



**MIRRI** MICROBIAL ERIC  
RESEARCH RESEARCH  
INFRASTRUCTURE INFRASTRUCTURE  
EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM

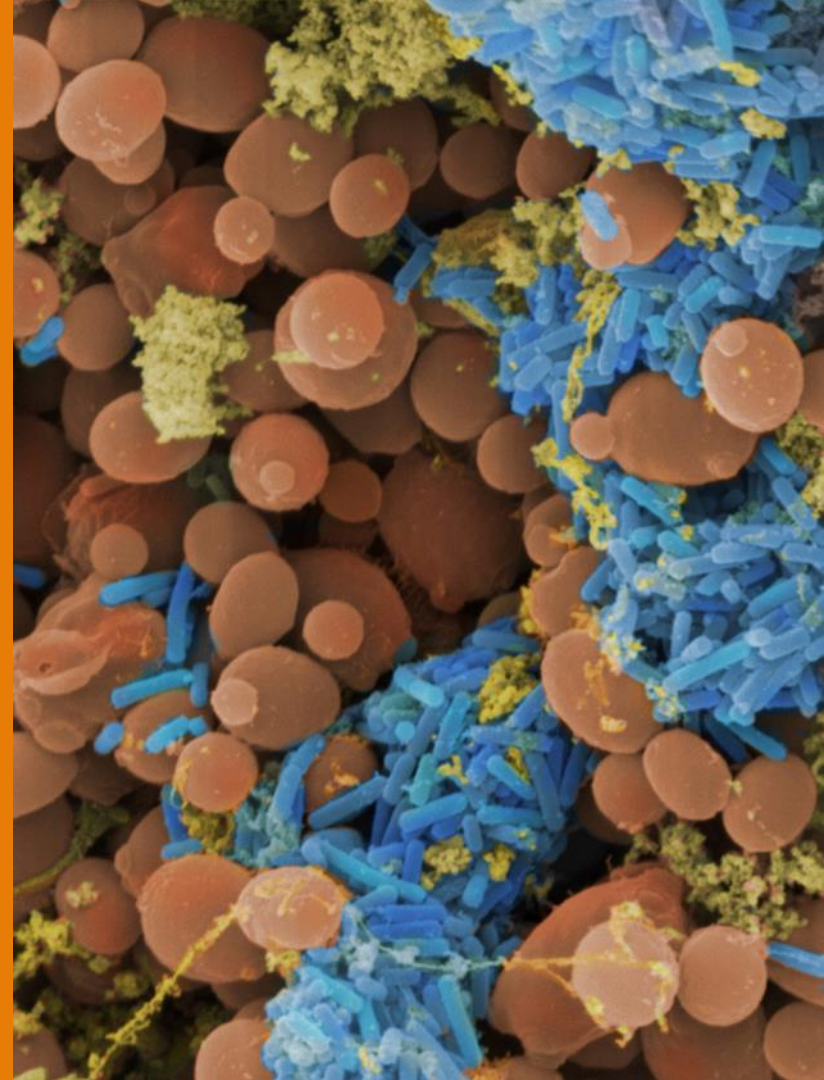
## A PAN-EUROPEAN RESEARCH INFRASTRUCTURE FOR MAKING MICROBIAL SCIENCE & INNOVATION HAPPEN



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*MIRRI Spanish National Node Coordinator  
Chair MIRRI Interim National Coordinators Forum*





# MIRRI: from microbial collections to real-life innovations

- The Microbial Resource Research Infrastructure – European Research Infrastructure Consortium (MIRRI-ERIC) is the pan-European distributed Research Infrastructure for the preservation, systematic investigation, provision and valorisation of microbial resources and biodiversity.

MIRRI-ERIC serves the bioscience and the bioindustry communities by facilitating the access, through a single point, to the broadest range of high-quality microorganisms, their derivatives, associated data and services, with a special focus on the domains of **Health & Food**, **Agro-Food**, and **Environment & Energy**.

By serving its users, by collaborating with other research infrastructures and by working with public authorities and policy makers, MIRRI-ERIC contributes to the **advancement of research and innovation in life sciences and biotechnology**, as well as for a **sustainable, competitive and resilient bioeconomy**.

*MIRRI-ERIC has been set up by the Commission Implementing Decision (EU) 2022/1204 of 16 June 2022, and is a 'Landmark' in the Health & Food domain of the European Strategy Forum on Research Infrastructures (ESFRI) Roadmap.*

**MIRRI: where biodiversity meets biotechnology & bioeconomy**



**MIRRI** MICROBIAL RESOURCE RESEARCH INFRASTRUCTURE ERIC  
EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM



For more information about MIRRI-ERIC and its partners please visit

[www.mirri.org](http://www.mirri.org)

## MIRRI: KEY FACTS & FIGURES

- ✓ **10 countries** (5 Founding Members + 5 Prospective Members/Observers)
- ✓ **50 partner biorepositories and research institutes**
- ✓ **2,800+ combined years of activity**
- ✓ **2/3 organisations with QMS**  
(quality management system implemented or in implementation)
- ✓ **7 strategic areas in the Health & Food, Agro-Food and Environment & Energy domains**
- ✓ **300+ people involved**
- ✓ **8 European projects ongoing, with €7.2M funding for MIRRI partners**
- ✓ **EU broadest catalogue of microbial resources**
- ✓ **20,000+ strains identified/characterised /year**
- ✓ **90+ types of general services**
- ✓ **30+ application-specific services/workflows**
- ✓ **6,000+ users /year**
- ✓ **20,000+ samples supplied /year**



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MICROBIAL RESOURCES FOR

A GREEN, HEALTHY  
AND SUSTAINABLE FUTURE

Strategic Research & Innovation Agenda 2021 - 2030



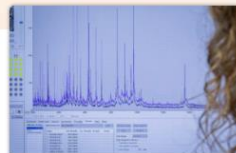
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#### MIRRI for Researchers

Find out how MIRRI can assist you on delivering better outcomes and more impact with your research and innovation projects

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#### MIRRI for Industries

Find out how MIRRI can collaborate with your company on bringing more value to your processes, technologies and products

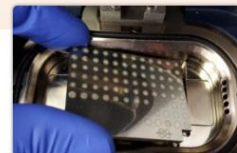
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#### Microbial Resources & Data

Browse/search the offer of microbial resources and associated data made available by MIRRI and its partner organisations

[Read More](#)



#### MIRRI Services

Browse/search the offer of general, application-specific and integrated services made available by MIRRI and its partner organisations

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# MIRRI offers the broadest catalogue of microbial resources and data in Europe

## Single point of access to high-quality microbial resources

– such as archaea, bacteria (and their cognate bacterio-phages), fungi (including yeasts), microalgae, eukaryotic viruses, and other microbiological material such as microbiomes, cell lines, natural or constructs carrying plasmids, DNA libraries, and genomic DNA –,

## and associated data

– e.g. taxonomy, ecology, pathogenicity, morphology, physiology, chemical characterization, DNA barcoding or genomics.

**20,000+ strains identified/characterised /year**

and

**20,000+ samples supplied /year**

Microbial Resources		Health & Food					
		Strategic Area 1		Strategic Area 2		Agro-Food	
						Environment & Energy	
		Strategic Area 3	Strategic Area 4	Strategic Area 5	Strategic Area 6		
Archaea	Archaea for bioactive compounds		•				•
	Archaea for agro-environmental applications						
	Archaea for biotech applications	•	•	•	•	•	•
Bacteria	Pathogenic bacteria (for humans, animals, plants and crops)	•	•	•	•	•	•
	Bacteria for bioactive compounds			•			
	Foodborne bacteria		•	•			•
	Bacteria for agro-environmental applications (e.g. bioremediation, biofertilizers, biopesticides, etc.)				•		•
	Bacteria for biotech applications	•	•	•	•	•	•
Cyanobacteria	Bacteria as reference strains for bioassays' controls	•	•	•	•	•	•
	Toxic cyanobacteria (for humans and animals)	•	•	•		•	•
	Cyanobacteria for bioactive compounds		•	•			
	Cyanobacteria for food (e.g. dietary supplements)			•			•
	Cyanobacteria for agro-environmental applications (e.g. biofertilizers)				•		•
Filamentous Fungi	Cyanobacteria for biotech applications	•	•	•	•	•	•
	Pathogenic fungi (for human, animal, plants and crops)	•	•	•	•	•	•
	Fungi for bioactive compounds			•			•
	Foodborne fungi		•	•			•
	Fungi for agro-environmental applications (e.g. bioremediation, biofertilizers, biopesticides, etc.)				•		•
Yeasts	Fungi for biotech applications	•	•	•	•	•	•
	Fungi as reference strains for bioassays' controls	•	•	•	•	•	•
	Pathogenic yeasts (for human, animal, plants and crops)	•	•	•			•
	Yeasts for bioactive compounds (e.g. mycocins)			•			•
	Yeasts for biotech applications	•	•	•	•	•	•
Microalgae	Yeasts as reference strains for bioassays' controls	•	•	•			•
	Microalgae for bioactive compounds		•	•			•
	Microalgae for food (e.g. dietary supplements, food additives, etc.)			•			•
	Microalgae for agro-environmental applications (e.g. bioremediation, biofertilizers, etc.)				•		•
Viruses	Microalgae for biotech applications	•	•	•	•	•	•
	Pathogenic viruses (for humans, animals, plants and crops)	•	•	•		•	•
	Viruses for therapies			•			•
	Viruses as vectors		•				•
	Viruses for agro-environmental applications				•		•
Cell Lines & Genetic Constructs	Viruses for biotech applications	•	•	•	•	•	•
	Viruses as reference strains for bioassays' controls	•	•	•	•	•	•
	Human, animal and plant cell lines	•	•	•	•	•	•
	Plasmids	•	•	•	•	•	•
	Bacteriophage vectors	•	•	•	•	•	•
	Microbial DNA/RNA	•	•	•	•	•	•

# MIRRI offers a comprehensive, diverse portfolio of 90+ types of high-quality services (1/2)

## SUPPLY OF MICROBIAL RESOURCES

### Supply of microbial resources

- . Supply of freeze-dried strains
- . Supply of active cultures
- . Supply of strains in cryovials
- . Supply of DNA
- . Supply of strains in other delivery forms
- . Supply of competent cells
- . Supply of inactivated strains

## DEPOSIT

### Deposit

- . Public Deposit
- . Patent Deposit
- . Safe Deposit

## IDENTIFICATION

### Identification from microbial pure cultures

- . Identification by gene sequencing
- . Identification by morphological and phenotypic traits
- . Identification by MALDI-TOF-MS

### Virus detection and identification

- . Identification of plant viruses
- . Detection and identification of human and animal viruses up to risk group 2

### Human cell line authentication

- . Human cell line authentication by STR profiling

## MOLECULAR TYPING AND PHYLOGENETIC ANALYSIS

### Gene sequencing and analysis

- . Gene sequencing and analysis

### Genotyping

- . Random Amplification of Polymorphic DNA (RAPD)
- . Denaturing Gel Gradient Electrophoresis (DGGE)
- . Temporal Temperature Gradient Gel Electrophoresis (TTGE)
- . Amplified Fragment Length Polymorphism (AFLP)
- . Microsatellites or Simple Sequences Repeats (SSR)
- . Repetitive element palindromic PCR (rep-PCR)
- . Inter-LTR

- . Genomic restriction fragment length polymorphisms (RFLP)
- . Mitochondrial restriction fragment length polymorphisms (mt-RFLP)

- . Amplified Ribosomal DNA Restriction Analysis (ARDRA)
- . Ribotyping

### Clustering of isolates by MALDI-TOF MS protein profiles

- . Clustering of isolates by MALDI-TOF MS protein profiles

### Karyotyping

- . Karyotyping by PFGE

### Determination of ploidy

- . Determination of ploidy by flow cytometry

### Plasmid profile analysis

- . Plasmid profile analysis

## PHENOTYPIC CHARACTERISATION

### Structural analysis

- . Analysis of the cellular fatty acid composition
- . Analysis of cell wall sugars
- . Analysis of peptidoglycan structure
- . Analysis of the cellular polar lipid composition
- . Analysis of mycolic acids
- . Analysis of respiratory quinones
- . Immunochemical analysis
- . Electron microscopy imaging

### Metabolic and physiologic analyses

- . Biochemical tests
- . Analysis of enzymatic activities
- . Analysis of volatile metabolites
- . Antioxidant activities
- . Analysis of respiratory quinones
- . Production of other metabolites/ bioactive substances and analysis

## NGS RELATED SERVICES

### Draft/complete genome sequencing of a pure culture

- . Genome sequencing of a pure culture
- . Preliminary bioinformatic analysis of the genome sequences

### Taxon-specific gene amplification and sequencing of environmental samples or mixed communities

- . Amplicon sequencing
- . Preliminary bioinformatic analysis of the amplified sequences

### Whole Metagenome Shotgun (WMS) sequencing

- . Metagenome sequencing
- . Preliminary bioinformatic analysis of the metagenome sequences

### Advanced genome and metagenome analyses

- . Gene annotation
- . Genotyping
- . *In silico* characterisation
- . Overall genome relatedness indexes (ANI, AAI, eDDH...)
- . Phylogenomics
- . Operational taxonomic units (OTUs) generation and tagging
- . Tailor made analyses of genomes and metagenomes

# MIRRI offers a comprehensive, diverse portfolio of 90+ types of high-quality services (2/2)

## MICROORGANISM ISOLATION, PRESERVATION AND CULTIVATION

### Isolation and purification of strains

- . Isolation and purification of strains

### Freeze-drying

- . Freeze-drying

### Optimisation of preservation conditions

- . Optimisation of preservation conditions

### Optimisation of cultivation/fermentation

- . Optimisation of cultivation/fermentation

### Microbial counting/titer

- . Microbial counting/titer

## SCREENING, TESTS AND BIOASSAYS

### Growth promoting / antimicrobial / antiviral bioassays

- . Microbial growth-promoting and antimicrobial tests
- . Antibiotic resistance assays
- . Biocontrol agents tests on plants
- . Biostimulating tests on plants
- . Virus resistance assays

### High-throughput screening

- . Metabolomic analyses
- . Analysis of the resistance/sensitivity of strains to physical and chemical stressors
- . Analysis of adhesive activity

### Characterisation of technological abilities of microbial strains

- . Analysis of the strain performance for industrial application
- . Analysis of adhesive activity
- . Analysis of biosurfactant-producing activity

### Detection of contaminants in raw materials and products

- . Detection of contaminants in raw materials and products

### Material resistance testing

- . Material resistance testing

## OTHER SERVICES

### Other characterisation analyses

- . Mycovirus detection
- . Determination O<sub>2</sub> consumption / CO<sub>2</sub> production
- . Plasmid copy number quantification
- . Safety assessment of strains for food and feed
- . High-throughput and high-resolution visualisation

### Purification of cells/metabolites

- . Cell sorting applications (Flow cytometry)
- . Purification of metabolites

### Complementary services

- . DNA extraction
- . Construction and characterisation of intraspecific hybrids

## TAXONOMIC DATABASE TOOLS

### Taxonomic database tools

- . MycoBank
- . YeastIP
- . FungalDC
- . Yeast-ID
- . BIGSdb-Pasteur
- . Klebsiella MALDI TypeR
- . CLIMA

## CONSULTANCY, TRAINING AND CONTRACT RESEARCH

### Consultancy, training and contract research

- . Consultancy (topics aligned with the MIRRI Clusters of Expertise)
- . Training courses
- . Contract Research

# MIRRI offers application-specific services or workflows of integrated services

## HEALTH & FOOD

### Diagnostic

- Bacterial and fungal pathogens detection, isolation, characterisation and preservation under controlled conditions.
- Selection of reference pathogenic strains for bioassays and diagnostics.
- Bacterial genome scanning for investigation of virulence factors and antimicrobial resistance.

### Biopharmaceuticals

- Identification of taxonomically related *Streptomyces* strains with antimicrobial activity using mass spectrometry profiles.
- Scanning of fungal genomes, identification of pathways for synthesis of biomolecules with pharmaceutical interest and heterologous expression of silent fungal gene clusters for bioactive compounds production.
- *In vitro* screening of anti-inflammatory and anti-infectious activities (antibacterial, antiviral, antifungal and antiparasitic) of newly isolated strains or strains preserved in mBRCs (including archaea, bacteria, cyanobacteria, yeasts and fungi isolated from untapped environments).
- Preparation of inactivated strains to be used for the development of vaccines.

### Microbial based therapeutics and health promoting solutions

- *In vitro* screening of phages for phage therapy as alternative to antimicrobials.
- *In vitro* screening for health-promoting properties i.e. production of organic acids, vitamins, aminoacids, GABA.
- Isolation and/or selection of strains with probiotic activity, screening of probiotic potential and analysis of resistance to gastrointestinal conditions.

## AGRO-FOOD

### Food production processes

- Food microbiome: metagenomic & culturomic analysis, fungal/yeasts/bacterial species isolation and identification.
- *In vitro* screening of food preservation activities: antifungal, antibacterial.
- Analysis of relevant metabolites for food production (e.g. exopolysaccharide, esters, superior alcohols, volatile compounds in wine production).
- Microalgae strain selection and mass culture optimisation for aquaculture feed and food ingredients production.
- Food-waste products recycling: isolation, identification and characterisation of degrading strains.

### Food safety

- Genome analysis for food safety strain requirements i.e. antimicrobial resistance (AMR), antimicrobial production, toxigenicity and pathogenicity.
- Food safety assessment based on genomic information (according to EFSA).
- Analysis of mycotoxin profiles.
- Investigation of food contamination and identification of bacteria and fungi applying an integrated polyphasic approach (e.g. identification of *Alicyclobacillus* sp., frequent spoiler of fruit juices).

### Agriculture

- Selection and characterisation of arbuscular mycorrhizal fungi strains for application in agricultural and horticultural crops.
- Biofertilizers: identification and quantification for registry purposes.
- Biocontrol agents: identification and characterisation of strains used as biocontrol agents (e.g. *Trichoderma harzianum*).
- Investigation of microbial activities with impact in soil nutrients (e.g. siderophore production, phosphate solubilisation).

## ENVIRONMENT & ENERGY

### Bioremediation

- Compositional and functional characterisation of microbiomes from metal contaminated sites, strain isolation (cyanobacteria, bacteria, fungi, yeasts, microalgae) and taxonomic characterisation. Screening of tolerance to heavy metals.
- Screening of existing microbial resources (cyanobacteria, bacteria, fungi, yeasts, microalgae) for biotransformation of organic pollutants (e.g. phthalates, polycyclic aromatic hydrocarbons).
- Characterisation of microbial communities, isolation of autochthonous strains or selection of strains in mBRC (bacteria, cyanobacteria, fungi, microalgae) for application in wastewater treatment processes.

### Biomass valorisation and bioenergy production

- Assessment from genome annotation of specific enzymatic activities for biofuel production (e.g. hydrolytic activities) and *in vitro* validation in bacteria.
- Characterisation of microbial communities and/or screening and isolation of autochthonous strains for enzymatic activities aimed at biomass degradation and waste-to-energy valorisation.
- Microalgae strain selection, ecophysiology, growth and mass culture for biofuel production.

### Biomaterials and bioindustry

- Bioplastics: production of polyhydroalkanoates.
- Self-healing concrete: strain for microbial calcium carbonate deposition and counselling for processes development.
- Analysis of relevant enzymatic activities with environmental and industrial interest (alginase, chitinase, lignolytic activity, agarase, amylase,  $\beta$ -glucanase, protease...).
- Counselling for microbial bioprocesses: growth and productivity, screening of tolerances under technological conditions, analysis of biotechnological relevant behaviour (e.g. flocculation, foaming).



# Catalogue of services

## General services

## Training & Education offer

### EuroMiRC first edition (March – July 2023)

## TNA offer

### The Transnational access includes:

- ✓ Technical and
- ✓ Administrative
- ✓ Access to the
- ✓ Hands-on train

### The TNA programme sponsors researchers'

- Non-standard c
- Expenses requir

# MIRRI's current participation in European projects



**IS\_MIRRI21 – Implementation and Sustainability of Microbial Resource Research Infrastructure for 21st Century**  
[Coord. UMinho]



**EOSC-Life – Providing an open collaborative space for digital biology in Europe**  
[Coord. ELIXIR/EMBL]



**BY-COVID – Beyond COVID**  
[Coord. ELIXIR]



**ISIDORe – Integrated Services for Infectious Disease Outbreak Research**  
[Coord. ERINHA]



**canSERV – Providing cutting edge cancer research services across Europe**  
[Coord. BBMRI]



**AgroServ – Integrated SERVICES supporting a sustainable AGROecological transition**  
[Coord. AnaEE]



**BIOINDUSTRY 4.0 – RI services to promote deep digitalization of Industrial Biotechnology – towards smart biomanufacturing**  
[Coord. IBISBA]



**MICROBE – MICRObiome Biobanking (RI) Enabler**  
[Coord. AIT]

## Expert Clusters

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## Forum

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### Expert clusters

The Expert Cluster platform of MIRRI-ERIC is an online public virtual collaborative space to promote interaction among different research and innovation actors (researchers in the public domain, companies, policy makers, etc.) and across sector boundaries.

This platform allows, among other things, the access to a wide selection of experts and to advisory services related to the use of microbial resources. The implementation of the clusters of expertise is on-going. Currently, you can access the public forum about Legal/Regulatory Issues & Standards associated with the use of microbial resources [here](#).

The clusters on other topics (see below) will come soon. Until then, you can reach our experts contacting us at [access@mirri.org](mailto:access@mirri.org).

Legal/Regulatory Issues & Standards

Applications in Biotechnology & Bioindustries

Taxonomy

Bioprospection, Cultivation & Preservation

High-End Technologies & Platforms

Legal/Regulatory Issues & Standards

There are a number of legal and ethical aspects that the users need to consider when working with microorganisms. Therefore, the **Legal/Regulatory Issues & Standards** expert cluster aims to support stakeholders in the compliant use of microbial resources.

#### Specific topics/sub-topics of expertise

- Access and Benefit Sharing (ABS) in the frame of the Convention on Biological Diversity and the Nagoya Protocol.
- Agreements for the transfer or the deposit of microbial resources (MTA and MDA).
- Biosafety: Safe use of the microbial resources, protecting the health of the workers and the environment.
- Biosecurity: Prevention of the misuse of microbial resources.
- Budapest Treaty: Deposit of microbial resources in International Depository Authorities (IDA) for the purpose of patent procedures.
- Intellectual Property Rights associated with the use of microbial resources.

Forums >



Members | Unread Posts

Legal | Regulatory Issues & Standards

Last Post Info



#### Access and Benefit Sharing (ABS)

Access and Benefit Sharing (ABS) in the frame of the Convention on Biological Diversity and the Nagoya Protocol

Topics: 2 | Posts: 9



ABS France

By [aurora zuzuarregui](#), 4 weeks ago



#### MTA and MDA

Agreements for the transfer or the deposit of microbial resources (MTA and MDA)

Topics: 0 | Posts: 0

Forum is empty



#### Biosafety

Safe use of the microbial resources, protecting the health of the workers and the environment

Topics: 0 | Posts: 0

Forum is empty

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urpose of patent

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Last Post Info

tion (microbiota) among

Forum is empty

# Thanks for your attention!!

## MIRRI-ERIC European Headquarters

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## Social media

<https://www.linkedin.com/company/microbial-resource-research-infrastructure>

[https://twitter.com/MIRRI\\_live](https://twitter.com/MIRRI_live)

<https://www.facebook.com/mirri.esfri>

<https://www.youtube.com/user/MicrobialResourceRI>



The Microbial Resource Research Infrastructure – European Research Infrastructure Consortium (MIRRI-ERIC) is a ‘Landmark’ in the Health & Food domain of the European Strategy Forum on Research Infrastructures (ESFRI) Roadmap.



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