Change, there are still three areas to which research will focus - Bioeconomy (subdomains: Bioenergy - Biogas, Biomass, Biofuel, Biotechnologies - Biotechnologies environment), Eco-nanotechnologies and advanced materials (depollution technologies) and the field of intelligent systems.

At present, in Romania, an integrated research infrastructure - IIC of this type does not work effectively, because the existing research infrastructures within University POLITEHNICA in Bucharest, ICEMENERG, ICPE, INCD-PM, INCD-ECOIND, ICSI Vâlcea and others, or from other universities, does not address integrated energy, environmental or water issues, as defined by the European Commission's definition of research infrastructures, but separately, mainly in collaborative research projects, funded from different public or private sources.

Socio-economic impact

The Scientific / Technological Impact of RII - RENEWS Development consists in increasing the competitiveness of University POLITEHNICA in Bucharest, its partners and other interested parties in collaboration with RII - RENEWS in the field of energy, environment, climate change, but also in related fields. This opens new opportunities and research directions and the results obtained are expected to highlight a field of excellence in research on the energy-environment-water domains, with a unique character presently in our country, which can attract researchers both from Romania and abroad.
As a social impact, the project contributes to the development, qualification improvement of human resources and attracting young researchers, in order to limit the exodus to other countries.
From an economic point of view, the proposed infrastructure:
- stimulate a type of knowledge-based economic development, in line with European trends, ensuring the scientific foundation of various projects, energy-environment-water technologies;- stimulates involvement in partnerships with research and development organizations and institutes in the country and abroad.

ROADMAP 2017

Energy, Environment and Climate Change

EPOS

European Plate Observing System

Type: European / distributed

Coordinator: IT
Participants: BE, CZ, DK, FIN, FR, GE, GR, HU, IS, IR, IT, NL, PL, PT, RO, SK, ES, SE, CH, TR, UK

Coord. Institution in RO: National Institute for Earth Physics, Magurele

Estimated costs in RO:
- construction: 1.7 MIL. EUR
- operation: 1.5 MIL. EUR/ an

Locations (coordinator & RO)
IT (INGV/ Instituto Nationale di Geofisica e Vulcanologica - Roma) – EPOS-ERIC

UK, FR, DK – (BGS – British Geological Survey & BRGM/ Bureau de Recherches Geologiques et Minieres, GEUS -) – ICS-C (Integrated Core Services – Central Hub)

RO: INCDFP, National Institute for Earth Physics, Măgurele

Website/s:
EPOS-IP http://www.epos-ip.org/
EPOS-RO http://roepos.infp.ro/

EPOS project is a long time plan to facilitate integrated use of data, data products and services from distributed research infrastructures for solid Earth science in Europe.

Description

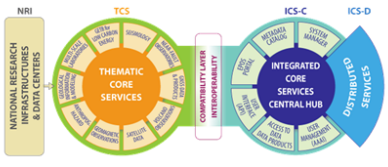
By bringing together national and transnational research infrastructures the access and use of multidisciplinary data recorded by the solid Earth monitoring networks, acquired in laboratory experiments and/or produced by computational simulations. In this way EPOS will foster worldwide interoperability in the Earth sciences and services to a broad community of users.

Main objective is to establish a comprehensive and multidisciplinary research platform for Earth Science. The ground-breaking nature of the EPOS federated approach relies on joining the capacity of delivering high-quality standardized and multidisciplinary data, the involvement of ICT experts in guaranteeing novel e-science opportunities and the leverage effect of user's engagement.

Scientific context and relevance

EPOS bring together researchers from Earth Science field, national and European monitoring infrastructures, ICT experts, users and policy makers to develop more holistic understanding about the underlying processes of Earth's dynamics and will use this progress in science for the assessment of geo-hazards and the secure and sustainable use and exploitation of geo-resources.

EPOS aims at:
representing a scientific vision and approach in which innovative multidisciplinary research is made possible for a better understanding of the physical processes controlling earthquakes, volcanic eruptions, unrest episodes and tsunamis as well as those driving tectonics and Earth surface dynamics;
establishing a long-term plan to facilitate the integrated use of data, models and facilities from existing, and new distributed research infrastructures (RIs), for solid Earth science;
adopting appropriate legal solutions to manage distributed pan European Research Infrastructures, securing on a common and shared data policy the open access and the transparent use of data, and guaranteeing mutual respect of the Intellectual Property Rights.



Stage of implementation in Romania

Romania was represented in EPOS by NIEP (beneficiary and national representative institution) from Preparation Phase (2010-2014) to Implementation Phase (2014-2019). Active involved infrastructures, grouped by thematic services are: geophysical monitoring networks (seismological, GPS/GNSS, infrasound, potential fields measurements), seismic engineering laboratory, and multidisciplinary near-fault observatory. Giving the importance of the EPOS initiative at European level, the diversity of the research domains represented, and considering also the advantages and benefits of the institutions and countries involved, NIEP promote, by initiating a Memorandum of Understanding, the establish of a national EPOS-RO consortium, expanding the involvement to other national institutions relevant to the field of Earth Sciences (eg: INCD GeoEcomar, IGR, UB, UTCB, INCER-URBAN si IG-AR)

Socio-economic impact

EPOS is not limited to accessing multidisciplinary data but will increase the socio-economic impact of Earth Sciences research both in Romania and at European level by: creating excellent scientific opportunities to better respond to society's needs by making use of data and products made available to users (scientific community, business environment, society); opening new business opportunities for local economies; facilitating collaborations between researchers in the thematic areas of Earth Sciences and ICT.

ROADMAP 2017

Energy, Environment and Climate Change

DANUBIUS-RI

The International Centre for Advanced Studies on River-Sea Systems

Type: European, distributed

Coordinator: RO
Participants: UK, NL, GR, DE, BG, MD, ES, IT, AU, CZ, ES, FR, IR, HU, UA

Coord. Institution in RO:
ESFRI Coordinator: National Institute of Research and Development for Geology and Geoecology – GeoEcoMar
Romanian component Coordinator: National Institute of Research and Development in Biological Sciences (NIRDBS)

Estimated costs in RO:
- construction: 150 MIL EUR
- operation: 15 MIL EUR/ year

Locations (coordinator & RO)
RO: Hub headquarters: Murighiol, Tulcea County, Romania.

Website/s:
www.danubius-ri.eu;
www.danubius-pp.eu

International Centre for Advanced Studies on River-Sea Systems supports interdisciplinary excellent research for an integrated river-sea management.

Description

DANUBIUS-RI is a pan-European distributed research infrastructure for interdisciplinary studies of river–sea systems, supporting research addressing conflicts between societal demands, environmental change and environmental protection.

It is being developed by 30 partners from 16 European countries, aiming to become operational by 2023. The current Preparatory Phase is funded by EC H2020 grant 739562.

There will be a Hub and Data Centre in Romania, Nodes led by UK (Observation), Germany (Analysis), Italy (Modelling) and Netherlands (Impact), and a Technology Transfer Office in Ireland. A set of Supersites across Europe will be the focus for observation, research and modelling. The DANUBIUS Commons will ensure standardised procedures and quality control.

It is included in the 2016 ESFRI Roadmap and is a Flagship Project of the EU Strategy for the Danube Region since 2013.

Scientific context and relevance

European research on river-sea systems and their transitional environments is world-leading but fragmented, largely discipline-specific and often geographically isolated. The lack of interdisciplinary Research Infrastructures has fuelled this fragmentation.
Led by Romania, DANUBIUS-RI will provide a pan-European Research Infrastructure to fill the gap and facilitate research on river-sea systems in Europe and worldwide. It will provide access to a range of European river-sea systems, facilities and expertise. Bringing together research on different environmental sectors, in an interdisciplinary approach to river-sea systems, it will build on existing European expertise and synergies to support world-leading interdisciplinary research and innovation in freshwater-marine research.

Our ability to confront the challenges has been constrained by disciplinary boundaries and a lack of interdisciplinary initiatives. There is growing concern that coastal deltas and estuaries are at 'tipping points'. Our knowledge of river-sea system functioning is insufficient to inform levels of resilience and sensitivity to 'collapse'.
A fundamentally new approach to research is needed to support better-informed environmental management of river-sea systems, particularly at the freshwater-marine interface. This requires world-leading science, comprising research of immediate societal relevance and impact. It must span traditional disciplinary and geographic boundaries and be implemented in a consistent and quality assured framework to yield a more rigorous understanding of: (i) environmental system dynamics that can be compared across Europe; (ii) the implications of catchment/marine pressures on system function; (iii) the consequences of human agency; and (iv) the importance of conserving or enhancing the ecosystem services that these systems provide for society to ensure future wellbeing.

Stage of implementation in Romania

47.5 Million Euros are available for the Structural Funds application (period 2015-2020) to start the development of the Romanian contribution to DANUBIUS-RI. The pre-condition – acceptance on the ESFRI Roadmap – fulfilled since 2016. The Application for Major Project (seen the Letter of Commitment of the Romanian Govt. to ESFRI - 2014) needs to be prepared and submitted to the European Commission.

10 hectares of land belonging to NIRDBS in Murighiol, Tulcea County, are dedicated for the building of the DANUBIUS-RI Hub.

The Third National Programme for Research and Innovation contains a dedicated subprogramme, DANUBIUS-RI. A competition is currently open for a management support project to prepare the application material and annexes to access the structural funds, and to train the Romanian scientific community to work on the DANUBIUS-RI scientific objectives.

Socio-economic impact

Surface waters are key for food and energy production, and societal wellbeing. Biodiversity hotspots at the interface between land and water provide essential ecosystem services. Natural and manmade environmental perturbations at local, regional and global scales exert a major threat to functionality. DANUBIUS-RI will enhance the impact of European research while maximising investment return.

ROADMAP 2017

Energy, Environment and Climate Change

ACTRIS

Aerosol, Clouds and Trace Gases Research Infrastructure

Type: European, distributed

Coordinator: FI
Participants: FI, IT, FR, RO, CZ, DE, GR, NO, ES, UK, NL, CH, CY, PL, SE, BE, IE, EE, DK, BG

Coord. Institution in RO: National R&D Institute for Optoelectronics - INOE 2000

Estimated costs in RO:
- construction: 2.154 MIL EUR
- operation: 0.819 MIL EUR/year

Locations (coordinator & RO)

FI: University of Helsinki, Yliopistonkatu 4, Helsingin Yliopisto 00014, Helsinki, Finland; **FI:** Finnish Meteorological Institute, PO Box 503, FI-00101 Helsinki, Finland , **IT:** Consiglio Nazionale delle Ricerche - CNR, Piazzale Aldo Moro 7, Roma 00185, Italy

RO: National R&D Institute for Optoelectronics - INOE 2000, Atomiştilor Str., No.409, Măgurele - Ilfov, 077125, Romania

Website/s:
http://www.actris.eu/
http://actris.ro/

ACTRIS IR carries out research on Earth's atmospheric composition, with applications on air quality, climate change and forecasting models.

Description

The main goal of ACTRIS consist is long-term and continental scale observation and exploration of the Earth's atmosphere. Research activities are focused on the study of aerosols, clouds and trace gases, which has a significant impact on weather, climate change and quality of life. Through its components, ACTRIS contributes to: (a) generate and disseminate new knowledge on the atmospheric composition, (b) technology advance in the field of atmospheric composition observation, (c) policy makers' support regarding climate change challenges: adaptation, mitigation policies and protection against environmental hazards generated by atmospheric processes.

Scientific context and relevance

The spatial and temporal concentration variability of various atmospheric compounds such as aerosols, clouds or trace gases, generate rapid physico-chemical processes with high short- and medium-term impact on air quality and human health, and with long-term impact on Earth's radiative budget and climate change. Therefore, the need of accurate information regarding global-scale distribution of aerosol's concentrations and their time variability are of a high importance in order to evaluate and to reduce the air pollution and the adverse effects on human and ecosystems health. The ACTRIS Infrastructure has been designed to respond to these challenges through the concerted use of the various national top-level facilities in the field of atmospheric research: remote sensing systems and monitoring of atmospheric compounds (at the surface, in vertical profiles or columnar observations), airborne exploratory platforms as well as the ancillary observations such as meteorological parameters and radiation.

The national facilities are added to the central ones: Central Headquarter, Data Centre and five Calibration/Expertise Centres that coordinate and integrate all the infrastructure activities, ACTRIS being a distributed infrastructure at the European level.
The use of ACTRIS facilities, the improvement of research performances trough centralized data access and specific services provided by ACTRIS, strengthening the international collaboration through participation in large-scale research project and the specialization opportunities, will contribute to the opening of new research directions with high socio-economic impact. The complex frontier research approach generated by ACTRIS IR will essentially contribute to increasing the competitiveness of all parties.

Stage of implementation in Romania

The implementation of the ACTRIS IR in Romania has been achieved by clustering the observation and exploration capacities of several research and academia organizations that have set up the ACTRIS-RO comunity. Romanian consortium is an open partnership, based on a distributed infrastructure consisting of: 3 multi-instrument observation stations, 2 specialized laboratories within the Lidar Calibration Center and 2 exploratory platforms: an airborne platform and an atmospheric simulation chamber. ACTRIS-RO is already carrying out research activities in the framework of H2020 projects and ESA contracts. For the next period, it is envisaged the organization of administrative and legal ACTRIS-RO Common Research Unit, and a series of actions will be taken in order to become an infrastructure of national interest, in order to participate as a full member of ACTRIS-ERIC.

Socio-economic impact

The foreseen socio-economic impact is a major one, through ACTRIS addressability to extended target groups and by generating of beneficial effects within the scientific and academic environment, industry but also to the general public. Through data access, products and services, ACTRIS addresses directly to the wide atmospheric research community (universities, research institutes, space agencies, the environment, etc.) and indirectly to various beneficiaries (local and governmental agencies, insurance companies, energy and food industry).

ROADMAP 2017

Energy, Environment and Climate Change

ICOS

Integrated Carbon Observation System

Type: European and distributed

Coordinator: European Research Infrastructure Consortium (ERIC)
Participants: BE,FI,FR,DE,IT,NL,NO,SE,DK,CZ,CH, GB

Coord. Institution in RO: National Institute of Research and Development for Optoelectronics – INOE

Estimated costs in RO:
- construction: 2.5 MIL EUR
- operation: aprox. 0.7 MIL EUR/year

Locations (coordinator & RO)
ICOS ERIC Head Office, Erik Palménin aukio 1, FI-00560 Helsinki, FINLAND, E-mail: info (at) icos-ri.eu, Mobile phone: +358 50 3523299

RO: National Institute of Research and Development for Optoelectronics - INOE,. Atomistilor Street, no. 409, Măgurele, 77125, Ilfov County, Romania.

Website/s:
https://www.icos-ri.eu/
http://environment.inoe.ro/

ICOS aims is to understand budgets and disturbances of greenhouse gase fluxes, command factor and control mechanisms.

Description

ICOS's mission is to build a single coherent data model to facilitate research on greenhouse gases, associated emissions and reservoirs, the data being assimilated into biogeochemical and ecological models. It aims to: i) assess carbon flows by monitoring ecosystems, the atmosphere and the oceans; ii) Provide the long-term observations needed to understand the current state and anticipate the future behavior of the global carbon cycle and greenhouse gas emissions; iii) Estimation of the efficiency of carbon storage and global greenhouse gas reduction activities of atmospheric composition, including attribution of sources and reservoirs; iv) Detection of changes in greenhouse gas flows and flow response in case of extreme climatic events.

Scientific context and relevance

Combating climate change is without a doubt the greatest environmental challenge that society will face in the coming century. Managing climate change requires understanding causes that generate that. One of the causes is the increase of greenhouse gas concentrations in the atmosphere, especially carbon dioxide, methane and nitrogen oxide. Increases in their concentration have been certified by accurate measurements over the past decades. Human actions are known to be the most important factor of these increases, although anthropogenic emissions are only partly responsible for changing concentrations in their atmosphere. The response of natural terrestrial and aquatic ecosystems is responsible for the other part of the "puzzle", introducing a complex set of interactions between humans, climate and the use of natural resources. The inappropriate approach to these interactions has led to the appearance of a wide variety of climate forecasts that have generated a number of doubts from policy-makers regarding negotiations on greenhouse gas emission reductions. Permanent greenhouse gas monitoring is the key to understanding these interactions and, therefore, for a better scientific basis needed to inform society about the best options to mitigate the effects of climate change. The infrastructure proposed by ICOS is the basis for these researches. The global nature of climate change and greenhouse gas exchange requires a global framework for this. In order to contribute to the achievement of the GEO targets, the European Union has promoted since 2006 the ICOS network, which aims to monitor the greenhouse gas exchange with the accuracy, density and frequency necessary to verify emissions and quantify exchanges with natural ecosystems by providing access to collected data.

Stage of implementation in Romania

The ICOS-RO Consortium, formed by the National Institute of Research and Development for Optoelectronics - INOE, the National Institute of Research and Development for Marine Geology and Geoecology, "Dunărea de Jos" University of Galati and the National Institute of Research and Development for Earth Physics, representatives through INOE is under coagulation, following the completion of ICOS accession formalities as an observer. The ICOS-RO National Infrastructure will help to ensure greenhouse gas monitoring and the assessment of flows between the atmosphere and the unique ecosystem in Europe, the Danube Delta. ICOS-RO will initiate the national greenhouse gas emission monitoring infrastructure in line with the international standards recommended by ICOS-RI, working with two emerging Romanian infrastructure DANUBIUS-RI and ACTRIS-RO.

Socio-economic impact

ICOS will have an impact both on climate change mitigation and attenuation strategies as well as on current greenhouse gas monitoring methodologies and assessment of their budgets. Providing access to data through the carbon portal, the scientific community and the general public, will be informed on monitored parameters and decision-making be made accordingly.

ROADMAP 2017

Eco - nano - technologies and Advanced Materials

LIFEWATCH ERIC

E-Science European Infrastructure for Biodiversity and Ecosystem Research

Type: European, distributed

Coordinator: ES
Participants: BE, GR, IT, NL, PT, RO, SI .

Coord. Institution in RO: LifeWatch – Romania Asociation

Estimated costs in RO:
- construction: 2.5 MIL EUR
- operation: aprox. 0.024 MIL EUR/year

Locations (coordinator & RO)
ES – Plaza España, 0, 41013 Sevilla

RO: LifeWatch–Romania Association, spl. Independentei 91 – 95, 050095, Bucharest

Website/s:
www.lifewatch.eu
www.servicecentrelifewatch.eu
www.unibuc.ro

LifeWatch ERIC is a pan-European distributed e-Infrastructure designed to support and develop biodiversity and ecosystem research.

Description

LifeWatch ERIC aims to promote research on biodiversity and ecosystems by helping to develop knowledge about the major environmental challenges facing human society such as climate change or the erosion of natural capital. This pan-European distributed e-Infrastructure provides technical capabilities for integrated access to spatial-temporal distributed complex data resources, the provision of data search services, analysis, modelling and data visualization, services and tools that allow the creation of virtual laboratories and the necessary applications assisting decisions. LifeWatch ERIC provides its users with: an unlimited computing environment; the transparency of the research process at all stages; and generic applications that enable multidisciplinary research and the development of "trading zones" between them.

Scientific context and relevance

Understanding the dynamics and role of biodiversity is extremely important, not only for scientific reasons, but also for its importance to the human population in buffering the effects of environmental change, fighting epidemics and supplying food and natural products to our environment.
Loss of biodiversity is one of the main challenges of today's society and a cause for concern at global, regional and local level. The UN declared 2011-2020 the decade of Biodiversity, after the global failure to meet targets proposed for 2010. The Europe's response to meet the new Aichi Biodiversity Targets is included in the European 2020 Biodiversity Strategic Plan. This plan sets out the future agenda for biodiversity research.
Four major challenges for biodiversity conservation are identified: climate change, habitat fragmentation / loss, invasive species and impacts resulting from combined pressures. Conservation of biodiversity is of particular importance for the provision of vital ecosystem services with implications for people's health and well-being, as well as many economic sectors such as agronomy, forestry, fishing, pharmaceuticals and chemicals and other industrial applications.
Decision makers and environmental managers require scientifically grounded tools to support their decisions on avoiding or mediating anthropogenic impacts on biodiversity and ecosystems.
Implementation of an adequate e-Infrastructure is needed to overcome the limitations and barriers to new research approaches in the field of biodiversity by building and testing specific models and by providing the results of these models in the form of tools for managers, decision-makers and the interested public.

Stage of implementation in Romania

Romania was involved in the process of setting up LifeWatch, which became ERIC by European Commission Decision 2017/499 of March 17, 2017 and get its member status. Romania's scientific and technical representation within LifeWatch ERIC is realized through the LifeWatch-Romania Association, which includes: Bucharest University, "Marin Drăcea" National Research and Development Institute for Forestry, National Research and Development Institute for Biological Sciences, "Grigore Antipa" National Research and Development Institute, "Alexandru Ioan Cuza" University of Iasi, Gheorghe Asachi Technical University of Iasi, Babes-Bolyai University Cluj. Within these institutions, a series of biodiversity research activities are being carried out that contribute to the development of national LifeWatch infrastructure.

Socio-economic impact

Biodiversity research through this e-Infrastructure ensures the sustainable use of natural capital, contributes to data standardization and interoperability, promotes ICT technology development and research facilities. It develops knowledge through interactions between researchers in several fields and provides educational and training facilities.

ROADMAP 2017

Energy, Environment and Climate Change

DECENEU

Development and Creation of New Research & Development Infrastructures in the Field of Terrestrial and Space Mineral Resources

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: R&D National Institute for Metals and Radioactive Resources (INCDMRR) – ICPMRR, Bucharest, Romania

Estimated costs in RO:
- construction: 14.6 MIL EUR
- operation: aprox. 4.5 MIL EUR/an

Locations (coordinator & RO)
RO: RO - R&D National Institute for Metals and Radioactive Resources (INCDMRR) – ICPMRR, Bucharest, Scientific Department, Măgurele, Şoseaua de Centură 48, 077125 Măgurele, Ilfov, Romania

Website/s:
INCDMRR – http://www.incdmrr.ro

The research infrastructure from DECENEU consist in buildings hosting laboratories endowed with new equipments and devices, highly qualified human resources providing R&D services focused on the mineral resources' field using multidisciplinary approaches.

Description

The DECENEU's main aim is to modernize, upgrade and update this unique existent infrastructure from Romania in respect with the European Union standards in order to provide the required conditions to increase the competitiveness in a highly important field of activity, mineral resources, respectively. The project proposal reinforces an R&D infrastructure in the fields of mineral resources (radioactive, precious and rare metals) capitalization (ores' exploration, exploitation and processing) and environmental protection (rehabilitation, ecological reconstruction and decontamination) by the addition of a new research direction consisting in the Solar system's useful mineral resources' capitalization grounded the existent expertise.

Scientific context and relevance

The project's main impact is the technological development achieved due to the elaboration of a new experimental method to exploit the mineral resources from the Earth and other planets under micro-gravitational conditions.
The recent reports concerning the water's detection on Moon and Mars show that it might represent an important resource in case when a colony would be established on those planets. The future outer-space developed colonies will increase the demand for mineral resources, which are situated at the lower limit of exploitable useful repositories.
The R&D activities will complement the future spatial missions by providing the best technological solutions to exploit mineral resources in the outer space and to support the human presence in a hostile environment. Those activities prior to the spatial missions are dedicated to their technological base's strengthening.
The technological activities grounded on the useful metals' exploitation and extraction processes' study under low gravity and micro-gravitational conditions present a high risk including the checking in and rethinking of all scientific principles of the current used procedures and technologies. The proposed activities' field promoted by IR DECENEU covers the applicative research as well as feasibility studies of mineral resources' exploitation process under different gravitational conditions. Under Moon's and Mars's colonizing programs' context and the limited terrestrial mineral resources in exhaustion process, the possibility to exploit the ones hosted by Moon, Mars, asteroids, comets or even by the spatial wastes in order to support the colonies' life has become an acute issue.

Stage of implementation in Romania

To our knowledge in Romania there is not any such research infrastructure dedicated to mineral resources' exploitation under low gravity or micro-gravity conditions. The creation of such unique RI in our country according to DECENEU proposal will make Romania an active participant the European spatial programs. DECENEU's implementation will contribute to the progress and efficiency's increasing of mineral resources' exploration and processing classic techniques by expanding their use under extra-terrestrial hostile environmental conditions, where the water resources are very limited. The project proposal answers to the requirement to rethink/remodeling/reorganize all the stages of useful elements' extraction process from the mineral resources with minimal energy and water consumptions besides supplying the water, oxygen and energy for colony's surviving.

Socio-economic impact

Social impact: new jobs' and highly qualified human resources' creation; interdisciplinary RI's development; international visibility and HORIZON2020 project proposals number increase.
Economic impact: funding gain by international collaborations; useful metals obtaining by new procedures; water recovery and recycling; money saving.

Bioeconomy

ROADMAP 2017

Bioeconomy

RORIC—NEXT—BIONAN

Inter-regional Infrastructure for Transdisciplinary Research for Emerging Nanobiotechnologies

Type: National, distributed

Coordinator: RO
Participants: RO

Coord. Institution in RO: National Research and Development Institute for Chemistry and Petrochemistry – **ICECHIM**

Estimated costs in RO:
- construction: 32.5 MIL EUR
- operation: 0.37 MIL EUR/year

Locations (coordinator & RO)

RO: ICECHIM , Spl. Independentei nr. 202, Bucharest

Website/s:
http://www.icechim.ro/_proiecte/nextbionan/indexen.php

National Network of complementary research infrastructures for the development of emerging nanobiotechnologies, with trans-sectoral relevance.

Description

Pole of excellence in nanobiotechnologies, with unique/state-of-the-art competences at national/regional level for development, characterization and diagnosis for new materials, metabolomics and rare diseases (ICMPP), (nano)biosensors (ICECHIM, INSB), new generation metagenomics coupled with barcode and bioinformatics (INSB), nanobiotechnological approaches for the enhancement of next generation functional food efficiency (UDJG), biomimetic nanostructures (UAV), Development of new bioproducts requested by the market by nanobiotechnological closing of the value chains from bioeconomy (ICECHIM, INSB, ICMPP, UDJG, UAV). The uniqueness of the main equipment, (micro)biological resources and available databases, the experience and competence of the research teams, make RDI services provided by the Consortium RoRIC NeXT BioNAN to be attractive both for the academia and the industry.

Scientific context and relevance

RoRIC NeXT BioNAN was formed in the context wherein bioeconomy from Romania is characterized by a low productivity and by a low degree of bioresources utilization. The research infrastructure aims to develop innovative solutions for solving these problems. Novelty is the result of: (i) the intensification and diversification of the activities of research and innovation for nanobiotechnologies, involved in the formation of an innovative and dynamic bioeconomic ecosystem, by automating high throughput experimental technology, with the integration of the (bio)process intensification; (ii) the double addressability of the infrastructure, both for research and innovation services intended to increase the competitiveness of enterprises and for an increased attractiveness of the RDI services provided by the Consortium to the academia, including through consortium inclusion in the framework of European projects partnerships; (iii) the maximum flexibility of the infrastructure, which allows a biomimetic approach on closing the loop on bioeconomy value chains. At the national level is the first network that allows concurrent integrated approach of biotechnology and nanotechnology, due to the interconnection of synergic research infrastructures and thanks to the creation of a complementary range of experts, able to support the expanding area of services and the leap of knowledge in the bioeconomy trans-sectoral domains. RoRIC NeXT BioNAN has relevance for the development of new biomaterials and bioproducts, with new applications in the food industry, pharmaceutical industry, industrial biotechnology, medicine, livestock and agriculture, including nanoformulation with controlled release of active principles, materials, nanocomposites, nanocoating /active biofilm, page, as well as for structural analysis, surface analysis, vegetal, animal and human metabolomics, advanced medical diagnosis for rare metabolic diseases.

Stage of implementation in Romania

National Consortium recently constituted, by a Partnership Agreement, which aims to link the activities of the research infrastructures, developed through concentrated efforts at the level of each Partner. Within the Consortium, there are already installed and operational unique/state-of-the-art facilities, both for the synthesis of (bio)nanostructures (systems for flow biochemistry and for intensified bio-processes) and for the nano-structures characterization/analysis (NMR, XPS, coupled LC-NMR-MS system, Cryo-TEM, HR-TEM, SEM, XRD with climate room, DLS, AFM microscope coupled with Raman spectroscopy, confocal microscope, high resolution bar code genetic system; High Pressure Capillary Rheometer), as well as (micro) biological resources (MIUG microorganism collection from UDJ Galați, with over 500 strains of bacteria and fungi with biotechnological importance) and databases.

Socio-economic impact

Advancement of knowledge through fundamental research, development of applied solutions to problems requested by the society, from advanced materials to bioproducts and personalized medical diagnosis, offers of research and innovation services for relevant industries, educational offers for PhD coordination and hosting, and for courses and trainings for state-of-the art techniques.

ROADMAP 2017

Bioeconomy

ANIMBIO

Animal Nutrition Biobasis

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: National Institute for Research-Development in Animal Biology and Nutrition (**IBNA**), Bucharest

Estimated costs in RO:
- construction: 2 MIL EUR
- operation: 0.7 MIL EUR/ year

Locations (coordinator & RO)
RO: AnimBio, Calea Bucuresti 1, Balotesti, Ilfov

Website/s:
www.ibna.ro/animbio

A fully operational research infrastructure serving as support for research-development in animal nutrition (experimental spaces, research equipment).

Description

AnimBio infrastructure concentrates most of the equipment, methodologies / know-how and scientific staff engaged in animal nutrition in Romania. Much of the specific infrastructure equipment (digestibility cages, metabolic chambers, equipment used to determine rumen degradability, etc.) is unique not just in Romania, but they also lack in many Eastern Europe countries.
AnimBio role is to provide the basis required for conducting animal nutrition research (on the major species and categories of farm animals), at European standards and in a volume of work large enough so as to ensure a significant and continuous flow of scientific results, of various types, thus being a determining factor for the modernization of the livestock production, while having a major impact on the society.
The infrastructure is fully operational and in progress of being modernized.

Scientific context and relevance

The further development of the animal production sector depends largely on the outputs of the research-development activity and on their transfer into innovative technologies, products and services. Animal nutrition, by its economic importance, feasibility of applying the research results and magnitude of its effects on other areas (environment, food quality, health, etc.) is a major lever for the development of the sector.
Within this context, **AnimBio** will have a major contribution to the next wave of innovations in animal husbandry, and to supporting this economy sector (by providing applicable solutions) to cope with the 21st century challenges: global changes (climate, economic and social) competition from the emergent economies, limited resources (feedstuffs included), volatility of raw materials' prices, etc.
AnimBio infrastructure, operated by IBNA staff, also allows connecting the animal science/production sector to the latest scientific knowledge and concepts: nutrigenomics applied to animal production, proteomics/ metabolomics, new generation od sensors, advanced crop processing technologies (e.g., to produce biofuels, biomaterials), etc.

Stage of implementation in Romania

AnimBio is fully operational, but the modernization which started these past years has to be continued (experimental areas, specific equipment). The infrastructure is currently used for many research projects, contracts with industry, participation in international projects and networks. The infrastructure can be readily connected to a pan European network of convergent infrastructures, similar to its past/current participations in FP7 Feed-to-Food project, FoodCLUSTER initiative or in Animal Task Force.
Besides continuing the modernization, the next step is ensuring a systematic participation in international networks by joining ESFRI-type initiatives / networks. In parallel, AnimBio will consolidate the collaboration with other research teams interested in animal nutrition (from universities, other national institutes, etc.).

Socio-economic impact

The RDI activities done within **AnimBio** yield practical solutions resulting from advanced scientific knowledge. These solutions are easy to disseminate and apply, which has a major impact on the economic efficiency, on the disfavoured areas/social categories (for whom animal production is relevant), on consumer health, on the environment, etc.

ROADMAP 2017

Bioeconomy

FOODSTREAM

Transdisciplinary research centre for applied sciences, technology, electrical, mechanical, and power engineering for the food industry

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: University Politehnica of Bucharest

Estimated costs in RO:
- construction: 3 MIL EUR
- operation: 1.7 MIL EUR/ year

Locations (coordinator & RO)

RO: University Politehnica of Bucharest, 313 Splaiul Independenţei, 060042 Bucharest

Website/s:
http://cleantech.pub.ro/

FoodSTREAM was conceived as the first comprehensive approach at national level to applied research in the field of food engineering.

Description

The idea of the FoodSTREAM research infrastructure started from the need to diversify the research and innovation offer through the development of the food industry and related fields, thus supporting the creation of a main pillar of stimulating enterprises' access to RDI activities.
The creation of FoodSTREAM will enable the integration of existing research groups in traditional areas such as energy, mechanical engineering and electrical engineering, with the specialists in food science and technology, leading to the creation of a pole that wishes to become a reference technology center for the food industry in Romania.

Scientific context and relevance

The Romanian research in the food science and technology can become a space of excellence in research at national and European level, making use of existing and / or insufficiently exploited resources, and thus increasing the added value of agro-food sector and employment in rural areas.
Tough competition on the domestic, global and European markets requires the increase of the economic competitiveness of the Romanian food industry that represents the largest productive sector and the largest employer in Romania. In this regard it is important to attract the food industry in R&D process, but also the systematic transfer of knowledge and technologies obtained through the R&D process to industry. In this context, the appearance of a transdisciplinary center to underpin the development of this industry by providing the research base, as well as the base for training the undergraduate and graduate and doctoral students, it should be viewed as a necessity.
The main justification of the proposal lies in the increasingly emphasis on the quality and nutritional value of food, thus integrating within the national and EU policy in this area. According to the National Competitiveness Strategy through addressing the Food and beverage processing sector, the project will contribute thus to the development of a sector considered as a sector with competitive dynamics and with potential of innovation, technological development and added value.
FoodSTREAM will aim to obtain and study safe, affordable and nutritionally optimized foods mainly using food technology and biotechnology, but having the support of the convergent areas such as industrial biotechnology and having the necessary equipment to conduct advanced studies for electro, thermo and mechanical optimizations.

Since FoodSTREAM is not yet operational, the logo is in the design phase.

Stage of implementation in Romania

FoodSTREAM was submitted as a proposal in the call COP 2015, Priority axis 1, Action 1.1.1 Large R&D Infrastructures, Project type – Investment projects for public R&D institutions / universities. As a result of the evaluation, the project earned 90 points, ranking 10th in the list of the submitted proposals.
Based on existing collaboration relationships, European and Romanian universities, institutes and private research organizations with recognized interests in the field of food engineering and related fields have expressed interest in carrying out joint research projects. In addition, the services that FoodSTREAM can offer to private agri-food companies are addressed to raw materials producers, processors, retailers, packaging, machinery and equipment manufacturers, as well as testing laboratories.

Socio-economic impact

FoodSTREAM is relevant to the societal challenges at national and EU level identified through the Horizon2020 Program, such as bioeconomy, food security, sustainable agriculture and forestry, marine and inland water research, health, demographic change and well-being. The IC FoodSTREAM supports the stimulation of enterprises' access to RDI activity results.

ROADMAP 2017

Bioeconomy

AQRI

Advanced Agro-food Quality Research Infrastructure

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO:
University of Agronomic Sciences and Veterinary Medicine, Bucharest

Estimated costs in RO:
- construction: 10 MIL EUR
- upgrade 4 MIL EUR
- operation: 1 MIL EUR/ year

Locations (coordinator & RO)
RO: UASVM Bucharest, bdul Mărăști, 59, Sect.1, 011464, Bucharest Romania

Website/s:
USAMV București
www.usamv.ro

Centrul de cercetare pentru studiul calității produselor agroalimentare
www.qlab.ro

Advanced Agro-food Quality Research Infrastructure - AqRI provides the necessary open access basis for research in the field, at European standards.

Description

Advanced Agro-food Quality Research Infrastructure is operational in Romania, coordinated by the University of Agronomic Sciences and Veterinary Medicine (UASVM Bucharest), with its core in the Research Centre for Study of Food and Agricultural Products Quality. It consist of 13 laboratories and a ultramodern research greenhouse, with some unique components in the agro-food Romanian research.

AqRI can contribute, in real time, to obtain the scientific results applicable in practice, through the concept of multidisciplinary, interdisciplinary and transdisciplinary approach, in open access, on the quality of agro-food products - from ecosystem to molecular level, with control points over the production / processing / storage chain, in the context of circular bioeconomics.

Scientific context and relevance

Bioeconomy is the smart scientific field present both in the European R&D Strategy ("Bioeconomy Strategy", according to 4th SCAR Foresight Exercise), in the world strategies (FAO 2050), but also in the most important national strategies (MADR Orizont 2020-2030, SNCD 2020). The quality of agri-food products is a priority component in this area, being demanded by both consumers andprocessors, with multiple implications for health and the environment.Currently, on the background of increasing environmental issues, changing the biology of diseases and pests, increasing consumer demand for diversified and high-quality agri-food products, organic products or the emergence of emerging forms of pollution, the use of this research infrastructure will allow a holistic approach (multidisciplinary / interdisciplinary / transdisciplinary) of the quality problems of agri-food products. It will be used to experiment, evaluate and monitor the environmental factors with an impact on the quality of agri-food products, but also to quickly and accurately determine the quality parameters specific to animal and vegetal products.At the same time, Advanced Agro-food Quality Research Infrastructure will ensure the implementation and development of the newest scientific concepts: functional analysis through genomic / proteomic / metabolomics techniques, new precision technologies for plant, soil, sensory / biosensory plant and animals diagnosis, advanced culture / storage / processing technologies according to the *"0 waste"* concept, as well as technologies for the *non-food* use of raw materials (eg biofuels, biomaterials, minerals of interest, etc.).

Advanced Agro-food Quality Research Infrastructure will be unique at national level by the complexity and accuracy of analytical determinations offering to the public or private beneficiaries a wide range of research-development-innovation services.

Stage of implementation in Romania

Advanced Agro-food Quality Research Infrastructure - AqRI has the starting point in the project POSCCE ID_931, code SMIS-CSNR 14051, "Development of the infrastructure of the Research Centre for Study of Food and Agricultural Products Quality - HORTINVEST", implemented through the financing contract no. 246 / 28.09.2010-27.06.2016. The project, the construction and the endowment of the research center with the equipment and functional facilities, research equipments, furniture, IT equipments were realized during this period. At the same time, the project, construction and endowment of the Automated Research grenhouse - a complex of 19 independent programmable compartments for the control of environmental and cultural factors were realized.

Currently, AqRI infrastructure is operational to provide research / innovation / agro-food consultancy services, but requires the upgrading of some components and facilities and new complementary equipments.

Socio-economic impact

AqRI can be a driving force for Bioeconomy domain competitiveness, but also a highly effective means of generating impact on different socio-professional categories and backgrounds: social environment, health and food security, environmental quality, emerging economies (eg. the development of processing industries, transport, trade, etc.).

ROADMAP 2017

Bioeconomy

EU-OPENSCREEN

European Infrastructure of Open Screening Platforms for Chemical Biology

Type: European, distributed

Coordinator: DE
Participants: DE, NO, CZ, LV, ES, FI, PL, DK, RO

Coord. Institution in RO: Institute of Chemistry Timisoara of the Romanian Academy, Bd. Mihai Viteazu nr.24, Timisoara 300223, Timis

Estimated costs in RO:
- construction: 1.95 MIL EUR
- operation: 0.074 MIL EUR/year

Locations (coordinator & RO)

DE: Leibniz-Institute fur Molekulare Pharmakologie (FMP), Campus Berlin-Buch Robert-Roessle Str. 10, 13125 Berlin, Germany

RO: Institute of Biochemistry of the Romanian Academy (**IBRA**), Splaiul Independentei 296, 060031, Bucharest

Website/s:
FMP: http://www.leibniz-fmp.de
ICT: http://acad-icht.tm.edu.ro/

The research infrastructure from IBRA assists the users in developing and automatizing biological assays suitable for high throughput screening.

Description

The main aim of EU-OPENSCRENN is to facilitate the understanding of the molecular mechanisms governing the biological functions at subcellular, cellular, tissular and organism level. Through an elaborated collaboration protocol the users of EU-OPENSCREEN ERIC together with the partner sites will identify chemical compounds which targets specific events at cellular and subcellular level. These bioactive compounds will be identified out of large compound library by automated processes using robotic platforms for high throughput screening (HTS). The hits will represent starting points for lead compounds with biological activity as drugs, cosmetic products or agrochemicals.

Scientific context and relevance

The scientific field of EU-OPENSCREEN is Chemical Biology which is an interdisciplinary field resulted from the fusion of pharmacology and cellular biology. Chemical Biology studies the effect of the chemical compounds over biological systems. The use of rationally designed chemical compounds with a specific biologic effect (chemical probes) underscores their advantage for the modulation of biological targets functions which is crucial for the basic research and the early phases of drug development. The availability of the chemical probes for the systematic investigation of the biological function represents a bottleneck. The major approach for new chemical scaffolds discovery is the automated, empirical screening of compound libraries using specific HTS assays calibrated to identify modulators of a biological function. This includes the identification of new drug targets, assay development and high throughput screening. The EU-OPENSCREEN compound library will be tested in HTS experiments to collect qualitative data of their biological activity. The compounds which present the desired biological activity (e.g. enzyme inhibition) are called "hits" which will be further developed for research chemical probes. The chemical probe design and search will lead to innovation towards commercial products like drugs, cosmetics or pesticides.

Stage of implementation in Romania

The EU-OPENSCREEN implementation in Romania have taken place along with the maturation of the project at the EU level which will enter the final phase (the operational phase) in 2018 as an ERIC network. Romania joined the preparation and transition phases (2010-2016) represented by the Institute of Chemistry of the Romanian Academy (ICT). Meanwhile, the Romanian Chemical Biology Network has formed which is co-coordinated by ICT and the Institute of Biochemistry of the Romanian Academy (IBRA). In 2017, the research infrastructure for high throughput screenig implemented at IBRA was confirmed as an EU-OPENSCREEN partner site for assay development and optimization suitable for HTS. Currentlly, EU-OPENSCREEN is in an advanced national evaluation stage for the national roadmap research infrastructures and the status of Romania within the EU-OPENSCREEN network.

Socio-economic impact

EU-OPENSCREEN supports multidisciplinary and multinational collaboration through cooperation with other European initiatives such as ESFRI, JPI, ERA-NET, IMI promoting Europe as a world leader in the biomedical field through this unique way of collaboration. EU-OPENSCREEN will also focus on countries from southern and eastern Europe which do not have access to screening facilities.

ROADMAP 2017

Bioeconomy

METROFOOD

Infrastructure for promoting Metrology in Food and Nutrition

Type: European, distributed

Coordinator: IT
Participants: BE, CH, CZ, DE, ES, FI, FR, GR, HU, MD, MK, NL, NO, PT, RO, SI, TR

Coord. Institution in RO: National Institute of Research and Development for Food Bioresources (**IBA**), Bucharest

Estimated costs in RO:
- construction: The infrastructure is operational
- operation: 1 MIL EUR/ year

Locations (coordinator & RO)

IT: ENEA - C.R. Casaccia - Via Anguillarese, 301, 00123 Roma, Italy

RO: INCDBA – IBA Bucharest - Dinu Vintilă street, no. 6, Bucharest

Website/s:
www.metrofood.eu

METROFOOD-RI is a new 18 countries-RI and it is carrying out activities of data collection & measurement reliability and food & nutrition research.

Description

The project consists in building up a physical research infrastructure (Physical-RI) including a network of plants, laboratories and experimental fields/farms and in developing an electronic network (e-RI). The Physical-RI will enable to carry out different research activities supporting data collection and measurement reliability; quality & safety and traceability of food production, as well as basic and frontier research in food and nutrition. The e-RI will provide a new useful, free access web platform to share and integrate information and data on availability of metrological tools for food analysis and it will focus on emerging needs and collection of data on food composition, nutritional contents and levels of contaminants in foods produced in different geographic regions.

Scientific context and relevance

Quality of measurements plays an increasingly key role in technological and socio-economic development. Legal Metrology is broadening out from the traditional role for ensuring quality and credibility of measurements related to law enforcement and trade to any field (i.e. health, safety, security and the environment) subject to official controls and regulations. It was estimated that the expenditure for measurement and testing accounts of 3-5% of GDP and very often the decision-making is taken on measurement results. Therefore the enforcement of the Metrological Infrastructure benefits Society as a whole, and more specifically the Economy, providing reliable measurements for trade, health, safety, protection of the environment and law enforcement and providing evidence of this reliability.

Stage of implementation in Romania

METROFOOD-RI was listed as "Emerging" on the 2016 ESFRI Roadmap (Domain Health & Food) and is currently under its "Early Phase", founded by EC through the H2020 INFRADEV -02 project PRO-METROFOOD "Progressing towards the construction of METROFOOD-RI" (GA n.739568). In August 2017, the proposal for 2018 ESFRI Roadmap was submitted with the aim of becoming "Active Project". If the project becomes active, IBA Bucharest committed to put at METROFOOD-RI's disposal a great number of research equipment/ facilities amounting to 6,6 mil. Euros of which 20% will be used for this RI. The final project meeting will be held in December 2017, followed by "Hearing" in January 2018.

Socio-economic impact

METROFOOD-RI will permit on the one hand to perform base and frontier research at a cutting edge level reaching new advanced knowledge, and, on the other hand to directly impact on the economic sectors producing concrete benefits for the stakeholders.

ROADMAP 2017

MIBIRO

Bioeconomy

Research, Training and Consulting Platform for Applications of Microbial Bioresources of Romania

Type: National, distributed infrastructure

Coordinator: RO
Participants: RO

Coord. INCDCF-ICCF – National Institute for Chemical-Pharmaceutical R&D ICCF, associated partner of MIRRI-ESFRI

Estimated costs in RO:
- construction: 4 MIL EUR
- operation: 1 MIL EUR/ year

Locations (coordinator & RO)
RO: INCDCF-ICCF: Calea Vitan no 112, Bucharest 031299, Romania

Website/s:
www.mirri.org
www.ncpri.ro

The aim of MIBIRO platform is the identification, conservation and most efficient use of the microbial bioresources, mainly for biotechnological processes.

Description

Starting from the microbial collections core of the 5 research centers, MIBIRO platform's purpose is the development of bioeconomy key branches, like the products with probiotic potential – for immune stimulation and infection control, biodegrading microorganisms used in the bioremediation of polluted ecosystems and in the reconstruction of agricultural fields, production of useful bioactive products for livestock and agriculture (enzymes, biosurfactants, antimicrobial compounds, biopesticides as ecological alternative to chemicals), biopolymers. Representing Romania in the pan-European network MIRRI-ERIC, MIBIRO is an infrastructure offering free access to expertise, resources and related data.

Scientific context and relevance

During the last decades, the efficient exploitation of microbial resources has a constantly growing importance, essential in pharmaceutical biotechnologies for human and animal health, food industry, bioremediation, agriculture and agricultural fields reconstruction.
Probiotic products have a significant impact in the infection control by immunostimulation, because of the wide spread of microbial antibioresistance and virulence, and of the related strong restrictions regarding antibiotic administration to farm animals.
Nowadays, microbial enzymes have replaced chemical synthesis (polluting and energy intensive) in various economy branches.
Stringent regulations for food / food supplements safety have determined replacement of the chemical pesticides and fertilizers by microbial counterparts. On the other hand, microorganisms are largely used in bioremediation and biomining.
New microbial strains are used to discover new antibiotics, active towards multiresistant microbes, thus preventing the spread of pathogens.
Considering all these facts, the development of a pan-european network of microbial collections have become a necessity and Romania's accession to such a structure is of most importance, both for fundamental research, as for biotechnological applications.
The Romanian consortium already has over 4000 microbial strains (bacteria, yeasts, fungi, with biotechnological and industrial potential) and is affiliated to WFCC (World Federation of Culture Collections).

Stage of implementation in Romania

During the last 25 years, the 5 component institutions have had constant scientific collaborations, mostly through over 15 research projects financed by the national authorities, proving to be a real research consortium.

Entering in the national roadmap, MIBIRO platform will represent the Romanian national node of the future European infrastructure of microbial resources MIRRI-ERIC. Following the participation of the MIBIRO coordinator since 2014 as associated partner in MIRRI-ESFRI, the Romanian Ministry of Research and Innovation has been invitated and participated, as national authority, at the preparatory meetings of MIRRI-ERIC . MIBIRO partners will strengthen collaboration with the European partners, will continously develop the infrastructure and will offer specialized services to economic partners in the field. They will follow all the decided actions of MIRRI-ERIC management.

Socio-economic impact

Development of the microbial resources and affiliation to the pan-european network MIRRI-ERIC will have a major social and economic impact, leading to the most efficient and safe use of microorganisms in various biotechnological processes for public health, livestock, agriculture, food industry, bioremediation, biopesticides/ biofertilizers/ biosurfactants production.

Eco - nano - technologies and Advanced Materials

ROADMAP 2017

Eco - nano - technologies and Advanced Materials

INOVABIOMED

Innovative Technologies to Ensure Quality of Materials in Health, Energy and Environment

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: University Politehnica of Bucharest, Splaiul Independentei 313, 060042, Sector 6, Bucharest

Estimated costs in RO:
- construction: 14 MIL EUR
- operation: 0.62 MIL EUR/year

Locations (coordinator & RO)
RO: INOVABIOMED, University POLITEHNICA of Bucharest, Splaiul Independentei 313, 060042, Sector 6, Bucharest

Website/s:
http://www.inovabiomed.upb.ro/

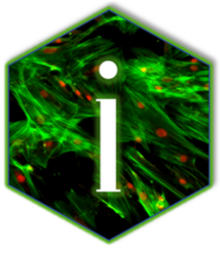
Unique initiative, addressing, in a systematic manner, to Research and Technological Development and Societal Issues in Regenerative Medicine.

Description

INOVABIOMED is the largest investment project in research equipment of University POLITEHNICA of Bucharest, which will allow multi and interdisciplinary approach for extension of the nanotechnologies development, new biomimetic biomaterials, cancer treatment and diagnostics materials, biomaterials and products design with a predefined function, advanced manufacturing, new and advanced diagnostic and imaging methods, combined analysis that overcome current boundaries and lead to integrated information, and to address the impact of nanomaterials on the environment. INOVABIOMED's research facilities are designed to deliver performance, flexibility, and versatility for the responsible approach of new themes and directions in line with industry progress and the needs of the private sector.

Scientific context and relevance

In line with the UPB Strategy, the National Strategy and Horizon 2020, the RI INOVABIOMED is of world top level integrating: (i) modern, advanced, internationally competitive equipment assembled into single functional structures, that covers a wide variety of complex themes needed to tackle the value-added product-to-product value chain in the same research centre, (ii) complementary top-level skills in fields such as chemistry and materials science, biomaterials and nanomaterials, surface chemistry, chemical engineering, microfluidics, micro- and nano-structural investigations, medical engineering, regenerative medicine, physics, imaging analysis, advanced microscopy, mechanical engineering and environmental engineering. The focus of RI facilities is unique and has realistically successful chances of imposing UPB and Romania as Europe's top RDI leaders.
In addition, for the first time, internationally renowned research groups, all from UPB, will design and produce together performance-driven results, directly applicable in industry, at the request of the private sector and doctors/clinicians. Each new laboratory is conceptually unique, with ultra-efficient and unique equipment, allowing an efficient approach to specific new themes. Combined/integrated exploitation of these facilities and skills will generate complementary results, allowing the value chain to go from idea to product. Laboratories complement each other and increase their value through the possibility of integrated research/studies with other laboratories of RI. INOVABIOMED RI comprises 56 equipment, including 32 top-of-the-line equipment, with a high degree of novelty at national and international level, worth more than 100,000 euros each, used to develop more than 20 research themes.



Stage of implementation in Romania

INOVABIOMED comprises 5 main phases of deployment chronology. The first phase relates to the preparation of the project application. Following the competition POC-A.1-A.1.1.1-F-2015 - Investment projects for public R&D institutions/universities, the project was declared the winner with the highest score. The second implementation phase takes place over a period of 24 months, comprising three stages of equipment acquisition, from which the three phases of operation are derived: two partial phases and one full operational phase, as follows: Partial operation phase I (after commissioning of Phase I procurement equipment): October 2017; Partial Operation Phase II (after commissioning of Phase II procurement equipment): April 2018; Full operation phase (after commissioning of Phase III procurement equipment): November 2018.

Socio-economic impact

Creating new jobs, eliminating labour migration, training highly qualified staff; stimulating the formation of research-industry partnerships/setting-up business consortia with similar EU organizations, sustainable through their enhanced capacity to address complex themes; respects European environmental, public procurement and equal opportunities policies.

ROADMAP 2017

Eco - nano - technologies and Advanced Materials

INFRATECH

Infrastructure for research of excellence in welding

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: National Institute for Research and Development in Welding and Material Testing, **ISIM** Timişoara

Estimated costs in RO:
- construction: 1.4 MIL EUR
- operation: 0.185 MIL EUR/year

Locations (coordinator & RO)

RO: National Institute for Research and Development in Welding and Material Testing, **ISIM** Timişoara

Website/s:
http://www.isim.ro/home.htm
https://erris.gov.ro/ISIM

INFRATECH aims to carry out welding research activities with applications in key scientific and technological fields.

Description

INFRATECH is active in the field of science 4. Eco-Nano-Technologies and Advanced Materials - 4.4.6 Advanced Materials and Technologies for Niche Applications of the Economy. The infrastructure aims to study research themes, focusing on: innovative solutions for the combination of materials, alternatives to classical processes, development of the process of computerization of technological processes of joining, monitoring, control and evaluation, analyzes and modeling of advanced materials behavior, etc.

INFRATECH is the only welding research infrastructure with over 47 years of experience in the field. INFRATECH brings together highly qualified human resources, experience in research, national and international projects, and patents. Also, Romanian and foreign researchers have free access to infrastructure, as part of their projects.

Scientific context and relevance

The global welded products market was estimated at $ 11.82 billion in 20151 and is expected to see increases in the next analysis period.
Steel demand and production declined in 2015, reflecting relatively lower expenditure on construction, which led to a decline in the welding equipment market. Projections for the next period, however, are promising, the construction, infrastructure, wind and energy sectors generally pointing to encouraging signs of recovery. Worldwide, the welding equipment market is estimated to reach $ 24.4 billion2 by 2022, amid a growing number of infrastructure development projects in emerging economies, particularly in the energy and transport sectors.
The welding and cutting equipment market will increase by a substantial rate by 2020. Among the main factors contributing to the global increase in welding and cutting equipment are the increasing demand in the energy, automotive and construction industries. The slow growth of the shipbuilding, aerospace and defense industry is expected to lead to new challenges for the market for welding and cutting equipment.
In this context, the development and modernization of the existing infrastructure within ISIM Timisoara, through a new INFRATECH project, will increase the research capacity, its quality and efficiency, with positive consequences on the level of economic competitiveness in key scientific and technological fields: materials engineering, automotive, food industry, etc.

Stage of implementation in Romania

The research infrastructure INFRATECH is in the operational phase through its departments, but requires development as a single center and from this point of view (development as a large CD infrastructure) is in the project stage.

INFRATECH is located in one location (Mihai Viteazul 30, Timisoara), it is of national interest (as a result of the expressions of interest received for infrastructure development) and provides free access to the researchers.

ISIM Timisoara is a member of the International Welding Institute and the European Welding Federation and is affiliated as a partner of the Welding Association of Romania, the Association for Multidisciplinary Research in the West Region of Romania and is a member of 5 clusters.

The development of research themes is essential for INFRATECH and for this reason, it is proposed to acquire the latest generation equipment for its improvement.

Socio-economic impact

INFRATECH will contribute to lower energy consumption, streamlining welding processes, eliminating costly consumables, increasing the service life and exploiting metallic wear components from railways. In the long term, infrastructure will contribute to safety in the operation of public transport and passenger comfort.

ROADMAP 2017

Eco - nano - technologies and Advanced Materials

KM3NET 2.0

Astro-particle and Oscillation Research with Cosmics in the Abyss (ARCA & ORCA)

Type: European, distributed

Coordinator: NL
Participants: CY FR GE DE GR IT IE MA NL PL RO RU ZA GB

Coord. Institution in RO: Institute of Space Science, 409 Atomiștilor Street, Măgurele – Ilfov, 077125

Estimated costs in RO:
- construction: 0.045 MIL EUR
- operation: 0.239 MIL EUR/year

Locations (coordinator & RO)

NL: NIKHEF, KM3NeT-HQ, Amsterdam Science Park, Amsterdam

RO: Institute of Space Science, 409 Atomiștilor Street, Măgurele – Ilfov, 077125, Romania

Website/s:
https://www.km3net.org/
http://www2.spacescience.ro/

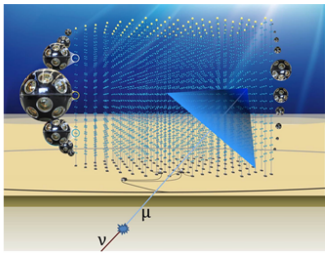
KM3NeT will examine astrophysical objects through their high-energy neutrino emission and the neutrino properties by measuring atmospheric neutrinos.

Description

The KM3 Neutrino Telescope 2.0 (KM3NeT 2.0) intends to examine astrophysical objects by detecting their high-energy neutrino emission and to investigate neutrino properties by measuring neutrinos produced through cosmic-ray interactions in the atmosphere. The research infrastructure comprises two deep-sea installations with shore stations, located off shore Toulon, France and Capo Passero, Italy. Data are processed and stored on three main computing centres: CCIN2P3-Lyon (CNRS), CNAF (INFN) and the ReCaS infrastructure. The deep-sea installations will also feature user ports for earth and sea sciences, thus offering unique opportunities for interdisciplinary research for continuous, real-time measurements, for example for marine biology, oceanography or environmental sciences.

Scientific context and relevance

Neutrinos are unique messengers from the most violent processes in our Galaxy and far beyond. Their measurement will allow for new insights into the mechanisms that govern the non‐thermal Universe and will complement high‐energy gamma ray astronomy and cosmic ray studies. Neutrinos are extremely light particles and electrically neutral thus travelling in straight lines from their origin to the Earth. They interact weakly and thus can escape dense regions where they are generated. They are produced in any environment containing protons or nuclei at the typical energies observed in cosmic rays. Neutrinos are ideal for observing the highest‐energy phenomena in the Universe and pinpointing the hitherto unknown sources of cosmic rays.
The IceCube neutrino telescope at the South Pole has detected a flux of cosmic neutrinos which is assumed to have its origin in extragalactic sources. They might be the same sources that produce the flux of the highest energy gamma rays observed, for instance, by H.E.S.S. The high-energy neutrino part of KM3NeT 2.0 (ARCA) will detect the neutrino flux reported by IceCube and will provide essential data concerning its origin, energy spectrum and flavour composition. Due to its location in the Northern hemisphere, the ARCA information will be complementary to the IceCube measurements.
The second major objective of KM3NeT 2.0 (ORCA) is to examine the properties of neutrinos and to determine the neutrino mass hierarchy. The ORCA detector will provide in addition sensitivity to low-mass dark matter and possibly also to the composition of the earth's interior via neutrino tomography.
KM3NeT 2.0 addresses neighbouring disciplines like astrophysics (sources of cosmic rays, high-energy neutrino astronomy), particle physics (neutrino oscillations, search for exotic particles) and cosmology (dark matter), but has also strong connections to Earth and Sea Sciences. To measure deep-water parameters with cabled sensors will add a novel option to the toolbox of oceanographers and marine biologists.



Stage of implementation in Romania

ISS joined the KM3NeT in 2007, during the implementation of the FP6 Project "Design Study", and contributed to the FP7 "Preparatory Phase". ISS is also a member of the ANTARES Collaboration, operating a pioneering neutrino telescope in the Mediterranean Sea, and a KM3NeT precursor. ISS coordinated the "mini-DOM" project, aiming to build and test a precursor of the actual KM3NeT Digital Optical Modules. The mini-DOM was successfully tested on the Instrumental Line of the ANTARES neutrino telescope. ISS intends to join the technical effort of the Consortium by installing and operating a DOM integration facility. ISS will extend its contributions in ANTARES, mostly in the search for exotic particles, in the KM3NeT scientific programme. ISS is represented in the KM3NeT Institute Board and in the Conference and Outreach Committee. ANCS signed the KM3NeT Phase 2 memorandum in November 2016.

Socio-economic impact

The Romanian presence in KM3NeT, including as stake holder in the future ERIC, is beneficial considering the significant discovery potential of the Project. Young researchers will have the opportunity to join, benefiting also of the opportunity of joint PhD programmes. ISS will develop a high technology facility. Romanian industry could also be involved in the future developments of KM3NeT.

ROADMAP 2017

Eco - nano - technologies and Advanced Materials

CERIC-ERIC

Central-European Research Infrastructure Consortium

Type: European, distributed

Coordinator: IT
Participants: AT, CZ, HR, IT, PL, RO, SI, HU

Coord. Institution in RO: National Institute of Materials Physics (**INCDFM**)

Estimated costs in RO:
- construction: 6 MIL EUR
- operation: 0.19 MIL EUR/year

Locations (coordinator & RO)

IT: CERIC-ERIC - Statutory Seat, S.S. 14 - Km 163,5 in AREA Science Park, 34149 - Basovizza, Trieste

RO: INCDFM-LASDAM; Str. Atomiștilor Nr. 405 A; 77125 Măgurele, Ilfov

Website/s:
CERIC-ERIC: http://www.ceric-eric.eu/
INCDFM: http://www.infim.ro/
LASDAM: http://lab50.infim.ro/

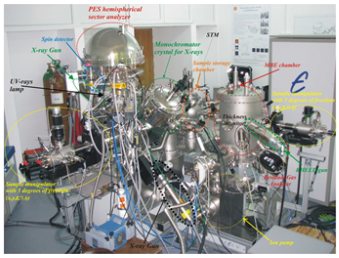
CERIC – ERIC represents a distributed infrastructure consortium dedicated to using multiple techniques based on phtons, electrons, ions, neutrons and synchrotron radiation for the preparation and characterization of materials down to the nanoscale.

Description

CERIC – ERIC is an integrated multidisciplinary research infrastructure which offers a single entry point for access to state of the art research equipment in eight countries. It is open to users involved in fundamental and applied research and demonstration at the highest level, representing an added value to the development of the European Research Area and for its innovation potential, stimulating in the same time its favourable impact for scientific, industrial and economic development. The National Institute of Materials Physics, through its laboratory offers to external users access to an infrastructure dedicated to materials characterization through Electron Paramagnetic Resonance and High Resolution Transmission Electron Microscopy through an international evaluation and access system.

Scientific context and relevance

The TEM andEPR equipment from the National Institute of Materials Physics are part of the seven research infrastructures which allow single technique access.
For the TEM equipment the services offered include:
-sample preparation for transmission electron microscopy;
-morphologic and microstructural characterization of nanostructured materials (powders, nanostructures), thin films, ceramics and alloys through transmission electron microscopy techniques;
-structural characterization at atomic resolution of extended defects in crystalline materials and characterization of mechanic stress fields associated with extended defects and interfaces by high resolution transmission electron microscopy (HRTEM/HRSTEM);
-determination of elemental composition of materials through energy dispersive X ray spectroscopy and electronic energy loss spectroscopy.
For the EPR equipment the services include:
-EPR measurements in microwave frequency bands X (9.4 GHz) and Q (34 GHz) in the temperature range 10 – 295 K on massive and nanostructurated materials, insulating or semiconducting.
-measurements of angular dependence microwave frequency bands X (9.4 GHz) and Q (34 GHz) in the temperature range 10 – 295 K for single crystal or thin film materials, insulating or semiconducting.
-analysis of EPR spectra using specialized software (EasySpin, EPRNMR, SIM) and determining EPR parameters of paramagnetic centers.
The informations obtained by EPR can be grouped in two large categories:
-determining the nature, structure, localization, local simetry , concentration and production and recombination mechanisms of paramagnetic centers (transition metals ions, free radicals, point defects, iradiation induced defects) in insulating and semiconducting materials.



Stage of implementation in Romania

Since 2014 until now CERIC – ERIC organised 6 project calls. NIMP's infrastructure was involved in 107 project proposals from research groups from countries such as: Austria, Czech Republic, Croatia, France, Germany, India, Italy, Pakistan, Portugal, Romania, Serbia, Hungary. After the international commitee evaluation 30 projects were granted with beam time to the National Institutes of Materials Physics infrastructure. 18 projects are under evaluation for the second call of 2017.

Socio-economic impact

The research techniques and the activities taking place in CERIC – ERIC in major research fields represent a solid base for the development of the scientific and technological development of the partners.
The projects developed through CERIC – ERIC up to now approached advanced materials with applications in medicine and medical imaging, energy, security, nanotechnology and research thematic in cultural heritage, ecology and environment.

ROADMAP 2017

Eco - Nanotehnologii și Materiale Avansate

HL-LHC (CERN)

High Luminosity, Large Hadron Collider

Type: European, distributed

Coordinator: There is no coordinator state.

Participants: CERN has 22 member states (21 European countries and Israel). Other 5 European states, Turkey and Pakistan have the status of associate members.

Coord. Institution in RO: National Institute for Physics and Nuclear Engineering **IFIN-HH**

Estimated costs in RO:
- construction: 7500 MIL EUR
- operation: As full rights member state of CERN, Romania pays each year a cotisation. The operation costs for LHC are devided among the Collaborations around the large experiments that use LHC. The quotas of each member of collaboration is established within the collaboration by MoUs (Memorandum of Understanding).

Locations (coordinator & RO)

CH: Switzerland, Geneva, CH 1211 Geneva 23

RO: National Institute for Physics and Nuclear Engineering **IFIN-HH**, Str. Reactorului 30, PO Box MG-6, Bucharest_Magurele, Romania

Website/s:
www.cern.ch

The research infrastructure HL-LHC of CERN has the most poweful collider in the world. The multinational team working within 7 large experiments collaborations has researchers of world reputation. At LHC, few years ago the longly awaited Higgs boson was discovered; for this discovery a Nobel prize in physics was attributed.

Description

The acronym HL-LHC comes from High Luminosity Large Hadron Collider, an accelerator unique in the world which allows fore front research in the field of elementary particles. LHC is a collider (two beams coming from opposite directions have a head-on collision) around which a number of 7 large scale experiments are set, namely at the crossing points of the two opposite beams circulating in a tunnel with a circumference of 27 km. The 7 experiments are: ATLAS, CMS, LHCb, ALICE, TOTEM, LHCf and MoEDAL. Romania participates in three of them: ATLAS, ALICE and LHCb. The project started in 1998 and was accomplished at the end of 2008 when the first beam for experiments was delivered. Its total cost amounted to 7500 Mil. Euro. The operation costs amount to 250 Mil. Euro/year.

Scientific context and relevance

The results of the researches performed at LHC are of paramount importance for our understanding of the way our Universe was formed immediately after the Big Bang (BB). The Standard Model for the interaction of elementary particles is tested at the highest energies accessible today, allowing this way to come closer to the time zero of the BB. These researches make the object of a large number of very relevant scientific papers. Building the collider and the experiment stations around it was possible due to a series of revolutionary technical innovations in various domains, innovations that subsequently were in large number taken by the interested industries. LHC disposes also by a quite impressive capacity to store and process huge amount of data resulting from these complex experiments, opening new avenues in IT technology.

Stage of implementation in Romania

Romania is a CERN member state. The Romanian researchers participated to the LHC experiments right from the begining. They participate to all stages of the project today: development and maintenance of detectors, modeling the experiments and data processing, they are actively participating in the meetings of the collaboration to which they belong and were major decisions are taken concerning both the strategy of future experiments and the way the data are processed and the results are confronted to the existing theoretical models. LHC has a very rigorous policy for publications and authorship. The Romanian researchers figure on most of the resulted publications from the experiments to which they participated. On the other side, these achieved rights and reputation must be preserved by continuing an active participation to the scientific life of their respective colaborations and also by an adequate financial support from their home institution.

Socio-economic impact

Pentru ca Romania sa aiba *vizibilitate in lumea stiintifica internationala*, o activitate consistenta si recunoscuta la CERN reprezinta un must. CERN si in particular LHC ofera largi oportunitati de formare si afirmare pentru tinerii cercetatori. A lucre la LHC este o onoare si o carte de vizita pentru viitor. In acelasi timp, participarea la CERN in general si la LHC este un challenge: toate tarile se intrec in oferi ceeace e cel mai reprezentativ tehnologic pentru ele, intrucat exista enorm de multe oportunitati. Depinde numai de noi cum le fructificam.

ROADMAP 2017

Eco - nano - technologies and Advanced Materials

SPIRAL2

2nd Generation Online Reactive Ion Production System

Type: National, single-sited

Coordinator: FR
Participants: RO

Coord. Institution in RO: Ministerul Cercetării şi Inovării (MCI), Str. Mendeleev, nr. 21-25, 010362, sector 1, Bucureşti

Estimated costs in RO:
- construction: 0.73 MIL EUR
- operation: - MIL EUR/ year

Locations (coordinator & RO)

FR: Bd Henri Becquerel, BP 55027, 14076 CAEN Cedex 05 - France

RO: Ministerul Cercetării şi Inovării **(MCI)**, Str. Mendeleev, nr. 21-25, cod 010362, sector 1, Bucureşti

Website/s:
www.ganil-spiral2.eu
www.research.gov.ro

SPIRAL2 will deliver beams of accelerated heavy ions, many of them radioactive for nuclear physics experiments, nuclear data and applications.

Description

The infrastructure aims to satisfy the beam requirements of a communities of over 700 physicists experimentalists and theoreticians, centered around GANIL. The main objectives of the SPIRAL2 project are: producing of intense radioactive beams using a linear accelerator (driver) able to deliver very high intensities, delivering of neutron beams for the study of neutron induced reactions and applications. It is foreseen to use two accelerated beams simultaneously. The main research fields will refer to the physics of nuclei far from stability, reactions with intense neutron beams and applications.

Scientific context and relevance

RI is mainly a beam provider: heavy ions (stable and radioactive elements) and neutrons. GANIL-SPIRAL2 offers to the users a large variety of complex basic experimental devices: magnetic spectrometers, complex detection systems and diagnosis, last generation systems for data acquisition and data processing, in other words all necessary elements for top class experiments in the domain covered by GANIL-SPIRAL2. The main components of SPIRAL2 are: the driver (linear accelerator), the converter (a specially devised target able to support very high beam intensities), the ion source, the beam lines, systems for beam diagnosis, vacuum systems, safety and radioprotection systems. A special block is devoted to neutron production and materials irradiations for applications, in particular nuclear data. The system allows operation in time of flight (TOF) mode. SPIRAL2 is built underground (for safety reasons) and is connected to all other GANIL infrastructures (CIME accelerator, beam lines and experimental areas, spectrometers and diagnosis systems). Besides the basic experimental equipment, there is a permanent activity directed to build new, specific setups for particular experiments. Often, their realization is accomplished in research institutes collaborating with GANIL -SPIRAL2.

Stage of implementation in Romania

The Romanian participation to GANIL-SPIRAL2 is made in the usual way of proposing experiments to the PAC GANIL. Often Romanian physicists participate in experiments proposed by collaborators either from GANIL-SPIRAL2 or from other research institutions. Preparing the experiments requires in many cases to build parts or sub-ensembles of the experiment in the home institutions. One should mention an important Romanian contribution to SPIRAL2: the Beam Loss Monitor (BLM) which costed 730 keuro.

Socio-economic impact

The accomplishment of the SPIRAL2 project will offer a state of the art accelerator to many physicists from Europe and more. The infrastructure will stimulate competitiveness and will offer to the Romanian physicists the possibility to manifest their talent. One can not ignore the role the research activities around SPIRAL2 may have in forming new young generations of scientists.

ROADMAP 2017

Eco - nano - technologies and Advanced Materials

FAIR

Facility for Antiproton and Ion Research

Type: International, single -sited

Coordinator: DE
Participants: DE RU IN PL FR RO SI SE FI

Coord. Institution in RO: Ministerul Cercetării şi Inovării (**MCI**), Str. Mendeleev, nr. 21-25, cod 010362, sector 1, Bucureşti

Estimated costs in RO:
- construction: 12 MIL EUR
- operation: 2.5 MIL EUR/ year

Locations (coordinator & RO)

GE: FAIR GMBH: Planckstr. 1, 64291 Darmstadt

RO: Ministerul Cercetării şi Inovării (**MCI**), Str. Mendeleev, nr. 21-25, cod 010362, sector 1, Bucureşti

Website/s:
www.FAIR-center.eu
www.research.gov.ro

FAIR will allow researches on: compressed baryonic matter, antiproton physics, nuclear structure and reactions, atomic physics and applications.

Description

The most important element of the project is the accelerator SIS100, the main beam provider for experiments. The project ensures an integral financing for the facility. For the experimental devices of total cost 300 Mil. euro, the project provides only 70 Mil. Euro, the rest being supplied by the experiment communities. The civil construction started in July 2017 and advances at a good pace. Excavation and consolidation works started for the tunnel that will host the accelerator and the beam lines. As soon as the civil construction will allow, the installment of accelerator related hardware will start. Components for the accelerator and experiments started to arrive and are tested on site. A subject on debate now is the restart or research activities using the refurbished SIS18 accelerator of GSI – the so called FAIR Phase 0.

Scientific context and relevance

FAIR is an ample scientific project assembling scientific communities from different domains of physics research, counting few thousand researchers. A new quality is expected from this project. FAIR is organized on four pillars, each of them representing important though distinct research directions: compressed baryonic matter (CBM), physics using antiproton beams (PANDA), studies of nuclear structure and reactions, mainly using the high performance magnetic spectrometer SuperFRS (NUSTAR) and atomic physics and applications, especially in biology, APPA. Each of the four communities has a thoroughly prepared long-range research plan. The first two mentioned domains are somewhat complementary o the studies at LHC-CERN. The NUSTAR community expects to extend the studies nuclei toward the regions of so called „exotic" nuclei (nuclei in which one of the components, neutrons or protons is in excess compared to the values of „normal" nuclei (close to stability line). APPA is a vast interdisciplinary laboratory: studies of the radiation effects on live matter, plasma studies, creation of new materials and study of their properties. FAIR will also be a center for professional formation of young. Here they will get acquainted with the most advanced technologies. Due to its international character, FAIR will be open to an even larger community of physicists. The close connections with the universities from the member states and especially with the neighboring German universities will create an academic climate favorable to exchange of ideas and collaboration.

Stage of implementation in Romania

The Romanian participation to FAIR is established by the FAIR Convention: 1% of expenses (building the infrastructure or operation costs). For the project the actual figures are 12 Mil. Euro made of 3 equal parts: cash, accelerator and experiments (in kind). Romania's payments are to date. Many in kind contributions are already contracted and started. Romania takes an active part in the FAIR governance: FAIR Council, Administrative and Finance Committee. Here reports are presented of some structures created by the Council like Scientific Council, Expert Committee for Experiments, In Kind Review Board, Machine Advisory Committee. Two important Romanian research institutes, IFIN-HH and ICPE have a strong implication in the FAIR project (in kind, scientific personnel).

Socio-economic impact

FAIR may have a substantial impact on the life of the community of Romanian physicists as it offers formation opportunities to young students (master, PhD) and also career opportunities. The in-kind contributions to FAIR will be a stimulus and a test for the engaged companies/institutions.

ROADMAP 2017

Eco - nano - technologies and Advanced Materials

RITECC

Research, Innovation and Technology Center for New Materials

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: (**INCDFM**) National Institute of Materials Physics

Estimated costs in RO:
- construction: 15 MIL EUR
- operation: 2 MIL EUR/ year

Locations (coordinator & RO)

RO: INCDFM, Str. Atomiştilor Nr. 405 A; 77125 Măgurele, Ilfov

Website/s:
http://www.infim.ro/

A research and development infrastructure dedicated to inovation and fast technology transfer in the field of advanced materials.

Description

RITECC is a research infrastructure in the field of fabrication and characterization of advanced materials, nanomaterials, and devices based on these, working with state of the art equipment and specialists in the above mentioned domains strongly connected to the international research area. RITECC aims at contributing at a decrease of the length of the evolutionary process from basic scientific ideas to products and technologies verified and adapted to particular environement. These reduction can offer a technical and economic advantage in a strongly competitive environement to interested businesses stimulating the development of inovative enterprises and an increase in both quality and quantity of the results of the research produced by the entities involved in the process.

Scientific context and relevance

The ideea of putting together RiTECC is based on both the desire of the host institution and the need to include romanian research in the economy and to increase the development at both local, regional and national level. During the last years NIMP demonstrated it can produce significant result in researchand it can integrate in the international research area as it can be proved by the published resulds and by being part of international consortia dedicated to the research in hot subjects. Recent development of the industrial production in Romania created the premises orienting these results towards an emerging market. The attention paid by companies to the development through research, visible in statistics and also visible from direct contacts generated a necessity to offer products and technological solutions towards profile industries. For these, the excellence in research and technology does not represent the only ingredients, being necessary the addition of two new concepts – scalability and compatibility to industrial production, which translated from an institutional point of view through the aquisition of equipment capable of offering these results. Moreover, taking into account the evolution of financing and the subsequent development of infrastructure NIMP well defined and fluent technological flows are necessary. This were implemented in Ritecc project both in the initial construction and equipment phase as in the follow up development which comprises a part of existing equipment and the aquisition of new one as to cover equally all of the ineresting areas. It was very important that the idea of focalization on some clear directions by intersecting high performance research areas with demands from companies represents the highest growth potential.

Stage of implementation in Romania

In order to obtain this infrastructure NIMP implemented in 2015 the project RITecC cofinanced by the Regional Development Fund a new building dedicated exclusively to the activities of research and experimental development and with a surface of 4100 square meters (21 laboratories). Through the same project an ensemble of clean rooms was built and state of the art last generation equipment was purchased, with the goal of multifunctional materials research, including nanostructurated materials and thin films with high technology applications, materials dedicated to applications in extreme conditions and materials with applications in environemental protection and life sciences.

Socio-economic impact

RITecC infrastructure has as a main goal research and innovation in high importance application fields and high socio-economic impact. The framework and the highlyqualified personnel ensures high importance activities in the chain which starts from fundamental research to applications and product development. Through this research facility NIMP aims at becoming an important presence in innovation in Romania, increasing the number of high tech products with high added value.

ROADMAP 2017

Eco - nano - technologies and Advanced Materials

CENASIC

Research Centre for Nanotechnologies Dedicated to Integrated Systems and Advanced Carbon Based Nanomaterials

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: National Institute for R&D in Microtechnologies (**IMT** Bucharest)

Estimated costs in RO:
- construction: 5 MIL EUR
- operation: 0.385 MIL EUR/year

Locations (coordinator & RO)
RO: IMT Bucharest, 126A Erou Iancu Nicolae street, 077190, Voluntari, Ilfov

Website/s:
CENASIC: www.imt.ro/CENASIC

CENASIC is a modern research centre for nanotechnologies dedicated to the development of integrated systems based on carbon nanomaterials with special properties.

Description

CENASIC is a modern infrastructure comprising 8 experimental laboratories and various support workshops, equipped with state of the art equipment, in a dedicated building. The centre offers high complexity equipment which allow the implementation of the latest technologies for processes and data analysis for carbon materials (0D – 3D films and structures), with high degree of applicability and strong interdisciplinary character. CENASIC aims to implement nanotechnologies for carbon based integrated systems to increase competitiveness and technological innovation capabilities, by efficiently combining the technological capabilities with modelling and simulation. Investments in research infrastructure are aimed at creating new technological platforms capable of sustaining synthesis and processing technologies for new materials, as well as designing and processing innovative devices and systems.

Scientific context and relevance

Over the last decade, the interest in carbon based nanomaterials and the development of applications has increased significantly, due to the simplification of synthesis methods, and the development of characterization instruments and techniques. This together with their electrochemical, optical, and electronic properties, makes the carbon based devices and integrated systems attractive for extreme condition operations (high temperatures, corrosive environments, etc). The synthesis technologies for these devices and new materials, combined with classical technologies and sciences (electronics, IT&C, material chemistry, etc), prove to be capable to bring major contributions in all industrial areas, especially in transportation, constructions, energy, environment, health, and security.

The advantages of integrated systems obtained by nanotechnologies lie not only in improvements of area, material and energy consumption, but as well as in new or drastically improved functions. It is estimated this development trend of the field will dominate the first part of the 21st century and will be the basis of the development of carbon based nanotechnologies.
Carbon based nanomaterials are used in technological fields having a high applicative potential and technological impact: molecular electronics, sensors, NEMS and MEMS, field emission devices, energy storage, and nanocomposite materials.
In this context, it is extremely important and relevant for Romania to be ready to face the new technological and scientific challenges in the context of globalization. The materials are the first step to increase the value and performance of devices, therefore the accent is on multidisciplinary approach for materials research in order to correlate molecular and atomic interactions, extracted from modelling and simulation, with device design.

Stage of implementation in Romania

CENASIC was inaugurated in December 2015. The Research Centre for Nanotechnologies Dedicated to Integrated Systems and Advanced Carbon Based Nanomaterials has 1000 m^2, from which 220 m^2 are class 100 and 1000 clean room facilities aligned to international standards. The centre opens a new development area for advanced nanomaterials and integrated systems based on carbon materials (graphene, SiC, nanocrystalline diamond). The experimental activity started in 2016, focused on the implementation and optimization of technological processes for the newly acquired equipment. Out of this activity CENASIC offered a series of services found in the ERRIS database (https://erris.gov.ro/CENASIC).

Socio-economic impact

The general objective of CENASIC is to amplify and diversify the RDI activities following a new trend in the field of micro and nano technologies for integrated systems. The central focus is on the improvement of quality and competitiveness of national R&D. CENASIC is essential for transforming the field of integrated micro and nano technologies in a modern source of competitiveness on national level, with a high impact on society and economy.

ROADMAP 2017

Eco - nano - technologies and Advanced Materials

CSSNT-UPB

Center for Surface Science and NanotechnologY — University Politehnica of Bucharest

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO:
CSSNT-UPB, Splaiul Independenței No. 313, AN-031, District 6, 060042, Bucharest

Estimated costs in RO:
- construction: 12 MIL EUR
- operation: 0.7 MIL EUR/ year

Locations (coordinator & RO)
RO: CSSNT-UPB, Splaiul Independenței No. 313, AN-031, District 6, 060042, Bucharest

Website/s:
www.cssnt-upb.ro

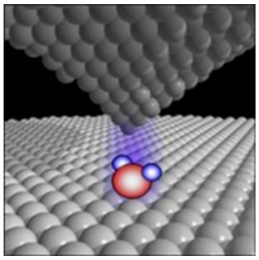
CSSNT-UPB deals with groundbreaking research in the fields of nanoscience and nanotechnology leading to the development of multiple applications.

Description

CSSNT-UPB with an internationally recognized expertise in the synthesis and characterization of the next generation of micro- and nano-materials, as well as in the fabrication of micro- and nano-devices and micro and nanostructures, has the ability to approach all the challenges launched by nanotechnology field. With an appropriate and well-coordinated strategy, based on a high-level international cooperation, CSSNT-UPB aims to bring a significant contribution to Europe's capabilities in the fields of nanoscience and nanotechnology, as well as in other related scientific areas. All the activities carried out within CSSNT-UPB are geared toward developing innovative and competitive technologies, used in applications such as sensors, biosensors, solar cells, MEMS, nano-FETs, micro- and nano-electronics, nano-optics, smart clothing, etc., capable of meeting the most demanding and critical societal needs.

Scientific context and relevance

Nanoscience and nanotechnology are recognized as top modern fields, with a revolutionary impact on industry and society by developing the next generation of materials, structures and devices. CSSNT-UPB, a multidisciplinary research institution, due to the unique characterization and synthesis systems at European and national level, but also due to the specialized research staff, with recognized expertise in their research activities, has the ability to understand, control and manipulate matter at atomic and nanometric dimensions and so to develop new innovative technologies capable of propelling the Romanian science to the world level. Through involvement in numerous research activities carried out in the framework of many international projects, successfully finalized or under implementation, such as SPFM-LA, NANODIATER, ACHEME, OPVCNT, Lab4MEMS, THINGS2DO, NANOFOAM, NOVTINAL-BEST, NANOCOATIL, NANOLIGHT, R3-POWERUP, CSSNT-UPB has built an international relevant scientific portfolio in the context of the major societal challenges identified in the H2020 program, with significant contributions in areas such as health, efficient and clean energy and the development of revolutionary technologies with societal impact. CSSNT-UPB stimulates cooperation and scientific integration, contributing to the improvement of the quality and reliability of third-party research results by giving them free access to its labs, of which we mention the Nano-optics Laboratory able of very specific Tip-Enhanced Raman Spectroscopy experiments and the SEM-STEM -ZC-EDX Laboratory for combined, simultaneous and co-localized measurements, which are not owned by other ESFRI research infrastructures. The two unique laboratories transform CSSNT-UPB into a key European player in nanotechnology.



Stage of implementation in Romania

At this point, CSSNT-UPB research infrastructure is completely implemented and functional. Established in 2011, CSSNT-UPB succeeded even from the beginning, through the SPFM-LA project and other international projects, to acquire state-of-the-art equipment and to attract external collaborations. In 2014, CSSNT-UPB received a grant through the project NANODIS co-financed from European Structural Funds to modernize its facilities by purchasing synthesis, characterization and micro- and nano-fabrication equipment. Now, the research infrastructure CSSNT-UPB has state-of-the-art systems, most of them being one of a kind at the national level and even two unique systems at the European level, which are able to meet the requirements of a large range of scientific fields, thus having a real contribution in the transfer of the fundamental information of its value to real market. The CSSNT-UPB research infrastructure was and continues to be operational and to provide applied scientific results and services since its establishment.

Socio-economic impact

CSSNT-UPB represents a strategic step for the materialization of the opportunities Romania has in order to establish itself in the field of nanotechnology at the European level, thus having the potential for major contributions in the re-launch of the Romanian industry by developing and implementing in local companies the most innovative and efficient technologies, that can satisfy important societal needs.

ROADMAP 2017

Eco - nano - technologies and Advanced Materials

COSMOS

Combined Spectroscopy and Microscopy on Surfaces

Type: European, distributed

Coordinator: IT
Participants: RO

Coord. Institution in RO: Institutul național pentru fizica materialelor (**INCDFM**)

Estimated costs in RO:
- construction: 2 MIL EUR
- operation: 1 MIL EUR/ year

Locations (coordinator & RO)

IT: CoSMoS-1, delocalized at Elettra Trieste Basovizza – Trieste and CoSMoS-2
RO: INCDFM, Str. Atomiștilor Nr. 405 A; 77125 Măgurele, Ilfov

Website/s:
http://www.infim.ro/

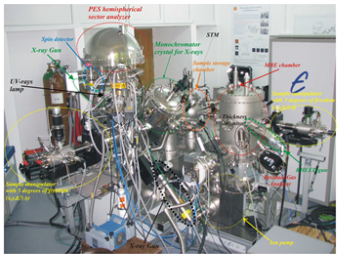
The infrastructure has as a main objective preparation and characterization of surfaces, interfaces and heterostructures through molecular beam epitaxy, electron diffraction, scanning tunneling microscopy and X ray photoelectron spectroscopy.

Description

In this particular infrastructure NIMP exploits two complex clusters of surface science based on X ray photoelectron spectroscopy and with a high degree of complexity through the presence of many associated techniques necessary in the study of surfaces and interfaces (MBE, AES, LEED, RHEED, STM, ARUPS, TPD).
The field of surface science and the connected fields which have as applications photoelectron spectroscopies are clearly distributed to a wide range of scientific domains: (I) physics, namely condensed matter physics, electronic physics, atomic and molecular physics; (II) chemistry, namely physical chemistry, anorganic and organic chemistry, cathalysis, electrochemistry, photocathalysis; (IV) materials science (multiple domains, including materials with applications in mechanics, electrical engeneering, electronics, textiles and food industry; (V) geology and geophysics.

Scientific context and relevance

Photoelectron Spectroscopy is based on the photoelectric effect (Einstein, 1905, Nobel Prize for Physics, 1921) which statuted for the first time in a definitive manner the corpuscular nature of light. In the same time as the XPS/ ESCA methods were implemented on a large scale (Noble Prize for Physics, 1981) studies related to nanometric and sub-nanometric scale structure of surfaces flourished. Modern surface science equipment supplements the XPS/ ESCA methods with other structural characterization methods, including here electron diffraction (low energy electron diffraction, LEED, or reflection high energy electron diffraction, RHEED), Auger electron spectroscopy for compositional measurements, atomic force microscopy (AFM) or scanning tunneling microscopy (STM, Nobel Prize for Physics in 1986) which allows visualization of individual atoms together with in-situ preparation facilities in Ultra – high vacuum for surfaces and thin films.
Analizing the angular distribution of XPS photoelectrons one can deduce the geometries of the surfaces or the possibilities of inserting impurities in a single crystalline solid the method being named (X-ray photoelectron diffraction, XPD).
The positions of deep levels in the vicinity of the surfaces and interfaces is affected by the band bends which appear in these areas due to the contacts between different matterials (as an example metal – semiconductor) or due to the ferroelectric polarization. Thus XPS can be employed for quantifying band bends. The teams in NIMP are among the first in the world which validated this method for ferroelectric materials.
During the last years photoelectron spectroscopy started to be used in conjunction with abilities of submicronic spatial resolution, developing methods which were named ESCA Microscopy, NanoESCA, Photoelectron SpectroMicroscopy sau Photoelectron Microscopy (PEEM).



Stage of implementation in Romania

2009. The aquisition through Nucleu Programme of the components necesary for the development of the cluster CoSMoS – 2 (XPS and STM instalations): opperating date august 2009.

2009: The aquisition through structural funds programme of the Photoelectron spectroscopy module with annular and spin resolution in CoSMoS 1 : opperating since october 2009.

2010 – 2012 New research project funded the aquisition of the MBE module. Operational since september 2012 – continuous upgrading since.

2013 – since november COSMOS 1 delocalized at the Elettra synchrotrone in Trieste. Operational since december 2013.

2017 – march – agreement signed with Elettra synchrotrone for association.

Socio-economic impact

The experiments performed in real time opened new colaboration oportunities with chemical, petrochemical, farmaceutical, automotive, electrical and electronic industries.
Teams in NIMP and in Romania which will exploit the new facility can perform an important transition in characterization from static results (spectra and photographs/ micrographs) to dynamic results (evolution as a function of time).

ROADMAP 2017

Eco - nano - technologies and Advanced Materials

RECAST

Research Centre for Advanced Surface Processing and Analysis by Vacuum Technologies

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: Center for Advanced Surface Processing and Analysis by Vacuum Technologies (**ReCAST**)

Estimated costs in RO:
- construction: 0 MIL EUR
- operation: 1 MIL EUR/ year

Locations (coordinator & RO)
RO: National Institute RD for Optoelectronics - INOE 2000, Atomistilor Str., no. 409, Magurele, county Ilfov, 077125

Website/s:
http://recast.inoe.ro

Development of novel multifunctional materials used in optoelectronic applications and related domains, using ecological tehnologies for surface processing by plasma and vacuum.

Description

ReCAST-RI is a complete research infrastructure, which involves the multidisciplinary research in the field namely "eco-technologies and advanced materials". In ReCAST-RI, the main aim is to modify surface properties of materials, in respect to the volume properties, giving it new applicative or extended valences. The surface processing involves the use of controlled ion flux- plasma, ion sources, and laser. Developed technologies offer an enlarge application fields, in order to re-technologized national industry by the implementation of modern and unpolluted technologies, with reduce material and energy consumptions.

Scientific context and relevance

The ReCAST research infrastructure, an integrated part of INOE 2000 infrastructure, is dedicated to the increase of research and innovation capabilities in the domain of optoelectronics, aiming for the development of an integrated research activity with high innovative potential. ReCAST-RI is a complete structure, allowing to approach interdisciplinary research in the domain „eco-technologies and advanced materials" from the National Strategy for Research, Development and Innovation 2014-2020. The main activity inside the ReCAST-RI is the development of multifunctional materials with applications in optoelectronics and related domains, by using plasma and vacuum related eco-technologies. As an example, some of the research topics implemented at ReCAST-RI:

- New materials and devices for solar energy conversion; photovoltaic and thermos-electrical devices; radiation detectors in the UV -Vis-IR domain;
- New multifunctional materials for low energy consumption and low energy loss buildings (high temperature thermal collectors (in the range of 400-600° C), architectural coloured filters, electrochromic glasses, etc);
- New materials for modern transportation; innovative technologies for the automotive industry;
- New multifunctional materials for increasing the energy efficiency and decreasing the pollution related to transportation (materials used in high temperature functioning regimes, structurally stable, resistant to oxidation and chemical attack in harsh environments);
- New multifunctional materials for systems and devices used in prosthesis;
- New multifunctional materials for nuclear technologies;
- Research in the domain of optoelectronics/photonics and nanoelectronics;
- New devices and systems for optoelectronics, photonics and nanoelectronics: sensors for relevant elements in Security Techniques.

Stage of implementation in Romania

ReCAST-RI is equipped with ultramodern research systems, being an infrastructure well connected with researchers/institutions form Romania and other countries, in order to become a solid research centre in the domain of optoelectronics and related domains. ReCAST-RI consists of following laboratories: Thin films deposition and surface processing (LaS), Laboratory for the development and implementation of high-/ultrahigh-vacuum technologies (LaV), Elemental and morphology analysis Laboratory (LanE), Structural analysis Laboratory (LanS), Laboratory for functional characterization (LaC). ReCAST-RI, due to its employed specialists with high qualifications as well as modern equipment, can answer to real economical and research needs of the Romanian market as well as of European one, by developing new products and RD services with added values.

Socio-economic impact

ReCAST-RI will sustain the progress of Romania participation into programs for international collaborations in three main fields:

- Novel photocatalytic materials or those for sensors, architectural panels and displays, prepared by eco-technologies;
- Independent performance evaluation of component of spatial equipment in high vacuum conditions, which worked in repeated thermal cycles (in the range ±240 ^{0}C);
- Novel biocompatible materials used in prosthetics.

ROADMAP 2017

Eco - nano - technologies and Advanced Materials

UNIREM

NMR spectrometer system equipped with autosamplers

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: University of Bucharest, Faculty of Chemistry, Department of Organic Chemistry, Panduri Street no. 90, sector 5, Bucharest

Estimated costs in RO:
- construction: 0,615 MIL EUR
- operation: 0,03 MIL EUR/year

Locations (coordinator & RO)
RO: University of Bucharest, Faculty of Chemistry, Department of Organic Chemistry, Biochemistry and Catalysis, Şoseaua Panduri nr. 90, sector 5, Bucharest, 050663

Website/s:
www.unirem.unibuc.ro

UniReM supports cutting-edge research in chemistry, physics, biology and related fields, in order to contribute to achievement of highly qualified human resources.

Description

UniReM represents an operational, single-sited, regional and open-access research infrastructure that supports fundamental research activities in fields like organic chemisry, inorganic chemistry, physics, materials sciences etc. UniReM holds two spectrometers that operate at proton Larmor frequences of 500 MHz and 300 MHz (in magnetic fields B0 = 11.75 T and B0 = 7.05 T, respectively), both equipped with autosamplers. The main applications of UniReM include: i) synthetic small-molecules structural confirmation, ii) protein structural determinations, protein-ligand interaction studies, eznyme transformations; iii) metabolomics on cell cultures and samples provided by medical units interested to use the facility for clinical research.

Scientific context and relevance

Nuclear magnetic resonance has been the central element that led to the spectacular evolution of physics, chemistry and biology during the 20th century. The presence of UniReM within the research groups belonging to our institution and our partners is an essenatial feature required to approach cutting-edge research themes at international level. The current active international collaborations, as well as the results obtained in the past few yeras in fields like organic synthesis, bioorganic chemistry, materials chemistry, free radicals, supramolecular chemistry etc. are a clear evidence of UniReM contribution for the research activities developed in our institution and partners. Development of human resources as highly qualified researchers in physics, chemistry, biology and the interdisciplinary/ multidisciplinary fields that were born at the boundaries betweem then (i.e. materials sciences, biochemistry, biophysics) constitutes an advantage brought in by the educational component of our institution. UniReM has an unique character at national level that is also given by our preocupations in the field of biomass valorization that primarily results in production of complex molecules, with multiple uses (i.e. in pharmaceutical industry). There are numerous potent applications, from small-molecule structural confirmation tu studies of enzyme reactions in cells. The applications area may be further extended to NMR studies with increased sensitivity, up to 10.000 fold, through dissolution Dynamic Nuclear Polarization, taking advantage of the expertize in the field. Sustainable and predictable development of UniReM will attract qualified human resources, training of future generations, participation to European research networks and projects, mainly in the smart specialisations Eco-nano-technology and Bioeconomy.

Stage of implementation in Romania

Construction of UniReM was started in 2011 and became fully operational in June 2014. UniReM is an open access facility that opened unconditionally for researchers, students/young researchers from University of Bucharest (mainly Faculty of Chemistry), Research Institute of University of Bucharest, Centre Institute of Organic Chemistry ‘‘C.D. Nenitescu” of the Romanian Academy, Polytechnica University of Bucharest – Faculty of Applied Chemistry and Materials Sciences, National Institute For Chemical - Pharmaceutical Research and Development – ICCF Bucharest. The users number of UniReM during the operational timeframe was over 100, yearly.

Socio-economic impact

The economical development of a region firstly requires very good qualified human resources. Existance and maintanance of top research infrastructure, whcih is yearly opened to a great number of students and researchers, will contribute to development and attraction of very well trained specialists, who will preserve, support and further expand the society interest to cutting-edge research and evolvement of new products and services that have direct economical impact.

Information and Communication Technology, Space and Security

ROADMAP 2017

Information and Communication Technology, Space and Security

DISTRICT

Research Infrastructure for Data Science and Intelligent Systems

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: University POLITEHNICA of Bucharest

Estimated costs in RO:
- construction: 27 MIL EUR
- operation: 1.8 MIL EUR/ year

Locations (coordinator & RO)
RO: PRECIS Research Center, CAMPUS Research Center, and National Center for Information Technology, all located in 313 Splaiul Independenței, Bucharest, 060042, Romania

Website/s:
http://www.district.pub.ro/

The infrastructure DISTRICT offers research services and facilities for Big Data processing and the development of artificial intelligence systems.

Description

The main aim of the DISTRICT infrastructure is fundamental research, applied research, and innovation, including inter- and multi- disciplinary research, for the conception and development of intelligent systems based on artificial intelligence methods, techniques and technologies, and on the analysis, processing and visualization of big data issued from various scientific domains and sources. The research is focused mainly on: machine learning, computer vision, multimedia content processing and analysis (images-video-text-audio) for intelligent decision systems, humanoid robots, industrial robots, intelligent vehicles, UAVs, Big Data (software and hardware support), Internet of Things, intelligent sensor networks, communication networks and antennas, cloud and grid computing.

Scientific context and relevance

The scientific field of DISTRICT is Information and Communication Technologies. In the context of a digitally-driven society and consumer growing expectations, companies from around the world must meet the challenges of processing and interpreting huge amounts of real-time data and of creating personalized consumer experiences. Presently, both the scientific world and the business community consider that artificial intelligence is one of the most profound research and development domains that humanity is working on right now, capable of a significant transformation of our future society, and benefiting of enormous funding from governments and companies in most of the countries around the globe. Approaches based on machine learning, computer vision, natural language processing and intelligent agents have already proven the capacity to meet present challenges, both in business and in a plethora of scientific domains. Big Data processing systems are able to treat data with a rapid evolution in terms of type, volume and velocity, based on advanced techniques of interpretation, machine learning, and intuitive visualization. The research on which DISTRICT is focused combines the methods, techniques and technologies of artificial intelligence with those of Big Data to develop innovative applications such as humanoid and industrial robots programming for specific tasks, autonomous driving, UAVs flying, interpretation of the massive amounts of data collected from the Internet of Things or sensor networks, automatic understanding of multimedia content, massive data processing in the cloud and grid. The DISTRICT infrastructure is successfully utilized to develop national and international research projects, in cooperation with similar centers and organizations, and cooperates with the ITC industry to facilitate innovation and advanced technological transfer.

Stage of implementation in Romania

DISTRICT is part of the University POLITEHNICA of Bucharest and is formed of a cluster of new research infrastructures developed through the Economic Competitiveness Growth Programme, co-financed by the European Regional Development Fund: Research Infrastructure for the Development of Intelligent Innovative Products, Processes and Services (PRECIS) and Advanced Research Center for Materials, Products and Innovative Processes (CAMPUS), and of the National Center of Information Technologies (CNTI). The development of the inter- and multi- disciplinary center CAMPUS began in December 2013 and it became operational in December 2015. The development of the research center PRECIS began in January 2015 and it became operational in January 2016. The CNTI center has been operational since 2000. DISTRICT was recently included in the national Roadmap of major research infrastructures.

Socio-economic impact

DISTRICT has a major economic impact by forming a critical mass of infrastructure, of internationalization (cooperation with European organizations and initiatives) and of technological transfer, and an important social impact by being a landmark infrastructure in the region, developing strategic projects of national interest, and responding to the current national social demands, in line with the newest international trends.

ROADMAP 2017

Information and Communication Technology, Space and Security

AEROSPATIAL

Platform for Research, Simulation, Testing and Certification of Aerospace Vehicles

Type: National, single-sited

Coordinator: RO
Participants: ES, NL, DE, IT, FR, BE

Coord. Institution in RO: INCAS – National Institute for Aerospace Research „Elie Carafoli"

Estimated costs in RO:
- construction: 37.3 MIL EUR
- operation: 10.8 MIL EUR/year

Locations (coordinator & RO)
RO: INCAS – National Institute for Aerospace Research „Elie Carafoli", Iuliu Maniu 220, sector 6, 061126 Bucharest, Romania .

Website/s:
http://www.incas.ro

AEROSPATIAL is a basic component for a joint EU simulation and virtualization facility for aerospace technologies at high technology readiness level.

Description

AEROSPATIAL is a high TRL research and industrial development environment towards certification in aerospace sciences. This facility is part of a pan-European virtual distributed research infrastructure (JSVFA) aimed to support the development of technologies needed for the new generation aircraft and space vehicles in a high tech environment specific for year 2030. It is a high level integrated virtual collaborative infrastructure based on four main pillars: Physical infrastructures and hardware; MDO simulation tools and HPC resources, Virtual reality access and interfaces and Integrated management and common development policy. AEROSPATIAL provides the relevant simulation environment, testing capabilities at highest industrial standards towards certification in aerospace sector, unified IPR policy and advanced cyber security compliance.

Scientific context and relevance

This type of ESFRI facility is unique in the sense that integrates most relevant facilities for aerospace research and specific know-how in an interactive cyber space, using common access policies, and integrates the unique knowledge in the usage of the most advanced facilities for aerospace in a 4 pillar structure. The Physical infrastructures and hardware pillar integrates relevant existing high TRL research facilities used for aerospace research by INCAS. This is the case for some of the high profile facilities in flow physics (low speed and high speed wind tunnels, shock tubes, aeroacoustics and harsh environment), engine test beds, structural testing facilities (aero elasticity, crash, bird strike) and aircraft ground test beds (iron bird, advanced mock-ups). Ground based flight simulators and similar human-machine interaction testing facilities also include static and dynamic flight simulators, avionics test benches and pilot-in-the-loop ground based testing environments. Small scale up to large scale flying research platforms/demonstrators include research flying aircrafts used as a platform for testing and validation of systems, materials and new airframe configurations. MDO simulation software tools and HPC pillar is focused on aero-thermodynamics analysis, structural design and analysis, systems simulation, mission planning and evaluation, environmental impact assessment and product life-cycle evaluation. The Virtual reality access and interfaces pillar is based on immersive virtual reality environment (i-cube VR, haptic systems), pre and post-processing dedicated tools and interfaces and access to HPC resources. The Integrated management and common development policy pillar features standardized access and accounting policies, advanced cyber security, joint training and user support and unified IPR policy. Resources (hardware and software) may be integrated in the facility based on their specific relevance for the aerospace sector.

Stage of implementation in Romania

INCAS currently operates relevant components from the 4 pillar structure of the AEROSPATIAL infrastrature on the main location in Bucharest, interconnected with 2 remote sites in Romania (Strejnic airport airbase for flying labs and Maneciu base for space robotic operation testing and simulation). AEROSPATIAL integrates current developments in JTI Clean Sky2 and space developments from on-going ESA FLPP programs. Toghether with partners in EREA – European Research in Establishments in Aeronautics Association, INCAS has initiated the ESFRI proposal for JSVFA - joint simulation and virtualization facility for aerospace research. JSVFA successfully completed the effort devoted to governance aspects in the Preparatory Phase to develop sound and reliable governance and administration schemes. In Romania AEROSPATIAL has been included in the national roadmap for research infrastructures.

Socio-economic impact

AEROSPATIAL supports multidisciplinary and multinational collaboration through cooperation with other partners in EREA, Clean Sky2 and ESA, promoting Europe as a world leader in aerospace sciences and developing a new generation research infrastructure. AEROSPATIAL provides open access policy for advanced academic research, combined with real industrial integration and higher exploitation of IPR.

ROADMAP 2017

Information and Communication Technology, Space and Security

IMT-MINAFAB

Facility for Design, Simulation, MIcro- and NAnoFABrication of Electronic Devices and Systems

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: National Institute for R&D in Microtechnologies – IMT Bucharest

Estimated costs in RO:
- construction: 8.024 MIL EUR
- operation: 0.92 MIL EUR/year

Locations (coordinator & RO)
RO: IMT Bucharest, 126A Erou Iancu Nicolae str., 077190, Voluntari, Ilfov, Romania

Website/s:
IMT Bucharest: www.imt.ro

IMT-MINAFAB: http://www.imt.ro/MINAFAB/; https://erris.gov.ro/

MINAFAB; https://ec.europa.eu/growth/tools-databases/kets-tools/infrastructure/imt-minafab

IMT-MINAFAB is a unique facility in Romania, competitive at European level, devoted to research in micro-nanoelectronics, sensors and Microsystems.

Description

IMT-MINAFAB is the only facility in the country, in operation state, where micro- and nanocomponents, micro-nanosensors and intelligent Microsystems could be manufactured, including the whole manufacturing chain, from computer aided simulations (CAD), technological processing, microphysical characterization, functional testing and reliability tests, with state-of-the-art technological equipment and specialised personnel. IMT-MINAFAB is a facility dedicated to excellence interdisciplinary research and innovation, similar to other EU facilities, functioning as an "open centre" for partners and clients. The facility represents an interaction platform between research, education and industry, at national and international level, proved by its participation as coordinator or partner in numerous national or European projects.

Scientific context and relevance

IMT-MINAFAB is the only facility in the country, in operation state, where micro- and nanocomponents, micro-nanosensors and intelligent Microsystems could be manufactured, including the whole manufacturing chain, from computer aided simulations (CAD), technological processing, microphysical characterization, functional testing and reliability tests, with state-of-the-art technological equipment and specialised personnel. IMT-MINAFAB is a facility dedicated to excellence interdisciplinary research and innovation, similar to other EU facilities, functioning as an "open centre" for partners and clients. The facility represents an interaction platform between research, education and industry, at national and international level, proved by its participation as coordinator or partner in numerous national or European projects.

Stage of implementation in Romania

IMT-MINAFAB was set up based on background expertise of ICCE (established in 1969) in developing of electronic devices and circuits and IMT Bucharest (national institute since 1996) in sensors and Microsystems domain.

The existing clean room has been upgraded in 2006, class 1000, surface 198 sqm, for mask lithography, photoengraving and metal deposition. The "grey zone" class 100 000, surface 287 sqm, financed by Capacities PNII funds (4 million Euro), has been set up to host microphysical characterization equipments. From 2010 to 2011, a new clean room has been established, surface 105 sqm, class 10 000, for LPCVD deposition and RIE, DRIE etching. Another zone for thermal process and oxide deposition, financed from investment funds granted by MCI, is being currently upgraded with the deadline for completion December 2017.

Socio-economic impact

IMT-MINAFAB is recognized at European level and is active in top areas important for big societal challenges. The infrastructure is ready to contribute to development of competitive economy in Romania, using the human capital to solve the major societal challenges related to intelligent sensors domain: personal monitoring, personal and infrastructures security, environmental security.

Health

ROADMAP 2017

Health

NANOBIOMED

European Research Infrastructure for the Use of Nanobio-Genomic Applications in the Life Sciences

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: Universitatea de Medicină și Farmacie "Iuliu Haţieganu" Cluj-Napoca

Estimated costs in RO:
- construction: 6 MIL EUR
- operation: 0.5 MIL EUR/ year

Locations (coordinator & RO)
RO: Cluj-Napoca, str.Louis Pasteur, nr.4-6, Cod 400349, jud.Cluj, Regiunea Nord-Vest

Website/s:
www.umfcluj.ro

A biogenomics and biomedical nano-technologies open access infrastructure for the personalized diagnostic of multiple pathologies.

Description

The aim of project is to develop an integrated system for the application of a personalized medical concept, through the combination and the application of the genomics studies at the level of multiple organisms of interest in the human pathology, as well as the human genome and the utilization of information from the area of "omics" in the development of some nanotechnology systems (for diagnostic & therapy, the development of multifunctional nanotherapeutically systems). The interdisciplinary approach will be ensured by the following studies: cellular toxicology, genomics, transcriptomics, proteomics and metabolomics. The data that will be obtained will be transferred to various pharmaceutical companies. The application of the studies in the clinical setting will benefit both the patient and the medical staff. Everything will be achieved under the umbrella of two new research centers.

Scientific context and relevance

Nano-bio-genomics has the potential to overcome different barriers as far as it comes to the development of some new and innovative tools for diagnostic and personalized therapies. Even more, gives the opportunity to come up with both an imagistic diagnostic and a treatment simultaneously. Despite the challenges associated with the implementation in a routine clinical setting, it is expected that nano-technology will have a major role in the future of medical imaging, and also in the patient's personalized treatment, by correlating data related to the human genome and by contributing to the streamline of their costs for care.
This platform will create the premises for the development of a pole of Excellency in the nano-bio-genomics field at a national and international level, in an area where there is an acute need for development and consolidation, in order to raise the Romanian level of the scientific performance.
By creating this platform, new interdisciplinary research directions will appear and develop, attracting new doctoral and master students in various interconnected domains and giving them the opportunity to grow as European specialists. The training, the exchanges and the creation of connections between the researchers are an important objective of the research platform. The doctoral students and the post-doctoral students will be taught using state-of-the-art techniques in the field of "omics" technologies, nanostructures and molecular biology. The combination and availability of different expertise techniques in the involved complementary research areas give these young researchers the unique chance to be trained outside of their research area, promoting the multi-interdisciplinary research.
The main purpose is to increase the competition in the field of bio-nano-genomics, to attract highly competitive personnel at a national and international level, to develop project partnerships and collaborations in interdisciplinary and frontier fields of research.

Stage of implementation in Romania

Nano-bio-genomics has large applications in promoting medical science and improving health care practices around the world. The unique character of the infrastructure is given by the complementarities of the two research centers, one in the field of functional and translational genomics, and the second, in the field of advanced medicine, which enables translational research studies. The platform will allow for studies with immediate clinical applicability, such as Bench-to-bed sight. Studies such as the evaluation of the mutational or transcriptional profile, bioinformatics, the identification of clinical correlations, the validation of molecular altered mechanisms on the animal model, the development of new innovative therapeutic strategies will be conducted to facilitate the establishment of partnerships with public institutions and private companies interested in research projects.

Socio-economic impact

Through the interactions of scientists, clinicians, bioinformatics and life sciences experts, there will be an exchange of techniques, expertise and knowledge. The results obtained from these interactions will be promptly disseminated and exploited to the maximum, thus ensuring the development of the involved economic societies, both at the regional and national level.

ROADMAP 2017

Health

RITM-EATRIS

Romania - Translating Medical Research Infrastructure

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: Academy of Medical Sciences

Estimated costs in RO:
- construction: 27 MIL EUR
- operation: 3 MIL EUR/ year

Locations (coordinator & RO)
RO: Academy of Medical Sciences, Str. I.C. Bratianu nr. 1, sector 3, București, Romania

Website/s:
www.ritm-eatris.ro

RITM-EATRIS is a national translational infrastructure that integrates 9 advanced research centres with multidisciplinary teams of experts, educational platforms and research laboratories with state-of-the-art equipment for fundamental and applied medical research.

Description

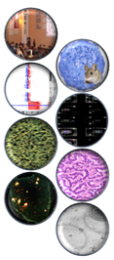
RITM-EATRIS is an infrastructure that aims to accelerate the application of research results in current medical practice, the discovery and translation of rapid and accurate diagnostic methods, effective monitoring techniques and personalized therapy into the clinic. RITM-EATRIS is an open access platform for all researchers with innovative ideas and a pole of educational excellence in modern medicine. The main areas of research are: tumour pathology; pathology of the gastrointestinal tract, cardiovascular pathology, endocrine pathology, regenerative medicine, emerging therapies.

Scientific context and relevance

RITM-EATRIS brings together cutting-edge technical facilities and experts with recognized international visibility and provides open access, technical support and high-level training in translational medicine to all researchers interested in developing innovative methods for diagnostic and therapy to improving the health of population. RITM-EATRIS has the ability to produce major progress in knowledge of physiologic and pathologic states by providing researchers with access to unique technologies: confocal endomicroscopy laser, ultrasound endoscopy, 3TMRI, PET-CT, angiography, 2 photon microscopy; high-resolution microscopy, high-capacity screening for proteomics, genomics and IHC, 3D bioprinting, biobanking facilities, GMP laboratories, etc.

Stage of implementation in Romania

RITM-EATRIS aims to synergistically utilize the complementary capacities of advanced research centers that have been funded through the program POS CCE 2.2.1: ASM-AngioNET, RD Center in Gastroenterology and Hepathology (PYRAMID, TARGET), Advanced RD Center for Experimental Medicine(CEMEX), RD in Experimental Medicine (CEMT), RD laboratoy in molecular, cellular and structural endocrinology (ENDOCED), Center for Gene and Cellular Therapies in the Treatment of Cancer (OncoGen), IBPC-N. Simionescu (CARDIOPRO, SORTIS), Center for Advanced Research in Cellular and Molecular Medicine of „Victor Babeș" National Institute of Pathology (CAMED), Center for research in oncogenesis and therapy with oncolytic viruses (ONCOIVN).



RITM-EATRIS promotes development-innovation research activities in the European Research Area, including through affiliation to the EATRIS-ERIC European Consortium, as well as innovative, knowledge-based economic activities. Continuing and expanding collaborations in translating research projects at national and international level will ensure the consolidation and development of specific expertise of each participant RITM-EATRIS. By encouraging education and training in translation medicine, it is estimated that significant results will be achieved in the context in which scientific progress means first of all the circulation of information, overspecialization and interconnection.

RITM-EATRIS is based on the adhesions of the founding members, as well as discussions with representatives of the Pan-European Consortium EATRIS-ERIC that support Romania's membership as a member of the consortium as an opportunity for both parties. The documents related to the registration of the consortium are under preparation. Discussions are taking place with decision makers from Romania in the field of research and health and other potential members joining the consortium to integrate RITM-EATRIS as the national platform of EATRIS-ERIC.

Socio-economic impact

RITM-EATRIS uses its critical mass to identify major health problems and find the necessary scientific solutions and funding for their implementation by supporting frontier research projects that can be carried out within the partner institutions. The most obvious socio-economic effects are: savings in the health system and reduction of social costs through development of adequate prevention policies, accurate diagnostic protocols and personalized therapy, improvement of health, enhancing the active life, and reduction of mortality. The goal is to generate improved medical services and innovative therapies with a positive impact on the health of the population.

ROADMAP 2017

Health

ROBI

RO-BioImaging

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: INCD „Victor Babeș" Bucharest

Estimated costs in RO:
- construction: - MIL EUR
- operation: 0.12 MIL EUR/year

Locations (coordinator & RO)

RO: „Victor Babeș" National Institute of Pathology, Splaiul Independenței, 99-101, sector 5, Bucharest, 050096

Website/s:
www.ivb.ro/
www.cell-imaging.ro/

RO-BIOIMAGING is a research infrastructure aimed to offer open-access to advanced bioimaging applications in the field of life sciences.

Description

Bioimaging is an emerging scientific field, set to bring major contributions to deciphering the molecular and cellular mechanisms that underlie physiological and pathological processes. RoBI is a research infrastructure hosted by Victor Babeș National Institute, Bucharest, and open to biomedical researchers requiring high resolution and high throughput imaging equipment for their projects. RoBI comprises complementary tools, able to structurally and functionally characterize organic structures, from tissue or cell level, down to molecular interactions in the nanoscale. Therefore, RoBI allows a multi-disciplinary approach to answering scientific questions, while also providing the necessary expertize and training for bioimaging techniques: advanced light and electron microscopy, electron tomography, wide-field, confocal and STED super-resolution microscopy, data analysis.

Scientific context and relevance

In the past decades, it has become increasingly obvious that understanding the mechanisms leading to disease and aging requires a complex and integrative approach, which can simultaneously examine all different levels of biological organisation: genes, molecules, macromolecular complexes, organelles, cells, tissues, organs and systems. Bioimaging is an emerging field, under continuous development worldwide, which includes high-resolution approaches to studying molecules and cells, augmenting molecular biology, proteomics and genetics applications. The equipment and techniques available through RoBI allow scientists to tackle the leading edges of knowledge and even bridge life and materials sciences.

Among these relatively new bioimaging techniques are super-resolution microscopy (SRM), electron-tomography (ET), cryo-electron-microscopy (cryo-EM) and correlative light and electron microscopy (CLEM). SRM is a type of optical microscopy, that can overcome the diffraction barrier and thereby image subcellular structures and molecular interactions at 50 nm resolution, in both living and fixed cells. Cryo-EM has become indispensable for characterizing viruses, molecules and even cells at near-atomic resolution. As opposed to other electron microscopy techniques, cryo-EM sample preparation does not require chemical fixation, instead allowing visualization of structures in their near-native state. CLEM allows the user to superimpose fluorescence data over ultrastructural images obtained through electron microscopy, thereby shedding new light on the molecular mechanisms inside cells in physiological and pathological conditions.

Stage of implementation in Romania

RoBI became operational in 2016 and hosts state-of-the-art bioimaging technologies, offered in an open-access system. RoBI is now also able to offer necessary expertise and training for processing and visualizing biological samples, as well as for processing and analysis of generated data. Areas of interest range from fundamental research in molecular and cellular biology focused on cell-to-cell communication and tissue regeneration, to molecular and cellular pathology focused on tumoral pathology and neurosciences.

Socio-economic impact

The results obtained by using the RoBI infrastructure are expected to significantly contribute to advancing knowledge in various scientific fields. RoBI has the potential to draw national and international collaborations and public-private partnerships, which will have a positive impact on both the visibility and competitiveness of Romanian researchers as well as the quality of biomedical research overall.

ROADMAP 2017

Health

CAREVASC

Center for Interdisciplinary and Cardiovascular-vascular Translational Research

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO:
The University of Medicine and Pharmacy „Carol Davila"

Estimated costs in RO:
- construction: 19.63 MIL. EUR
- operation: 1.4 MIL. EUR/ year

Locations (coordinator & RO)
RO:
Trei locatii vor deservi scopurilor proiectului, distribuite ca o retea: 25 de laboratoare aferente Locatiei 1 (UMFCD), 7 laboratoare fiind aferente Locatiei 2 (SUUB) si 1 Laborator fiind aferente Locatiei
3 (SCUBA). Locatia 2 si Locatia 3 apartin Universitatii de Medicina si Farmacie „Carol Davila" ca urmare
a Acordului de utilizare emis de cele doua unitati.

Website/s:

https://umfcd.ro/

The goal of CAREVASC is to achieve research excellence in the field of cardio-cerebro -vascular diseases, with a multidisciplinary approach.

Description

CAREVASC is an infrastructure that interconnects 11 disciplines from Carol Davila UNIVERSITY of MEDICINE: Cardiology, Neurology, Neurosurgery, Neuroscience, Physiology and Biophysics, Biochemistry, Pharmacology and Pharmacotherapy, Histology and cell biology and anatomy. It will create a functional network, well-coordinated, extremely wide (33 different laboratories) to successfully complete the 21 research topics, all of them representing major challenges at the national and international levels.
It is the only research structure from Romania, with a multidisciplinary approach in the field of cardio-cerebro-vascular diseases, with direct applications in the health and medical services of pharmaceutical products. In these laboratories will be involved at least 46 experts, with the highest level of scientific expertise.

Scientific context and relevance

The need for carrying out this project lies on the national and international context of cardio -cerebro-vascular diseases, representing major risks for the population. Romania is ranked No. 3 in the world in deaths due to cardiovascular disease. According to the Romanian Foundation of heart, 62% of the deaths are generated by CV diseases. Currently 7 million Romanians suffers from cardiovascular disease. At the international level, cardiovascular disease causes 50% of deaths in the European Union and 30 percent of deaths worldwide, affecting the workforce and family incomes, especially in Eastern European countries (World Health Organisation). 10% of the total expenditure for health are dedicated to these diseases. It recorded 4.3 million annual deaths in Europe due to cardiovascular diseases, while the estimated costs for treatment and care are of 196 billion €/year. European society of Cardiology, believes that a new epidemic of cardiovascular diseases expands in Europe, a result of the increased prevalence of diseases such as obesity and diabetes. According to the same sources, "this epidemic is also a great opportunity for European universities, companies and health care providers to be at the forefront of a global reactions to address this threat."
Center for interdisciplinary and translational research cardio-cerebro-vascular CAREVASC will create a nucleus of multidisciplinary research. Through the project we will address the research topics that will lead the research conducted so far to a superior level, compared to previous research projects.

Stage of implementation in Romania

CAREVASC infrastructure is in the phase of operation through its departments, but requires development as an unique center. CAREVASC begin in Cardiology Research Unit, located in the Bucharest University Emergency Hospital, location that has an agreement to be use by CAROL DAVILA UNIVERSITY. The research unit was created after more than 25 years, and conduct research activities in Cardiology (screening, diagnosis, evaluation, treatment). CAREVASC, as Large research infrastructure, is in the phase of the project at the moment, the total amount required for development is about 89 million RON, mainly for the acquisition of equipment, facilities and CD IT equipment. We had Signed partnership agreements with public and private institutions from Romania and from abroad, for the purpose of developing research themes proposed by the project.

Socio-economic impact

CAREVASC infrastructure has a major socio-economic impact, since it contributes to:
-improvement of clinical trials of medicinal products;
-improvement of preventive behaviour and treatment;
-reducing the costs of treatment and monitoring;
-reducing cardio-embolic complications;
-improved social integration of persons suffering from cardio-cerebro-vascular diseases.

ROADMAP 2017

Health

CONCEPT

Multidisciplinary Center for Advanced Research in Personalized Oncology

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO:
The University de Medicine and Pharmacy "Victor Babeş" Timişoara (UMFVBT)

Estimated costs in RO:
- construction: 20 MIL EUR
- operation: 20 MIL EUR/ year

Locations (coordinator & RO)
RO: The University de Medicine and Pharmacy "Victor Babeş" Timişoara (UMFVBT)

Farma-GRUP GOSPODĂRESC - Spitalul Clinic Judeţean de Urgenţă „Pius Brînzeu" Timişoara (SCJUPBT) / Organizaţie participantă
România / Centrul de Terapii Genice şi Celulare în Tratamentul Cancerului- OncoGen - SCJUPBT / Organizaţie participantă
România / Centrul Robocape - SCJUPBT / Organizaţie participantă

Website/s:
www.umft.ro

The goal of CONCEPT is to develop a multidisciplinary center for advanced research in the field of personalized oncology.

Description

CONCEPT aims to study over 10 personalized oncology research topics. The infrastructure ensures the collaboration between the departments involved in the project, and there is complementarity between the proposed research themes. Multidisciplinarity is supported by the diversity of scientific approaches addressed in the project, with a common goal: the development of advanced research in personalized oncology.
The experts involved in the project present expertise, experience and professional competence in accordance with the objectives of CONCEPT.
By acquiring high-performance equipment, improved medical services shall be provided in the field of pathology with high morbidity and mortality rates (cancer, diabetes, obesity), as well as related services concerning animal health and the environment.

Scientific context and relevance

Top health research is a priority area both in Romania and in the European Community. The progressive evolution of medical and laboratory technology and equipment has enabled the elucidation of some pathophysiological mechanisms and the discovery of new treatment modalities in diseases considered incurable a few years ago. In this context, CONCEPT aims to set up a multi-center and multidisciplinary consortium with expertise in the development and implementation of innovative biomedical research projects in order to set up new bioanalytical research laboratories. New research laboratories will be set up within the project.
They will be equipped with technology and performance equipment for cellular and molecular biology, biomarkers analysis in alcohol intoxications, xenobiotic drugs and substances, microbiological investigations, analysis of chemical elements in biological samples, proteomics, analysis of macromolecular compounds, determination of risk factors in pregnancy, reproductive medicine, but also tumor research, mainly those in the gynecological sphere.
In addition, a laboratory for storage and collection of biological samples, as well as a statistical analysis of the obtained results will be introduced. The direct beneficiaries will be the academic community and commercial companies providing medical services (hospitals, polyclinics, medical offices, spin-offs, start-ups, etc.), manufacturers of medical technology and medicines. Indirect beneficiaries will be patients who will benefit from more competitive medical services and health system organizers, local and central communities that will have better evidence of pathology and more effective means of reducing incidence and complications caused by these pathologies.

Stage of implementation in Romania

The CONCEPT infrastructure currently operates in three locations: the OncoGen Center, the Robocape Center and the Clinical Laboratory of the „Pius Branzeu" County Clinic Hospital in Timisoara. The aim of OncoGen is the development of advanced methods of diagnosis and therapy of cancer and chronic degenerative diseases with increased morbidity and limited therapeutic options. The Robocape Center conducts research in the fields of diagnosis and medical interventions for obesity and cancer.

The total estimated value for CONCEPT is about 90 million lei, requiring the latest generation R&D equipment, IT equipment and furniture.

The CONCEPT research themes are of particular interest to economic agents, members of existing cluster structures, who will use research results to develop new or improved products, processes or services.

Socio-economic impact

The research topics proposed within CONCEPT have a major economic impact as:
- they contribute to a better use of funds and resources available for clinical trials, and prevent patient involvement in failed clinical trials;
- the therapeutic decisions reduce complications and morbidity;
- by carrying out the research themes, the preventive behavior will be improved.

ROADMAP 2017

Health

INSPIRE

High Field Magnetic Resonance Spectroscopy and Imaging Infrastructure

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: National Magnetic Resonance Centre (**NMRC**); The Platform for Advanced Imaging – MRI/EEG – in Clinical Cognitive Sciences (**PAI-MRI/EEG**).

Estimated costs in RO:
- construction: 3.31 MIL EUR
- operation: 0.23 MIL EUR/ year

Locations (coordinator & RO)
RO: INSPIRE infrastructure is located at two different campuses of Babeş-Bolyai University.
1 Mihail Kogalniceanu, Cluj -Napoca 400084, Cluj, Romania
30 Fântânele, Cluj-Napoca 400294, Cluj, Romania

Website/s:
http://phys.ubbcluj.ro/laboratoare/cnrm/NMR.html
http://clinicalpsychology.psiedu.ubbcluj.ro/skyra/

INSPIRE infrastructure hosts a full array of Nuclear Magnetic Resonance spectrometers and imaging scanners (pre-clinical and clinical MRI).

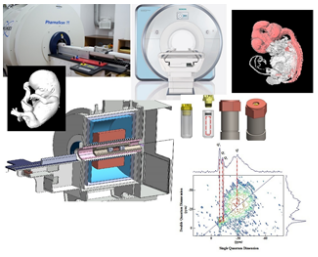
Description

The INSPIRE infrastructure covers a wide range of investigation capabilities exclusively based, on nuclear magnetic resonance (NMR) phenomena. The capabilities are dedicated to molecular level structural and dynamic investigation. Starting with NMR spectroscopy, leveraging up to pre-clinical and clinical MRI, the full NMR structural and dynamic investigation are possible to be performed at a single R&D organization.

The efficiency of NMR phenomena based analysis, depends directly on the strength of the applied magnetic field. The INSPIRE infrastructure hots the systems with the highest magnetic field in the country for each of the three research branches: NMR spectroscopy – 14.1 Tesla, pre-clinical MRI 7.04 Tesla, and the clinical MRI 3.0 Tesla

Scientific context and relevance

Based on high field MR spectroscopy and imaging capabilities of INSPIRE infrastructure, new classes of contrast agents may be developed. This class of materials is of critical importance for the clinical MRI investigation, a non-invasive technique. Since the upper limit of the applied magnetic field was raised up constantly over the last three decades, by the US and EU authorities, is highly important do develop new contrast agents which fits better the need of investigations on 7 Tesla and above MRI system. The INSPIRE infrastructure allows the full path for such developments, from materials structural analysis to ex vivo investigation and from pre-clinical to clinical MRI assessment of the new contrast agents.



The National Magnetic Resonance Centre (NMRC) continues the magnetic resonance tradition of over half century at the Faculty of Physics. The research in nuclear magnetic resonance field has led to the highest possible level scientific recognition. The Noble prize in three different areas: Physics (1938 and 1952), Chemistry (1991 and 2002) and Physiology or Medicine (2003). The start of the field, at national level, was back in 1963 and took place at Babes-Bolyai University. At the beginning of the third millennium the whole National Magnetic Resonance Centre's infrastructure at BBU was completely renewed. The NMRC has the capabilities to investigate molecular structure and dynamics information of systems regardless of whether the system is in a solid, a liquid, a gaseous, or a supercritical state. Thus, a wide range of investigations addressing numerous biological, chemical and physical problems are now possible.
The Advanced Imaging MRI/EEG Platform, a unique capability in Romania, has became operational since December 2011. It was the first research dedicated MRI scanner, with the highest magnetic field in the country (3.0 Tesla). The machine is configured for both morphological and functional investigations.

Stage of implementation in Romania

All the components integrated into the INSPIRE infrastructure we fully operational since second half of 2012. The infrastructure development time frame is briefly exposed:

2002, Bruker Avance 9.4 Tesla , NMR spectrometer

2009, Bruker Avance III 14.1 Tesla, NMR spectrometer

2011, Siemens SkyRa 3.0 Tesla, MRI scanner (clinical)

2012, Bruker BioSpec 7.04 tesla, MRI scanner (preclinical)

Socio-economic impact

The INSPIRE infrastructure is open for collaborators from inside BBU (academic and research staff), as well from outside. The infrastructure was already used, on research contract based, by other organizations (private and state own / for-profit and not for -profit type).

ROADMAP 2017

Health

CRCBABI

Romanian Biomolecular Centre for Infectious Diseases

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: National Institute for Infectious Diseases "Prof. Dr. Matei Bals" (**INBIMB**)

Estimated costs in RO:
- construction: 10.93 MIL EUR
- operation: 7.46 MIL EUR/year

Locations (coordinator & RO)
RO: INBIMB, No.1, Dr.Calistrat Grozovici Street, District2, Bucharest

Website/s:
www.mateibals.ro

Developing the medical research capacity in Romania through a modern infrastructure for biomolecular research in infectious diseases aiming to increase clinical quality and efficiency and to improve public health.

Description

Construction of a modern research centre with a 4078 square meters surface, comprising 7 BSL3-BSL4 safety-level medical laboratories, by providing state of the art CD equipment in order to increase the capacity of NIID "Prof. Dr. Matei Bals" in the area of research projects. Creating CD jobs and consolidating the university teaching process and CD activities at the level of INBIMB.

Scientific context and relevance

The idea for the current project stemmed out of the need to develop and implement special measures of prevention against human disasters, such as Ebola or other resistant viruses, as a consequence of the global alerts triggered by WHO as well as from the need to develop biomolecular medical research in the area of infectious diseases in Romania, research that sides with the international requests.

As a member state of the European Union, Romania must side with the recommendations released by the European Communion organisms regarding management strategies for public health and medical strategies. The European partnership projects FP6/ FP7 evinced both projects in the area of biotechnology/nanotechnology (e.g. Microactive projects, SmartHealth, STEP) as well as other research projects, where Romania must be actively involved, during 2014-2020, based on the 2020 European Agenda directives, in the larger context of adjusting the national research-development infrastructure to European and global standards. Based on the Lisbon Strategy: *Research, Development and Information Society* the target is to increase the total spending for the area of research and development.

At the time of the project's initiation Romania lacked an intervention- research and diagnostics facility as this Centre plans to be.

Stage of implementation in Romania

two periods: 12.03.2014-31.05.2016 and

the sustainability period: 2016-2021.

Socio-economic impact

- Quality improvement in the medical services for patients all over the country and those accessing the services of National Institute for Infectious Diseases „Prof. Dr. Matei Bals", as a last solution, amounting to approximately 180.000 persons/year.
- New working positions for specialists and researchers in the Research Centre's 7 modernized and equipped laboratories.
- Scientific results for the medical community in the National Institute for Infectious Diseases „Prof. Dr. Matei Bals" and the affiliated members of the European AIDS&Infectious Diseases Academy within INBIMB, the HIV/AIDS and Infectious Diseases Romanian Society, Medical Sciences Academy, various universities, Romanian Academy, Ministry of Health, National Public Health Institute, etc.
- Possibility of practical learning for students, graduate students (MAs), PhD candidates in "Carol Davila" Medicine and Pharmacy University and other medical universities in Romania and abroad, for students in Genetics, Cellular Biology, Biophysics, Pharmacology and Biochemistry.
- Establishment and development of a Scientific and Academic European and International Community by implementing joint programmes with Romanian and foreign specialists and involving public education institutions: Universities, The Romanian Academy, Ministry of Health, Public Health Institute, etc.

Social and Cultural Heritage

ROADMAP 2017

Social and Cultural Heritage

E-RIHS

European Research Infrastructure for Heritage Science

Type: European, distributed

Coordinator: IT
Participants: BE, CY, CZ, FR, DE, GR, IR, IL, GB, PL, PO, SLO, ES, NL, HU, AT, RO, DK, RO, SE

Coord. Institution in RO:
INOE, IFIN—HH—Măgurele
INP—Bucharest

Estimated costs in RO:
- construction: 2 MIL EUR
- operation: 0.9 MIL EUR/ year

Locations (coordinator & RO)

IT: CNR Florence, Italy

RO: INOE CERTO
IFIN HH IRASM
Str. Atomistilor Nr. 409, MG 77125 Măgurele, Ilfov, România
INP – Str. Ienachita Vacarescu Nr. 16, Sector 4, Bucharest

Website/s:
E-RIHS: http://www.e-rihs.eu
E-RIHS RO: http://e-rihs.ro

E-RIHS is distributed ERIC that will use better and coherently the existing facilities in Heritage Sciences domain, aiming to stimulate collaboration.

Description

The strong European initiative created E-RIHS to support research on heritage investigation, preservation, documentation and management. It comprises: E-RIHS Headquarters and National Hubs, fixed and mobile national advanced infrastructures of recognized excellence, physically accessible collections/ archives and virtually heritage data. E-RIHS provides state-of-the-art tools and services to cross-disciplinary research communities advancing preservation of the heritage. It assures access to cutting-edge existing scientific infrastructure, data and tools, trainings, public engagement, repositories for standardized data storage. E-RIHS enables the community to advance heritage science and global access to distributed infrastructures in a coordinated and streamlined way. E-RIHS RO will distribute advanced infrastructure, based on existing facilities in INOE, IFIH HH and INP.

Scientific context and relevance

The European program Horizon 2020 recognized the importance of HS for Europe and its major contributions to society through major impacts in economic development and education. The Romanian National Strategy for Research, Development and Innovation 2014-2020 has also included explicitly "Heritage and cultural identity" in a short list of three domains of national importance. According with E-RIHS structure, E-RIHS RO is conceived as a distributed infrastructure offering access to:
- Archives in European museums or conservation institutes (ARCHLAB);

- Advanced mobile analytical instrumentations for in-situ non-invasive measurements (MOLAB);
- Integrated platforms where large scale facilities are coupled with medium scale installations (FIXLAB)

Through the three programs of access, the project aims to deliver to the users (from experienced practitioners to primary users) not only experimental resources but also methodological approaches, compliant best practices, tools and technologies to permit them to carry out their projects in conditions otherwise impossible for them.
In implementation phase, E-RIHS offers a vast portfolio of services and activities based on the demanded themes and complex projects from the heritage science community in Europe and Associated Countries.

Stage of implementation in Romania

Romania has many facilities that do work for HS subjects. Larger ones are based in the Magurele campus, like CERTO, ART4ART, IRASM and RoAMS, many others are scattered in various institutions in the country, facilities which offer radiocarbon dating, isotopic and molecular analyses, conservation/consolidation through gamma irradiation, compositional and structural analyse for materials, complex imaging, laser treatment etc. Attempts to unify them, or a large part of these in a coherent program already exist, and they will be strengthened. In June-July 2017 a National network of institutions interested in HS was formed and 14 institutions from all fields and geographic areas have adhered, institutions which will participate and exploit the E-RIHS RO infrastructure.

Socio-economic impact

The potential for socio-economic impact is very high. Romania has a rich heritage of all types, not yet fully researched, valued and well conserved in all cases. Potential is manifested in restoration-conservation practice, in infrastructure development and in education. An important aspect is reflected in improved competitiveness and higher visibility in thematic multinational projects.

ROADMAP 2017

Social and Cultural Heritage

CINETIC

The International Center for Research and Education in Innovative Creative Technologies

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: UNATC Il Caragiale Bucharest

Estimated costs in RO:
- construction: 8 MIL EUR (covered cost 7.3 MIL EUR)
- operation: 0.7 MIL EUR/ year

Locations (coordinator & RO)
RO: 3B Tudor Arghezi Street, București, 020941

Website/s:
http://unatc.ro/
http://cinetic.arts.ro/

CINETic has as mission the technological innovation and research in the fields of digital interaction and applied neuroscience in performing arts.

Description

The International Center for Research and Education in Innovative Creative Technologies was founded as a project of UNATC IL Caragiale. CINETic's mission is to develop knowledge at an international level in the fields that lead to the developing of performing arts. At CINETic are exploited, in research and interdisciplinary projects, the knowledge acquired in areas such as theatre and film through research and innovation activity. CINETic has 6 labs: the Laboratory of Creative Digital Techniques in Cinematography, the Laboratory for Sound and Light Digital Interaction, the Laboratory for Digital Animation, the Laboratory for the Design of Virtual Decor and Augmented Reality, the Laboratory of Digital Interaction, the Laboratory of Cognitive Development and Applied Psychology via Immersive Experiences. Through the use of technologies of capture and generation of sound and image in the digital medium, in CINETic are made immersive and interactive experiences and are developed applications and innovative uses of technologies of production in the digital medium.

Scientific context and relevance

Performing arts are a field of fundamental expression as well as a field of skills and knowledge acquired through practice. The unprecedented growth of digitization and data transmission continuously changes and diversifies the human experience. The digital devices augment reality, bringing new challenges at both technological and socio-human levels. The insertion of new technologies happens at an extremely fast pace.
Studying the comparative impact of traditional immersive media, such as theatre or film, with VR produces new fundamental knowledge in both animal and human models. The representation of human actions in the fictional environment determined, since ancient times, the shaping of the individual, but science did not thoroughly evaluate the mechanisms involved in the artistic representation or the effect of these on viewers.
At CINETic, through interdisciplinary approach, through a major technological input, are brought new tools for creating digital representations as well instruments from the psycho-neuro-cognitive field developed for measuring the mechanisms at the core performing arts. The aim of performing arts as "emotional regulator" is emphasized in its ambivalent dynamics since ancient times, starting in the written European culture with Plato and Aristotle. The evaluation of this role on a scientific basis will increase the possibility of using art for a harmonious social evolution through the development of new methods of intervention through art as well as new learning methods. The beneficial effects of psychodrama have been highlighted in the therapeutic practice, as well as those of learning through embodiment and game. Developing knowledge about direct human interaction in the theatrical environment is a necessity in order to develop equally relevant digital interactions.

Stage of implementation in Romania

The CINETic center is a research infrastructure created through a Sectorial Operational Program Increasing the Economic Competitiveness investment throughout 8 million euros grant between 2014-2016. Currently, the project is in the sustainability period, at the end of which 10 new research jobs will be created. At the present moment, CINETic has 7 employed researchers, technical and administrative staff. Presently, CINETic is developing the project MET – Developing a theatre therapy method with impact at the neurochemical and neurocognitive level, where over 11 researchers are employed. The project value is of 2 million over a 4-year period. At the same time, CINETic develops its human, technological resources in the field of VR as well as the opportunities for national and international cooperation, aiming to become a pillar of regional expertise in this field.

Socio-economic impact

The VR is one of the most dynamic sectors of technological and artistic innovation, with major potential for economic growth. The new environments will reshape human interactions to an unprecedented level. Developing VR production capabilities and studying the effect of these environments on human development are essential to their integration in a harmonious and beneficial way in society.

ROADMAP 2017

Social and Cultural Heritage

CESSDA ERIC

Council of European Social Science Data Archives

Type: European, distributed

Coordinator: NO
Participants: AU, BE, CZ, DK, FR, DE, GR, HU, NE, NO, SK, SI, SW, UK

Coord. Institution in RO: Arhiva Română de Date Sociale Şoseaua Panduri nr. 90-92, sala 008, Bucharest, sector 5

Estimated costs in RO:
- construction: - MIL EUR
- operation: 0.1 MIL EUR/ year

Locations (coordinator & RO)

NO: CESSDA AS, Parkveien 20, 5007 Bergen

RO: Arhiva Română de Date Sociale, Şoseaua Panduri nr. 90-92, sala 008 Bucharest, sector 5

Website/s:
CESSDA-ERIC: https://www.cessda.eu
RODA: http://www.roda.ro/

CESSDA ERIC formalizes an European network of social science data archive, which was previously operating under an informal umbrella of similar institutions.

Description

The mission of this research infrastructure consortium is to provide, for the entire European academic community, a distributed and sustainable data network to contribute finding efficient solutions to the major societal challenges that modern societies are facing: health, demographic changes, immigration processes and social integration of immigrants, work force and general welfare in the society. The data provided by CESSDA are also highly useful instruments for teaching purposes and general learning in the social sciences.

Scientific context and relevance

Modern academic surveys (e.g. European Social Survey) seek to ensure comparability between countries and cultures, for each wave of the survey, transversally collecting data.
However the data acumulated over time has generated another comparability need, namely temporal comparability.
This can be achieved by storing the data collected from a single study over time, but most importantly it can be achieved by archiving date from all similar social research studies, from a particular country or even from the entire Europe.
To produce a set of data acording to accepted standards is easy, but to facilitate comparative research over time, the datasets shoule be permanently migrated from one standard to another or from one software to another, function of technological changes. Experience show that such migrations can prove to be difficult, and sometimes even impossible. The main data archive in Germany still holds data collected in the 60s or 70s, stored on magnetic tape or even punch cards.
In this context, the data archives from the CESSDA network are working hard to achieve an atemporal standard format, independent to a particular operating system or a particular software. Even more, similar questions from different studies and different years can be linked, and this is the work of another CESSDA project named QDB – Question Data Bank, this facilitating the construction of temporally comparable indicators.
All of these are facilitated by the maintenance of a standardazed Thesaurus called ELSST, enabling to connect questions and studies through keywords, which can also be used to facilitate searching for the relevant information in the archives from all participating countries.
Through the SSO – Single Sign On system, users can log in a particular country and are automatically recognised in the entire European network.

Stage of implementation in Romania

The Romanian Social Data Archive (RODA) was founded in 2001, and since 2002 it is a full member of the CESSDA network, participating to multiple joint projects funded through FP6, FP7 and Horizon2020.

RODA was awarded an upgrade project worth about 650000 euro, by the National Authority for Scientific Research between 2012 and 2014, to upgrade the operational procedures to international standards, in preparation for Romania's participation in the CESSDA-ERIC.

Currently, RODA is organised as an institutional consortium with a legal entity of its own, formed by the University of Bucharest, National Institute of Statistics and the Research Institute for the Quality of Life from the Romanian Academy of Sciences.

It is an open consortium that promotes open access to research data, completely prepared to act as a Service Provider for the CESSDA-ERIC when operational costs will be funded by the Ministry of Research and Innovation.

Socio-economic impact

The general impact of a data archive is related to the societal impact generated by the open access to research data, promoted by RODA. There are numerous examples of scientific articles, accompanied by open data, that have generated societal impact by fostering public debate on specific domains. Additionally, open data facilitate Citizen Science initiatives, while research literature is a key factor for the innovation enterprises, as well as for a series of governmental and non-governmental services.
Last but not least, European policies necessarily assume the existence of comparable research data for all members of the European Union freely available in public repositories.

ROADMAP 2017

Social and Cultural Heritage

ESS ERIC

European Social Survey

Type: European, distributed

Coordinator: UK
Participants: AU, BE, CZ, EE, FI, FR, DE, HU, IS, IE, IL, IT, LT, NL, NO, PL, PT, RU, SI, ES, SW, CH, UK

Coord. Institution in RO: Arhiva Română de Date Sociale Şoseaua Panduri nr. 90-92, sala 008, Bucharest, sector 5

Estimated costs in RO:
- construction: - MIL EUR
- operation: 0.15 MIL EUR/ year

Locations (coordinator & RO)

UK: Centre for Comparative Social Surveys, City, University of London Northampton Square London, EC1V 0HB

RO: Arhiva Română de Date Sociale, Şoseaua Panduri nr. 90-92, sala 008 Bucharest, sector 5

Website/s:
ESS ERIC: http://www.europeansocialsurvey.org/
RODA: http://www.roda.ro/

The European Social Survey (ESS) is a pan-European research infrastructure providing freely accessible data for academics, policy-makers, civil society and the wider public.

Description

It is an academically driven, biennial cross-national survey of attitudes and behaviour that has been conducted across Europe since its establishment in 2001, using probability samples which are representative of all persons aged 15 and over resident within private households in each country.

ESS aims to monitor social and political change in Europe, using the highest methodological standards employed in the academic world. Over the 8 completed rounds, more than 34 countries have participated to the study, and the questionnaires refer to attitudes on politics, religion, imigration and a range of other topics like ageing, welfare, health, inequalities of many types etc.

Scientific context and relevance

The need for such an infrastructure has grown from the ongoing academic need for comparative research data. In order to reliably compare countries or cultures, some form of data that is structured for comparative research is needed. Many other international studies exist (European Values Survey, International Social Survey Programme, World Values Survey, Eurobarometer, to name the most prominent), but none developed as such a high academic standard.
The European Social Survey was created with a specific purpose to generate comparative data at an unprecedented level of quality. Every two years, the data being collected is compiled and made available to social scientists accross the world through an open access dissemination system, and many academic and non-academic users benefit immensely by helping to structure the academic debate which is then translated into governance and policy making, not only at national level but especially at European level.
The founders of ESS designed the methodology on the principle of equivalence. Where possible, the same research methods are used in all countries, and where that is not possible, the data is harmonised in such a way that in the end, it is comparable across countries.
ESS aims to be comparable, independently of the sampling designs which may be chosen flexibly and that is particularly advisable for multinational comparisons because the sampling resources differ greatly between countries. It assumes probability selection methods: known probabilities of selection for all population segments.
The questionnaire construction takes about two years, to ensure that concepts are clearly defined, questions measure the concepts they are trying to tap, and everything works comparably in different countries and different cultures.
The structure of the questionnaire consists of a central module that is repeated each wave, plus a series of rotating modules that are decided by the Core Scientific Team.

Stage of implementation in Romania

Romania's participation in the European Social Survey began with Rounds 3 and 4 (in 2006 and 2008), when data collected in Romania was integrated into the compiled European dataset.

After the economic crisis in 2008, Romania was unable to continue its participation in the survery and the data collection has not restarted ever since. In 2016, a new national committee was formed under the umbrella of an institutional consortium dedicated to social science research, with members from the largest universities in Romania, and an ESS conference was organised at the University Bucharest.

Currently, the national consortium is ready to restart activities, once the operation funds will be approved by the Ministry of Research and Innovation.

Socio-economic impact

The high quality standards, country coverage and increasing longevity have contributed to impressive levels of academic impact, the ESS being rated as a gold standard for surveys of this type. The ESS provides an important teaching resource, as an useful tool for entry-level teaching, especially for methodological aspects of social sciences, and particularly in smaller countries that do not have many suitable alternative data sources to act as real-world teaching tools.

Future and Emerging Technologies

ROADMAP 2017

Future and Emerging Technologies

ECODPD

Open Distributed Production Ecosystems - The Fabrication of the Future

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO:
University of Craiova, 13 A.I. Cuza Street, 200185, Craiova, Romania

Estimated costs in RO:
- construction: 21,515 MIL EUR
- operation: approx. 0.114 MIL EUR/ an

Locations (coordinator & RO)
RO: University of Craiova, Research Infrastructure for Applied Sciences – INCESA - 107 Decebal Blvd., Craiova; The Polytechnic University of Bucharest, Research Centres UPB - PREMINV and CNCPST-Optimum – 313 Splaiul Independenței Street, Bucharest; The National Institute of Research and Development in Mechatronics and Measurement Technique – INCDMTM – 6-8 Sos. Pantelimon Street, Sector 2, Bucharest; The Academy of Romanian Scientists, Department of Technical Sciences – 54 Splaiul Independenței Street, Sector 5, Bucharest; SC IPA SA – 1 Strada Mihai Viteazul Street, Craiova; ICT Regional Competitiveness Pole Oltenia Cluster – 2A Aleea Teatrului Street, Craiova; The Technical University of Cluj Napoca – 28 Memorandumului Street, Cluj-Napoca; Transilvania University of Brașov - 29 Eroilor Blvd., Brașov; Gheorghe Asachi University of Iași - 67 Profesor Dimitrie Mangeron Blvd., Iași; National Institute for Research and Development in Microtechnologies - IMT Bucharest – 126A Erou Iancu Nicolae Street, Voluntari; National Institute for Research and Development in Electrical Engineering - ICPE CA – 313 Splaiul Unirii Street, Bucharest; National Research and Development Institute for Cryogenics and Isotopic Technologies - ICSI Rm Vâlcea – 4 Uzinei Street, Râmnicu Vâlcea.

Website/s:
http://www.ucv.ro
http://www.incesa.ro

EcoDPD - National Network of Research Infrastructures in the Field of Open Distributed Production Ecosystems addressing complex research topics.

Description

EcoDPD is a network made up of companies and research and development infrastructures nodes, acting as a collaborative platform integrating basic research outcomes to applied research and production. EcoDPD will assist in the development of innovative products by selecting and providing the related research infrastructure and expertise. The assessment of national and regional needs has been made by EcoDPD, aiming to identify areas of specialisation and future development at the regional level of the regions. Through the development of research facilities, EcoDPD will provide the business environment with solutions for complex products of high added value, which will be included in the product portfolio of existing companies or constitute the reason for the establishment of new firms by graduates of higher education institutions.

Scientific context and relevance

Future and Emerging Technologies (FET) activities aim at fostering science-based research in the field of future technologies, in an attempt to bring together science, technology and innovation actors and act as a catalyst in encouraging new perspectives, new practices and new partnerships. FETs are structured around three expandable points directly through the university technology park:
1. FET Open:
Supporting a large number of collaborative projects in the field of high-risk scientific and technological visionary research in the early stages, exploring the cutting-edge technologies of the future. Being explicitly non-mathematical and non-prescriptive, this activity supports new ideas, no matter when and from where they emerge, covering the widest range of topics and disciplines.
2. FET Proactive:
For new ideas and topics to mature, efforts must be made to structure emerging communities and support the creation and development of transformational research topics. The main advantages of this structuring and exploratory approach lie in the fact that it addresses the emerging areas that cannot be included in the industrial research roadmaps yet as well as in the creation and structuring of research communities around these topics.
3. Addressing the major interdisciplinary challenges in science and technology
EcoDPD Research Initiatives are science-oriented, large-scale, multidisciplinary and articulated around a unifying visionary objective. Networking and community-based collaboration lays the vibrant and cross-fertilising foundation for the research of future technologies, enhancing the effects of new technologies and accelerating their impact and smart distribution through the use of the IT technology park in Craiova.

Stage of implementation in Romania

The implementation of the EcoDPD in Romania has been started by partners through investments amounting to 14.97 million Euros up to now. Partners initiated a series of studies and joint project proposals, the EcoDPD infrastructure stimulating businesses to develop process and product innovation in the economic sectors with growth potential. The current results of the research carried out within the EcoDPD have begun to be transferred to the business environment, the companies in the region have applied in partnership with EcoDPD members for financing under the POC programme (5 ongoing projects), PNCDI III, Bridge Grant (7 ongoing projects). The EcoDDP project is at an advanced stage of evaluation for inclusion in the National Roadmap for Research Infrastructures.

Socio-economic impact

EcoDPD will be an open collaborative network integrating basic research elements to applied research based on the iFactory concept. This will secure a solid foundation for education and research, as jointly developed by firms, research institutes and universities with a view to the design and implementation of manufacturing architectures appropriate to the industrial revolution 4.0.

ROADMAP 2017

Future and Emerging Technologies

MobA

Distributed Mobility Research Infrastructure

Type: National, distributed

Coordinator: RO
Participants: RO

Coord. Institution in RO: National Institute for Research-Development in Animal Biology and Nutrition (**IBNA**)

Estimated costs in RO:
- construction: - MIL EUR
- operation: approx. - MIL EUR/an

Locations (coordinator & RO)
RO: Str. Uzinei 4, Rm. Valcea.

Website/s:
www.icsi.ro

Distributed Research Infrastructure for Alternative Mobility and Alternative Solutions for Sustainable Transport (MobA).

Description

MobA it is an important step towards intelligent, environmentally friendly and integrated transport. The goal is to develop a complex research infrastructure that meets the specific needs and developments in the field of mobility and alternative transport solutions at national, European and international level, but also to the general needs that provide for a secure, inclusive, innovative and reflexive society.

MobA aims to be a research, development and innovation infrastructure whose mission is to provide solutions for the development of roadmaps, plans and projects for the infrastructure development and implementation, case studies, testing and accreditation methodologies, operating rules, etc., in order to support the implementation of the National Policy Frameworks (NPF).

The infrastructure will put together teams of elite researchers, state-of-the-art facilities and private partnerships, research, prestigious universities and regional clusters. The researches will be interdisciplinary and will be in the field of New and Emerging Technologies.

Scientific context and relevance

The MobA research infrastructure proposed to set up meets the requirements of EU Regulation no. 651/2014 of the EC - June 17, 2014, of the ESFRI and also follows the recommendations highlighted in the Romanian Research Infrastructure Committee Report (CRIC), 2016. The priorities of the "National RDI Strategy" (SNCDI) and the "National R & D and Innovation Plan 2014-2020" (PNDCI - III) cover in General Objective 3 (OG3) which explicitly refers to the increasing role of science in society the objective the MobA. The science and technology become relevant to society when their effects are felt in the everyday life of the citizen. For this purpose, the results of the research and innovation of the proposed infrastructure will respond to the concrete needs of the economic and public sectors for solutions for alternative mobility with the smallest greenhouse and pollutant emissions. The results will particularly reflect the increasing quality of services offered such as the health or safety of citizens, and will provide new employment prospects in the private sector through the development of new services or economic activities. The results of the infrastructure activities will solve, through innovative solutions, in the medium and long term, the problems related to alternative mobility, but also problems of immediate interest, in the short term, by providing expertise in the elaboration of the public policies for the implementation of Law no. 34 of 27 March 2017 on the installation of alternative fuel infrastructure that transposes Directive 2014/94 / EU of the European Parliament and of the Council.

Stage of implementation in Romania

In support of such research infrastructure is Law no. 34 of 27 March 2017 on the installation of alternative fuel infrastructure. Annex I concerning the implementation of the National Policy Framework, paragraph 4, provides an annual public budget to support research, technological development and demonstration activities in the field of alternative fuels, divided in two depending on fuel type and mode of transport.

Socio-economic impact

MobA is a complex research infrastructure that includes, in addition to alternative mobility, energy, natural resources and environmental protection activities in the intelligent systems context-based approach. The research infrastructure opens up new opportunities and a research field that can attract researchers both from home and abroad.

ROADMAP 2017

Future and Emerging Technologies

INFRACITMP

Center for Advanced Research, High Voltage and High Power

Type: National, single-sited

Coordinator: RO
Participants: RO

Coord. Institution in RO: National Institute for Research Development and Testing in Electrical Engineering – ICMET Craiova, Romania

Estimated costs in RO:
- construction: 3.2 MIL EUR
- operation: 0approx. 0.85 MIL EUR/year

Locations (coordinator & RO)
RO: National Institute for Research Development and Testing in Electrical Engineering – ICMET Craiova, Decebal Avenue no. 118A, code 200746, Craiova, Dolj, Romania

Website/s:
www.icmet.ro

The purpose of INFRACITMP is to carry out research, development and testing activities in the field of high voltage and high power equipment.

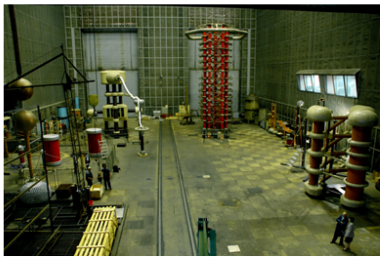
Description

INFRACITMP will be used for scientific services, tests and certifications of products for economic agents in the electrical engineering industry, electric power transmission and distribution, automotive components industry, telecommunication, machinery industry. The research infrastructure actively participates in the implementation of research projects within national and international programmes. INFRACITMP provides the technical infrastructure for validating the constructive solutions of a wide range of low and high voltage electrotechnical products.

The research infrastructure is open to any requests for collaboration, technical support, for experimentation and training of the personnel, requests from economic agents, research institutes, technical universities, market regulatory authorities, both in the country and abroad.

Scientific context and relevance

The activity of research-development and testing in the field of high-voltage and high-power equipment in research of the infrastructure is carried out at the highest international standards through unique equipment and the trained and qualified personnel at its disposal.
ICMET Craiova is accredited by RENAR (Romanian Accreditation Association-unique national accreditation body) and internationally by ILAC-MRA (International Laboratory Accreditation Cooperation-Multilateral Recognition Arrangement). ICMET Craiova obtained international recognition by association with Short-Circuit Testing Liaison (STL) and LOVAG (Low Voltage Association Group) bodies.
The scientific recognition of ICMET Craiova activity is highlighted by collaborations with prestigious universities and institutions (University of Craiova, Technical University of Cluj-Napoca, University Politehnica of Bucharest, Uni Karlsruhe Germany, PTB Braunschweig Germany, etc.) and reputable companies (SIEMENS, AREVA, ABB, TOZZI, ARTECHE, Electroputere Craiova, Energobit Cluj-Napoca, Electrotel Alexandria, Eximprod Buzău).
The research infrastructure has the capacity to produce major changes in the electrical engineering field through:
- testing the switching equipment to limits of breaking power for the implementation of innovative technical solutions;
- collaboration with Romanian and foreign companies for the development of electrotechnical equipment (high-voltage and high power transformers, high voltage instrument transformers, circuit breakers, disconnectors, electric cables);
- innovative benefits deriving from joint research from industry and the research infrastructure;
- scientific research with an applicative nature for the implementation of new methods for investigating the operating condition of electrical equipment, under on-site conditions.



Stage of implementation in Romania

The INFRACITMP infrastructure is currently operating and it includes the installation of national interest "Generation, measuring and recording system for short-circuit currents" SPMICS. INFRACITMP is an ensemble of equipment for the production of high currents, high voltages, measurement and calibration of electric quantities under transitory and steady-state regime. The infrastructure is to be developed by the equipment with the latest facilities for the improvement of the parameters and development of new research areas. INFRACITMP is assessed and enclosed in the National roadmap of research infrastructures in the field of New and Emerging Technologies correlated with the field of Physical Science and Engineering of ESFRI Roadmap.

Socio-economic impact

INFRACITMP promotes national and international joint research collaborations between research and industry infrastructure which lead to different forms of innovation in economic operators. INFRACITMP has the capacity to attract young talents and generate knowledge transfer mechanisms through exchange programmes between research infrastructure, industry and academia.

ROADMAP 2017

Future and Emerging Technologies

ECOSIN-MECATRON

New Smart Multiaplicative Mechatronic and Cyber-Mechatronic EcoSystem

Type: National, distributed

Coordinator: NATIONAL INSTITUTE OF RESEARCH AND DEVELOPMENT IN MECHATRONICS AND MEASUREMENT TECHNIQUE Bucharest, 6-8 Pantelimon, District 2, 021631, Bucharest, Romania

Participants: INCD-ICPE CA, Bucharest; INCD-IMT, Bucharest; INCD-TP, Bucharest; INCD-INMA, Bucharest; INCD-INOE 2000 Măgurele; INFLPR – Măgurele; IMS-A.R.-Bucharest; ISSR – Măgurele; SC Optoelectronica 2001 -SA Măgurele; University Politehnica of Bucharest; University Gh.Asachi of Iaşi; University Transilvania of Braşov; University VALAHIA of Târgovişte; University Dunărea de Jos of Galaţi; University Ovidius of Constanţa; University Lucian Blaga of Sibiu; Technical University of Cluj Napoca; University Politehnica of Timişoara; University Ştefan cel Mare of Suceava; Technical University of Craiova; University of Piteşti; University of Medicine and Pharmacy Carol Davila of Bucharest, Bucharest. INCD - Victor Babeş, Bucharest; I.N. Fundeni Bucharest; Renault Technologie Roumanie, Bucharest; SC Automobile Renault – Dacia, Piteşti

Coord. Institution in RO: NATIONAL INSTITUTE OF RESEARCH AND DEVELOPMENT IN MECHATRONICS AND MEASUREMENT TECHNIQUE

Estimated costs in RO:
- construction: 56 MIL Euro (contribuţie românească)
- operation: 13 MIL Euro

Locations (coordinator & RO)
RO: Headquarters of the coordinating institution: Bucharest, Romania, 6-8 Pantelimon, District 2, 021631; Headquarters of partners: Bucharest, Iaşi, Braşov, Măgurele, Târgovişte, Galaţi, Constanţa, Sibiu, Cluj-Napoca, Suceava, Craiova, Piteşti.

Website/s:
http://www.incdmtm.ro

ECOSIN-MECATRON RI, New Smart Multi-Applied Mechatronic and Cyber-Mechatronic Eco-Systems develops the Smart Specialized Field of Eco-Nano-Technologies and Advanced Materials from SNCDI through the field of Physical Sciences and Engineering correlated and Focused on Science, Mechatronics and Cyber-Mechatronics.

Description

Due to advances in automation of manufacturing and processes, mechatronic and cyber -mechatronic control engineering is gaining more importance resulting in the need for advanced smart systems that can deliver both the ultimate generation technology, and the practical skills required. Due to the increasing importance of automation and cybernetization of manufacturing and processes, the automation and cybernetic technology industry takes on an increasingly important role in industrial processes (smart manufacturing and integrated control). The basis of any smart mechatronic and/or cyber -mecatronic integrated closed loop control system is manufacturing states and variables detection of smart or data processes that are then teleconfigured, telemanipulated and telemonitored.

Scientific context and relevance

Due to advances in automation of manufacturing and processes, mechatronic and cyber -mechatronic control engineering is gaining more importance resulting in the need for advanced smart systems that can deliver both the ultimate generation technology, and the practical skills required. Due to the increasing importance of automation and cybernetization of manufacturing and processes, the automation and cybernetic technology industry takes on an increasingly important role in industrial processes (smart manufacturing and integrated control). The basis of any smart mechatronic and/or cyber -mecatronic integrated closed loop control system is manufacturing states and variables detection of smart or data processes that are then teleconfigured, telemanipulated and telemonitored.

Stage of implementation in Romania

The R.I includes a National Strategic Consortium (Universities and Research Entities), which will expand its strategy at European/ international level (with existing Mechatronics and Cyber-Mechatronics entities in Europe). The implementation steps are: S1-the development of the National Consortium (**achieved**) and the International Strategic Consortium (**to be achieved**); S2-Tendering projects in the fields of R.I under national and European programs (**partially implemented**); S3-project execution (**in progress**); S4-Monitoring of construction of equipment related to projects and infrastructure (**in progress**); S5-Monitoring of national and European project financing (**to be achieved**); S6-Enrollment of R.I in (national and European/International) Networks, completing the National and European Values Chain (**to be achieved**); S7-value contribution of the R.I (**to be achieved**). R.I highlights the achievements already begun, with socio-economic impact, as follows: achieving over 250 smart mechatronic products implemented in the industry (e.g. Automotive Industry-SC Automobile Renault-Dacia, SC Componente Auto Topoloveni, SC Renault Technologie Roumanie, etc.), creation of new jobs (about 120); increasing labour productivity, increasing manufacturing quality, etc.

Socio-economic impact

(a) chronology of events: established in 2010, and based on the POSCCE projects (see section 3 of RI File). The initiative started with the projects won under POSCCE competitions, as early as 2010, for the smart fields: CENTRES: Sedcontrol, Biomecatronica, Certim, Cermiso, Knowledge Transfer and Mechatronic Products. (b) type of service they provide or they will provide: industrial and laboratory services; for intelligent manufacturing services; new and advanced materials; micro-nanotechnologies; automation and cybernetization of manufacturing, etc.

ROADMAP 2017

Future and Emerging Technologies

RO-OMICS

Romania - unique national consortium of multi-omics biomedical infrastructures

Type: National, multicentric

Coordinator: RO
Participants: National Institute of Pathology "Victor Babes"
Institute of Biochemistry of the Romanian Academy (IBAR)
Institute of Cell Biology and Pathology "Nicolae Simionescu"
CEMT Fundeni Clinical Institute
National Institute of Endocrinology "C.I Parhon "
County Hospital for Emergency Hospital "Pius Brînzeu" Timişoara
Institute of Virology "Ştefan S. Nicolau"
Cantacuzino National Institute
"Ovidius" University of Constanta
Titu Maiorescu University, Cajal Institute
University of Medicine and Pharmacy "Gr.T. Popa "Iaşi

Coord. Institution in RO:
National Institute of Pathology "Victor Babes"

Estimated costs in RO:
- construction: 70 MIL EURO
- operation: 0.5 MIL EURO / YEAR

Locations (coordinator & RO)
RO: National Institute of Pathology "Victor Babes" Spl. Independence, 99-10, sector 5, Bucharest, Romania

Center: Bucharest, Timisoara, Craiova, Iasi, Cluj, Constanta

Website/s:
www.ivb.ro

RO-OMICS is a unique national multi-level CD biomedical infrastructure consortium of top Romanian centers, which integrates over 10 academic and research-development institutions with tradition and teams of professionals in the field, the structure enrolling in new and emerging technologies (correlated with ESFRI exact science and engineering)

Description

The project was initiated by the letters of adhesion of over 10 research centers, with previous POSCCE projects with omics components. The Consortium offers access to a wide variety of advanced omic techniques and expertise in genomics, proteomics, epigenomics, transcriptomics, metabolomics, microbiomics, to all interested researchers in Romania, Southeast Europe, etc. The main areas of research are: tumor pathology, regenerative medicine, endocrine pathology, personalized / precision medicine.

Scientific context and relevance

The purpose of the consortium is to function as a pole of excellence, based on the principle of an open entity in South Eastern Europe and beyond, both in the field of fundamental and applicative biomedical research, towards the achievement of the goal of precision / personalized medicine with the final target - translation of results in clinical practice. Within the consortium we can also develop new technologies to meet the current scientific challenges in the field at international level. Another important goal of the consortium is to provide courses, workshops, and training sessions on these technologies.

Stage of implementation in Romania

RO-OMICS aims to synergistically use the complementary capacities of academic and R & D centers whose infrastructure upgrades were funded through the POS CCE 2.2.1 Program :, N. Simionescu Institute of Cell Biology and Pathology, Victor Babeş INCD with the multi-omics platform: RO-BIOIMAGING molecular biology, the Fundeni Clinical Institute with the Center for Excellence in Translation Medicine (CEMT), the Institute of Biochemistry of the Romanian Academy (IBAR), with the proteomics platform developed within the PROCERA project, Cantacuzino Institute, with Proteomics and Structural Biology of Research Infrastructure in Microbiology, Immunology and Biotechnology, Institute of Virology "Stefan S. Nicolau", with Regional Reference Center on Oncogenesis (ONCOIVN), Timisoara Emergency Clinical Hospital with ONCOGENE - Therapy Center gene and cellular cancer, National Institute of Endocrinology "CI .Parhon ", with the Molecular and Cellular Endocrinology Laboratory and the" Ovidius "University of Constanta, with CEDMOG - Research Development Center for Morphological and Genetic Study in Malignant Pathology, Titu Maiorescu University, Cajal Institute and Iasi University of Medicine and Pharmacy.
RO-OMICS is based on the adhesions of the founding members. The documents related to the registration of the consortium / legal forms are under preparation. Discussions are taking place with decision makers from Romania in the field of research and health and other potential members joining the consortium to integrate RO-OMICS as a national / European platform.

Socio-economic impact

RO-OMICS uses its critical mass to identify major health issues and find scientific solutions and funding for their implementation by supporting border research projects that can be carried out within partner institutions. The most obvious socio-economic effects are: savings in the health system through prevention policies and investigative protocols and personalized treatment, reduction of social costs and increase in the level of health and the active period, reduction of mortality. The goal is to generate improved or innovative medical services and advanced therapies with major impact on the health of the population.

ROADMAP 2017

Future and Emerging Technologies

ELI-NP

Extreme Light Infrastructure - Nuclear Physics

Type: National, single-sited

Coordinator: RO
Participants: NC

Coord. Institution in RO: Horia- Hulubei National Institute for R&D in Physics and Nuclear Engineering (IFIN-HH)

Estimated costs in RO:
- construction: 311MIL EUR
- operation: 31 MIL EUR/ year

Locations (coordinator & RO)
RO: ELI-NP-IFIN-HH
30. Reactorului
077125 Bucharest, City of Măgurele, Ilfov County
Romania

Website/s:
ELI-NP: http://www.eli-np.ro/
ELI DELIVERY CONSORTIUM: https://eli-laser.eu/
LASER VALLEY: http://laservalley.ro/

Description

ELI-NP represents the pillar in Nuclear Physics of the Pan-European project ELI (Extreme Light Infrastructure) implemented in Romania, Hungary and in Czech Republic and it consists of two components: **a laser system of high intensity**, 2x10 PW, and **a very intense γ beam** (1013 γ / s) with Eγ to 19.5 MeV obtained through Compton scattering of laser photons on an intense electron beam (E_e up to 720 MeV) produced by a classical linear accelerator.

Scientific context and relevance

ELI was part of the ESFRI 2006 Roadmap. ELI-NP was selected by the most important Scientific Committee in the field of Nuclear Physics in Europe-NuPECC-in the Long-term Plan of Nuclear Physics in Europe as a major infrastructure meant to create a new European laboratory, with a wide range of fields of science.
Implemented in Magurele by Horia Hulubei National Institute in Physics and Nuclear Engineering, ELI-NP is the most advanced infrastructure for research in the world in nuclear photonics, with unique parameters, which will enable the approach of a wide spectrum of research topics in the field of fundamental physics,nuclear physics and astrophysics, as well as in the field of materials science, life sciences and the management of nuclear materials. The project will allow both experiments with high-power laser or with γ beam, and combined experiments.

Stage of implementation in Romania

In the first stage, the construction was completed along with the laser system components, and the first part of the linear electron accelerator which is part of the gamma system.. In the second stage, the assembling of the large pieces of equipment and, in parallel, the development and implementation of experimental set-ups will be completed. The completion of the major works of the three main pillars created the context for developing aunique research infrastructure, of Pan-European dimensions, made available to the researchers' community using the beams. Thus, ELI-DC was created aiming to optimize the synergy of the scientific programs of the three infrastructures and to prepare the transformation of three independent building projects from a legal point of view (but not from a conceptual one), in order to operate as an international and unique legal entity, called ELI- ERIC, as of 2018.

Socio-economic impact

The project aims to improve the research capacity of Romania and to stimulate technology transfer between RI, RD and enterprises. "Magurele High Tech Cluster" cluster aims tocapitalise the researchers' results and, thus, boost the business field but also the technology innovation one.