PART3

PROJECTS & LANDMARKS

PART3
CONTENTS

ESFRI Research Infrastructures are facilities, resources or services of a unique nature, identified by European research communities to conduct and to support top-level research activities in their domains. ESFRI selects proposals of RIs in strategic areas of research and with an adequate level of maturity to become ESFRI Projects, and identifies successfully implemented RIs to become ESFRI Landmarks.

Each ESFRI Project and ESFRI Landmark is described by a dedicated card.

ESFRI PROJECTS

PAGE 167

The ESFRI Projects are RIs in their Preparation Phase, which have been selected for the excellence of their scientific case and for their maturity, according to a sound expectation that the Project will enter the Implementation Phase within the ten-year term. They are included in the Roadmap to point out the strategic importance they represent for the European Research Area, and to support their timely implementation as new RIs or major updates of existing RIs. The Projects can be at different stages of their development towards implementation according to their respective date of inclusion in the Roadmap.

ESFRI LANDMARKS

PAGE 191

The ESFRI Landmarks are RIs that were implemented, or reached an advanced Implementation Phase under the Roadmap, and that represent major elements of competitiveness of the ERA. The Landmarks can be already delivering science services and granting user access, or can be in advanced stage of construction with a clear schedule for the start of the Operation Phase. The Landmarks need continuous support and advice for successful completion, operation and – if necessary – upgrade to achieve optimal management and maximum return on investment.

A short description of each ESFRI Project and ESFRI Landmark is given as well as updated information about the legal status, the timeline for the preparation/implementation/operation, the estimated costs and the interconnections with other domains when analysed – Projects and Landmarks in Operation Phase or in advanced Preparation Phase.

These data were updated by Projects and Landmarks according to the definitions described in the ESFRI Roadmap 2021 Guide[1] and the methodology implemented in the ESFRI Monitoring System (MoS)[2]. The information about the Political Support – expressed by Governments of Member States and Associated Countries – was validated by the ESFRI Delegations through the MoS.

1. ESFRI Public Roadmap 2021 Guide, September 2019
https://www.esfri.eu/sites/default/files/ESFRI_Roadmap2021_Public_Guide.pdf

2. ESFRI Monitoring System (MoS)
https://mos.esfri.eu/mos/

POLITICAL SUPPORT TO ESFRI PROJECTS

LEAD COUNTRY/ENTITY: MS, AC or EIROforum member leading the Preparation Phase.

PROSPECTIVE MEMBER COUNTRY/ENTITY: MS, AC and third country, which submitted Expressions of political Support (EoS) signed by the national ministries responsible for the RI, or other entity – such as EIROforum member – whose mandated authorities have expressed interest to join the RI through a Council resolution.

POLITICAL SUPPORT TO ESFRI LANDMARKS

LEAD COUNTRY/ENTITY: MS, AC or EIROforum member leading the Implementation/ Operation Phases.

MEMBER COUNTRY/ENTITY: MS, AC, third country or other entity – such as EIROforum member – which is Member of the legal entity by any formal agreement, or applied to ERIC Step2 or to other international legal form.

OBSERVER: MS, AC, third country and other entity – such as EIROforum member – which is Observer of any legal entity by any formal agreement, or applied to ERIC Step2 or to other international legal form.

PROSPECTIVE MEMBER COUNTRY/ENTITY: MS, AC and third country, which have submitted Expressions of political Support (EoS) signed by the national ministries responsible for the RI, or other entity – such as EIROforum member – whose mandated authorities have expressed interest to join the RI through a Council resolution.

MS, AC and third country, neither being the Lead country, Member Country nor Prospective Member country, but which hosts research institutions and international organisations formally involved in the consortium, are not listed.

A complete list of stakeholder organizations – Research Institutes, Academia, Research Performing Organizations, territorial authorities – is to be found on the own website of the RIs, as institutional participation may not engage the direct responsibility of the Government.

PART3

ESFRI PROJECTS

CONTENTS

DATA, COMPUTING & DIGITAL RESEARCH INFRASTRUCTURES

169 EBRAINS
170 SLICES
171 SoBigData++

ENERGY

172 IFMIF-DONES
173 MARINERG-i

ENVIRONMENT

174 DANUBIUS-RI
175 DiSSCo
176 eLTER RI

HEALTH & FOOD

177 EIRENE RI
178 EMPHASIS
179 EU-IBISBA
180 METROFOOD-RI

PHYSICAL SCIENCES & ENGINEERING

181 EST
182 ET
183 EuPRAXIA
184 KM3NeT 2.0

SOCIAL & CULTURAL INNOVATION

185 E-RIHS
186 EHRI
187 GGP
188 GUIDE
189 OPERAS
190 RESILIENCE

EBRAINS

European Brain ReseArch INfrastructureS

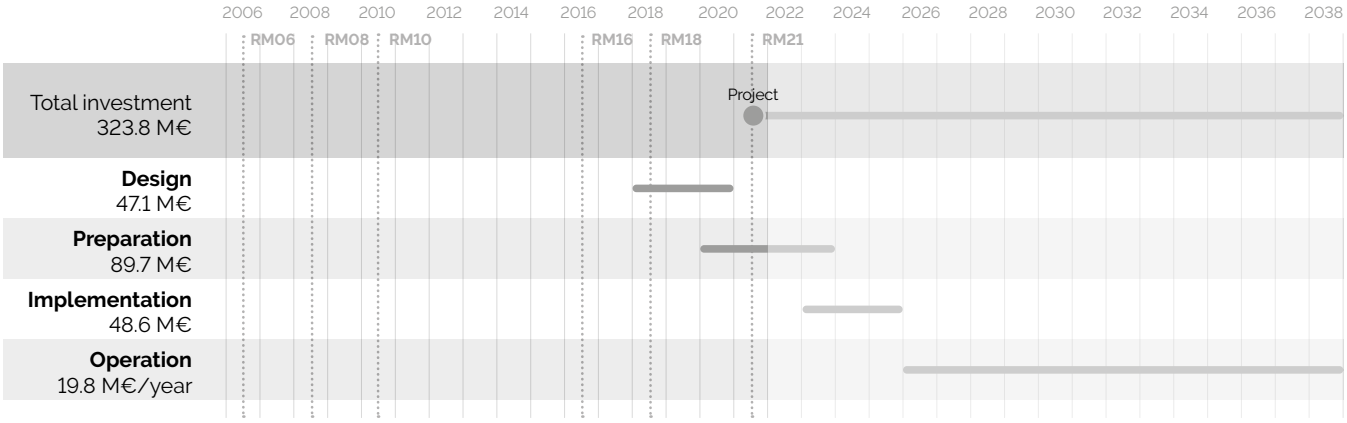
Website	Headquarters	Legal status	Type
www.ebrains.eu	EBRAINS AISBL Brussels, Belgium	AISBL, 2019	distributed

DESCRIPTION

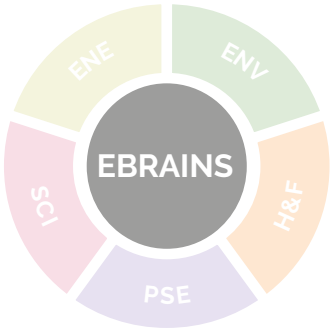
The European Brain ReseArch INfrastructureS (EBRAINS) is a distributed Digital Infrastructure at the interface of neuroscience, computing and technology. It is a 'one-stop-shop' offering scientists and technology developers the most advanced tools and services for brain research, including FAIR data services, next-generation brain atlasing, simulation platforms and AI-based analysis of big data. EBRAINS catalyses new findings in science, and innovative brain-inspired technologies and computing to help reach a deeper understanding of the human brain. Beyond neuroscience, it will empower a broad spectrum of biomedicine and other research, including work on Covid-19. It should also enable forward-looking, digital applications for industrial and medical use, for the benefit of patients and society.

Entered in the ESFRI Roadmap in 2021, EBRAINS is a major outcome of the Human Brain Project EU FET Flagship and will provide the coordination nucleus of the post-FET structure. It is powered by the Federated Exascale Network for data Integration and eXchange (Fenix) Infrastructure as a Service (IaaS), itself a blueprint for other research communities. Since 2019, EBRAINS is an International non-profit Association under Belgian law (AISBL), whose members currently represent seven European countries. EBRAINS AISBL acts as a Central Hub for RI and support services spread across the participating Member States that will shortly form the National Nodes of EBRAINS with the aim to integrate 'best-in-class' resources, creating synergy and building upon national scientific developments and efforts.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead

FR˚

Prospective member

BG, CH˚, DK, EL, ES˚, IT˚, NL, NO˚, SE˚

˚AISBL member

SLICES

Scientific Large-scale Infrastructure for Computing/Communication Experimental Studies

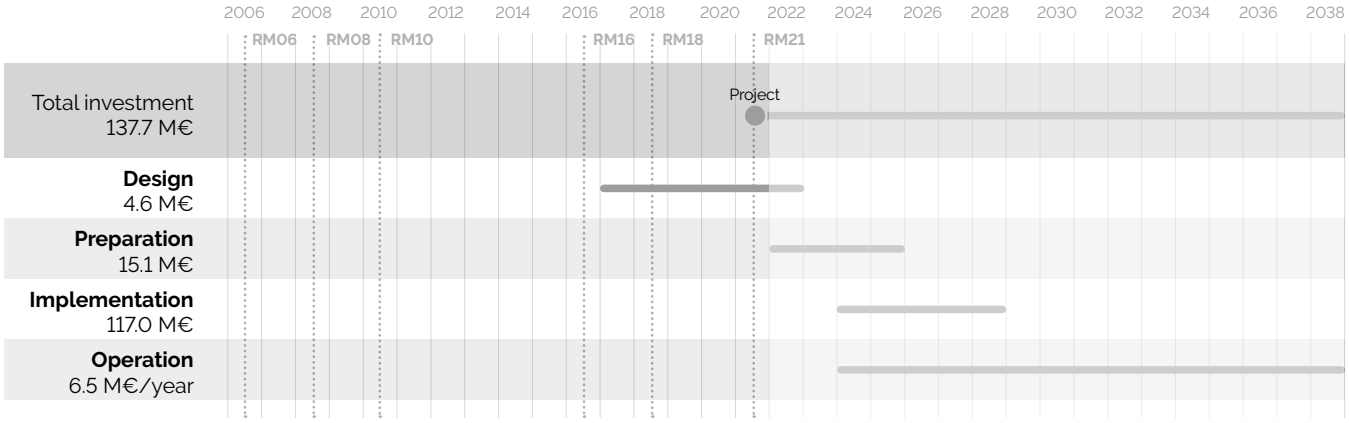
Website	Headquarters	Legal status	Type
www.slices-ri.eu	INRIA Le Chesnay, France	pending	distributed

DESCRIPTION

The Scientific Large-scale Infrastructure for Computing/ Communication Experimental Studies (SLICES) is a distributed flexible Digital Infrastructure designed to support large-scale, experimental research focused on networking protocols, radio technologies, services, data collection, parallel and distributed computing and in particular cloud and edge-based computing architectures and services. SLICES will make a fundamental contribution to research and innovation in Digital Sciences and Infrastructures, future Internet technologies, future smart networks and services. This encompasses the full range of network, computing, and storage functions required for 'on-demand' services across many verticals, and addresses new complex research challenges, supporting disruptive science in IoT, networks and distributed systems.

Entered in the ESFRI Roadmap in 2021, SLICES is the outcome of previous experience in the design, deployment, and operation of several test platforms, such as PlanetLab Europe or the FIRE test-beds, since 2005. SLICES is built on EU-funded projects: SLICES-DS to provide a complete design study, a Europe-wide test-platform designed to support large-scale, experimental research on Digital Infrastructures; and SLICES-SC to foster the community of researchers around the RI ecosystem, create and strengthen necessary links with relevant industrial stakeholders for the exploitation of the RI, advance existing methods for research reproducibility and experiment repeatability. Currently, SLICES consortium gathers partners from 15 European countries, all of them having committed to contribute resources and 11 providing political support.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
FR

Prospective member
BE, CH, CY, EL, ES, FI, IT, LU, NL, PL

SoBigData++

European Integrated Infrastructure for Social Mining and Big Data Analytics

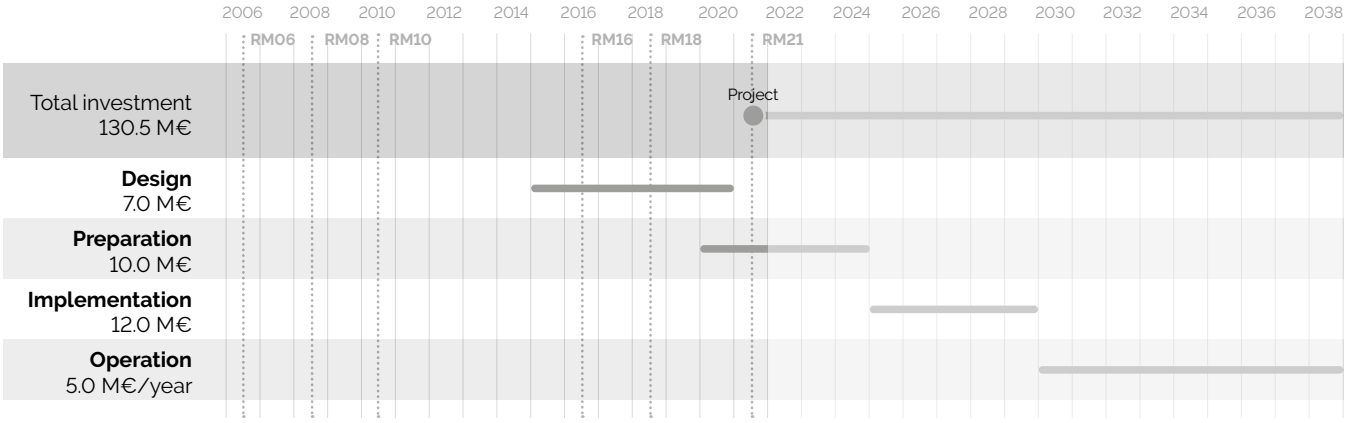
Website	Headquarters	Legal status	Type
www.sobigdata.eu	ISTI-CNR Pisa, Italy	pending	distributed

DESCRIPTION

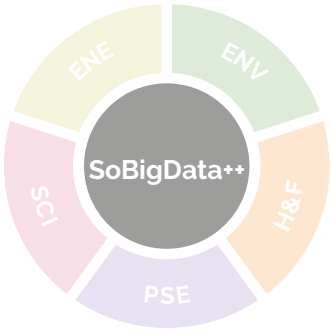
The European Integrated Infrastructure for Social Mining and Big Data Analytics (SoBigData++) is a distributed and multi-disciplinary Research Infrastructure for big social data analytics that, coupled with the consolidation of a cross-disciplinary European research community, is aiming at using social mining and big data to understand the complexity of our contemporary, globally-interconnected society. SoBigData++ offers a distributed platform of interoperable social data mining tools, methodologies and services for obtaining, analyzing, and visualizing massive datasets. The SoBigData++ RI will render social mining experiments more efficiently designed and repeatable by leveraging concrete tools that include ethics, values and norms for privacy, fairness, transparency, and pluralism.

Entered in the ESFRI Roadmap in 2021, SoBigData++ brings together 31 partners representing key European centres for Data Science and Artificial Intelligence. The Consortium combines research areas related to big data analytics, computational social science, digital humanities, city planners, artificial intelligence, and covers competences on ethics, economic analysis, environmental sustainability and energy saving. SoBigData++ works in synergy with different EU-funded projects, networks of excellence and ESFRI RIs, including HumanE-AI-Net, TAILOR, AI4EU, WeVerify, Pericles, NoBias and CLARIN ERIC. Currently in the Preparation Phase, SoBigData++ will define the legal aspects for establishing the European Research Infrastructure Consortium (ERIC) and extend the partnership to other countries.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
IT

Prospective member
BG, CH, EE

IFMIF-DONES

International Fusion Materials Irradiation Facility - DEMO Oriented NEutron Source

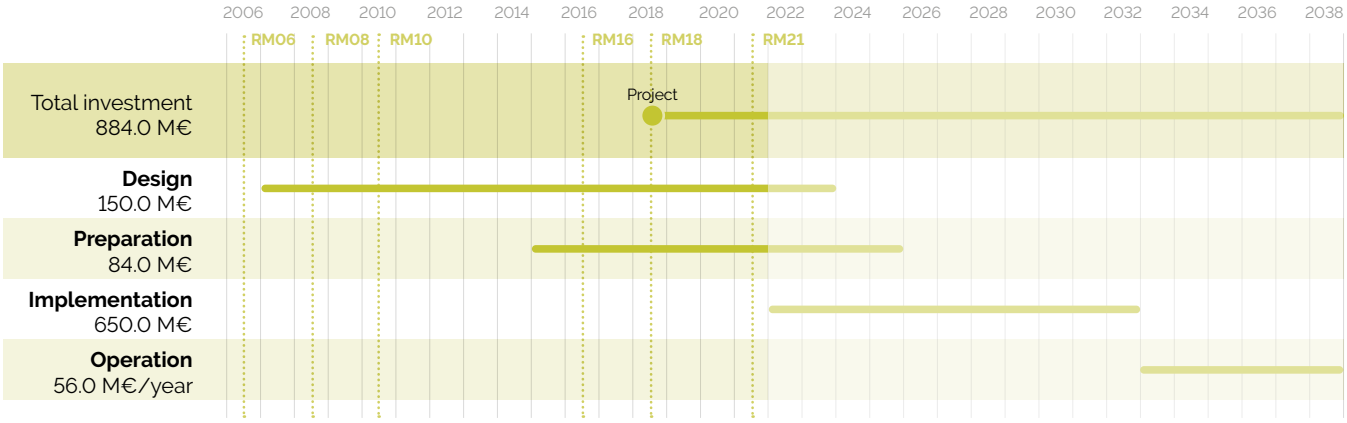
Website	Headquarters	Legal status	Type
www.ifmifdones.org	CIEMAT Madrid, Spain	pending	single-sited

DESCRIPTION

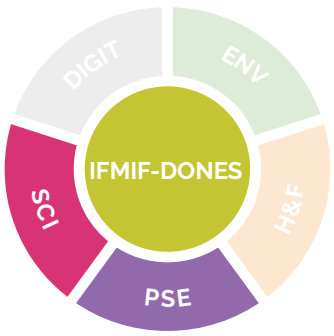
The International Fusion Materials Irradiation Facility – Demo Oriented NEutron Source (IFMIF-DONES) is a single-sited Research Infrastructure for testing, validation and qualification of the materials to be used in a fusion reactor. It is based on a unique neutron source with energy spectrum and flux tuned to those expected for the first wall containing future fusion reactors. The IFMIF-DONES will be a major step towards IFMIF as it will develop a unique high-current high-duty cycle accelerator technology, liquid metal target technology and advanced control systems. The facility will also offer unique experimental opportunities in other scientific and technology areas including nuclear physics, astrophysics, medical and industrial applications.

EUROfusion and Fusion for Energy (F4E) started in 2015 a process to develop the engineering design of DONES and to identify possible EU sites to host the facility. In December 2017, F4E positively evaluated the joint Spain-Croatia proposal to site DONES in Granada. As the IFMIF-DONES entered the Roadmap in 2018, it was eligible for the Preparatory Phase – presently going on to the end of 2021 – and, simultaneously, have started the Implementation Phase with the initial steps for the construction of the civil engineering infrastructure. Intense international activity is sought in order to benefit from the final results of the Broader Approach Agreement and to establish the broadest international collaboration in the design and construction of the DONES.

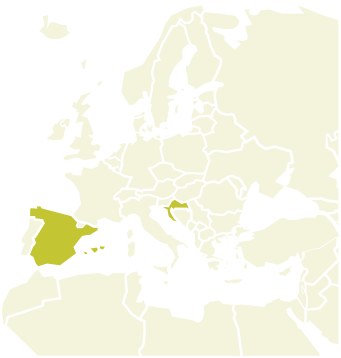
TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT



Lead

ES, HR

Prospective member

EUROfusion, Fusion for Energy

MARINERG-i

Marine Renewable Energy Research Infrastructure

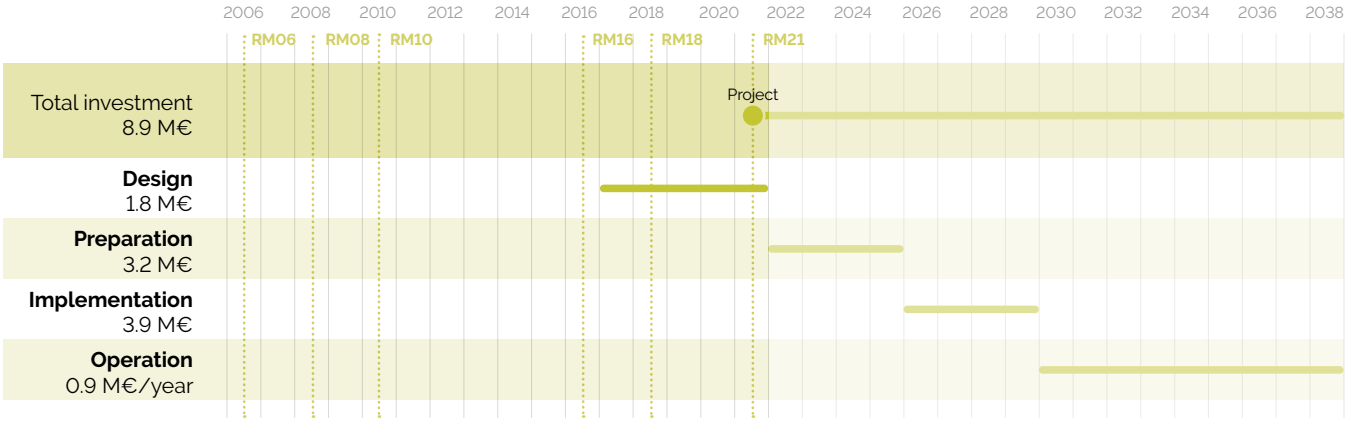
Website	Headquarters	Legal status	Type
www.marinerg-i.eu	University College Cork, Ireland	pending	distributed

DESCRIPTION

The Marine Renewable Energy Research Infrastructure (MARINERG-i) is a distributed Research Infrastructure composed of a network of test facilities with the critical mass of expertise and world-class equipment to support the design and advancement of the Offshore Renewable Energy (ORE) systems. This involves interdisciplinary research in hydrodynamics, aerodynamics and fluid-structure interaction, material science, electro-technical engineering, ICT, naval architecture, sensors, oceanography, environmental and social sciences, business management, economics and legal sciences. It will accelerate the research development of wave, tidal, offshore wind and combined energy technologies to maintain Europe a global leader in constantly evolving industry.

MARINERG-i builds on the existing community developed in the FP7 MaRINET and H2020 MaRINET2 projects and it is the major outcome of the first application to ESFRI Roadmap 2016. Even though unsuccessful, MARINERG-i was considered an *emerging project* and deserving a H2020 funding for ESFRI Early Phase projects. The project provided the nucleus to coordinate the consortium of 14 partners spread in 12 countries to undertake the effort to successfully submit a new proposal to the ESFRI Roadmap 2021 with the development of the main components of the RI, the identification of the most appropriate legal and governance structure, the identification and implementation of the actions necessary at the national level to secure the Member States commitment.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
IE

Prospective member
BE, DK, ES, NL, PT, UK

DANUBIUS-RI

International Centre for Advanced Studies on River-Sea Systems

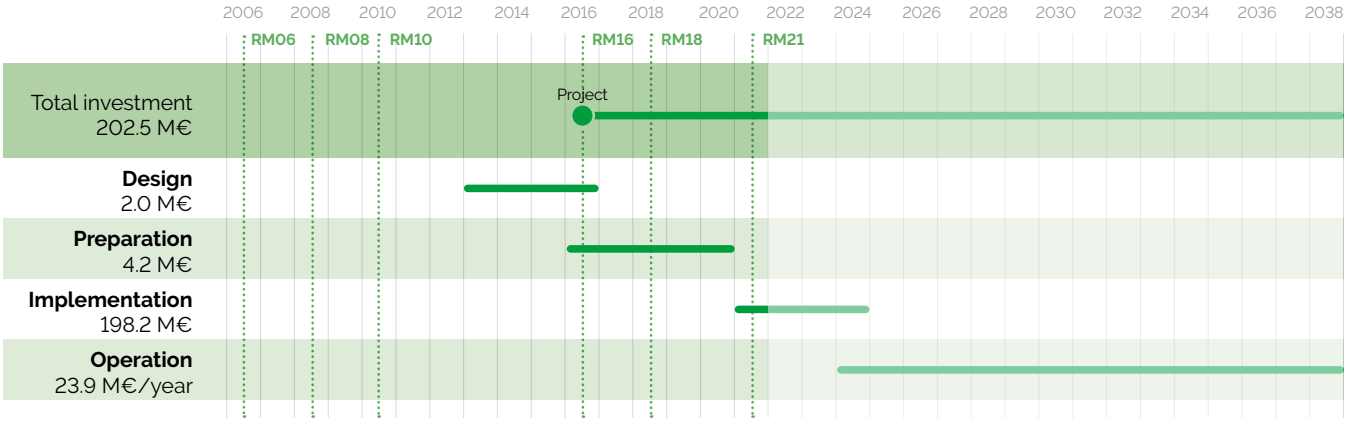
Website	Headquarters	Legal status	Type
www.danubius-ri.eu	DANUBIUS-RI Murighiol, Romania	ERIC Step1	distributed

DESCRIPTION

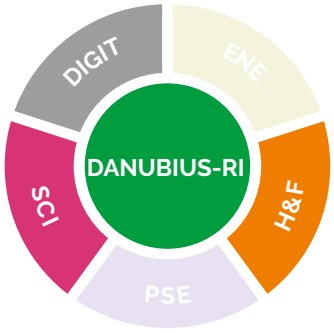
The International Centre for Advanced Studies on River-Sea Systems (DANUBIUS-RI) is a distributed Research Infrastructure to enable excellent interdisciplinary research and innovation on River-Sea Systems (RSS). Building on existing expertise spanning the environmental, social and economic sciences, it aims to provide an integrated Research Infrastructure for remote and *in situ* observation systems, experimental facilities, laboratories, modelling tools and resources for knowledge exchange along freshwater-seawater continua throughout Europe, from river source to coastal sea. DANUBIUS-RI will provide solutions to societal risks and challenges arising from global and climate change, and extreme events, offering a source to sea perspective to resolve the problems of adverse human impacts.

The DANUBIUS project dates back in early 1990s when the Romanian Government with the support of the National Institute for Marine Geology and Geoecology (GeoEcoMar) and the National Institute Research & Development for Biological Sciences (INSB) had proposed the creation of an International Centre for advanced studies on the Danube River-Danube Delta-Black Sea System. Over the years, the necessity of studying not just the Danube Delta ecosystem, but an integrated River-Sea System became clearer. In the ESFRI Roadmap since 2016, DANUBIUS-RI has recently submitted the Step1 application for the European Research Infrastructure Consortium (ERIC). Currently in the Implementation Phase, DANUBIUS-RI is setting new services with the introduction of individual components in a number of partners countries.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
RO

Prospective member
BG, CZ, DE, EL, ES, IE, IT, MD, NL, PT, UA, UK

DiSSCo

Distributed System of Scientific Collections

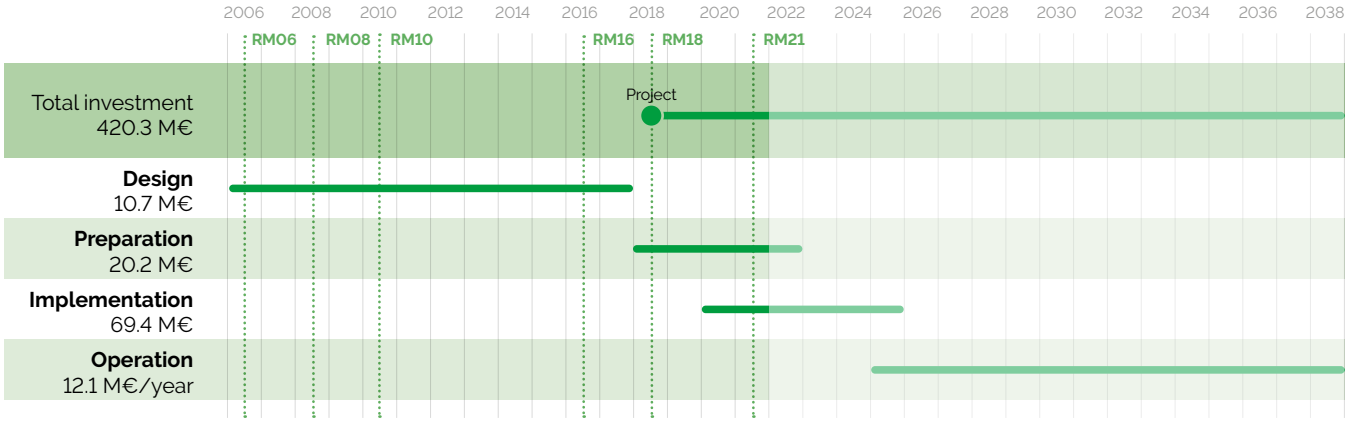
Website	Headquarters	Legal status	Type
www.dissco.eu	Naturalis Biodiversity Center Leiden, The Netherlands	pending	distributed

DESCRIPTION

The Distributed System of Scientific Collections (DiSSCo) is a distributed word-class Research Infrastructure to integrate European Natural Science Collections (NSCs) for data-intensive research and innovation in environment, food security, health, and bioeconomy. The DiSSCo RI aims to digitally unifies all European natural science assets under common access, curation, policies and practices that ensure that all the data is easily Findable, Accessible, Interoperable and Reusable (FAIR principles). By mobilising, harmonising and providing Natural Science Collections data, DiSSCo fills a significant gap in the value chain of European RIs because it provides a fundamental basis of knowledge at the scale and precision required to enable research for tackling grand societal challenges.

DiSSCo represents the outcome of significant scientific and technical investments, started in 2004, to design a virtual organization for European Natural Collections. In the ESFRI Roadmap since 2018, DiSSCo develops an integrated approach to provide unified access and analysis services, building on the super-advanced CETAF network and on multiple previous access programmes. In its Implementation Phase since 2020, DiSSCo has engaged with strong scientific, managerial and technical leaders at national levels to unify 115 leading Natural Science Collection facilities in 21 countries. Each of the DiSSCo national nodes identifies complementary thematic priorities, relevant to the delivery of the DiSSCo service portfolio, and ensuring alignment with national Strategies for Smart Specialisation.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
NL

Prospective member
BE, BG, DK, EE, EL, FR, IT, PT, SK, UK

eLTER RI

Integrated European Long-Term Ecosystem, critical zone and socio-ecological system Research Infrastructure

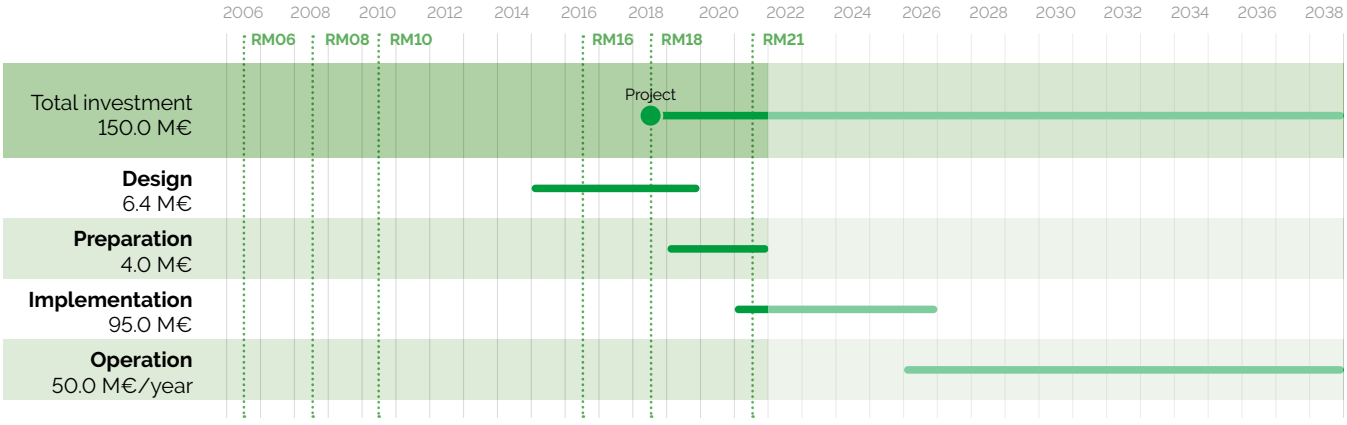
Website	Headquarters	Legal status	Type
www.elter-ri.eu	UFZ Leipzig, Germany	pending	distributed

DESCRIPTION

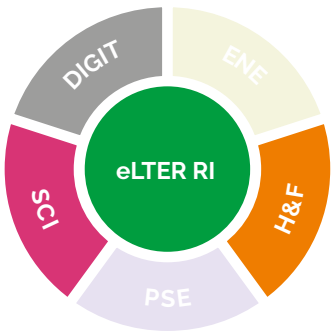
The Integrated European Long-Term Ecosystem, critical zone and socio-ecological system Research Infrastructure (eLTER RI) is a distributed RI to facilitate high impact research and catalyse new insights about the compounded impacts of climate change, biodiversity loss, soil degradation, pollution, and unsustainable resource use on a range of European socio-ecological systems. eLTER RI aspires to develop the scientific capacity to improve the understanding of terrestrial, freshwater, and transitional water ecosystems. Combined with socio-ecological approach to studying integrated human-nature systems and commitment to integrating stakeholder knowledge, it provides a solid foundation to inform policy-maker systems to find evidence-based sustainable solutions for addressing current and emerging challenges.

eLTER has evolved via several flagship networks and projects – e.g. ALTER-Net, EnvEurope, ExpeER and eLTER H2020. Cited as *emerging project* in 2016, it was successfully selected and included in the ESFRI Roadmap 2018. eLTER is currently in the Preparation Phase on the way to become a fully-fledged RI that will comprise National Research Infrastructures (NRIs), and European level Central Services (CS), such as data access, training and harmonized methods and parameters. Countries supporting eLTER RI will provide facilities in the form of eLTER Sites (focal points for long-term ecosystem observation and research) and eLTSER Platforms (large areas facilitating socioecological research and exemplary stakeholder engagement). These national building blocks shape the in situ backbone of eLTER RI.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
DE

Prospective member
AT, BG, CH, CZ, EL, ES, FI, FR, IL, IT, LV, PT, RO, SI, SK, UK

EIRENE RI

Research Infrastructure for EnvIRonmental Exposure assessmeNt in Europe

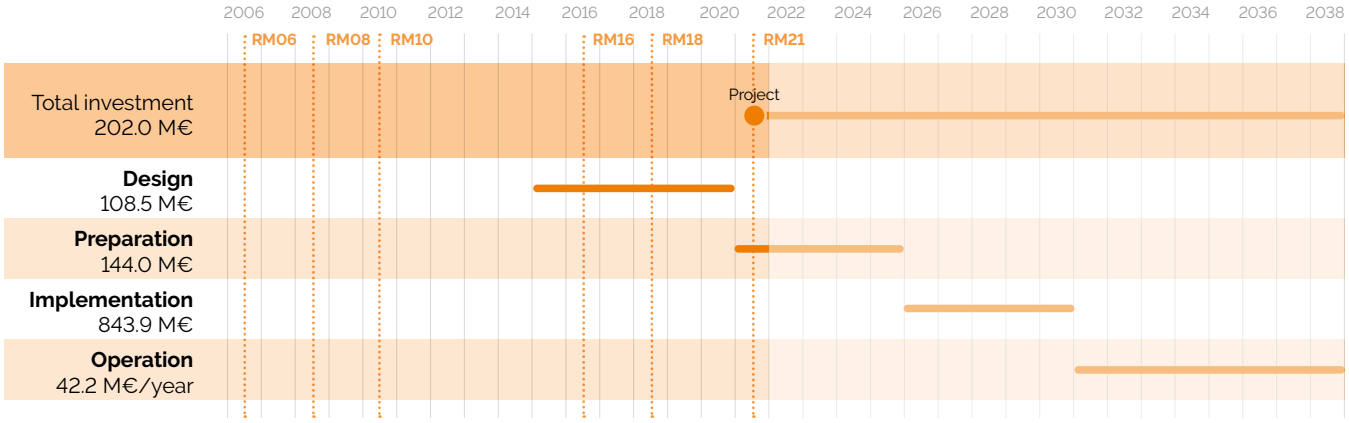
Website	Headquarters	Legal status	Type
pending	Masaryk University Brno, Czech Republic	pending	distributed

DESCRIPTION

The Research Infrastructure for EnvIRonmental Exposure assessmeNt in Europe (EIRENE RI) pioneers the first European Research Infrastructure on environmental determinants of human health, the Human Exposome. EIRENE RI intends to support large-scale research for the interdisciplinary assessment of environmental determinants of health, including indoor and outdoor environment factors, lifestyle, socioeconomics, and the individual's ability to cope with various stressors such as infection or disease. EIRENE RI will provide harmonised workflows and integrated services for data and sample collection, as well as knowledge and tools that will be made accessible to academic researchers, private companies, public authorities and citizens through the EIRENE open-access system and the EIRENE knowledge hub.

The concept of a pan-European Infrastructure supporting research on the effects of long-term exposures to various types of stressors on population health and the roles these exposures play in the development of chronic diseases is based on ten-year experience of Czech national RECETOX RI. Entered in the ESFRI Roadmap 2021, EIRENE RI already connects 50 research institutions from 17 countries. It builds on the legacy of the European environmental monitoring networks and their databases (EMEP, GMP, GMOS), GEO Initiatives (GOS4POP and GOS4M) and related H2020 projects (ERA PLANET, e-SHAPE), EU biomonitoring initiatives (DEMOCOPHES, HBM4EU), UNEP/WHO global biomonitoring efforts, EU exposome (HELIX, EXPOSOMICS, HEALS and EHEN cluster) and other related projects (HERA, EURION cluster).

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
CZ

Prospective member
AT, BE, DE, EL, ES, IS, IT, NL, SK

EMPHASIS

European Infrastructure for Multi-scale Plant Phenomics and Simulation

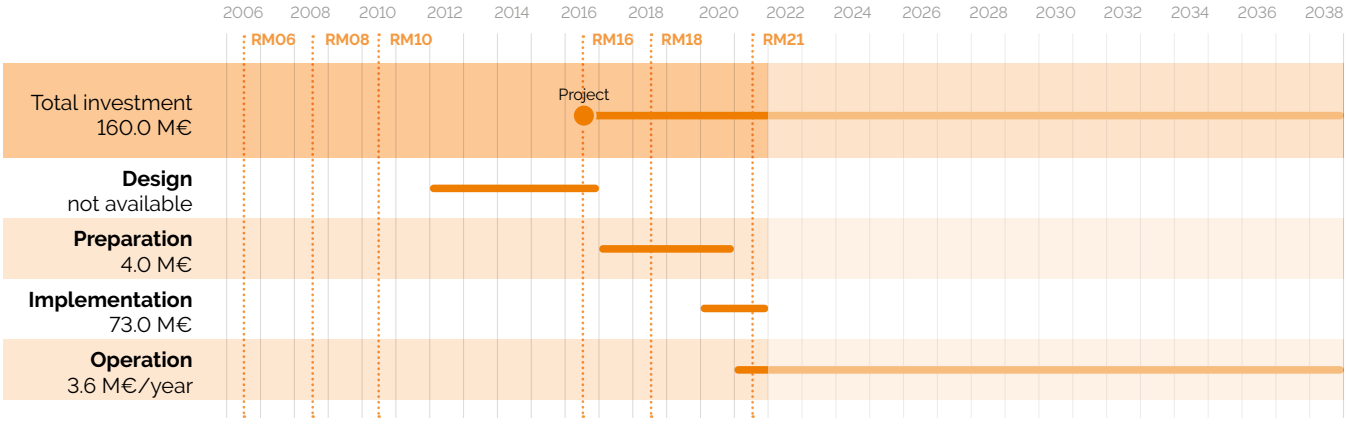
Website	Headquarters	Legal status	Type
www.emphasis.plant-phenotyping.eu	Forschungszentrum Jülich Jülich, Germany	pending	distributed

DESCRIPTION

The European Infrastructure for Multi-scale Plant Phenomics and Simulation (EMPHASIS) is a distributed Research Infrastructure with the aim to develop and provide access to facilities and services addressing multi-scale plant phenotyping in different agro-climatic scenarios. It will establish an integrated European phenotyping infrastructure to analyse genotype performance under diverse environmental conditions and quantify the diversity of traits contributing to performance in diverse environmental conditions – plant architecture, major physiological functions and output, yield components and quality. EMPHASIS addresses the technological and organizational limits of European phenotyping, for a full exploitation of genetic and genomic resources available for crop improvement in changing climate.

Entered the ESFRI Roadmap in 2016, EMPHASIS establishes a sustainable and innovative RI for plant phenotyping by linking and developing national initiatives, amongst which are: national platforms with (semi)-controlled conditions for high-resolution phenotyping and high-throughput phenomics, experimental fields with control of rainfall and CO_2 highly-equipped with phenotyping devices, a coordinated network of field experiments in distributed sites with lighter but efficient phenotyping close to practical breeding set-ups, and modelling platforms to test existing and virtual combinations of alleles in different climates and management practices. Currently, political support to EMPHASIS has been expressed by 12 countries and there is an increasing investment in plant phenotyping across Europe.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
DE

Prospective member
BE, CH, CY, EE, FR, IE, IL, IT, NL, RS, UK

EU-IBISBA

European Industrial Biotechnology Innovation and Synthetic Biology Accelerator

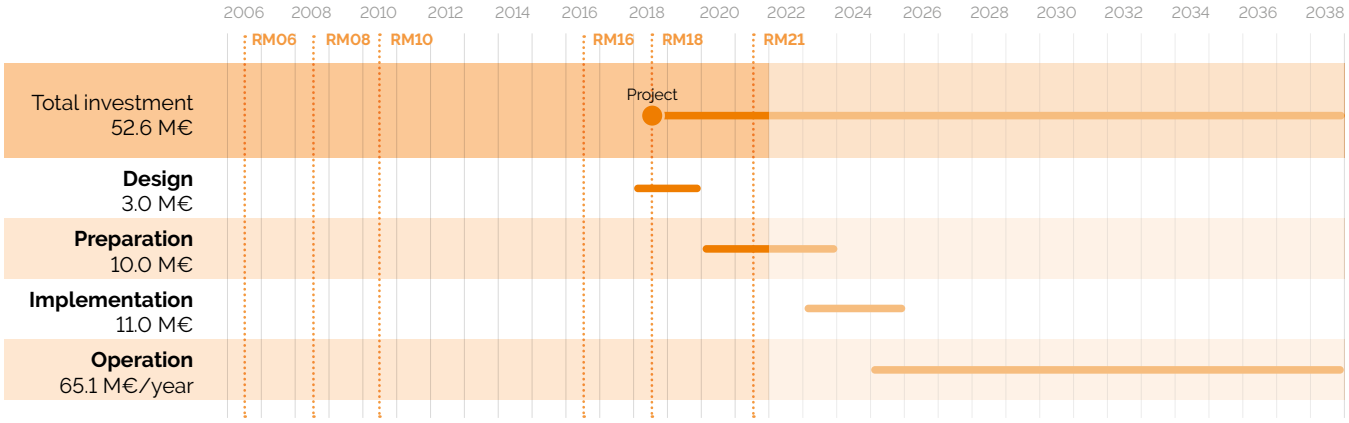
Website	Headquarters	Legal status	Type
www.ibisba.eu	INRAE Toulouse, France	pending	distributed

DESCRIPTION

The European Industrial Biotechnology Innovation and Synthetic Biology Accelerator (EU-IBISBA) is a distributed RI that provides translational Research & Development & Innovation services to an international community of industrial biotechnology stakeholders, including academia, SMEs and industry. EU-IBISBA contributes to the growth of biotechnology, providing academics and industry with a unique opportunity to access services and expertise necessary to move early-stage research results towards higher maturity and innovation. It delivers services at the exit point of basic and early stage applied research, and provides support for concept proofing, prototyping, upscaling and piloting, to bridge the innovation gap that separates academic research from industrial demonstration and premarket development.

The IBISBA concept emerged as early as 2013 and a significant milestone in his history is the launch of IBISBA 1.0, a starting community project that has provided the means to perform foundational work and develop a subsidized transnational access program for biotechnology. Entered the ESFRI Roadmap 2018, EU-IBISBA is in the Preparation Phase to develop and operate a one-stop portal for its services. The scientific and technological capabilities of IBISBA are developed within the framework of Member Country investments and local management. Most of the facilities contributing to IBISBA are identified as parts of nationally based Research Infrastructure. Currently, IBISBA gathers research facilities owned by universities and Research & Technology Organisations from seven European countries.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
FR

Prospective member
BE, EL, ES, FI, IT, NL

METROFOOD-RI

Infrastructure for promoting Metrology in Food and Nutrition

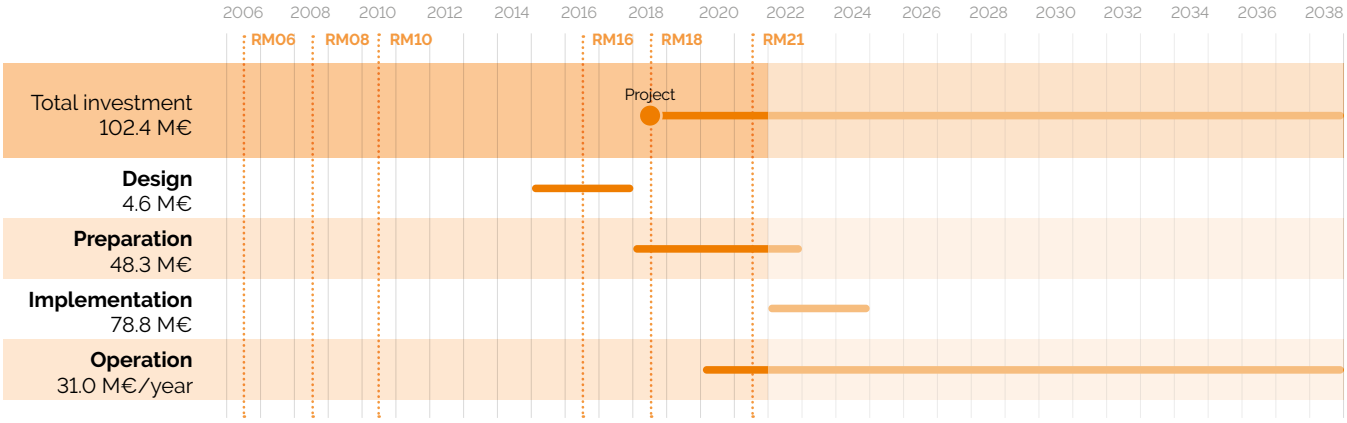
Website	Headquarters	Legal status	Type
www.metrofood.eu	ENEA Rome, Italy	pending	distributed

DESCRIPTION

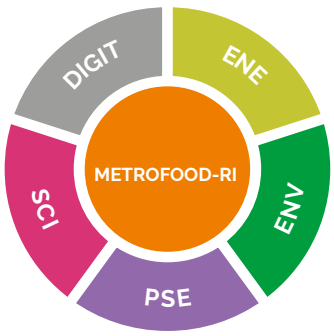
The Infrastructure for promoting Metrology in Food and Nutrition (METROFOOD-RI) is a distributed Research Infrastructure to provide high-quality metrology services, knowledge and tools in food and nutrition. It comprises an important cross-section of highly interdisciplinary and interconnected fields throughout the food value chain, including agri-food, sustainable development, food safety, quality, traceability and authenticity, environmental safety and human health. METROFOOD-RI consists of a physical infrastructure (P-RI) and an electronic infrastructure (e-RI) to coordinate and integrate existing networks of plants, laboratories, experimental fields/farms for crop production/animal breeding, small-scale plants for food processing and storage, kitchen-labs for food preparation.

METROFOOD-RI was cited as an *emerging project* in the ESFRI Roadmap 2016 and completed its Early Phase in 2017. Entered the ESFRI Roadmap 2018, METROFOOD-RI is currently in the Preparation Phase with a consortium partnership composed of research operators – Research Institutes, Universities, National Metrology Institutes, Institutes for Food Safety and Health Protection – located in 18 European Countries. Their common ambition is to create an array of services that will enhance the operation of each partner's research facilities, offering access to top-class laboratories, plants and experimental facilities, promoting standardisation and harmonisation on measurements related to the agri-food field, and sharing, integrating and making interoperable knowledge and data on food.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
IT

Prospective member
BE, CH, CZ, DE, EL, MK, PT, RO, SI, TR

EST

European Solar Telescope

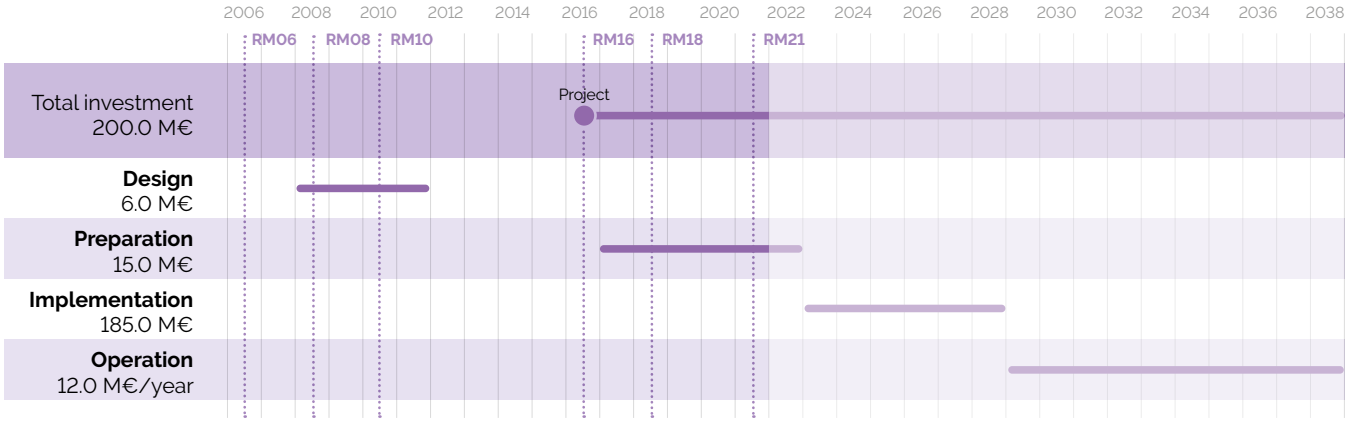
Website	Headquarters	Legal status	Type
www.est-east.eu	IAC Canary Islands, Spain	pending	single-sited

DESCRIPTION

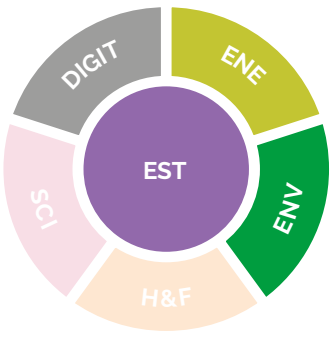
The European Solar Telescope (EST) is a 4-metre class telescope dedicated to study the fundamental processes in the Sun that control the solar atmosphere and its activity. EST will be optimised for high-resolution multi-wavelength simultaneous multi-instrument observations of the photosphere and chromosphere, as well as magnetic structures therein. One aim is to address the still unresolved and complex question concerning the emergence of magnetic fields at the solar surface and transfer of magnetic and kinetic energy from subsurface layers to the solar atmosphere. Understanding the interaction of plasmas with magnetic fields will also have many technological implications, for example in fusion nuclear reactors. Space missions are also tributary of data from ground solar telescopes.

Entered in the ESFRI Roadmap 2016, EST is the result of the effort of the solar physics community organised through EAST and under SOLARNET, GREST, PRE-EST and SOLARNET H2020 projects. Currently in Preparation Phase, EST will be built in the Canary Islands, a first-class site for astronomical observations, where the current aging telescopes are already situated. Operation of the telescope will progressively implement queue mode observing, which is standard for night-time telescopes, allows optimisation of the observations, and does not require on-site presence of the beneficiary. The design of all subsystems prior to construction will be accomplished by the end of 2022. In parallel, contacts are taking place for consolidation of national contributions to the budget and the creation of an ERIC.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
ES

Prospective member
CZ, IT, PT, SE, UK

ET

Einstein Telescope

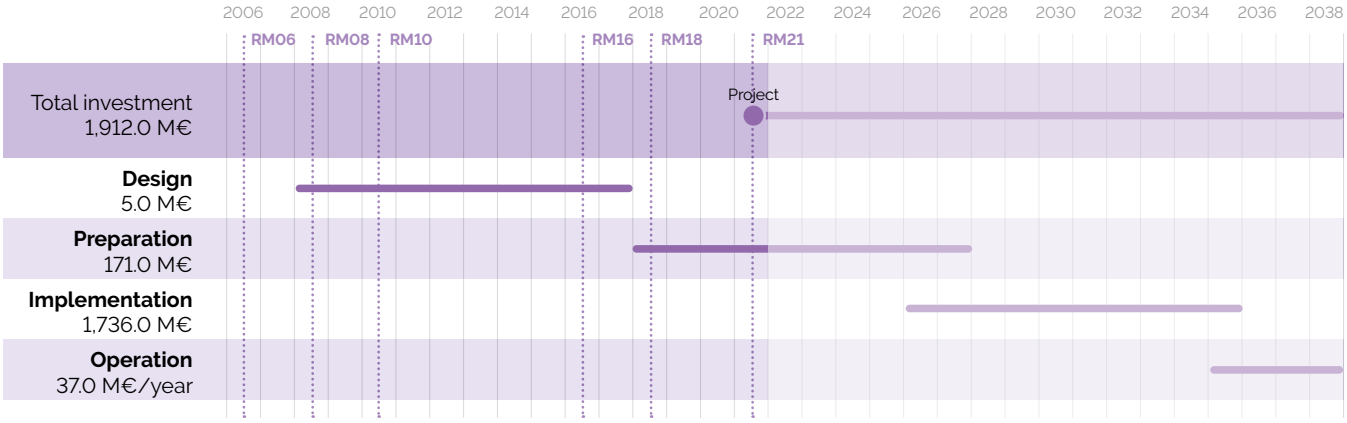
Website	Headquarters	Legal status	Type
www.et-gw.eu	EGO Pisa, Italy	pending	single-sited

DESCRIPTION

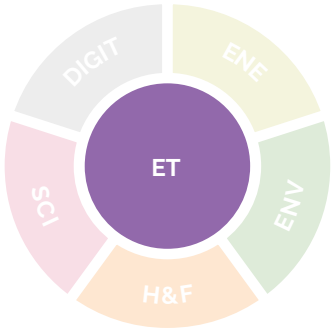
The Einstein Telescope (ET) will be the European Third-Generation Gravitational Wave (3G GW) Observatory, a multi-detector, multi-interferometer designed to observe the whole Universe. Thanks to the unprecedented sensitivity of ET, Europe will take the lead in the newborn multi-messenger astronomy by combining information delivered by ET with optical, IR, UV, gamma, cosmic ray and neutrino telescopes observations. ET, being a unique tool to investigate the spacetime fabric of the Universe, will impact on our fundamental physics knowledge, and our understanding of the fundamental interactions governing the evolution of black-holes and neutron stars. The technologies needed for ET will affect industrial sectors, like lasers, sensors, optics, seismic isolation, and materials.

Entered in the ESFRI Roadmap 2021, ET builds on the success of current, second-generation laser-interferometric detectors Advanced Virgo and Advanced LIGO. The idea of 3G GW observatory was conceived in 2004 with the Design Phase in 2008. Part of the enabling technologies of ET was developed in collaboration with the Japanese project KAGRA and currently through the Interreg ETpathfinder and E-TEST projects and the SarGrav facility. The Preparation Phase towards Implementation will consist in a number of steps including the formalization of the ET collaboration, the selection of the hosting site, the acquisition of the land, the establishment of a legal entity, the organisation of the governance, the delivering of operative TDR and the optimization of the site. Start of operations are expected in 2035.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
IT

Prospective member
BE, ES, NL, PL

EuPRAXIA

European Plasma Research Accelerator with Excellence in Applications

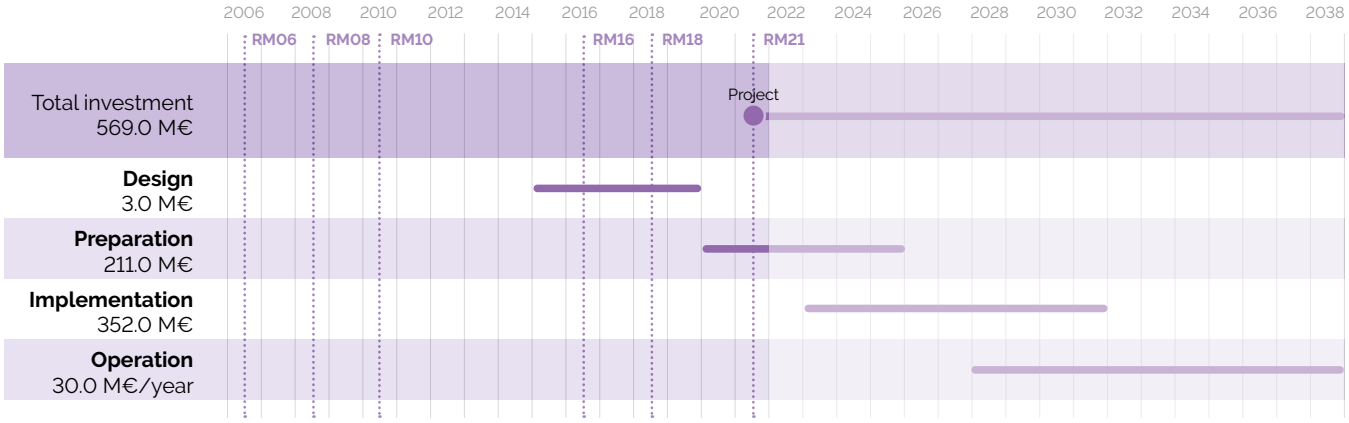
Website	Headquarters	Legal status	Type
www.eupraxia-project.eu	INFN-LNF Frascati, Italy	pending	distributed

DESCRIPTION

The European Plasma Research Accelerator with Excellence in Applications (EuPRAXIA) is a distributed, compact and innovative accelerator facility based on plasma technology. By using plasma wakefields gradients as high as some tens of billions of electron volts per meter – as much as 1,000 times more – EuPRAXIA will be a transformative step in the development of ultra-compact accelerators that could be used for a wide range of fundamental and applied research applications. It is the important intermediate step between proof-of-principle experiments and ground-breaking, ultra-compact accelerators for photon science, structural biology, particle physics detector development, materials science, medical imaging, radiation therapy, protons sources for hadron therapy and industrial applications.

EuPRAXIA is the outcome of a consortium of 16 laboratories and universities from five European countries to prepare the Conceptual Design Report for the worldwide first high energy plasma-based accelerator. As of December 2020, the consortium has grown to 40 members and 11 observers. The scientific communities bring expertise from accelerator science and high-energy physics, design and construction of leading accelerators like the LHC, advanced acceleration test facilities like SPARC and frontier laser projects like CLF, CILEX-APOLLON and ELI. The construction of an electron-driven plasma accelerator in the metropolitan area of Rome is expected to be ready for operation in 2028. The site of the laser-driven plasma accelerator has several options in Europe aiming to start operation by 2032.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
IT

Prospective member
CZ, HU, PT, UK

KM3NeT 2.0

KM3 Neutrino Telescope 2.0

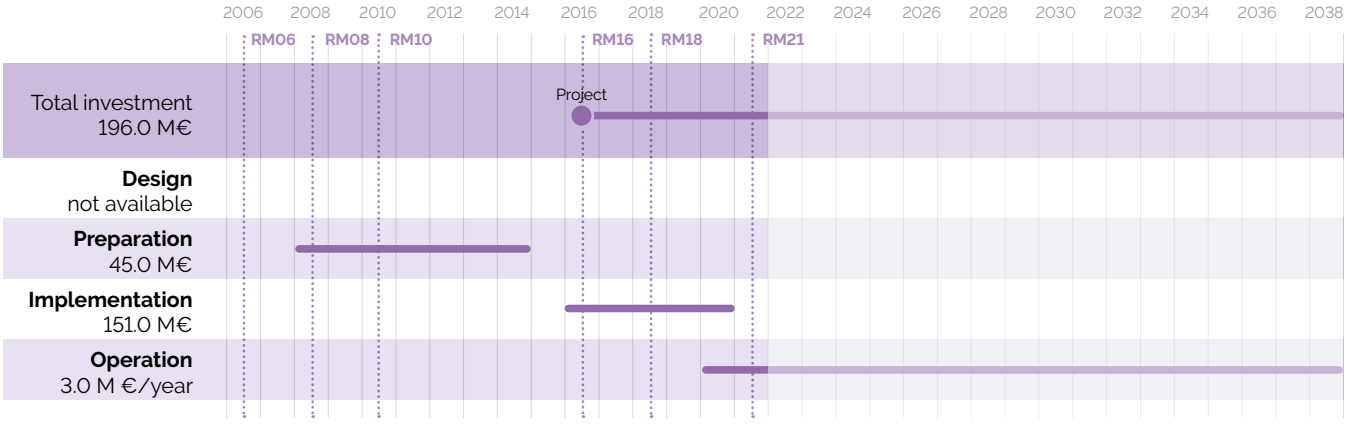
Website	Headquarters	Legal status	Type
www.km3net.org	Science Park Amsterdam, The Netherlands	pending	distributed

DESCRIPTION

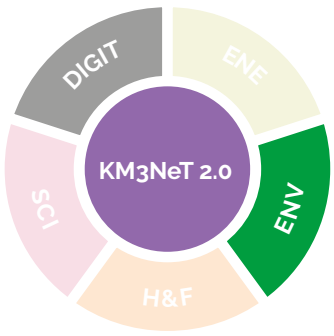
The KM3 Neutrino Telescope 2.0 (KM3NeT 2.0) is a three-sites Research Infrastructure housing the next generation neutrino telescopes. Once completed, the telescopes will have detector volumes between megaton and several cubic kilometres of clear sea water. Located in the deepest seas of the Mediterranean, KM3NeT 2.0 will open a new window on our Universe, but also contribute to the research of the properties of the elusive neutrino particles. With the ARCA telescope, KM3NeT 2.0 scientists will search for neutrinos from distant astrophysical sources such as supernovae, gamma-ray bursters or colliding stars. The ORCA telescope is the instrument for KM3NeT 2.0 scientists studying neutrino properties exploiting neutrinos generated in the Earth's atmosphere.

Three suitable deep-sea sites are identified, namely going from west to east, KM3NeT-Fr, off-shore Toulon (France), KM3NeT-It, off-shore Portopalo di Capo Passero (Italy) and KM3NeT-Gr, off-shore Pylos (Greece). Data are continuously streamed via the public internet to the data repository and computing centres in Lyon, Bologna and in South-Italy. The administrative headquarters of the KM3NeT Research Infrastructure are located in Amsterdam, The Netherlands. The first phase of construction of the KM3NeT Research Infrastructure has begun in 2015 at the KM3NeT-It and KM3NeT-Fr site. Currently, the full configuration of KM3NeT 2.0 is partially funded. The final phase of construction of the KM3NeT Research Infrastructure will also include the KM3NeT-Gr site.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
NL

Prospective member
EL, FR, IT

E-RIHS

European Research Infrastructure for Heritage Science

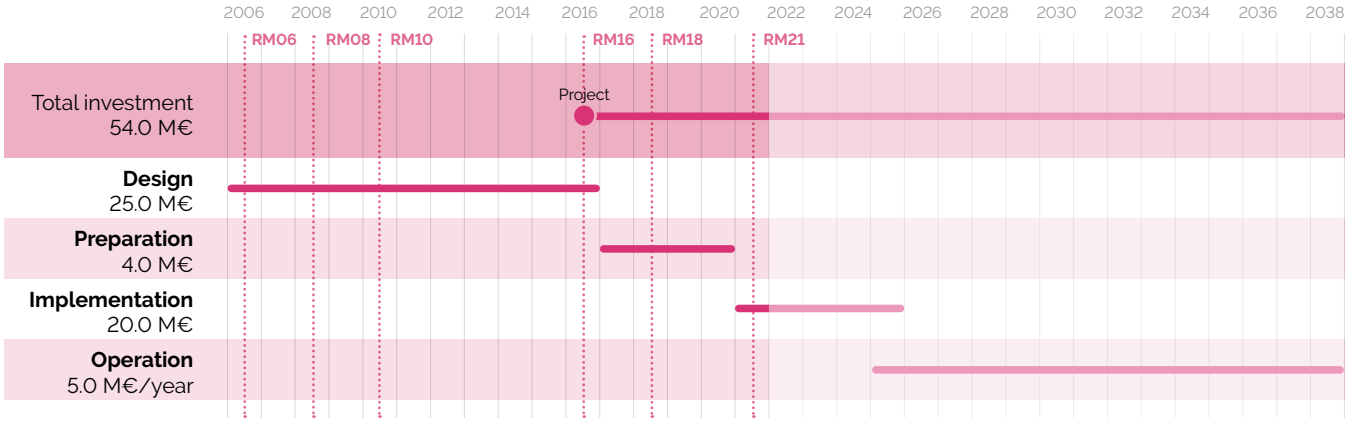
Website	Headquarters	Legal status	Type
www.e-rihs.eu	INO-CNR Florence, Italy	pending	distributed

DESCRIPTION

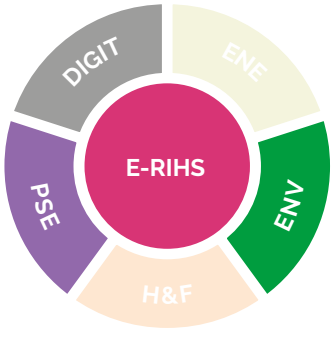
The European Research Infrastructure for Heritage Science (E-RIHS) is a distributed Research Infrastructure to support research on heritage interpretation, preservation, documentation and management. E-RIHS will deliver integrated access to expertise, data and technologies through a standardized approach, and integrate world-leading European facilities into an organisation with a clear identity and a strong cohesive role within the global heritage science community. Through interdisciplinary access to the four platforms – E-RIHS ARCHLAB, E-RIHS DIGILAB, E-RIHS FIXLAB, E-RIHS MOLAB – E-RIHS supports a wide variety of research, from smaller object-focussed case studies to large-scale and longer-term collaborative projects, and stimulates innovation in instrumentation, portable technologies and data science.

The long-term tradition of this field of research, the ability to combine science with innovation, and the support provided by EU-funded projects and integrating activities such as EU-ARTECH, CHARISMA, IPERION CH and IPERION HS in conservation science, and ARIADNE in archaeology, represent the background of E-RIHS.. Entered in the ESFRI Roadmap 2016, E-RIHS will offer access to a wide range of fixed and mobile instruments in national facilities of recognized excellence, physically accessible collections/archives and virtually accessible heritage repositories for standardized data storage, analysis and interpretation. Further developments are planned for extending the partnership and including more facilities outside Europe, gradually reaching the status of a Global Research Infrastructure.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
IT

Prospective member
BE, EL, ES, FR, HU, IL, NL, PT, UK

EHRI

European Holocaust Research Infrastructure

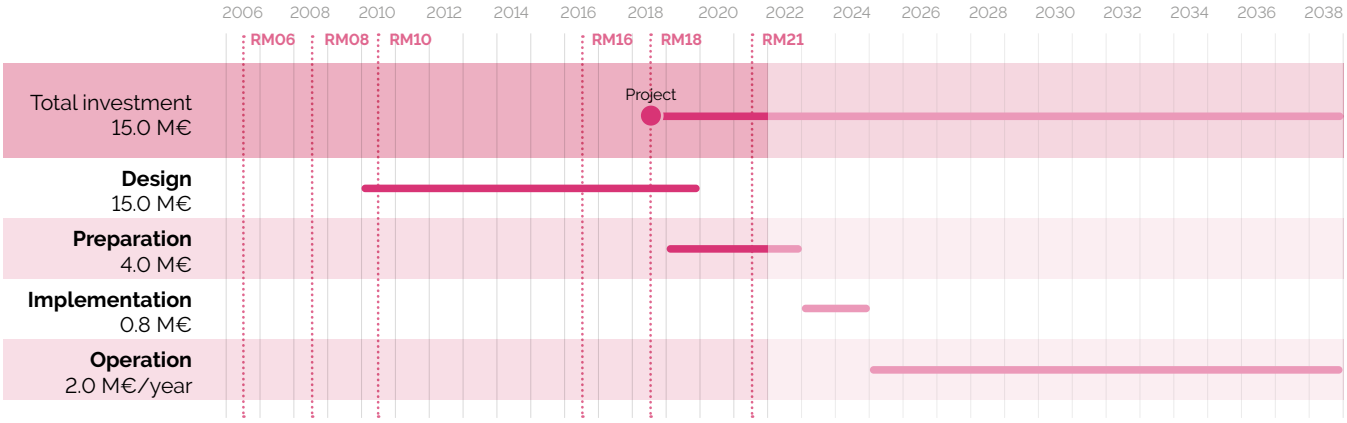
Website	Headquarters	Legal status	Type
www.ehri-project.eu	NIOD Amsterdam, The Netherlands	pending	distributed

DESCRIPTION

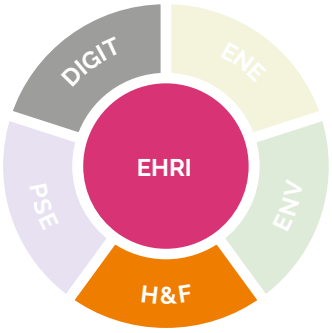
The European Holocaust Research Infrastructure (EHRI) is a pan-European distributed Research Infrastructure with the aim to support transnational Holocaust research, commemoration and education. EHRI provides access to information about dispersed sources, and develops tools and methods that enable researchers and archivists to collaboratively work to overcome one of the hallmark challenges of Holocaust research – the wide dispersal of sources across Europe and beyond, and the concomitant fragmentation of Holocaust historiography. Providing access – remotely by the EHRI Portal and physically by the access to the world's twenty leading Holocaust archives – is vital for the innovation of Holocaust research and for the training of the next generation of Holocaust researchers and archivists.

EHRI is the outcome of the consortium that has been working on integrating Holocaust-related sources and research documentation since 2010. EHRI has been supported by three EU-funded integrating projects relying on the participation of twenty-five partners – research institutions, libraries, archives, museums and memorial sites – which form the core working group, as well as on the support of many individuals and organisations in the broad fields of Holocaust studies and digital humanities. EHRI is currently running its Preparation Phase to undertake all the necessary legal, financial and strategic planning to prepare the long-term EHRI RI. Following the Preparatory Phase, EHRI foresees a relatively short transition phase of two years with full operation expected to start in 2025.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
NL

Prospective member
AT, BE, CZ, DE, IL, SK, UK

GGP

The Generations and Gender Programme

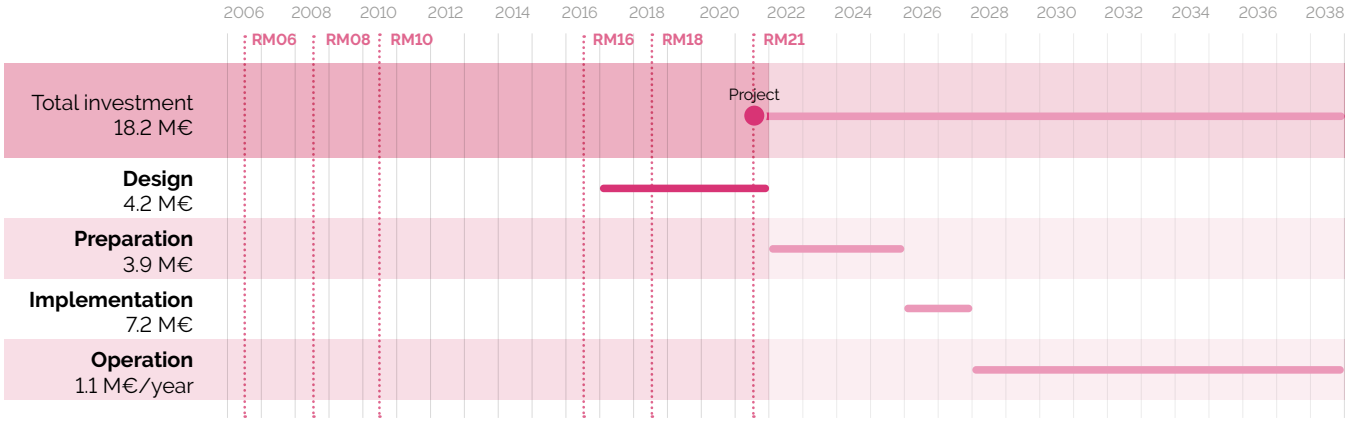
Website	Headquarters	Legal status	Type
www.ggp-i.org	NIDI The Hague, The Netherlands	pending	distributed

DESCRIPTION

The Generations and Gender Programme (GGP) is a distributed RI with the aim to provide scientists and policy makers with high quality and cross-nationally comparable longitudinal data on population and family dynamics to answer pressing scientific and societal challenges. The GGP is based on the collection, documentation, and dissemination of data from large-scale, nationally representative surveys in Europe and beyond. It provides data on transitions to adulthood, family dynamics, fertility decisions, work-life balance, well-being, and intergenerational exchanges. It maintains a Contextual Database which comprises a wide range of macro-level indicators characterizing the societal, economic and institutional context of countries to formulate empirically-informed policies on families and population.

The GGP Programme was launched under the umbrella of the United Nations Economic Commission for Europe (UNECE) as early as 2000. In the following years, the findings and potential of the GGP emerged and new funding enabled to rethink the Programme's long-term strategy. In 2016, the GGP obtained the status of *emerging project* in the ESFRI Roadmap 2016, noting GGP's scientific excellence as well as its European added value and socio-economic impact. The GGP-EPI project provided the GGP with the means to institutionalize and further formalise key processes required to position the GGP for a successful application for inclusion in the ESFRI Roadmap as a sustainable, world-class Research Infrastructure. The project culminated with the successful application and inclusion in the ESFRI Roadmap 2021.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
NL

Prospective member
AT, DE, DK, EE, ES, FR, HR, HU, NO, PL, SE

GUIDE

Growing Up In Digital Europe: EuroCohort

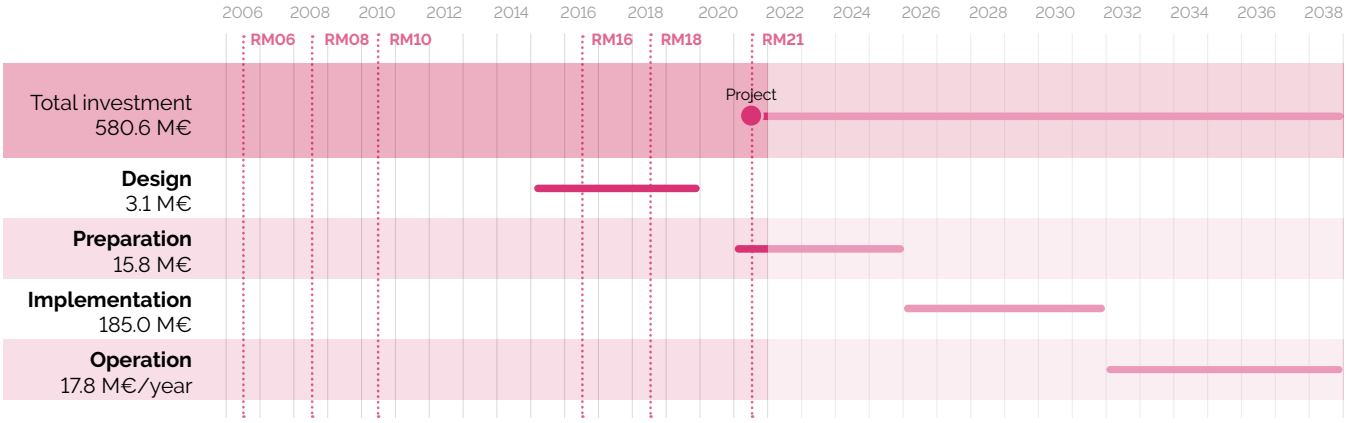
Website	Headquarters	Legal status	Type
www.eurocohort.eu	University College Dublin, Ireland	pending	distributed

DESCRIPTION

The Growing Up In Digital Europe: EuroCohort (GUIDE) will be Europe's first comparative birth cohort survey, a Research Infrastructure that will be an important source of high quality longitudinal statistical evidence to support the development of social policies which will enhance the well-being of children, young people and their families across Europe. GUIDE/EuroCohort will be an accelerated cohort survey including a sample of new born infants as well as a sample of school age children to be surveyed using a common questionnaire and data collection methodology at regular intervals until the age of 24 years. The data will be used by a broad community of researchers and will generate cross-culturally comparative results of potential great value to child and youth initiatives and policies.

The feasibility study to scope the development of a European wide longitudinal survey with a focus on child well-being was undertaken by the MYWeB project in 2014. MYWeB was followed by the European Cohort Development Project: ECDP which developed the business case and research design for GUIDE/EuroCohort. In ECDP the project partners developed the governance structure for GUIDE/EuroCohort and initiated the consortium which involves international networking with key stakeholders in each partner country to identify funding sources necessary for the Implementation Phase. ECDP has also developed the plan for the scientific parts of the Preparation Phase which involves piloting research instruments and developing an IT infrastructure to house data and facilitate user access and exploitation.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
IE

Prospective member
ES, HR, HU, LV, PT, UK

OPERAS

OPen scholarly communication in the European Research Area for Social Sciences and Humanities

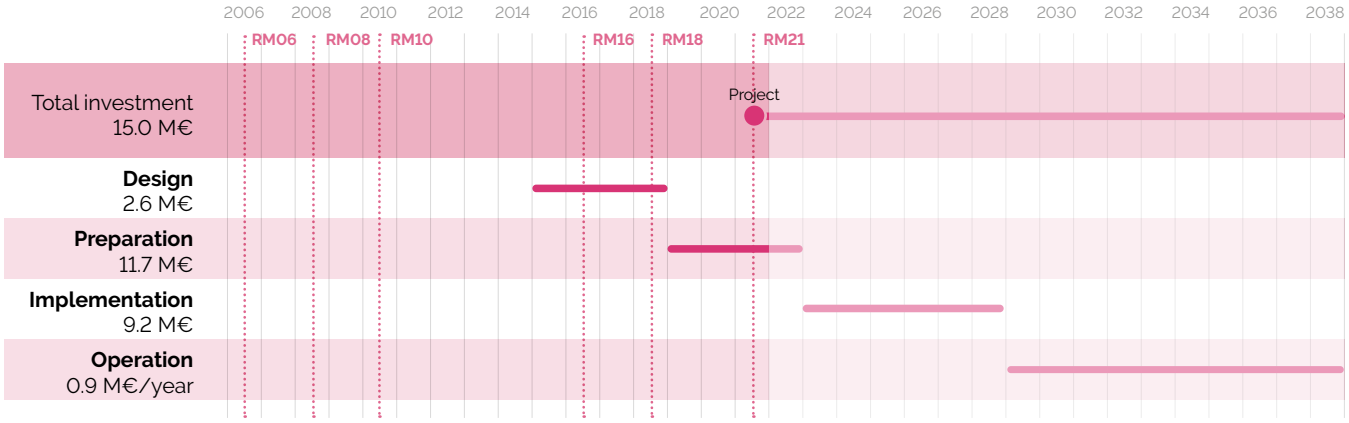
Website	Headquarters	Legal status	Type
www.operas-eu.org	CNRS Paris, France	AISBL, 2019	distributed

DESCRIPTION

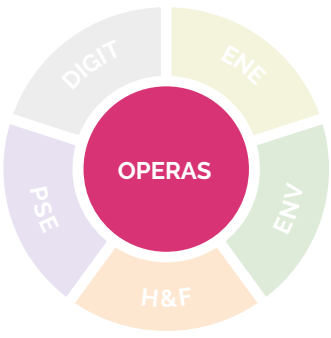
The OPen scholarly communication in the European Research Area for Social Sciences and Humanities (OPERAS) is a distributed RI to enable Open Science and upgrade scholarly communication practices in the Social Sciences and Humanities in line with the EOSC. OPERAS pools resources and offers services to enable all SSH stakeholders to streamline their activities and maximize the societal impact, in an interdisciplinary, mission-driven approach. OPERAS fosters the co-creation and adoption of scholarly communication services addressing research needs in terms of discovery, content creation, quality assurance, dissemination, outreach, and evaluation of outputs. It catalyses knowledge and know-how sharing, practices adoption, and increases return on socio-economic investments.

The OPERAS Concept and Design Phase dates back to 2012-2018 when the coordinated actions to establish the network and shaping the project began. This effort lead to the recognition of OPERAS as a project addressing *High strategic potential area for research in SCI* in the ESFRI Roadmap 2018. OPERAS started its Preparation Phase in 2019 by developing the business plan and governance model and promoting services creation and alignment for EOSC catalogue and transnational access. In 2019, OPERAS established the status of International non-profit Association under Belgian law (AISBL). Entered the ESFRI Roadmap 2021, OPERAS is striving to efficiently guarantee an efficient move to the Operation Phase with a coherent approach to technical, administrative, and financial issues and the establishment of OPERAS ERIC.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead

FR*

Prospective member

DE*, EL, HR*, IT*, NL*, PL*, PT*, UK*

*AISBL member

RESILIENCE

REligious Studies Infrastructure: tooLs, Innovation, Experts, conNections and Centres in Europe

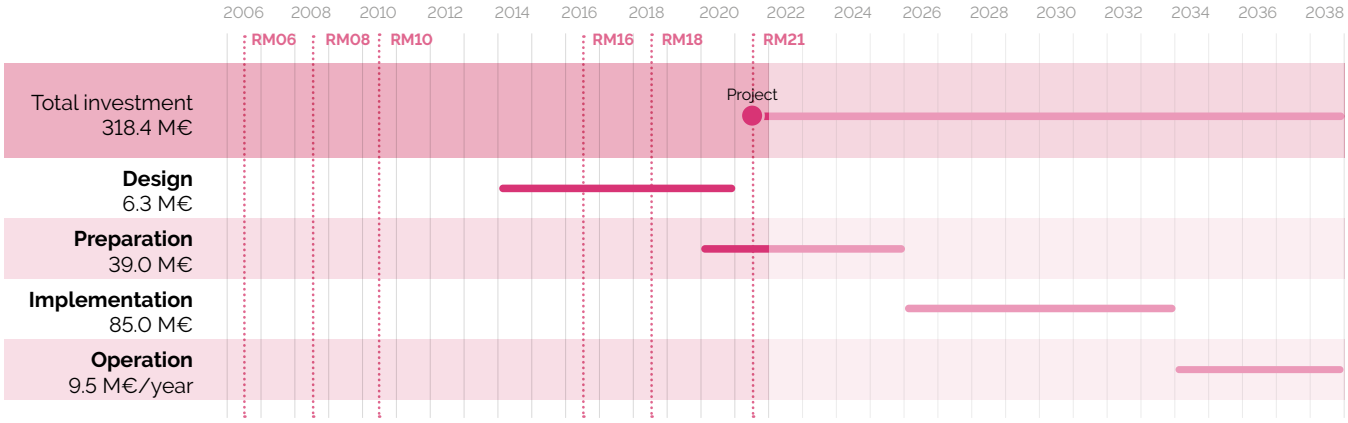
Website	Headquarters	Legal status	Type
www.resilience-ri.eu	FSCIRE Bologna, Italy	pending	distributed

DESCRIPTION

The REligious Studies Infrastructure: tooLs, Innovation, Experts, conNections and Centres in Europe (RESILIENCE) is a interdisciplinary Research Infrastructure for all Religious Studies, building a high-performance platform, supplying tools and services for scholars studying religions in their different forms and in their diachronic and synchronic variety. It responds to the need for the broader and more structured involvement of excellent researchers, producing productive skills, new knowledge, a new approach and a visible impact in terms of innovation in Religious Studies. RESILIENCE supplies easy access to digital and physical data on religion and to advanced tools in knowing and understanding these data, and thus facilitates high-quality research concerning religion all over Europe and beyond.

The Concept and Design of RESILIENCE have built on several steps, both at national and European level, being RESILIENCE based on the excellency of thirteen partners who have proven to be able to collaborate in a collegial and efficient way. Many of the partners share more than a decade of fruitful collaborative relationships, which proves the capacity to achieve an implementation which is feasible and stable. Recognised as a project addressing *High strategic potential area for research in SCI* in 2018, RESILIENCE entered the ESFRI Roadmap in 2021. The RI is currently in the Preparation Phase working hard to get a clear picture of the future infrastructure: what it will look like, what services it will provide and what does that means for users. Operations are expected to start in 2034.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
IT

Prospective member
AL, BA, BG, EL, IL, NL

PART3

ESFRI LANDMARKS

CONTENTS

DATA, COMPUTING & DIGITAL RESEARCH INFRASTRUCTURES

193 PRACE

ENERGY

194 ECCSEL ERIC
195 EU-SOLARIS
196 JHR

ENVIRONMENT

197 ACTRIS
198 EISCAT_3D
199 EMSO ERIC
200 EPOS ERIC
201 EURO-ARGO ERIC
202 IAGOS
203 ICOS ERIC
204 LifeWatch ERIC

HEALTH & FOOD

205 AnaEE
206 BBMRI ERIC
207 EATRIS ERIC
208 ECRIN ERIC
209 ELIXIR
210 EMBRC ERIC
211 ERINHA
212 EU-OPENSCREEN ERIC
213 Euro-BioImaging ERIC
214 INFRAFRONTIER
215 INSTRUCT ERIC
216 MIRRI

PHYSICAL SCIENCES & ENGINEERING

217 CTA
218 ELI ERIC
219 ELT
220 EMFL
221 ESRF EBS
222 European Spallation Source ERIC
223 European XFEL
224 FAIR
225 HL-LHC
226 ILL
227 SKAO
228 SPIRAL2

SOCIAL & CULTURAL INNOVATION

229 CESSDA ERIC
230 CLARIN ERIC
231 DARIAH ERIC
232 ESS ERIC
233 SHARE ERIC

PRACE

Partnership for Advanced Computing in Europe

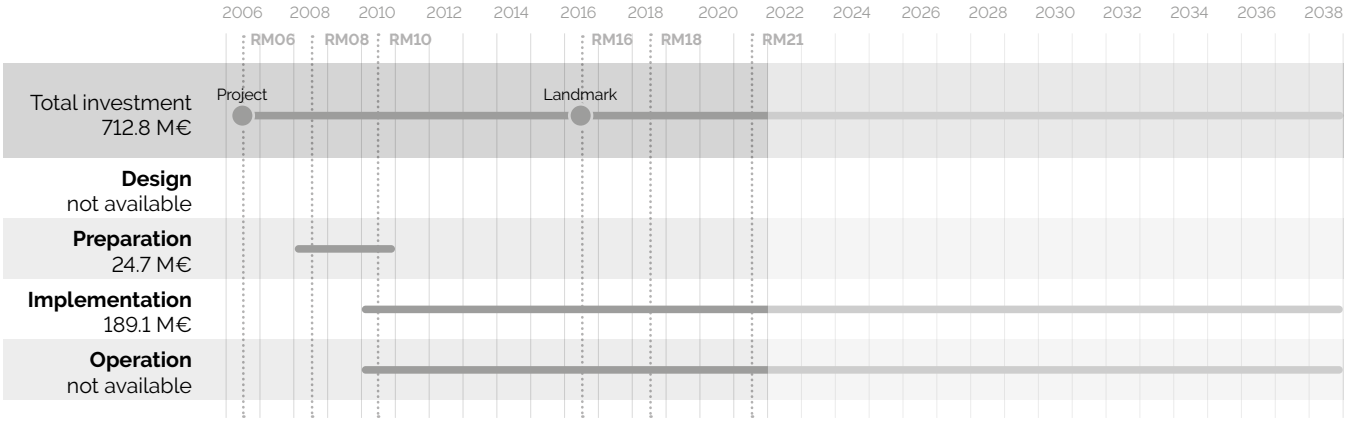
Website	Headquarters	Legal status	Type
www.prace-ri.eu	PRACE AISBL Brussels, Belgium	AISBL, 2010	distributed

DESCRIPTION

The Partnership for Advanced Computing in Europe (PRACE) is a supercomputing Research Infrastructure providing access to world-class computing and data management resources and services through a peer-review process, for large-scale high-impact scientific and engineering applications at the highest performance level across all disciplines. PRACE seeks to support the European scientists and engineers to exploit more broadly high-end HPC and to strengthen connection with many ESFRI RIs to maximise the impact on the ERA and on broad applications in industry. PRACE actively interfaces with XSEDE (USA), RIKEN (Japan), Compute Canada, the European data network for the research and education community (GÉANT), the European Grid Infrastructure (EGI), the European Data Infrastructure (EUDAT), and the Human Brain Project (HBP).

PRACE is established as an International non-profit Association under Belgian Law (AISBL) with seat in Brussels since 2010. It brings together 26 members organisations, representing EU Member States and Associated Countries, to create a pan-European supercomputing infrastructure. A total of seven supercomputers and their operations are accessible through PRACE and provided by five Hosting Members, among which BSC in Spain, CINECA in Italy, GCS in Germany and GENCI in France secured funding for the initial period 2010-2015. In 2016, ETH Zurich/CSCS (Switzerland) opened its system via the PRACE Peer Review Process. In pace with the needs of the scientific communities and technical developments, systems deployed by PRACE are continuously updated and upgraded to be at the apex of HPC technology.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
CH, DE, ES, FR, IT

Member
AT, BE, BG, CY, CZ, DK, EL, FI, HU, IE, IL, LU, NL, NO, PL, PT, SE, SI, SK, TR, UK

Observer
HR, LV

ECCSEL ERIC

European Carbon Dioxide Capture and Storage Laboratory Infrastructure

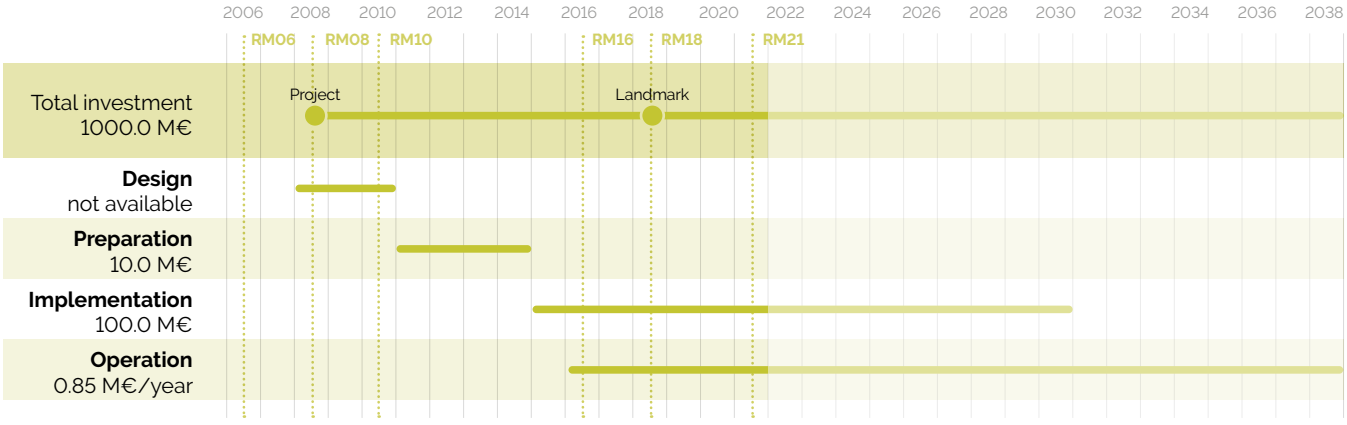
Website	Headquarters	Legal status	Type
www.eccsel.org	ECCSEL ERIC Trondheim, Norway	ERIC, 2017	distributed

DESCRIPTION

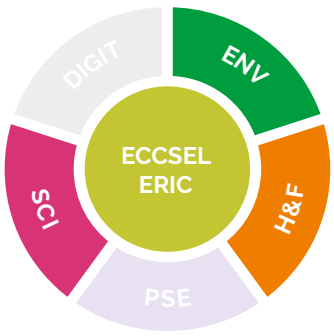
The European Carbon Dioxide Capture and Storage Laboratory Infrastructure (ECCSEL) is a distributed Research Infrastructure with the aim to enhance European science, technology development, innovation and education in the field of Carbon Dioxide Capture, Utilisation, Transport and Storage (CCUS). Its vision is to enable low to zero CO2 emissions from industry and power generation to combat climate change. ECCSEL provides coordination, operation, development and open access to world-class CCUS research facilities across Europe, covering the whole CCUS value chain: membranes, integrated CCUS systems, pressure/injection, migration, security/troubleshooting, CO2 pipeline transport and integrity, shipping of CO2, smart integrations with carbon capture and re-use into valuable products.

Conceived and included in the ESFRI Roadmap 2008, ECCSEL was established as a European Research Infrastructure Consortium (ERIC) in June 2017 and was acknowledged as ESFRI Landmark in 2018. ECCSEL ERIC is the result of several EU-funded projects that bring together high-quality research facilities in Europe in the field of CCUS. The central coordinating office, the ECCSEL Operations Centre, integrates and coordinates the activities of national partners – Industry, Research Institutes and Universities – across Europe. Over 80 individual research facilities are currently part of the ECCSEL ERIC; they are located in five countries each representing a national node, and are owned by 23 different facility operators. The number of countries, operators and facilities is increasing over time.

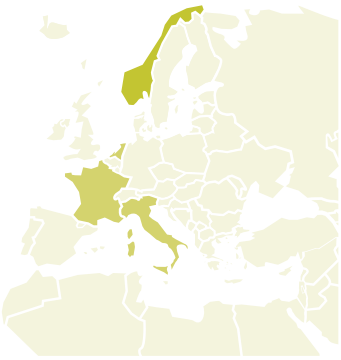
TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT



Lead
NO

Member
FR, IT, NL, UK

EU-SOLARIS

European Solar Research Infrastructure for Concentrated Solar Power

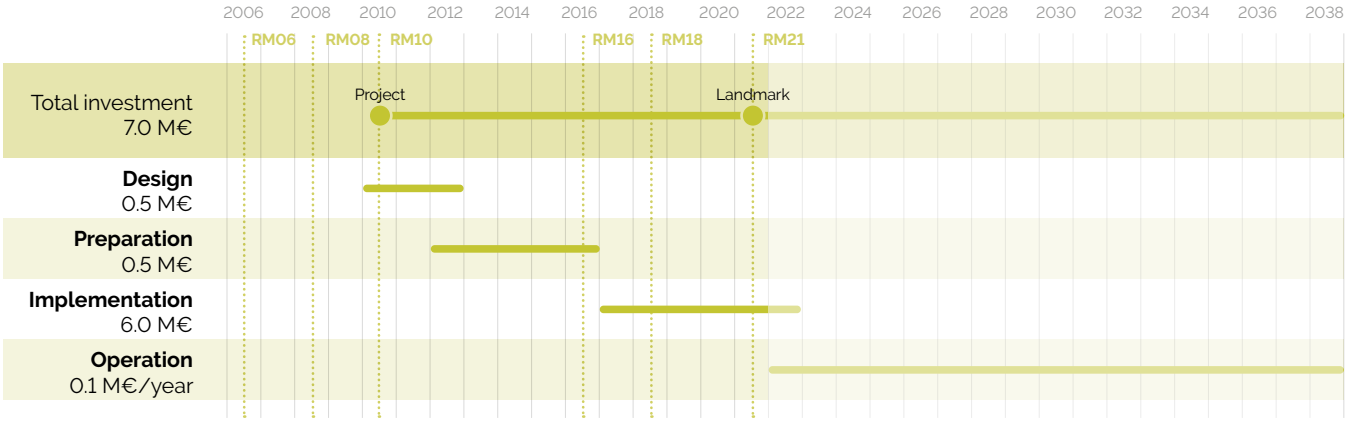
Website	Headquarters	Legal status	Type
www.eusolaris.eu	CIEMAT-PSA Almeria, Spain	ERIC Step2	distributed

DESCRIPTION

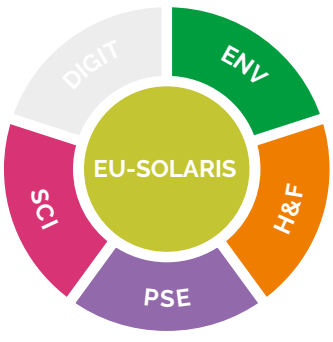
The European Solar Research Infrastructure for Concentrated Solar Power (EU-SOLARIS) is a distributed Research Infrastructure for the integration and coordination of Research and Technology Development (RTD) capabilities and efforts in Concentrating Solar Power/Solar Thermal Energy (CSP/STE) technologies in Europe. EU-SOLARIS will become the reference for CSP/STE and maintain Europe at the forefront of these technologies by facilitating the access of researchers to the most complete, high-quality scientific portfolio of facilities, services and tools via a single access point. EU-SOLARIS will link scientific communities and industry and speed up the development of research and innovation due to a closer collaboration model, knowledge exchange management and a wider dissemination of results.

EU-SOLARIS entered the ESFRI Roadmap in 2010 and was acknowledged as ESFRI Landmark in 2021 as a result of successful submission of the European Research Infrastructure Consortium (ERIC) Step2 application by four Member States. EU-SOLARIS is the outcome of a Preparation Phase made by a consortium composed of thirteen research institutions plus the Spanish Ministry of Economy and Competitiveness (MINECO) and the European Solar Thermal Electricity industry Association (ESTELA). In Geographical terms, the consortium offers a wide geographical spread to handle the main stakeholders in the Solar Thermal Energy Research and R&D Infrastructures throughout Europe, with links outside the European territory. EU-SOLARIS is now facing the Implementation Phase with Operation Phase expected to start in 2022.

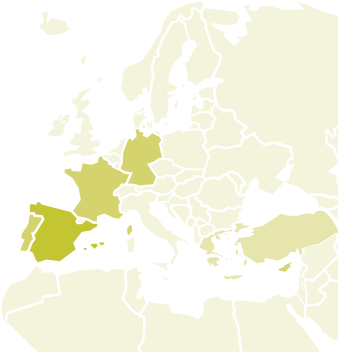
TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT



Lead
ES

Member
CY, DE, FR

Observer
PT

Prospective member
EL, TR

JHR

Jules Horowitz Reactor

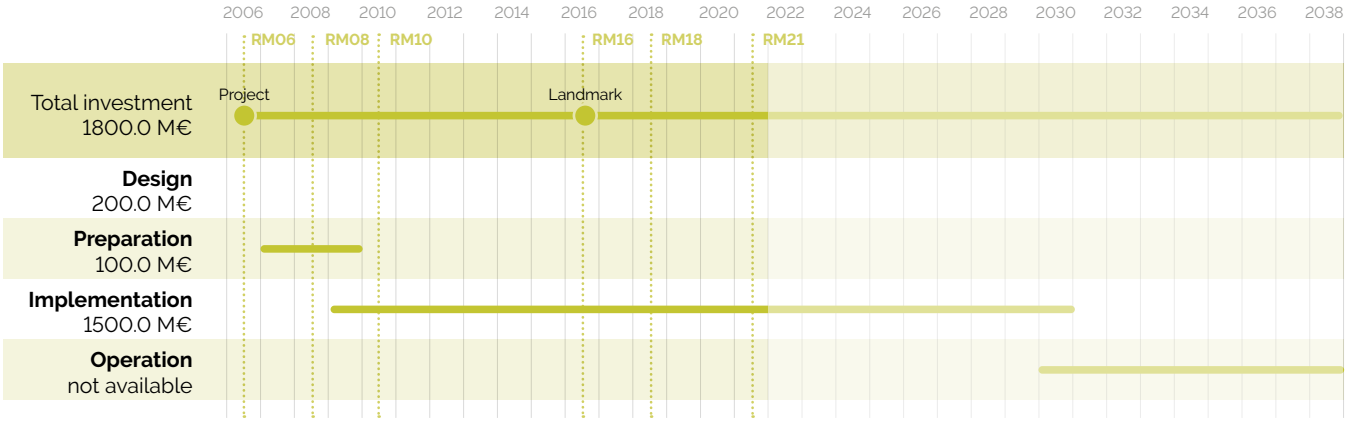
Website	Headquarters	Legal status	Type
www-rjh.cea.fr	CEA Cadarache, France	JHR Consortium Agreement, 2007	single-sited

DESCRIPTION

The Jules Horowitz Reactor (JHR) is a reference user facility to observe and understand material and fuel behaviour in extreme nuclear environment by reproducing the operational condition of the different power reactor technologies. JHR will be key for the nuclear international community by extending performances and assessing safety for nuclear power plants, also strengthening technology credibility and public acceptance. JHR will be effective in training new generations of scientists and engineers in the strategic field of nuclear energy also guaranteeing the high level of expertise needed in the staff of power plants in all steps of their lifecycle. JHR will also ensure the production of radioelements for nuclear medicine and for non-nuclear industry.

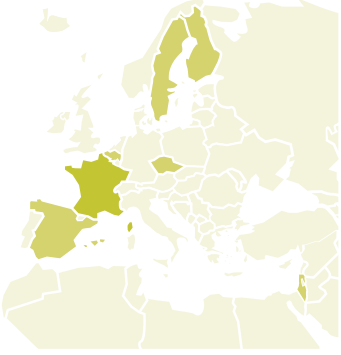
JHR project entered the ESFRI Roadmap in 2006 and the site preparation began at the Cadarache Research Centre in 2007. The first concrete step for the reactor's foundations was poured in 2009, and the central containment structure was completed with the addition of a 105-tonne dome in late 2013. JHR will be built and managed in the framework of an international cooperation among several organizations bound by a Consortium Agreement (CA) signed in 2007 by CEA, French industrial partners EDF and AREVA, the EC together with research institutes from seven European Member States and Associated countries, UK, China and India, the CEA being the owner, nuclear operator and contracting authority of the facility. JHR is expected to start the Operation Phase by the beginning of the next decade.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT



Lead

FR

Member

The following countries are JHR members

BE, CN, CZ, ES, FI, IL, IN, SE, UK

Observer

EC

ACTRIS

Aerosol, Clouds and Trace Gases Research Infrastructure

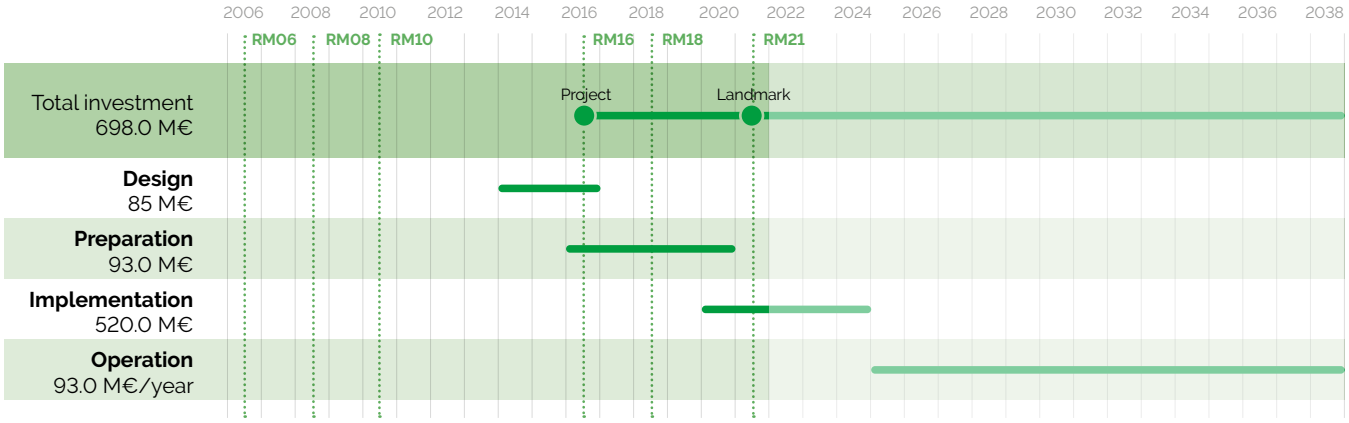
Website	Headquarters	Legal status	Type
www.actris.eu	University of Helsinki - FMI Helsinki, Finland	ERIC Step2	distributed

DESCRIPTION

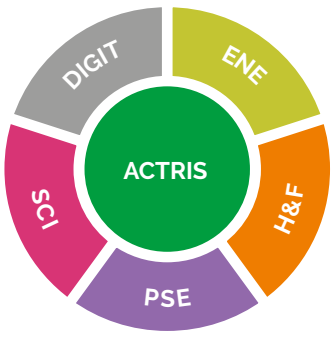
The Aerosol, Clouds and Trace Gases Research Infrastructure (ACTRIS) is a distributed RI dedicated to high-quality observation of aerosol, clouds, trace gases and exploration of their interactions. ACTRIS delivers precision data, innovative services, and procedures regarding the 4D variability and the physical, optical and chemical properties of short-lived atmospheric constituents. It improves the current capacity to understand and predict past, current and future evolution of the atmospheric environment. ACTRIS serves a vast community of users working with observations, experiments, models, satellite data, analysis and predicting systems. It offers access to advanced technological platforms to explore atmospheric processes crucial for monitoring air quality and understanding climate change.

In the ESFRI Roadmap since 2016, ACTRIS was granted the status of ESFRI Landmark in 2021 as a result of successful submission of the European Research Infrastructure Consortium (ERIC) Step2 application by thirteen Member States. ACTRIS builds on the long-term collaboration within the atmospheric science community sustained by a series of EU-funded projects since 2000. After successfully completing the Preparation Phase from 2017 to 2019, ACTRIS has entered the Implementation Phase in January 2020 supported by the ACTRIS IMP project and by committed countries with their national ACTRIS budgets. ACTRIS Implementation Plan outlines the main activities to be worked on during the Implementation Phase. ACTRIS is aiming to be operational with well-functioning operations and services in 2025.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
FI

Member
AT, BE, BG, CY, CZ, DE, DK, FR, IT, NO, RO

Observer
CH

Prospective member
EL, ES, NL, PL, UK

EISCAT_3D

Next generation European Incoherent Scatter radar system

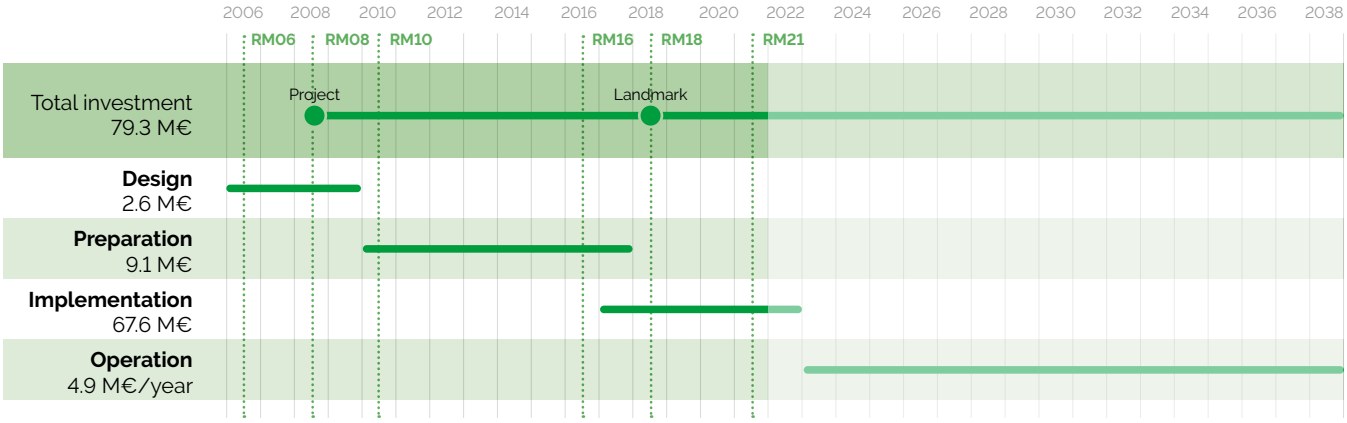
Website	Headquarters	Legal status	Type
https://eiscat.se	EISCAT Scientific Association Kiruna, Sweden	EISCAT Scientific Association, 1975	single-sited

DESCRIPTION

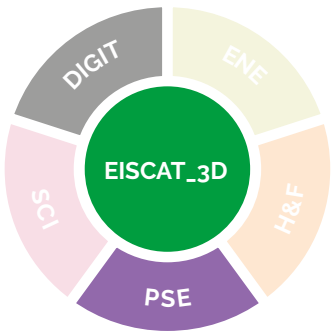
The next generation European Incoherent Scatter radar system upgrade (EISCAT_3D) is a single-sited international Research Infrastructure using radar observations and the incoherent scatter technique to study the atmosphere and the near-Earth space environment above the Fenno-Scandinavian Arctic as well as to support the solar system and radio astronomy sciences. The radar system is designed to investigate how the Earth's atmosphere is coupled to space and the facility is almost fully dedicated to the solar-terrestrial physics, a research area where the interaction between the Sun and the Earth is studied. EISCAT_3D will also be suitable for other scientific targets and applications including climate change, space weather, plasma physics, space debris and near-Earth object studies.

The EISCAT Scientific Association was established in 1975 to conduct research on the lower, middle and upper atmosphere and ionosphere using the incoherent scatter radar technique. Since then, the facilities of the EISCAT have been continuously developed and extended and today comprise world-class radars and a powerful ionospheric heating facility. The EISCAT_3D system will consist of a phased-array radar system located in Northern Fenno-Scandinavia near space research centres in Kiruna (Sweden), Sodankylä (Finland) and Tromsø (Norway), two rocket launch facilities at Andøya (Norway) and Esrange (Sweden), and several other distributed instrument networks for geospace observation. In the ESFRI Roadmap since 2008, EISCAT_3D is expected to start operations at the end of 2022.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead

SE

Member

The following countries are EISCAT members

CN, FI, FR, JP, KR, NO, UA, UK

EMSO ERIC

European Multidisciplinary Seafloor and water-column Observatory

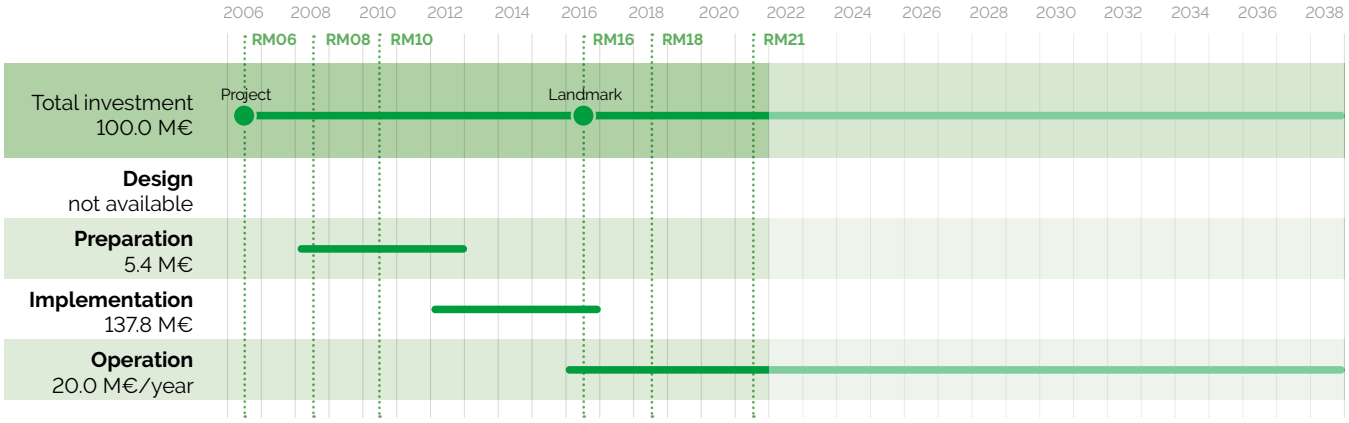
Website	Headquarters	Legal status	Type
www.emso.eu	EMSO ERIC Rome, Italy	ERIC, 2016	distributed

DESCRIPTION

The European Multidisciplinary Seafloor and water-column Observatory (EMSO) is a distributed Research Infrastructure aiming at exploring the oceans to gain a better understanding of phenomena happening within and below them, and to explain the critical role that these phenomena play in the broader Earth system. EMSO offers high-quality environmental data and services covering a multi- and inter-disciplinary range of research areas including biology, geology, chemistry, physics, engineering and computer science, from polar to tropical environments. EMSO provides these data to a large and diverse group of users, from scientists and industries to institutions and policy makers to support the definition of environmental policies and respond to pressing scientific and societal challenges.

Entered in the ESFRI Roadmap 2006, EMSO is a European Research Infrastructure Consortium (ERIC) since 2016. EMSO ERIC consists of a system of regional facilities that includes open-ocean, seafloor observatories down to 4,850 metres depth, and shallow-water test sites placed at key sites around Europe, from North East to the Atlantic, across the Mediterranean, to the Black Sea. Observatories are platforms equipped with multiple sensors, placed along the water column and on the seafloor. They constantly measure different biogeochemical and physical parameters, that address natural hazards, climate change and marine ecosystems. Currently, EMSO ERIC brings together 15 Regional Facilities, among which three are test sites, offered by 28 research centres located in nine European countries.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
IT

Member
EL, ES, FR, IE, NO, PT, RO, UK

EPOS ERIC

European Plate Observing System

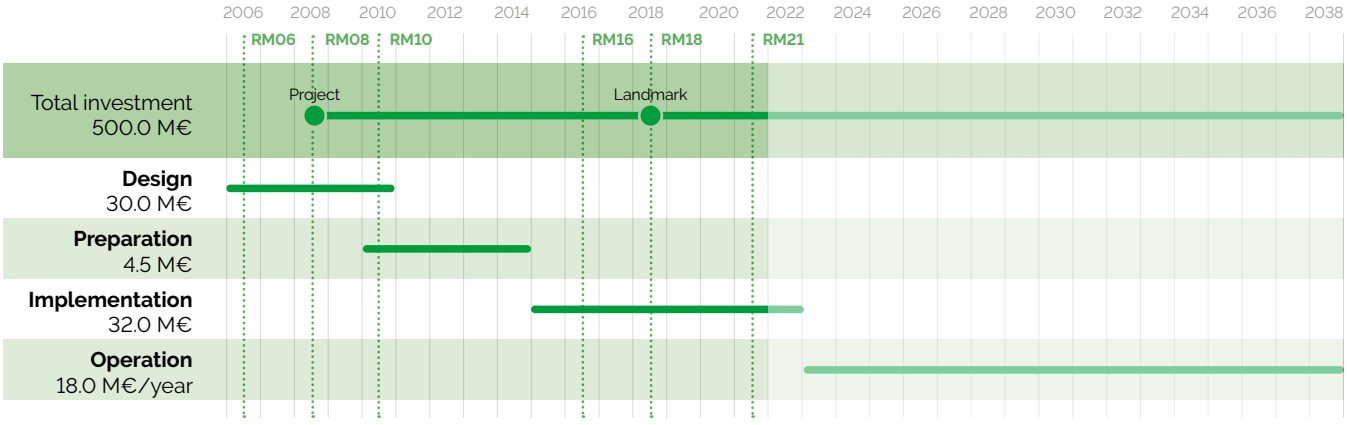
Website	Headquarters	Legal status	Type
www.epos-eu.org	EPOS ERIC Rome, Italy	ERIC, 2018	distributed

DESCRIPTION

The European Plate Observing System (EPOS) is a multidisciplinary, distributed Research Infrastructure that facilitates the integrated use of data, data products, and facilities from the solid Earth science community in Europe. EPOS will enable innovative multidisciplinary research for a better understanding of the Earth's physical and chemical processes that control earthquakes, volcanic eruptions, ground instability and tsunamis as well as the processes driving tectonics and Earth's surface dynamics. Through integration of data, models and facilities, EPOS will allow the Earth science community to make a step change in developing new concepts and tools for key answers to scientific and socio-economic questions concerning geo-hazards and geo-resources for a safe and sustainable society.

Entered the ESFRI Roadmap in 2008, EPOS established the European Research Infrastructure Consortium (ERIC) in 2018. After the Preparation and Implementation Phases, EPOS ERIC is currently facing the challenging transition to the Operation Phase (foreseen to start in 2023). This transition, focused on finalizing the operation of the EPOS Delivery Framework, is coordinated by EPOS ERIC also through the three years EU-funded EPOS Sustainability Project. This project will create synergies among diverse actions dedicated to securing governance, technical, financial and legal sustainability for the operation of the whole Research Infrastructure. EPOS ERIC is taking the responsibility of coordinating and managing the EPOS Delivery Framework guaranteeing its long-term sustainability.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
IT

Member
BE, DK, EL, FR, IS, NL, NO, PL, PT, RO, SI, UK

Observer
CH

Prospective member
BG

EURO-ARGO ERIC

European contribution to the international Argo Programme

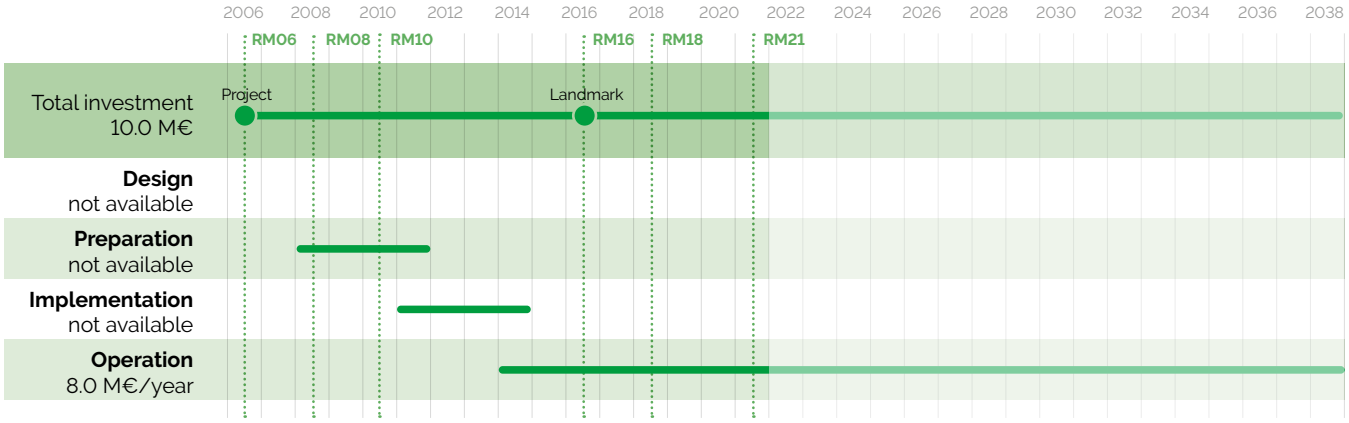
Website	Headquarters	Legal status	Type
www.euro-argo.eu	EURO-ARGO ERIC Plouzané, France	ERIC, 2014	distributed

DESCRIPTION

The European contribution to the International Argo Programme (EURO-ARGO) is a distributed Research Infrastructure that organizes and federates the European contribution to the Argo international programme for *in situ* ocean observations. EURO-ARGO provides enhanced coverage in the European regional seas by deploying and operating an array of around 800 floats corresponding to ¼ of the global Argo array of profiling floats which measure temperature and salinity every 10 days throughout the deep global oceans. It delivers data both in real-time and delayed mode for climate change research and monitoring as well as operational services such as Copernicus. It also aims at developing the new phase of Argo extending the network to abyssal oceans, biogeochemical parameters, marginal seas and high latitudes.

Built around the Argo programme, EURO-ARGO is also a major *in situ* infrastructure for the Copernicus Marine Environment Monitoring Service (CMEMS) and the European Marine Observation and Data Network (EMODnet). Entered the ESFRI Roadmap in 2006, EURO-ARGO established the European Research Infrastructure Consortium (ERIC) in 2014. Since then, the EURO-ARGO ERIC has been developing its long-term strategy to enhance and strengthen its data system to support the real-time requirements of operational modelling applications in oceanography and meteorology, and to develop new services for Members such as joint float procurement, at-sea monitoring of the European fleet and training. Its data coverage is deemed to be sufficient to resolve many of the important global climate signals.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
FR

Member
BG, DE, EL, ES, FI, IE, IT, NL, NO, UK

Observer
PL

IAGOS

In-service Aircraft for a Global Observing System

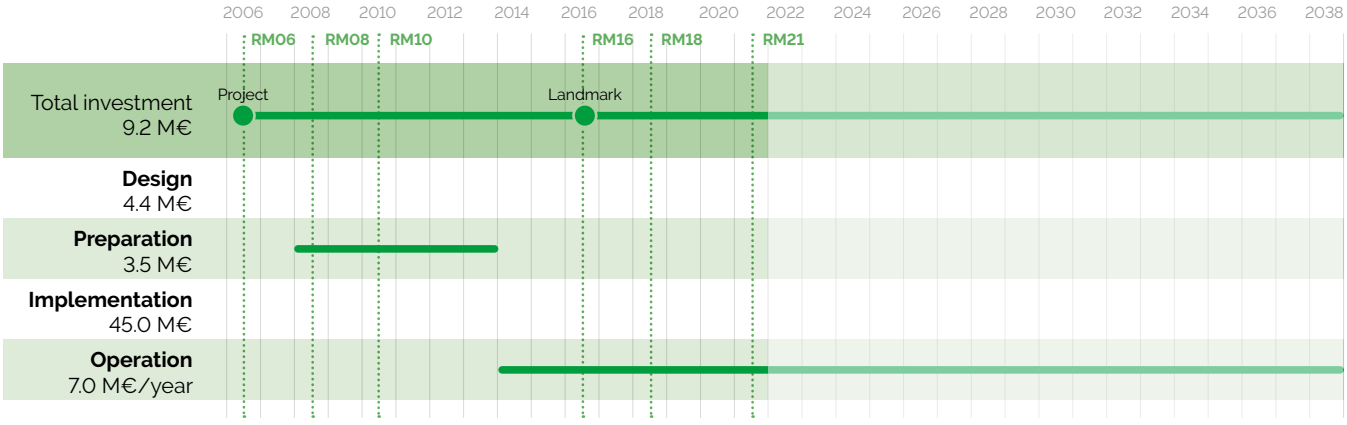
Website	Headquarters	Legal status	Type
www.iagos.org	IAGOS AISBL Brussel, Belgium	AISBL, 2014	distributed

DESCRIPTION

The In-service Aircraft for a Global Observing System (IAGOS) is a distributed Research Infrastructure that operates a global-scale monitoring system for atmospheric trace gases, aerosols and clouds by using the existing provisions of the global air transport system to provide essential data on climate change and air quality. It complements the global observing system in addition to ground-based networks, dedicated research campaigns and observations from satellites, balloons, and ships. In order to provide optimal information, two complementary systems have been implemented, (i) IAGOS-CORE providing global coverage on a day-to-day basis of key observables and (ii) IAGOS-CARIBIC offering a more in-depth and complex set of observations with lesser geographical and temporal coverage.

IAGOS builds on the scientific and technological experience gained within the research projects MOZAIC (Measurement of Ozone and Water Vapour on Airbus in-service Aircraft) and CARIBIC (Civil Aircraft for the Regular Investigation of the Atmosphere Based on an Instrument Container). In the ESFRI Roadmap since 2006, IAGOS developed the technical, organisational and legal concept during its Preparation Phase under the EU-funded IAGOS-ERI project. IAGOS was formally implemented in 2014 as an International non-profit Association under Belgian Law (AISBL) with its seat in Brussels. The scientific equipment deployed in IAGOS is owned and provided in-kind by the Members of IAGOS AISBL, who are also responsible for quality assurance of the measurements and for provision of the data.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
DE, FR

Member
UK

ICOS ERIC

Integrated Carbon Observation System

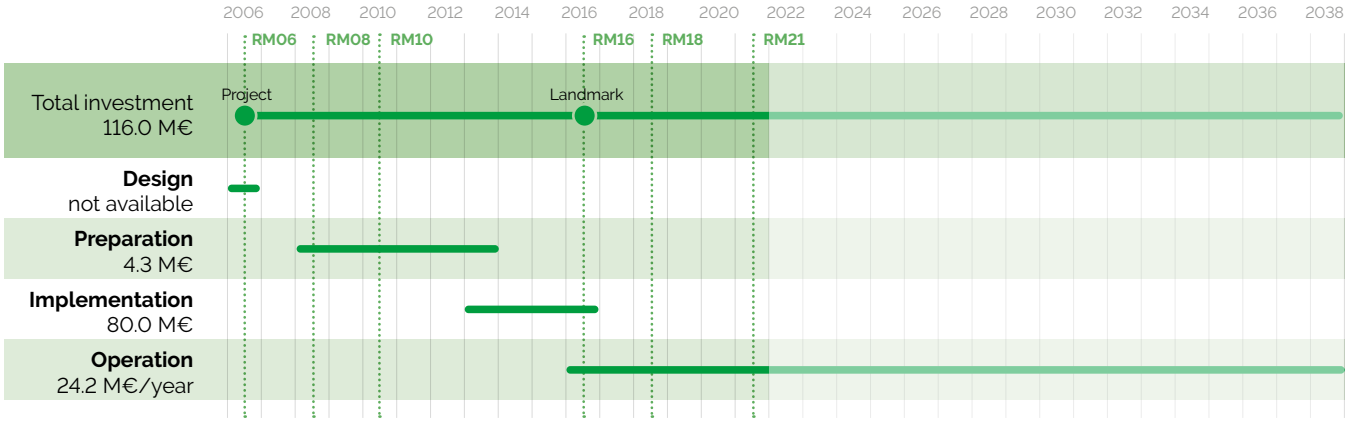
Website	Headquarters	Legal status	Type
www.icos-ri.eu	ICOS ERIC Helsinki, Finland	ERIC, 2015	distributed

DESCRIPTION

The Integrated Carbon Observation System (ICOS) is a distributed Research Infrastructure to facilitate research on carbon cycle and to provide necessary information on greenhouse gases (GHG). ICOS conducts long-term observations in the atmosphere, ecosystems, and oceans, and generates high-precision and stardardised data to monitor the present state and extrapolate the future behaviour of the global carbon cycle and GHG fluxes in order to predict environment changes and mitigate their impacts. ICOS helps to elaborate an account of the Earth system and its response to climate change and other environmental challenges. ICOS advances the fulfilment of the United Nations' Sustainable Development Goals and the European Union's Societal Challenges, especially those concerning climate change.

Entered the ESFRI Roadmap in 2006, ICOS established the European Research Infrastructure Consortium (ERIC) in 2015. The basis of ICOS's operations is the measurement network that comprises more than 140 standardised stations organised in three distinct domains – Atmosphere, Ecosystem and Ocean – to observe greenhouse gas concentrations in the atmosphere as well as carbon fluxes between the atmosphere, the land surface and the oceans. The stations are coordinated and run by the ICOS National Networks, representing 13 Member countries and one Observer country. Overall, ICOS community consists of more than 500 scientists in Europe and beyond. More than 80 renowned universities or institutes are a part of the ICOS community which has also strong connections to colleagues and operators outside academia.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
FI

Member
BE, CZ, DE, DK, ES, FR, HU, IT, NL, NO, SE, UK

Observer
CH

LifeWatch ERIC

e-Infrastructure for Biodiversity and Ecosystem Research

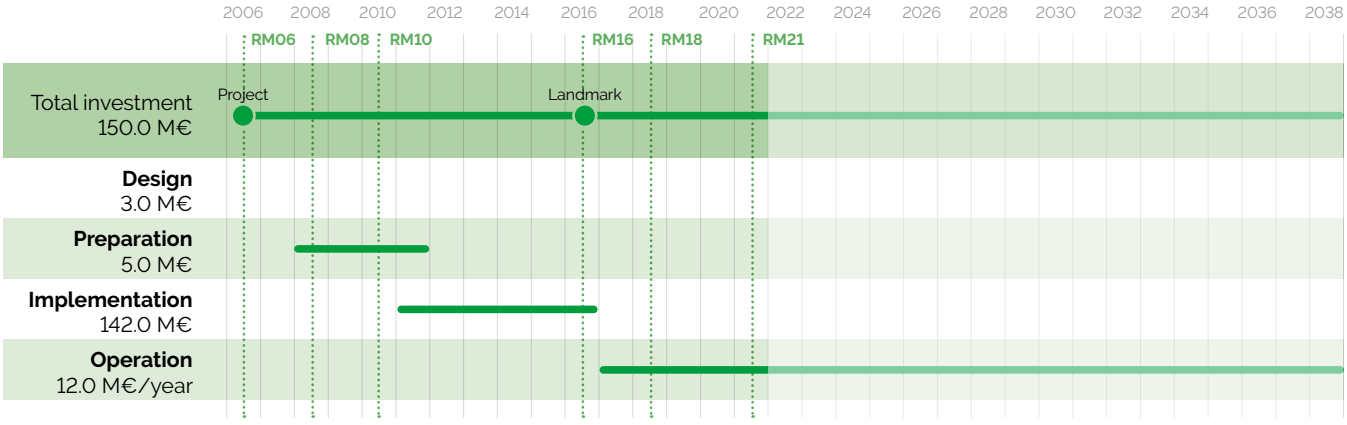
Website	Headquarters	Legal status	Type
www.lifewatch.eu	LifeWatch ERIC Seville, Spain	ERIC, 2017	distributed

DESCRIPTION

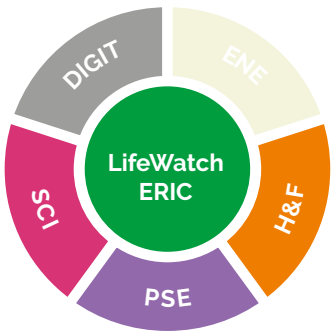
The e-Infrastructure for Biodiversity and Ecosystem Research (LifeWatch) is a distributed Research Infrastructure providing e-Science facilities and services to the biodiversity and ecosystem research community. LifeWatch ERIC seeks to understand the complex interactions between species and the environment, taking advantage of High-Performance, Grid and Big Data computing systems, and the development of advanced modelling tools to implement measures aimed at preserving life on Earth. LifeWatch tackles the constraints affecting biodiversity and ecosystem research, such as the pressing need for increasingly diverse data, larger and more advanced models, open data and open science clouds, thus allowing to explore new frontiers in ecological science and support society in addressing global challenges.

In the ESFRI Roadmap since 2006, LifeWatch established the European Research Infrastructure Consortium (ERIC) in 2017 by bringing together seven European countries. LifeWatch ERIC Statutory Seat and the ICT e-Infrastructure Technical Offices are located in Spain and jointly assist the coordination and management of the day-to-day institutional relationships and administrative, legal, financial issues. It also coordinates the implementation of e-Services demanded by the Service Centre in Italy, and the Virtual Laboratories and Innovations Centre in The Netherlands. The national nodes, known as Distributed Centres, are operated by each of the seven members of the LifeWatch ERIC and are encouraged to establish Thematic Centres in accordance with ERIC overall architectural scheme.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
ES

Member
BE, EL, IT, NL, PT, SI

AnaEE

Analysis and Experimentation on Ecosystems

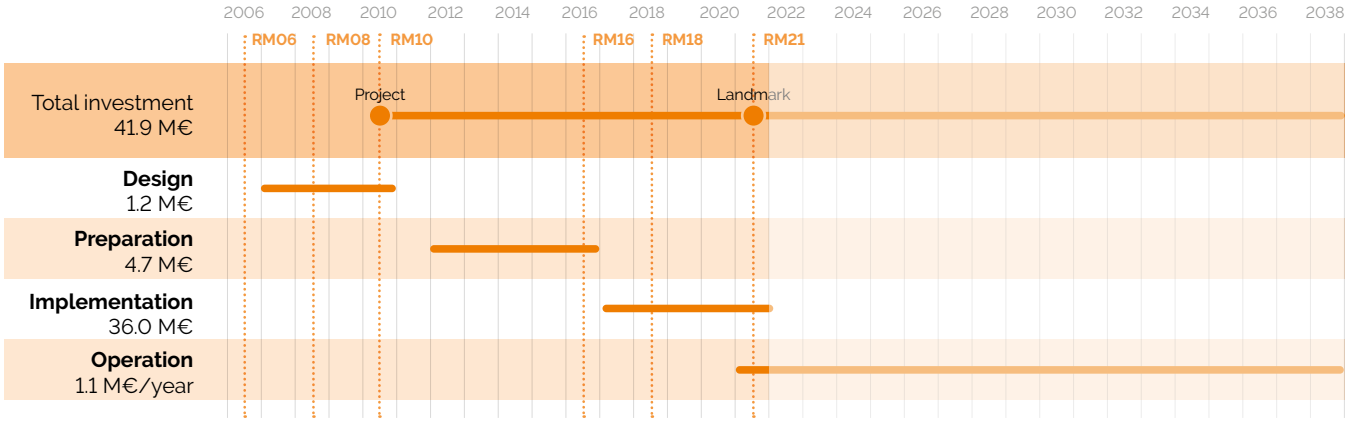
Website	Headquarters	Legal status	Type
www.anaee.eu	AnaEE – Central Hub Gif sur Yvette, France	ERIC Step2	distributed

DESCRIPTION

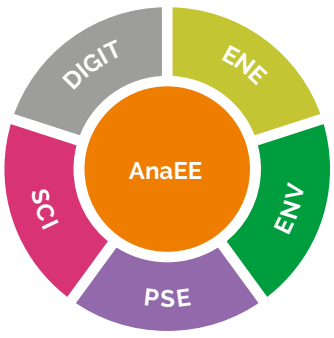
The Analysis and Experimentation on Ecosystems (AnaEE) is a distributed Research Infrastructure which provides integrated and coordinated management of experimental, analytical and modelling facilities, with the aim to support scientists in testing the potential impacts of climate change and land use in Europe. Characteristic to AnaEE are its versatile facilities that can simulate environmental drivers ranging from land-use change, pollution, biological invasions, rising atmospheric greenhouse gases concentrations, to increasing extreme events such as droughts and heatwaves. AnaEE will forge evidence-based adaptation and mitigation strategies to maintain essential services to society including carbon sequestration, food security, clean water, biodiversity and ecosystem health today and in the future.

Entered in the ESFRI Roadmap 2010, AnaEE was acknowledged as ESFRI Landmark in 2021. Currently in the Implementation Phase, AnaEE submitted the European Research Infrastructure Consortium (ERIC) Step2 application with the support of five Members (including CIHEAM) and one Observer. The AnaEE Central Hub, hosted in France, will be the main entry point, responsible for the provision of the services. Three Service Centres – Technology, Interface and Synthesis, Data and Modelling – are under implementation respectively in Denmark, Czech Republic and Italy. The coordination and integration of the national platforms, through the Hub and Centres, will ensure international access, improved measurements and data harmonization, technology development, links between data and models.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
FR

Member
BG, CZ, DK, IT, CIHEAM

Observer
BE

Prospective member
FI

BBMRI ERIC

Biobanking and BioMolecular Resources Research Infrastructure

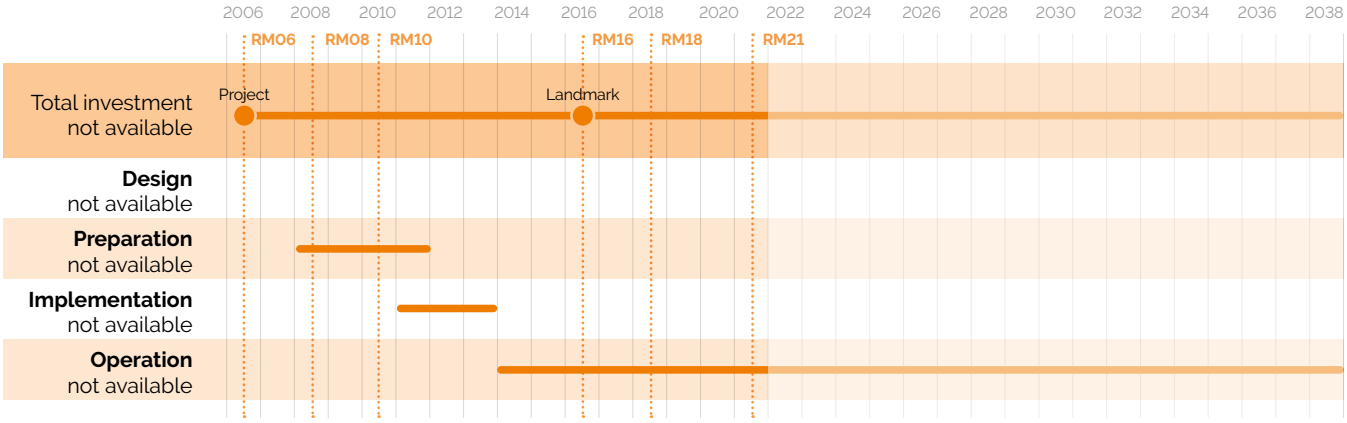
Website	Headquarters	Legal status	Type
www.bbmri-eric.eu	BBMRI ERIC Graz, Austria	ERIC, 2013	distributed

DESCRIPTION

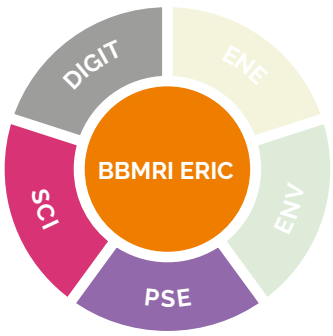
The Biobanking and BioMolecular resources Research Infrastructure (BBMRI) is one of the largest Research Infrastructures for biobanking in Europe. BBMRI brings together main players from the biobanking field – researchers, biobankers, industry, and patients – to boost biomedical research and ultimately to make new treatments possible. BBMRI improves the accessibility and interoperability of existing comprehensive collections, either population-based or clinical-oriented, of biological samples from different (sub-)populations of Europe or rare diseases. These collections include the associated data on factors such as health status, nutrition, lifestyle and environmental exposure of the study subjects. BBMRI also offers quality management services and support with ethical, legal and societal issues.

Entered the ESFRI Roadmap 2006, BBMRI was established as a European Research Infrastructure Consortium (ERIC) in 2013. The agreement among 17 Members and 5 Observers, including one International Organisation (WHO/IARC), enabled the integration of biobanks/biological resource centres/collections at National Nodes to setup a pan-European distributed Research Infrastructure. BBMRI ERIC is a key Europe-wide resource to access to quality-defined human disease-relevant biological samples and associated data in an efficient as well as ethically and legally compliant manner. It is continuously expanding its membership and building partnerships with biobanks, as well as patient organisations and industry to foster personalised medicine and disease prevention for the benefit of European citizens.

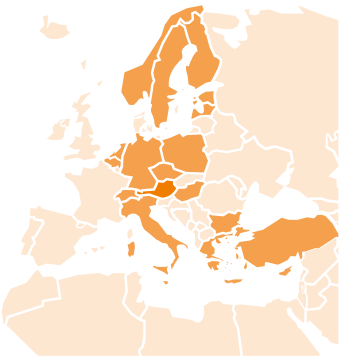
TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT



Lead
AT

Member
BE, BG, CZ, DE, EE, EL, FI, HU, IT, LV, MT, NL, NO, PL, SE, UK

Observer
CH, CY, TR, IARC/WHO

EATRIS ERIC

European Advanced Translational Research Infrastructure in Medicine

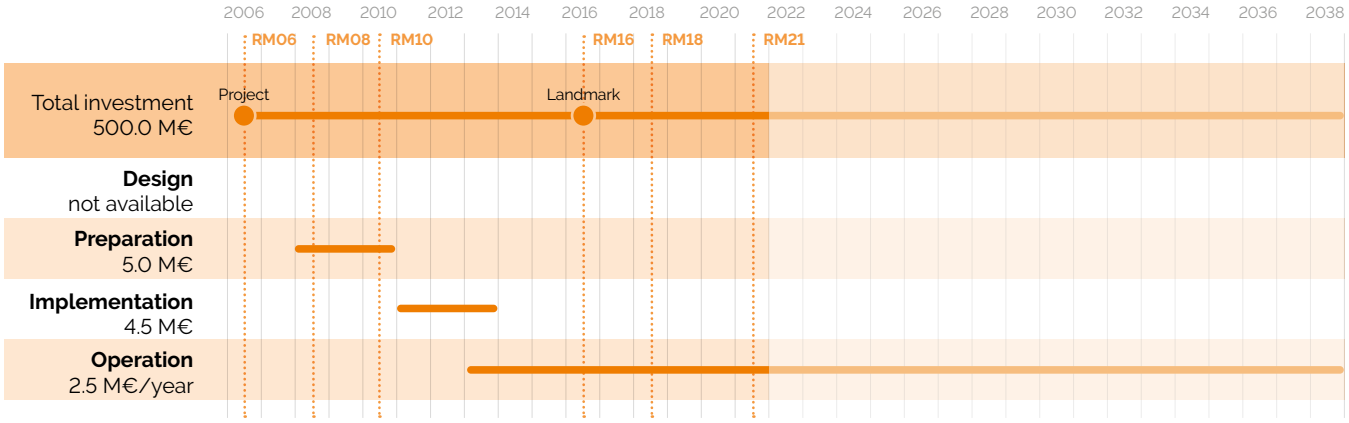
Website	Headquarters	Legal status	Type
www.eatris.eu	EATRIS ERIC Amsterdam, The Netherlands	ERIC, 2013	distributed

DESCRIPTION

The European Advanced Translational Research Infrastructure in Medicine (EATRIS) is a distributed Research Infrastructure for translational medicine. EATRIS brings together resources and services to support researchers in developing their biomedical discoveries into novel translational tools and interventions for better health outcomes. EATRIS provides access to cross-disciplinary expertise and cutting-edge technologies to successfully move early-stage research for drug development, ranging from scientific equipment, knowledge-based resources from sample collections to GMP manufacturing and regulatory guidance, closer to the patient. Research services and medicines development expertise are provided in advanced therapy medicinal products, biomarkers, imaging and tracing, small molecules and vaccines.

In the ESFRI Roadmap since 2006, EATRIS established the European Research Infrastructure Consortium (ERIC) in 2013. As of June 2021, EATRIS ERIC is supported by 14 European countries, 12 Members and 2 Observers, and regroups more that 114 academic research institutes and university medical centres across Europe. EATRIS ERIC is operating a broad range of research services and platforms – including regulatory services, training and education, and mentoring – for both academia and industry across various fields. To facilitate academic collaborations with industry, EATRIS ERIC provides research services geared towards biotech SMEs and pharmaceutical companies. EATRIS ERIC works with public funding agencies, charities and policy makers to help improve the translational research and innovation ecosystem.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
NL

Member
BG, CZ, ES, FI, FR, IT, LU, NO, PT, SE, SI

Observer
HR, LV

ECRIN ERIC

European Clinical Research Infrastructure Network

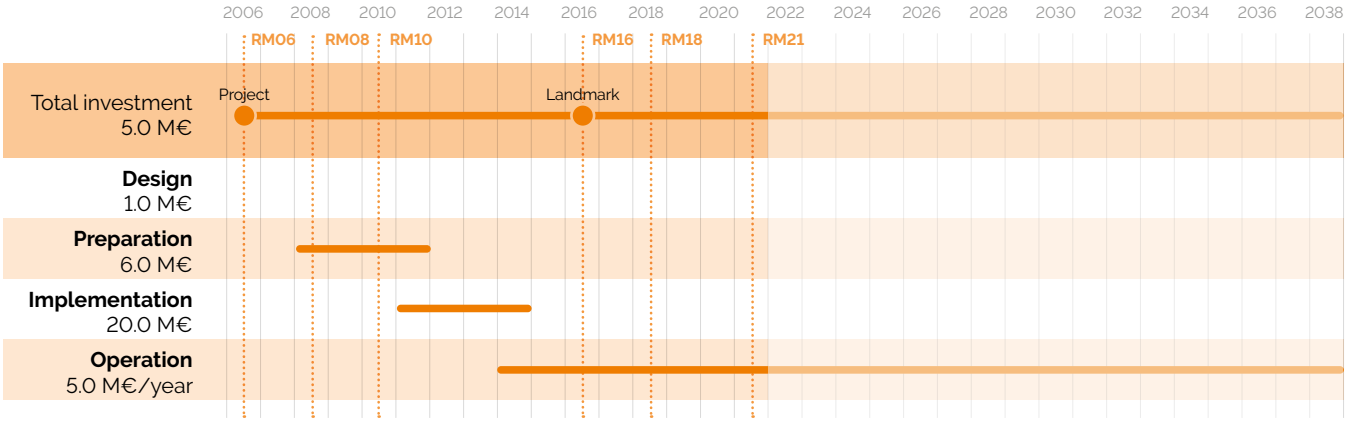
Website	Headquarters	Legal status	Type
www.ecrin.org	ECRIN ERIC Paris, France	ERIC, 2013	distributed

DESCRIPTION

The European Clinical Research Infrastructure Network (ECRIN) is a distributed Research Infrastructure that supports the preparation and implementation of multinational, high-quality, transparent clinical trials thus overcoming the obstacles caused by fragmentation and poor interoperability of the national, clinical research environment in Europe. Support areas include the preparation of applications for funding, protocol evaluation, trial management, quality assurance and addressing regulatory and ethical issues. ECRIN creates added value through access to expertise and patients, increasing the reach, diversity, and result quality of clinical trials. It fulfils the vision of a society where all decisions in medical practice are based on sound scientific evidence from high-quality clinical research.

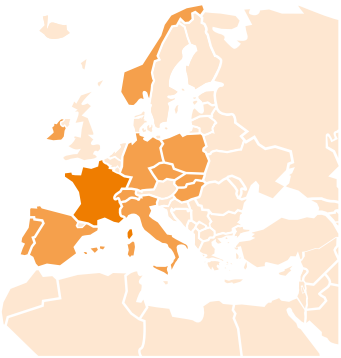
In the ESFRI Roadmap since 2006, ECRIN established the status of European Research Infrastructure Consortium (ERIC) in 2013. As of November 2021, ECRIN ERIC is supported by nine Members and three Observers which collaborate through ECRIN's unique organization involving the ERIC Core team, the European correspondents (EuCos) based in each country, and the national scientific partners of Clinical Trial Units (CTUs). The core team, based in Paris, develops ECRIN's strategy, common tools and procedures, and contributes to 'infrastructure development' projects. The national scientific partners manage trials in-country and host the EuCos. In coordination with the EuCo, they identify the clinical trial units (CTUs) or clinical research centres (CRCs) that will provide trial management tasks in a given trial.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT



Lead
FR

Member
CZ, DE, ES, HU, IE, IT, NO, PT

Observer
CH, PL, SK

ELIXIR

A distributed infrastructure for life-science data

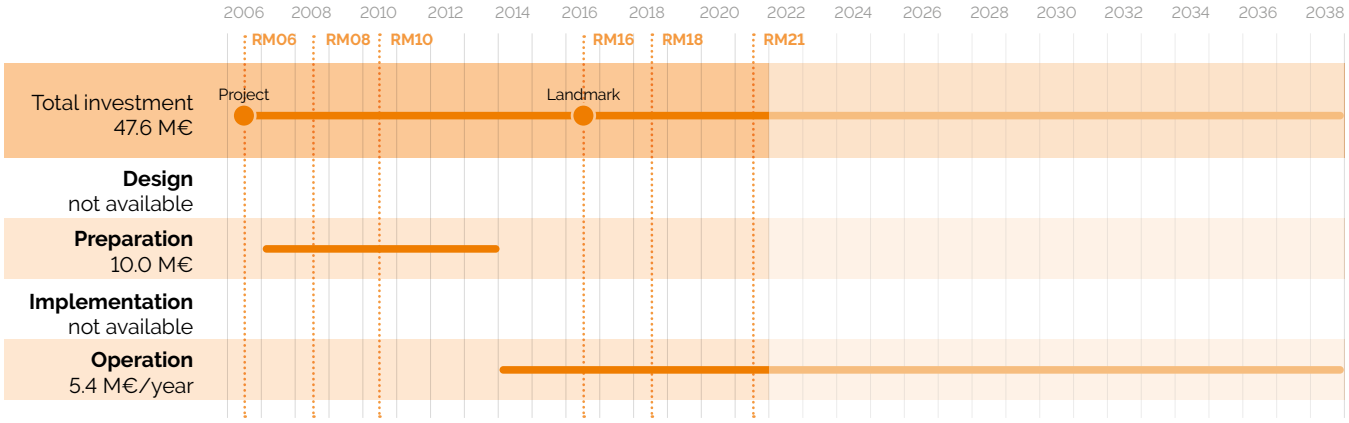
Website	Headquarters	Legal status	Type
www.elixir-europe.org	ELIXIR Hub Hinxton, United Kingdom	ELIXIR Consortium Agreement, 2013	distributed

DESCRIPTION

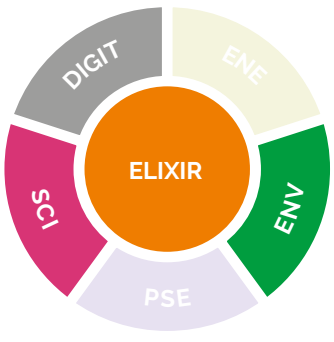
The distributed infrastructure for life-science data (ELIXIR) is a unique initiative that brings together Europe's leading life science organisations in managing and safeguarding the increasing volume of data being generated by publicly funded research. It coordinates, integrates and sustains bioinformatics resources across European countries and enables users in academia and industry to access services that are vital for their research. ELIXIR makes it easier for scientists to find and share data, exchange expertise, and agree on best practices and will help them gain new insights into how living organisms work. Ultimately, ELIXIR helps address the *Grand Challenges* across life sciences, from marine research – via plants and agriculture – to health research and medical sciences.

Entered in the ESFRI Roadmap in 2006, ELIXIR became a European intergovernamental organisation following the ratification of the ELIXIR Consortium Agreement (ECA) in 2013. ELIXIR began implementing its first scientific programme in 2014 and is currently running its second five-year scientific programme. At present, ELIXIR consists of 22 Members, including EMBL which leads the consortium, and one Observer, bringing together over 220 research organisations and more than 700 life scientists, computer scientists and support staff. ELIXIR is organized with a Hub that coordinates and manages the activities across the RI, and the National Nodes, networks of research organisation within a Member State coordinated at local level to run the scientific and technical activities of ELIXIR.

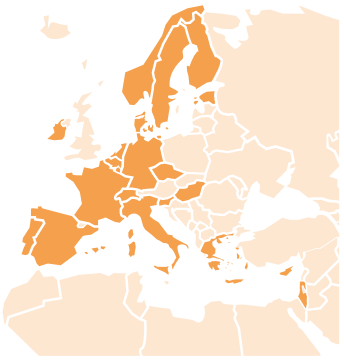
TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT



Lead

EMBL

Member

The following countries are ELIXIR member

BE, CH, CZ, DE, DK, EE, EL, ES, FI, FR, HU, IE, IL, IT, LU, NL, NO, PT, SE, SI, UK

Observer

CY

EMBRC ERIC

European Marine Biological Resource Centre

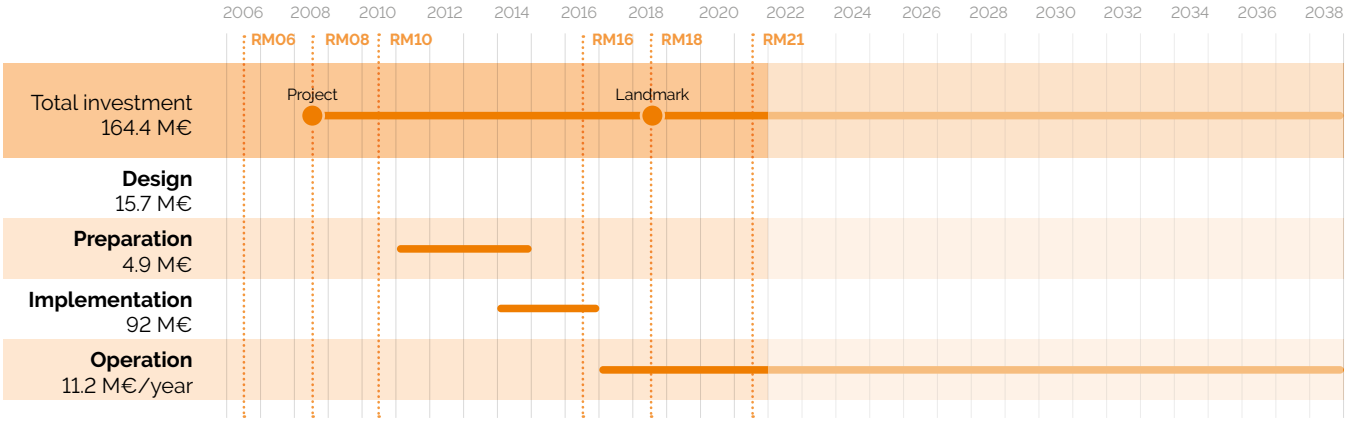
Website	Headquarters	Legal status	Type
www.embrc.eu	EMBRC ERIC Paris, France	ERIC, 2018	distributed

DESCRIPTION

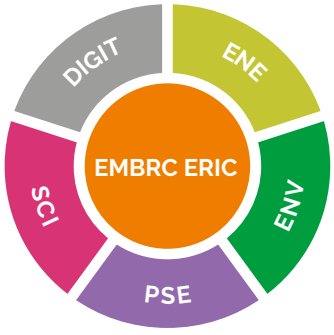
The European Marine Biological Resource Centre (EMBRC) is a distributed Research Infrastructures for large-scale marine science in Europe. EMBRC offers access to marine resources, as well as cutting-edge services and facilities, that allow researches, both from academia and industry, to study the ocean and develop innovative solutions to tackle societal challenges. The EMBRC investigation capacity and capability covers the whole range of marine biodiversity, using approaches ranging from molecular biology to ecology, chemistry, bioinformatics and mathematics, and integrative biology. EMBRC key thematic areas include marine biodiversity and ecosystem function, developmental biology and evolution, marine products and resources – biotechnology, aquaculture, fisheries – and biomedical science.

Entered in the ESFRI Roadmap in 2008, EMBRC was acknowledged the status of ESFRI Landmark in 2018, when the European Research Infrastructure Consortium (ERIC) was established. The transition to the Operational Phase was smooth, as most services were already active and accessible to users' community. At present, EMBRC offers a wide variety of high-quality services, experimental facilities and cutting-edge technology platforms supporting both fundamental and applied research activities in Europe and beyond. Services are provided by 45 sites, including several marine stations and institutes, located in 9 Member States. EMBRC is projected to serve its users for at least 25 years, facilitating marine biology research and supporting cutting-edge research and solutions to today's societal issues.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
FR

Member
BE, EL, ES, IL, IT, NO, PT, UK

ERINHA

European Research Infrastructure on Highly Pathogenic Agents

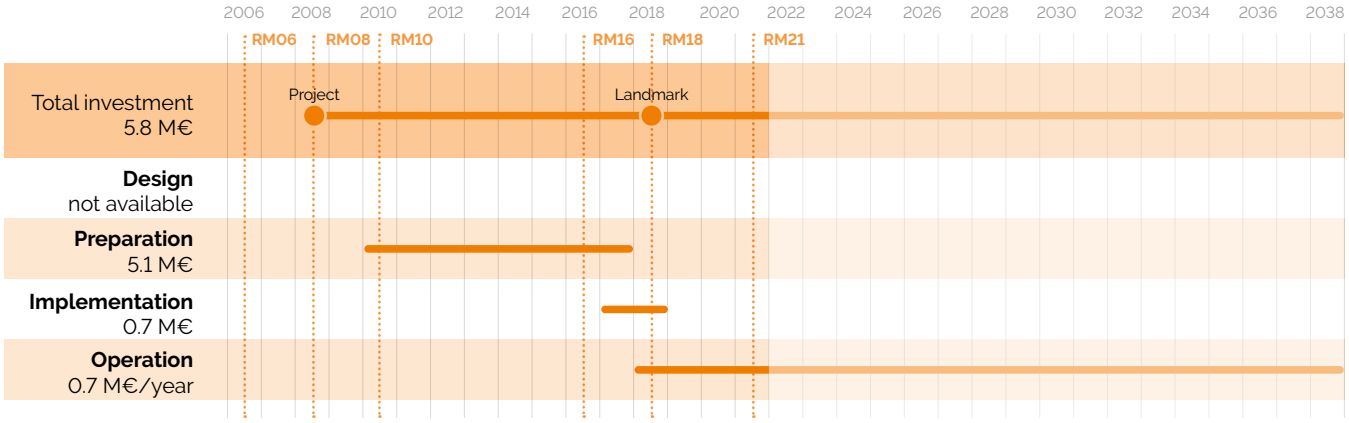
Website	Headquarters	Legal status	Type
www.erinha.eu	ERINHA AISBL Brussels, Belgium	AISBL, 2017	distributed

DESCRIPTION

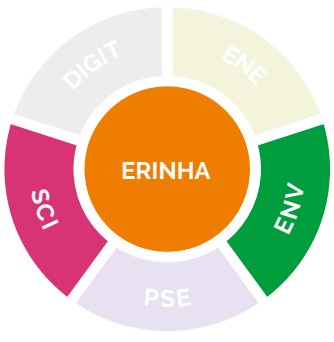
The European Research Infrastructure on Highly Pathogenic Agents (ERINHA) is a distributed Research Infrastructure dedicated to develop an adequate and coordinated effort to address the challenges posed by the emergence or re-emergence of highly dangerous human and animal micro-organisms infecting humans. ERINHA seeks to reinforce the European capacities for the study of Risk Group 4 pathogens, enhance the coordination of Biosafety Level 4 (BSL-4) activities and give access to BSL-4 and complementary facilities (e.g. BSL-3) with longstanding experience of research in the field of highly infectious diseases. Such a coordinated approach is vital in a context marked by frequent globalization of infectious diseases with high risk for public health, society and economy, as suggested by the COVID-19 pandemic.

Entered in the ESFRI Roadmap in 2008, ERINHA was established as an International non-profit Association under Belgian Law (AISBL) in 2017 and was acknowledged as ESFRI Landmark in 2018. ERINHA brings together Europe's top high containment laboratories and focuses on highly pathogenic agents with no approved or widely available treatment or vaccine. ERINHA's Central Coordinating Unit (CCU) located in Paris is the single point of access to the Infrastructure. It ensures ERINHA's daily operations and provides functions for scientific project management, data management, advocacy & communication, legal and administrative matters. ERINHA member facilities foster research in their field of expertise and accelerate the development of countermeasures to keep the public safe.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
FR

Member
HU, PT

Prospective members
NL

EU-OPENSCREEN ERIC

European Infrastructure of Open Screening Platforms for Chemical Biology

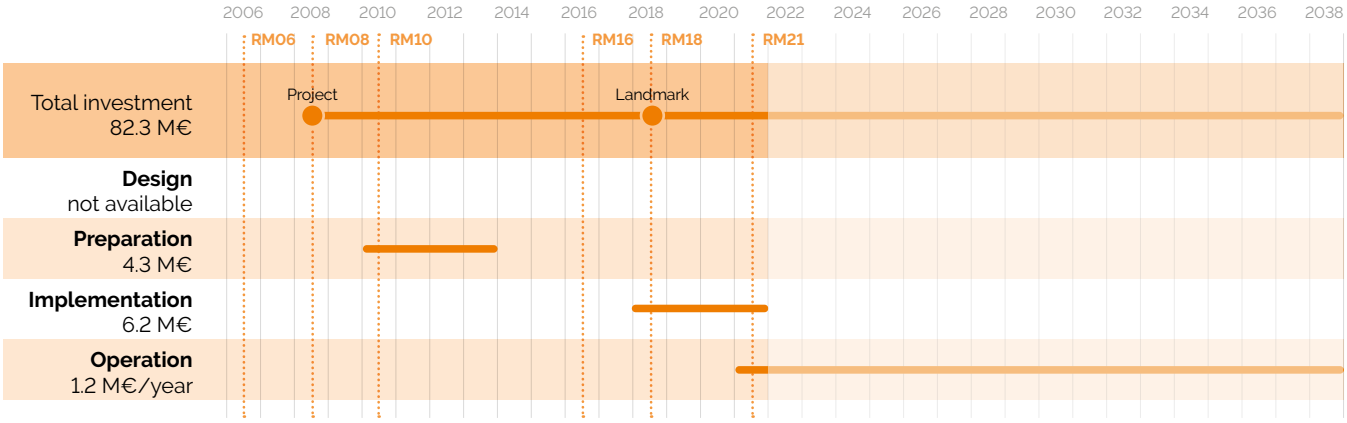
Website	Headquarters	Legal status	Type
www.eu-openscreen.eu	EU-OPENSCREEN ERIC Berlin, Germany	ERIC, 2018	distributed

DESCRIPTION

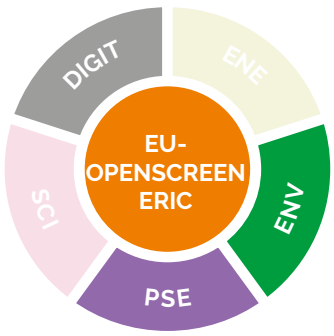
The European Infrastructure of Open Screening Platforms for Chemical Biology (EU-OPENSCREEN) is a distributed Research Infrastructure that develops novel small chemical compounds which elicit specific biological responses on organisms, cells or cellular components. EU-OPENSCREEN enables scientists to use compound screening methods to validate novel therapeutic targets and support basic mechanistic studies addressing fundamental questions in cellular physiology, across domain systems, using the methods of chemical biology. EU-OPENSCREEN is a cost-effective solution to address the need of the broad scientific community providing access to Europe's leading screening platforms and chemistry groups, a jointly used compound collection and operating an open-access database accessible on a global basis.

In the ESFRI Roadmap since 2008, EU-OPENSCREEN has established the European Research Infrastructure Consortium (ERIC) in 2018. As of November 2021, EU-OPENSCREEN ERIS is supported by eight Member States hosting 23 Partners Sites which offer access to academic high-throughput screening compounds facilities – jointly comprising up to 140.000 commercial and proprietary compounds – and medicinal chemistry services. EU-OPENSCREEN supports all stages of a tool development project, including assay adaptation, high-throughput screening, and chemical optimisation of the 'hit' compounds. All generated tool compounds and data are made available in an open access database with the possibility to request a grace period of up to three years to allow for data deposition after submitting a patent application.

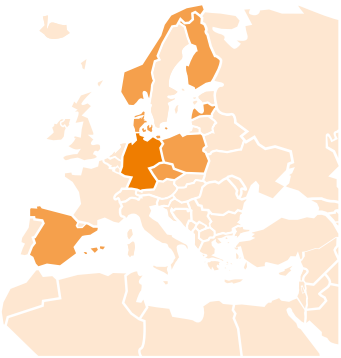
TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT



Lead
DE

Member
CZ, DK, ES, FI, LV, NO, PL

Euro-BioImaging ERIC

European Research Infrastructure for Imaging Technologies in Biological and Biomedical Sciences

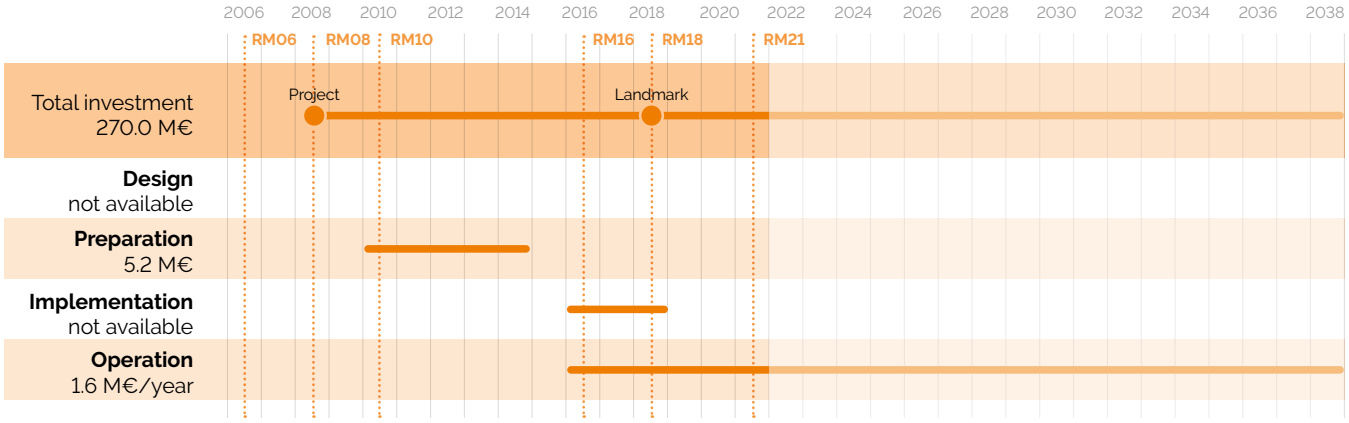
Website	Headquarters	Legal status	Type
www.eurobioimaging.eu	Euro-BioImaging ERIC Turku, Finland	ERIC, 2019	distributed

DESCRIPTION

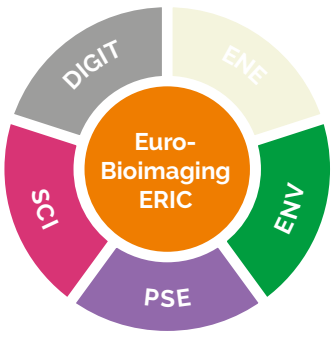
The European Research Infrastructure for Imaging Technologies in Biological and Biomedical Sciences (Euro-BioImaging, EuBI) is a distributed Research Infrastructure that provides a large-scale open physical access to state-of-the-art imaging technologies for life scientists in Europe and beyond. Euro-BioImaging will offer access to imaging instruments, expertise, training and data management services to infrastructure users and providers, both from academia and industry, and continuously evaluate and include new imaging technologies to ensure sustainable cutting-edge services. All scientists, regardless of their affiliation, area of expertise or field of activity can benefit from these pan-European open access services, which are provided with high-quality standards by leading imaging facilities.

EuroBioImaging entered the ESFRI Roadmap in 2008 and granted the status of Landmark in 2018. It was established as a European Research Infrastructure Consortium (ERIC) in 2019, with the support by 17 Members and one Observer. EuroBioImaging ERIC consists of a set of complementary, strongly interlinked and geographically distributed Nodes – specialised imaging facilities – to reach European scientists in all Member States. The infrastructure is empowered by a strong supporting and coordinating entity, the EuBI Hub. The Hub provides the virtual entry point from which users are directed to their desired technology as served by the respective EuBI Nodes. As of November 2021, EuBI provides open access to 33 Node distributed in 14 European countries and at EMBL, offering more than 140 imaging services.

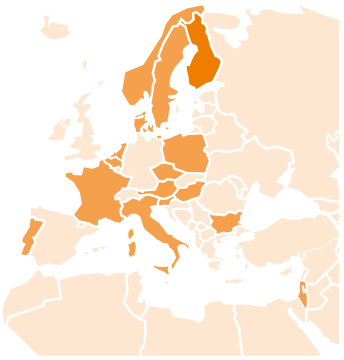
TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT



Lead
FI

Member
AT, BG, CZ, DK, FR, HU, IL, IT, NL, NO, PL, PT, SE, SI, UK, EMBL

Observer
BE

INFRAFRONTIER

European Research Infrastructure for the generation, phenotyping, archiving and distribution of mouse disease models

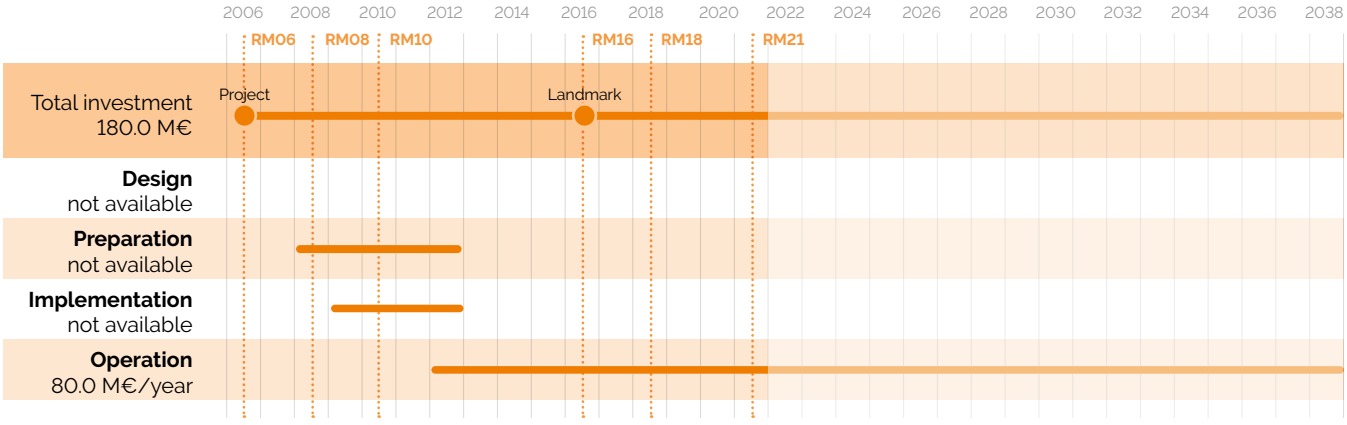
Website	Headquarters	Legal status	Type
www.infrafrontier.eu	INFRAFRONTIER GmbH Munich, Germany	GmbH, 2013	distributed

DESCRIPTION

The European Research Infrastructure for the generation, phenotyping, archiving and distribution of mouse disease models (INFRAFRONTIER) aims to build a distributed world-class Research Infrastructure that provides the biomedical research community with the tools needed to unravel the role of gene function in human health and disease. By offering access to a unique collection of mouse models and research tools and associated data, and to state-of-the-art technologies for mouse model development and phenotype analyses, INFRAFRONTIER enhances medical research and promotes studies that lead to breakthrough discoveries in cancer, metabolic and cardiovascular diseases, lung diseases, infectious diseases and the group of rare diseases, global threats to our socio-economic well-being.

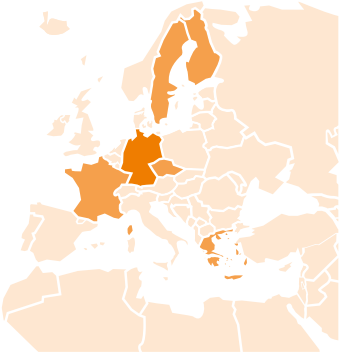
INFRAFRONTIER entered the ESFRI Roadmap in 2006 and established a Company with Limited Liability under German law (GmbH) in 2013, based on a MoU signed by six members, research organisations mandated by their national research ministries, and including EMBL. The INFRAFRONTIER GmbH provides central access to all the services of the INFRAFRONTIER Research Infrastructure via its website. It improves access for the users, both from academia and industry, by building capacities for systemic phenotyping, archiving and distribution of mouse models and by providing an efficient and transparent access process, based on peer-evaluated scientific excellence. The INFRAFRONTIER Research Infrastructure currently brings together 23 scientific partners from 15 European countries and Canada.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT



Lead
DE

Member
CZ, EL, FI, FR, SE, EMBL

INSTRUCT ERIC

Integrated Structural Biology Infrastructure

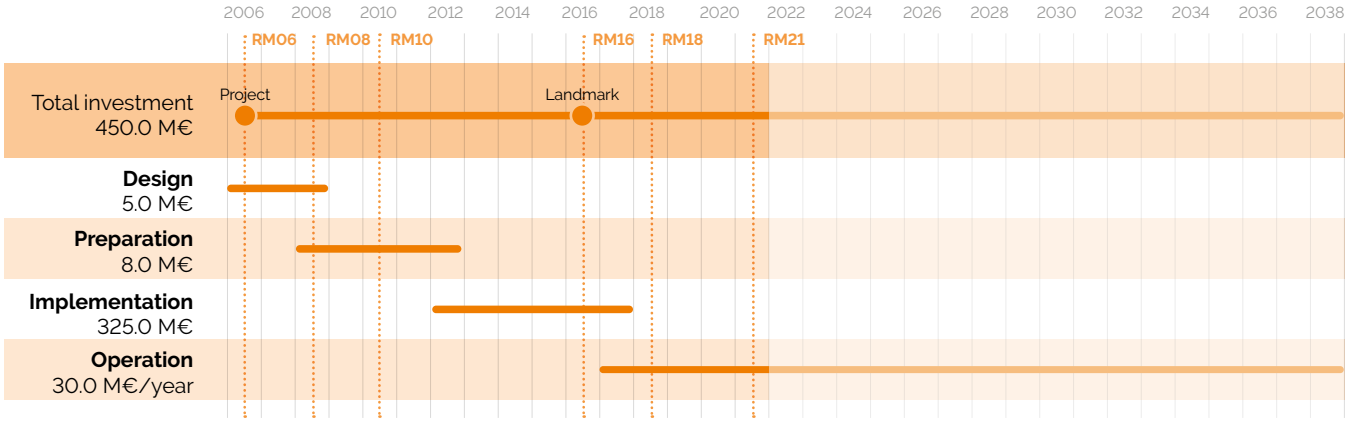
Website	Headquarters	Legal status	Type
www.instruct-eric.eu	INSTRUCT ERIC Oxford, United Kingdom	ERIC, 2017	distributed

DESCRIPTION

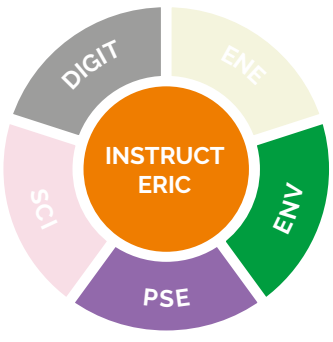
The Integrated Structural Biology Infrastructure (INSTRUCT) is a distributed Research Infrastructure that provides peer-reviewed access to a broad palette of high-end technologies and methods, expertise and training in structural biology. INSTRUCT major goal is underpinning fundamental research and promoting innovation in the biological and medical sciences by providing an integrated approach that combines multiple technologies. INSTRUCT is a major player in delivering this strategy by creating close cooperation with other biological and medical sciences Research Infrastructures and establishing international partnership both with academia and industry supporting the biotechnology and pharmaceutical industries, and helping to tackle the *Grand Challenges* as defined by Horizon Europe.

Entered the ESFRI Roadmap in 2006, INSTRUCT established the European Research Infrastructure Consortium (ERIC) in 2017. INSTRUCT ERIC consists of 15 Members, including EMBL, and one Observer and provides access to cutting-edge technology and scientific expertise in structural biology by means of 11 INSTRUCT Centres. Each Centre has contributed a range of instruments to the catalogue of platforms for a total of 26 facilities delivering 78 services. The INSTRUCT Hub acts as the point of contact and administrative centre for all organizational and reporting activities to the consortium and the community. Through international collaborative projects, INSTRUCT ERIC has been able to offer these services to users from outside Europe, outlining the advantages at trans-continental level.

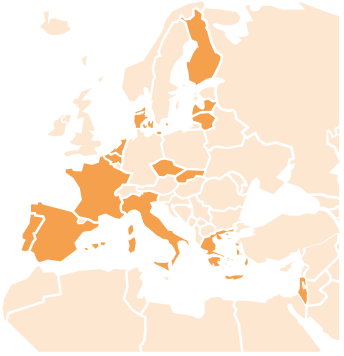
TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT



Lead
UK

Member
BE, CZ, DK, ES, FI, FR, IL, IT, LT, LV, NL, PT, SK, EMBL

Observer
EL

MIRRI

Microbial Resource Research Infrastructure

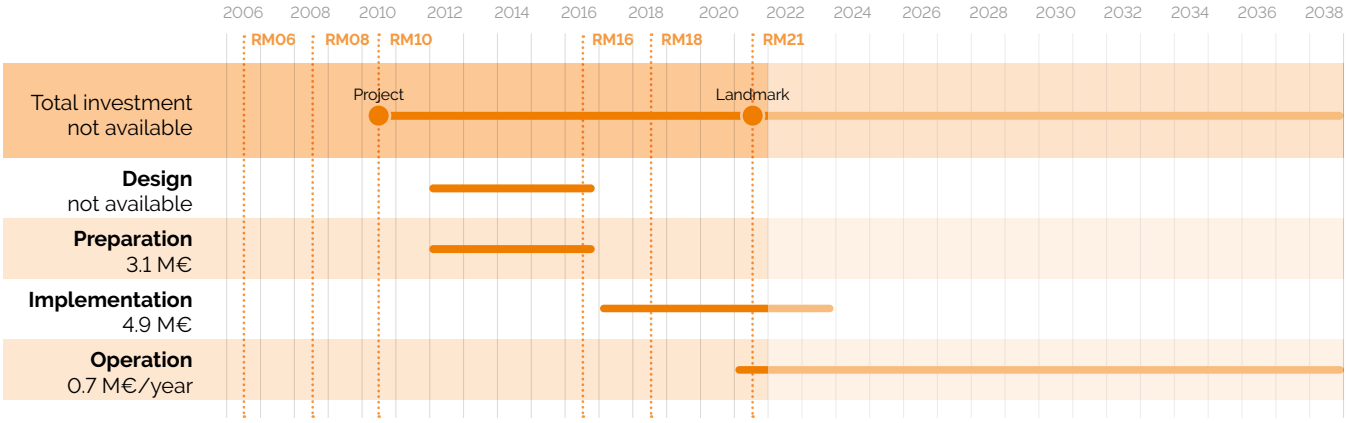
Website	Headquarters	Legal status	Type
www.mirri.org	University of Minho Braga, Portugal	ERIC Step2	distributed

DESCRIPTION

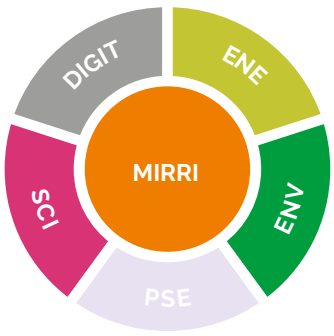
The Microbial Resource Research Infrastructure (MIRRI) is a distributed Research Infrastructure for the preservation, systematic investigation, provision and valorisation of microbial resources and biodiversity. MIRRI aims to serve the Bioscience and the Bioindustry user communities by facilitating their access to a broad range of high-quality microbial bioresourses, microorganisms, their derivatives, associated data and services, with a special focus on the interconnection domains of Health & Food, Agro-Food, and Environment & Energy. The MIRRI partners strive to alleviate the fragmentation of bioresource holdings and expertise, to deliver fit-for-purpose microbial material, to add value to microbial diversity, and to discover and preserve the yet unknown or uncultivated microorganisms.

MIRRI was included in the ESFRI Roadmap 2010 and was acknowledged as ESFRI Landmark in 2021 when it successfully submitted the European Research Infrastructure Consortium (ERIC) Step2 application. MIRRI brings together more than fifty microbial domain Biological Resource Centres (mBRCs), culture collections and research institutes from 11 European countries. The statutory seat of MIRRI ERIC will be located in Portugal while the Collaborative Working Environment Hub will be operated from Spain in cooperation with LifeWatch ERIC Common Facility situated in Spain. The materials and services will be provided by partners in MIRRI member countries, coordinated by their national nodes. Users will be able to easily search MIRRI services and make requests on the MIRRI access portal.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
PT

Member
BE, ES, FR, LV, NL, RO, RU

CTA

Cherenkov Telescope Array

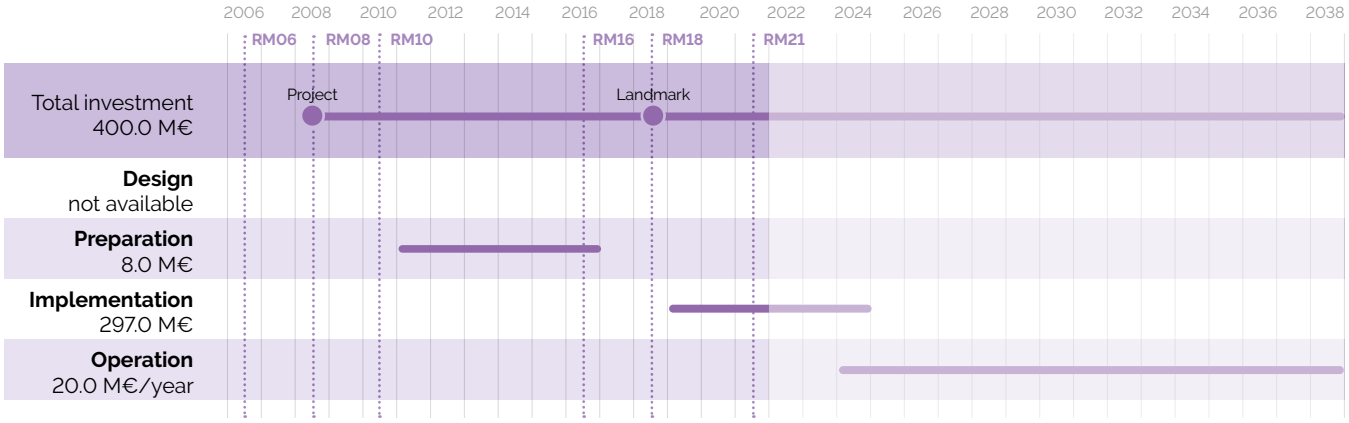
Website	Headquarters	Legal status	Type
www.cta-observatory.org	CTAO gGmbH Heidelberg, Germany	gGmbH, 2014	single-sited

DESCRIPTION

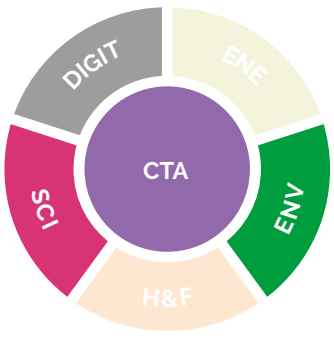
The Cherenkov Telescope Array (CTA) is an Observatory for ground-based very high-energy gamma-ray astronomy. Building on the technology of current generation ground-based gamma-ray detectors, CTA will be ten times more sensitive and have unprecedented accuracy in its detection of high-energy gamma rays with more than 100 telescopes located in the northern and southern hemispheres. CTA will provide the first complete and detailed view of the Universe in this part of the radiation spectrum and will contribute towards a better understanding of astrophysical and cosmological processes, such as the origin of cosmic rays and their role in the Universe, the nature and variety of particle acceleration around black holes and the ultimate composition of matter and physics beyond the Standard Model.

Entered in the ESFRI Roadmap 2008, CTA Observatory (CTAO) was founded to manage the construction and operation of the instrument. The current interim legal entity, the CTAO gGmbH with shareholders from 11 countries plus ESO, is charged with preparing the design and the implementation of the Observatory and will give way to the CTAO European Research Infrastructure Consortium (ERIC). With two host sites in the southern and northern hemispheres – on the European Southern Observatory (ESO) at Paranal grounds in Chile and at the Instituto de Astrofisica de Canarias (IAC) in Roque de los Muchachos Observatory in Spain – it will extend the study of the astrophysical origin of gamma-rays at energies of a few tens of GeV and above, and investigate cosmic non-thermal processes.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
IT

Member
AT, AU, CH, CZ, DE, ES, FR, JP, SI, UK, ESO

ELI ERIC

Extreme Light Infrastructure

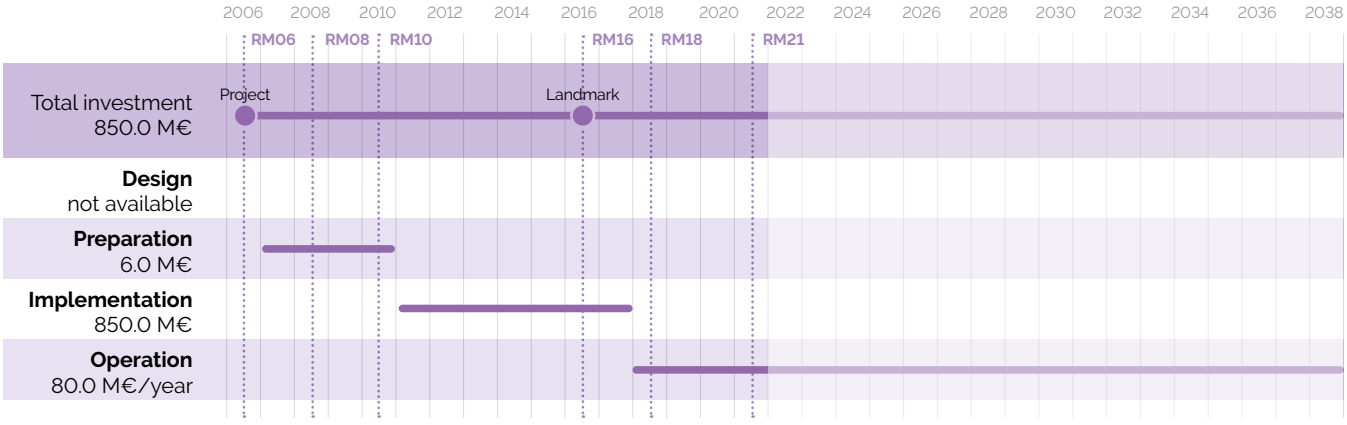
Website	Headquarters	Legal status	Type
www.eli-laser.eu	ELI ERIC Dolní Břežany, Czech Republic	ERIC, 2021	single-sited

DESCRIPTION

The Extreme Light Infrastructure (ELI) is the world's largest and most advanced high-power laser Infrastructure and a global technology and innovation leader in high-power, high-intensity, and short-pulsed laser systems. The international user facility ELI accomodates some of the most intense lasers in the world. ELI's lasers produce ultra-short pulses of high energy photons, electrons, protons, neutrons, muons and neutrinos in the (sub-) attosecond regimes on demand. In terms of research, ELI's lasers enable a broad range of discovery possibilities from pioneering research in physics to applications and engineering. As the technology develops and spreads, ELI will become one of the more cost-effective means to conduct 'big science' in physics, biology, medicine and materials science.

In the ESFRI Roadmap since 2006, ELI established the European Research Infrastructure Consortium (ERIC) in 2021. The ELI ERIC is currently participated by four Members and two Observers, and is responsible for making the ELI facilities available to the scientific community as a single international organisation, with unified governance and management. ELI ERIC consists of two facilities hosting operational world-class high-power, high-repetition-rate laser systems, specialised in different fields of research with extreme light beams: the ELI-Beamlines in Dolní Břežany (Czech Republic) with the ERIC Statutory seat, and the ELI-ALPS for Attosecond Physics in Szeged (Hungary). The forthcoming third facility ELI-NP for Nuclear Physics is under commissioning in Măgurele (Romania).

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
CZ, HU

Member
IT, LT

Observer
BG, DE

ELT

Extremely Large Telescope

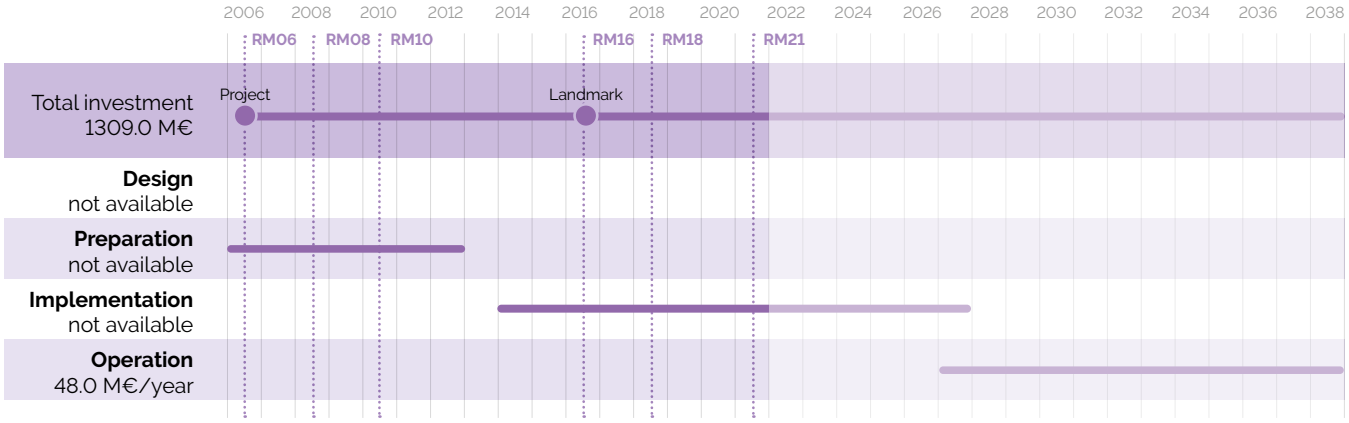
Website	Headquarters	Legal status	Type
elt.eso.org	ESO Garching-bei-München, Germany	ESO EIROforum	single-sited

DESCRIPTION

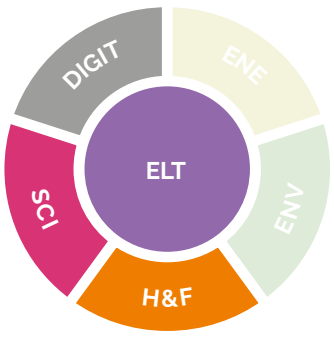
The Extremely Large Telescope (ELT) is a revolutionary ground-based telescope that will have a 39-metre main mirror and will be the largest visible and infrared light telescope in the world: the world's biggest eye on the sky. In addition to this unparalleled size, the ELT will be equipped with a lineup of cutting-edge instruments, designed to cover a wide range of scientific possibilities. The leap forwards with the ELT can lead to a paradigm shift in our perception of the Universe. The ELT will track Earth-like planets around other stars, and has the potential of becoming the first telescope to find evidence of life outside of our Solar System. It will also probe the furthest reaches of the cosmos, revealing the properties of the very earliest galaxies and the nature of the dark Universe.

The ELT is an integral part of ESO, the EIROforum organisation operating facilities at a number of sites in Chile. The ELT programme was approved in 2012 and green light for the first Construction Phase was given at the end of 2014. It will be located at Cerro Armazones, a 3060-metres high mountain in the central part of Chile's Atacama Desert, about 20 kilometres from Cerro Paranal, home of ESO's Very Large Telescope (VLT). From construction of the immense telescope dome structure to casting of the mirrors, the work on this wonder of modern engineering has been made possible thanks to the spirit of collaboration. ESO has been working alongside a worldwide community and dozens of Europe's most cutting-edge companies to bring the ELT to 'technical first light' later this decade.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead

ESO

Member

The following countries are ESO members

AT, BE, CH, CZ, DE, DK, ES, FI, FR, IE, IT, NL, PL, PT, SE, UK

EMFL

European Magnetic Field Laboratory

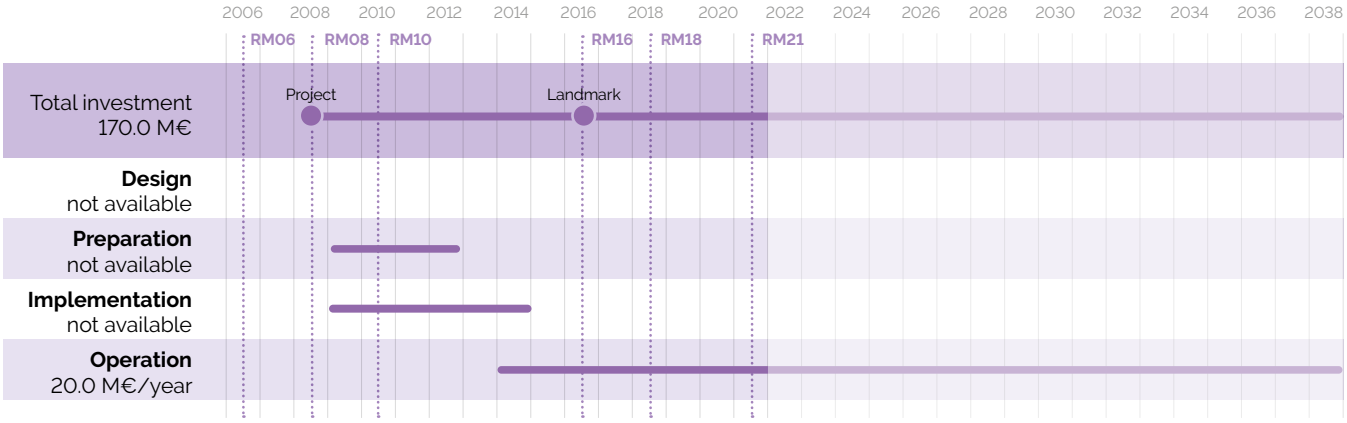
Website	Headquarters	Legal status	Type
https://emfl.eu/	EMFL AISBL Brussels, Belgium	AISBL, 2015	distributed

DESCRIPTION

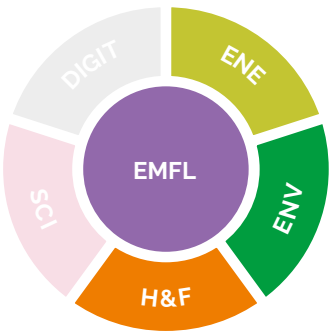
The European Magnetic Field Laboratory (EMFL) develops and operates the highest possible magnetic field facilities and make them available to the scientific community for the systematic investigations and manipulation of material properties. The main research activities supported by EMFL are: magnetic and superconducting materials, strongly correlated electron systems, low dimensional magnetic materials, nanostructured materials, magnet design and technology, semiconductors and nano-systems, mesoscopic physic, strongly correlated electron systems, molecular magnetism, soft condensed matter. Very commonly, materials research provides the basis for innovation that help boost the economy while offering clean technology solutions to problems we are finding ourselves faced with in today's world.

The EMFL was founded as a legal structure in the form of an International non-profit Association under Belgian Law (AISBL) in early 2015 with the aim to unite, coordinate and reinforce the existing European high magnetic field laboratories in a single body as a world-leading Infrastructure. The EMFL formally represents and operates tasks, in particular the access program, of the parent laboratories: the Laboratoire National des Champs Magnétiques Intenses (LNCMI), with its sites for pulsed fields in Toulouse and continuous fields in Grenoble, the Dresden High Magnetic Field Laboratory (HLD) and the High Field Magnet Laboratory (HFML) in Nijmegen. The UK community, represented by the University of Nottingham, joined EMFL at the end of 2015 followed by University of Warsaw (PL) and CEA-IRFU (FR) in 2019.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
DE, FR, NL

Member
PL, UK

ESRF EBS

European Synchrotron Radiation Facility Extremely Brilliant Source

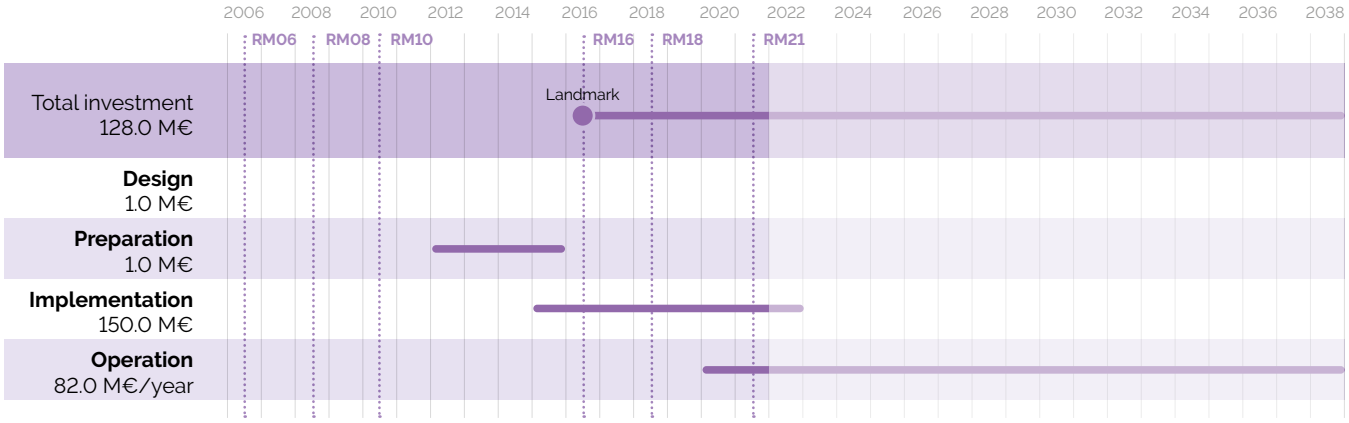
Website	Headquarters	Legal status	Type
www.esrf.fr	ESRF Grenoble, France	ESRF EIROforum	single-sited

DESCRIPTION

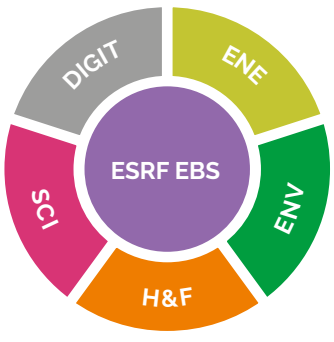
The European Synchrotron Radiation Facility Extremely Brilliant Source (ESRF EBS) is the upgrade of the world-leading source of synchrotron X-rays and a centre of excellence for fundamental and innovation-driven research in condensed and living matter science. Operating more than 40 beamlines with state-of-the-art instrumentation, the ESRF serves ~10.000 scientists each year who study materials and living matter. With the Extremely Brilliant source (EBS), the world's first fourth-generation of high-energy synchrotron, ESRF opens new vistas for X-ray science in imaging condensed and living matter from meter to nanometer scales, enabling scientists to address the global challenges facing our society such as health, climate changes and environment, but also energy and innovative industry.

Since its inception in 1988, the ESRF has driven synchrotron science worldwide. The ESRF partner countries from Europe and beyond – with the successful within-budget and on-time realisation of the EBS programme – have set a new standard in international collaboration. The ESRF EBS (Extremely Brilliant Source) is the facility upgrade that led to opening, in August 2020, the completely rebuilt first fourth-generation high-energy storage ring, bringing its scientific users a unique, low-emittance source and new, cutting-edge beamlines. With a revolutionary new storage ring concept that increases the brilliance and coherence of the X-ray beams produced by a factor of 100 compared to present-day light sources, ESRF EBS represents a new generation of synchrotron and an extraordinary new tool for scientists to study the heart of matter.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
ESRF

Member
The following countries are ESRF members
BE, CH, DE, DK, ES, FI, FR, IT, NL, NO, RU, SE, UK

European Spallation Source ERIC

European Spallation Source

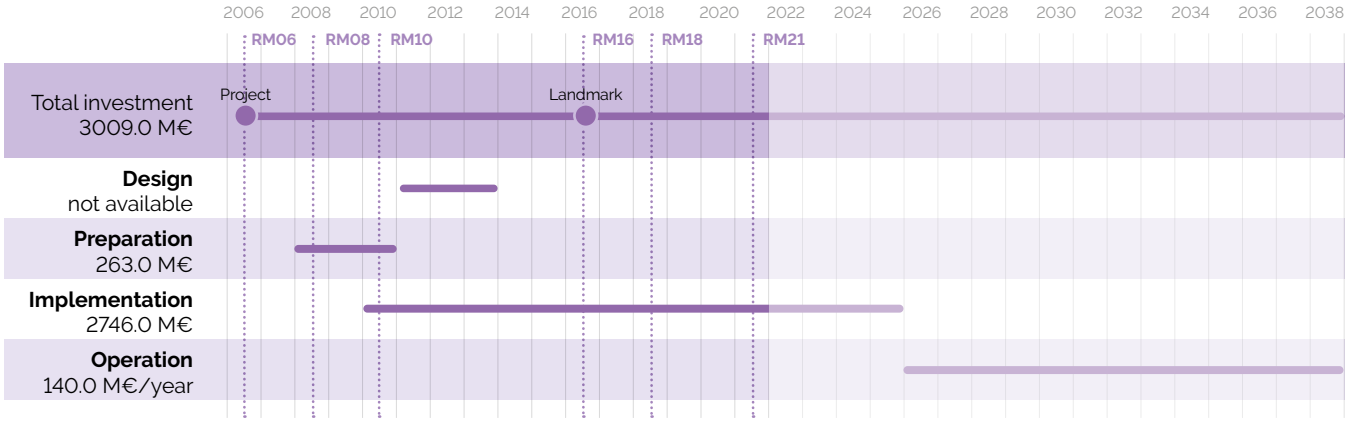
Website	Headquarters	Legal status	Type
https://europeanspallationsource.se/	ESS ERIC Lund, Sweden	ERIC, 2015	single-sited

DESCRIPTION

The European Spallation Source (ESS) is a single-sited, multi-disciplinary Research Infrastructure based on the world's most powerful neutron source. The ESS will use nuclear spallation, a process in which neutrons are liberated from heavy elements by high energy protons, a much safer process than nuclear fission used by other operating facilities. The ESS will provide up to 100 times brighter neutron beams than currently available at existing facilities and thus empowering the study of the structure and function of matter from the microscopic down to the atomic scale. The ESS will enable scientific breakthroughs in research related to materials to improve and develop new solutions for health, environment, clean energy, and help addressing some of the most important societal challenges of our time.

The European Spallation Source became a European Research Infrastructure Consortium (ERIC) in 2015 supported by thirteen Founding Member countries and bringing together around 40 European partners and more than 130 global institutions. ESS is currently under construction in Lund (Sweden) and the Data Management and Software Centre (DMSC) is based in Copenhagen (Denmark). The ESS ERIC has a large network of laboratories to exchange knowledge, personnel and experience, and that in many cases will contribute directly through in-kind contributions which are expected to finance more than 35% of the total construction costs. When the ESS User Programme is full established, an estimated two to three thousand visiting scientists will come to ESS annually to perform experiments.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead
DK, SE

Member
CH, CZ, DE, EE, ES, FR, HU, IT, NO, PL, UK

European XFEL

European X-Ray Free-Electron Laser Facility

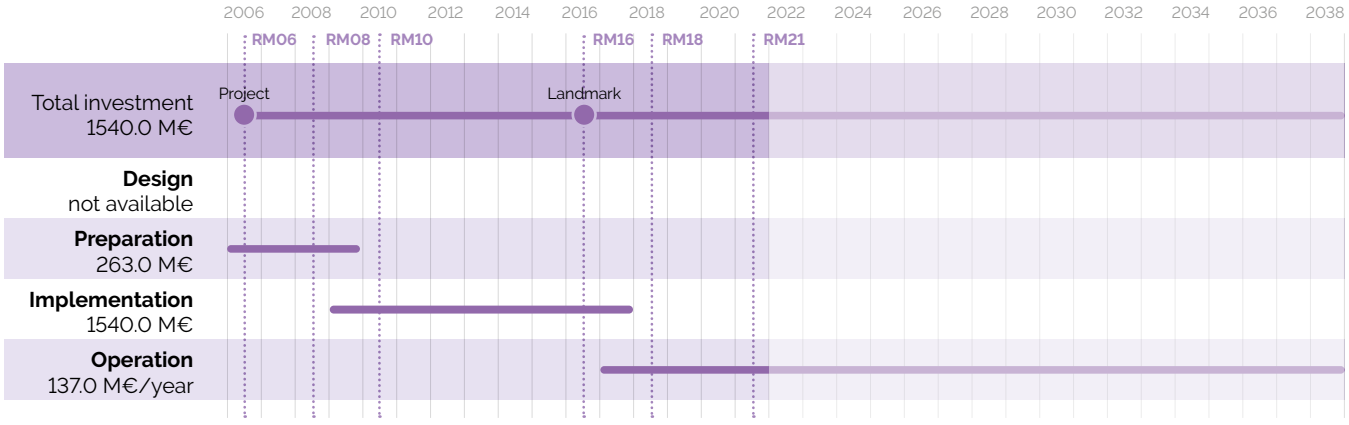
Website	Headquarters	Legal status	Type
www.xfel.eu	European XFEL GbmH Schenefeld, Germany	European XFEL EIROforum	single-sited

DESCRIPTION

The European X-Ray Free-Electron Laser Facility (European XFEL) is a world leading Research Infrastructure for the generation of ultrashort X-ray flashes - 27,000 times per second and with a brilliance that is a billion times higher than that of the best conventional synchrotron X-ray radiation sources. The world's largest X-ray laser creates all-new research opportunities for scientists and industrial users, pushing forward the frontiers of scientific knowledge and thus enabling us to solve major societal challenges. Using the X-ray flashes of the European XFEL, scientists are able to map the atomic details of viruses, decipher the molecular composition of cells, take three-dimensional images of the nanoworld, film chemical reactions, and study processes such as those occurring deep inside planets.

The European XFEL was constructed and founded as a non-profit Company with Limited Liability under German law (GmbH) since 2009 as a joint effort of many partners participating in the project. To this end, the European XFEL GmbH cooperates closely with the DESY research centre and other organizations worldwide. To a great extent, the European XFEL facility was realised by means of in-kind contributions by shareholders and partners. The European XFEL is located mainly in underground tunnels which can be accessed on three different sites. The 3.4 kilometre-long facility runs from the DESY campus in Hamburg to the town of Schenefeld in Schleswig-Holstein. At the research campus in Schenefeld, teams of scientists from all over the world carry out experiments using the X-ray flashes since 2017.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead

European XFEL

Member

The following countries are European XFEL members

CH, DE, DK, ES, FR, HU, IT, PL, RU, SE, SK, UK

FAIR

Facility for Antiproton and Ion Research

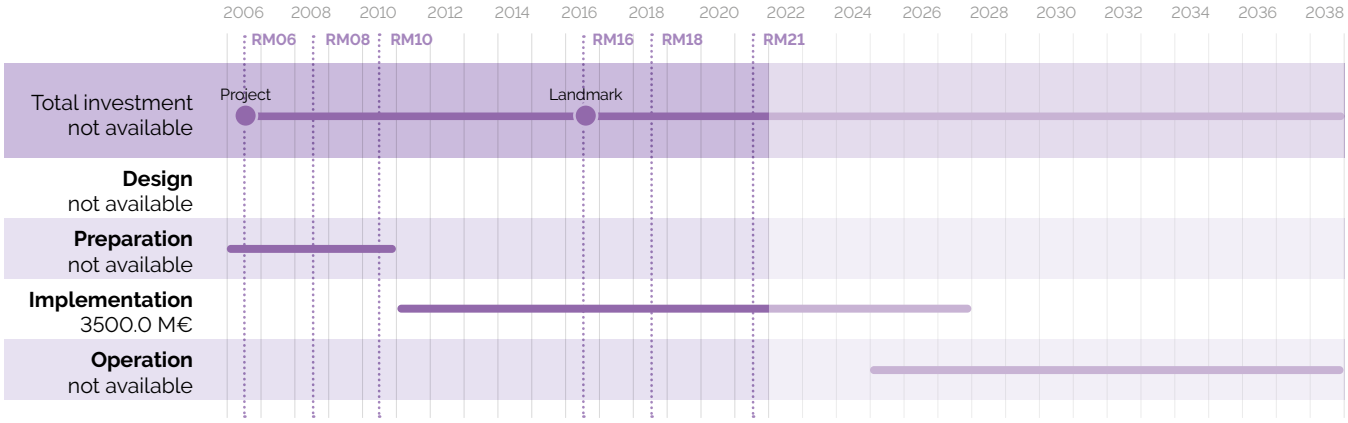
Website	Headquarters	Legal status	Type
www.gsi.de/en/researchaccelerators/fair	FAIR GmbH Darmstadt, Germany	GmbH, 2010	single-sited

DESCRIPTION

The Facility for Antiproton and Ion Research (FAIR) is a new complex accelerator providing high-energy, high-intensity primary and secondary beams of antiprotons and ions to enable forefront research into the structure and dynamics of matter under extreme conditions. In close cooperation with astronomers, who use telescopes to view the Universe at a distance, the scientists at FAIR will directly create and examine cosmic matter in the laboratory, thereby providing new insights into the evolution of the Universe and the nucleosynthesis in stars and star explosions. In addition to the fundamental science research, FAIR is focusing on applications like radiobiological risk assessments for manned space missions, material sciences, plasma physics studies, and radiotherapy research.

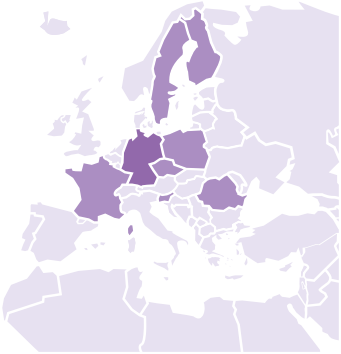
The FAIR was established as a Company with Limited Liability under German law (GmbH) in 2010, when ten countries – the shareholders of the FAIR GmbH – signed the international agreement for the construction of the FAIR facility in Darmstadt. In total over 50 countries are involved in the FAIR science program by contributing to the construction and to the exploitation of the FAIR detectors. The FAIR experiments are organized in four large collaborations: APPA, CBM, NUSTAR and PANDA encompassing more than 2,500 scientists in total. FAIR is expected to deliver first beams for science experiments in 2025. Partial operation – FAIR Phase 0 science programme – has started in 2018 with the upgraded GSI accelerators, which will serve as injector chain for FAIR, and the new FAIR storage ring CRYRING.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT



Lead
DE

Member
CZ, FI, FR, IN, PL, RO, RU, SE, SI, UK

HL-LHC

High-Luminosity Large Hadron Collider

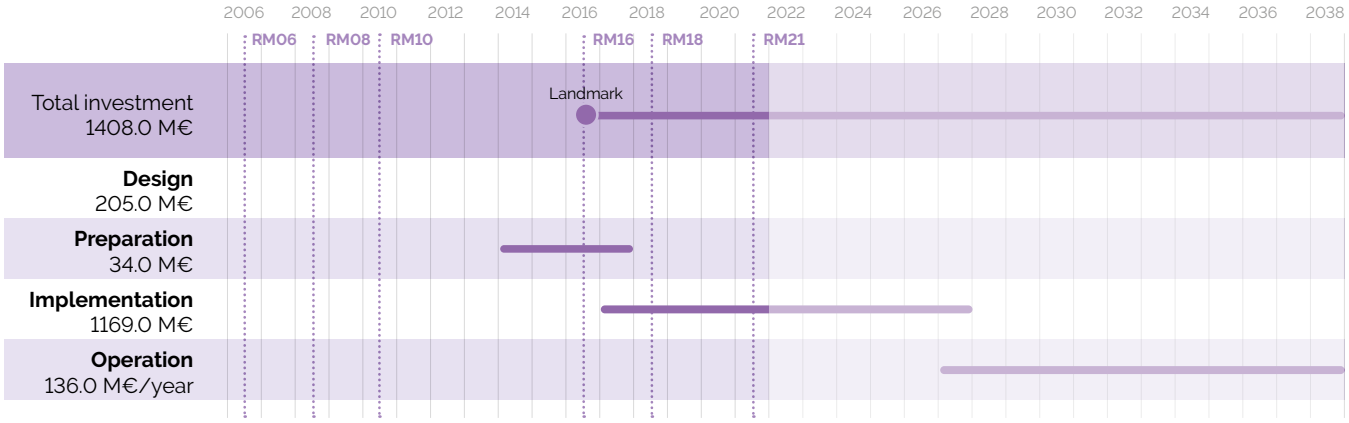
Website	Headquarters	Legal status	Type
https://hilumilhc.web.cern.ch/	CERN Geneva, Switzerland	CERN EIROforum	single-sited

DESCRIPTION

The High-Luminosity Large Hadron Collider (HL-LHC) is an upgrade of the LHC which aims to achieve instantaneous luminosities a factor of five larger than the LHC nominal value, thereby enabling the experiments to enlarge their data sample by one order of magnitude compared with the LHC baseline programme. Following five years of design study and R&D, this project will require about ten years of developments, prototyping, testing and implementation with operation expected to start in the second half of this decade. The timeline is dictated by many critical components of the accelerator ending their lifetime and need to be replaced. The upgrade phase is therefore crucial not only for the full exploitation of the LHC physics potential, but also to enable operation of the collider beyond 2027.

The Large Hadron Collider (LHC) at CERN has been exploring the high-energy frontier since 2010 and attracts a global user-community of more than 7,000 scientists spanning more than 60 countries. In July 2012 the LHC experiments, ATLAS and CMS, announced the first major discovery: the long-sought Higgs boson, the cornerstone of the Standard Model (SM) of Particle Physics. After a two-year long shutdown, the LHC restarted delivering proton-proton collisions at a record of 13 TeV centre-of-mass energy in spring 2015. In order to further increase its discovery potential around the mid-2020s, LHC would eventually need an upgrade to increase the total number of collisions by a factor of 10. How this upgrade can be technically achieved is at the heart of the High Luminosity LHC project.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead

CERN

Member

The following countries are CERN members

AT, BE, BG, CH, CZ, DE, DK, EL, ES, FI, FR, HU, IL, IT, NL, NO, PL, PT, RO, RS, SE, SK, UK

ILL

Institut Max von Laue - Paul Langevin

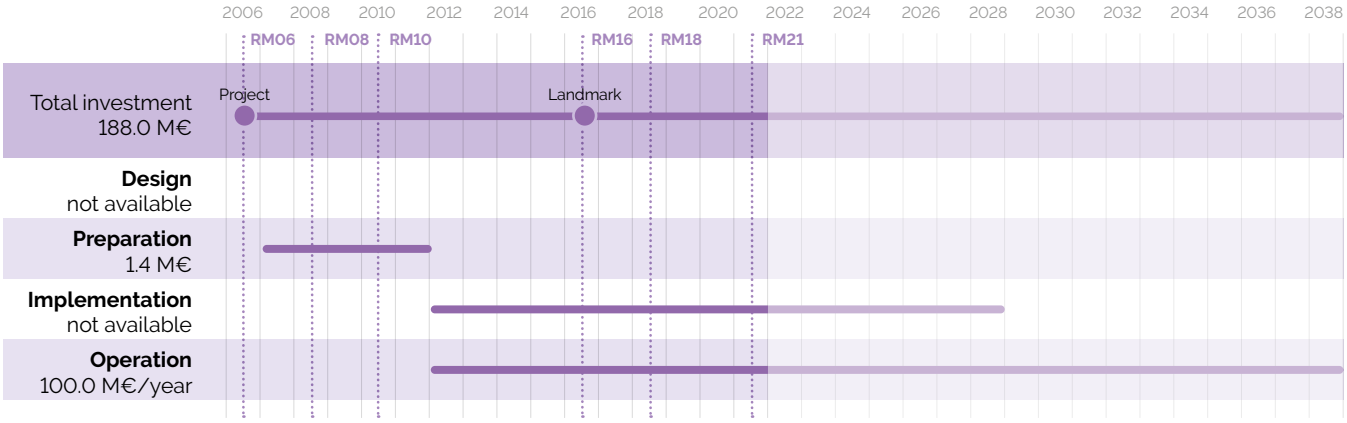
Website	Headquarters	Legal status	Type
www.ill.eu	ILL Grenoble, France	ILL EIROforum	single-sited

DESCRIPTION

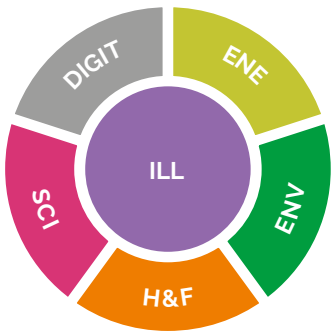
The Institut Max von Laue - Paul Langevin (ILL) is the leading international research facility for neutron science and technology. The reactor provides intense beams of neutrons that enable a large and diverse scientific community of visiting academic and industrial researchers to make new scientific advances and discoveries. The ILL suite of highperformance instruments is constantly developed and upgraded aiming at improving operation, adapting the instrumentation to new research environments and offering new innovative techniques. Research at the ILL addresses critical challenges across areas ranging from the study of the origin of the Universe to the understanding of viral diseases in living organisms. The ILL devotes a large part of its activity to new energies and the environment.

Entered in the ESFRI Roadmap in 2006 with the ILL 20/20 project, ILL continuously developed programmes to support the overall upgrade of the instrument suit. By 2023, a two-decade campaign of improvements to the reactor and instruments will be complete, positioning researchers to carry out completely new types of experiments. The sixth protocol, recently signed by ILL's Associate countries, extends the original agreement from 1971 for the period 2024 to 2033. In partnership with ILL's Scientific Member countries, the commitment expressed in the protocol will ensure that European researchers have access to world-leading neutron scattering capabilities for break-through discoveries thus contributing to Europe's competitiveness in areas addressing the most challenging questions facing our societies.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead

ILL

Member

The following countries are ILL members

AT, BE, CH, CZ, DE, DK, ES, FR, IT, PL, SE, SI, SK, UK

SKAO

Square Kilometre Array Observatory

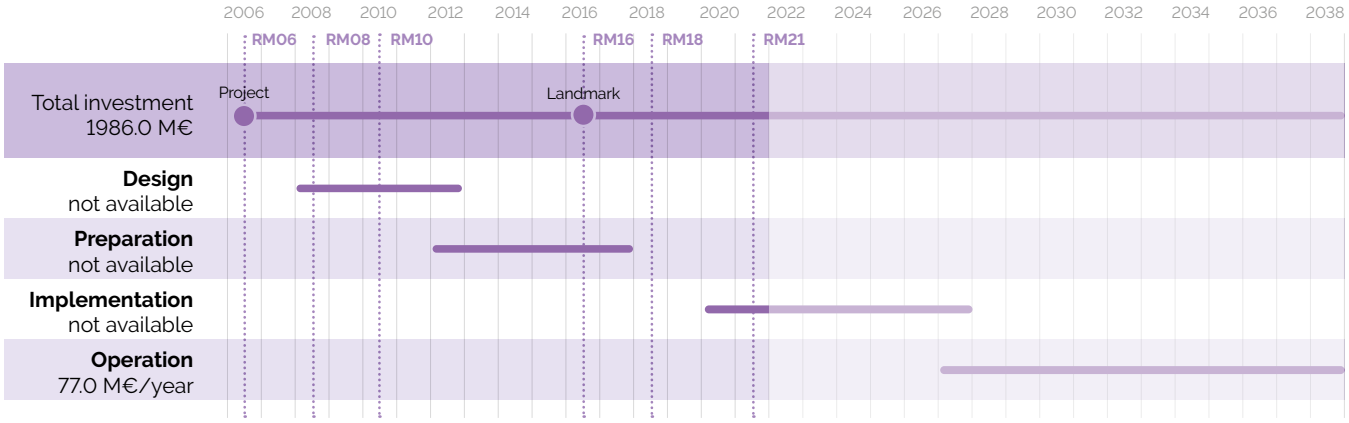
Website	Headquarters	Legal status	Type
www.skao.int	Jodrell Bank Lower Withington, United Kingdom	SKA Organisation, 2011	single-sited

DESCRIPTION

The Square Kilometre Array Observatory (SKAO) is a global effort to build and operate the largest and most sensitive radio telescope on Earth, with eventually over one million square metres of collecting area. SKAO will be able to look back into the furthest reaches of the cosmos to study the first structures in the Universe, as well as probing the nature of gravity and cosmic magnetism and exploring the origins of life itself. The scale of the SKA represents a huge leap forward in both engineering and research & development towards building and delivering a unique instrument, with the detailed design and preparation under way. As one of the largest scientific endeavours in history, the SKA will bring together a wealth of the world's finest scientists, engineers and policy makers to bring the project to fruition.

The SKA Project is led by the SKA Organisation, a not-for-profit company established in December 2011 to formalise relationships between the international partners and centralise the leadership of this grand endeavour. Whilst 14 member countries are the cornerstone of the SKAO, around 100 organisations across about 20 countries are participating in its design and development. In 2012, the members of the SKAO agreed on a dual site location for the SKA telescope in the deserts of South Africa and Australia, while the site for the Headquarters was established in the UK. The Construction Phase has started in 2021 with early science foreseen in 2025, providing an operational array of telescopes capable of carrying out some of the key science set by the community, before scaling up to the full SKAO by 2030s.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS

POLITICAL SUPPORT

Lead

SKAO

Member

The following countries are SKAO members

AU, CA, CH, CN, DE, ES, FR, IN, IT, NL, PT, SE, UK, ZA

SPIRAL2

Système de Production d'Ions Radioactifs en Ligne de 2e génération

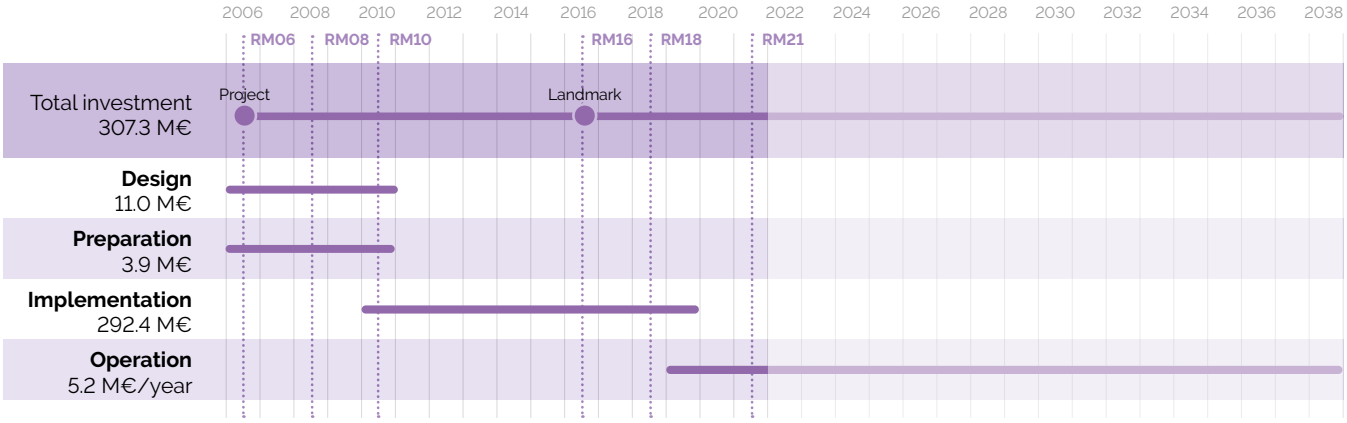
Website	Headquarters	Legal status	Type
www.ganil-spiral2.eu	GANIL Caen, France	GANIL	single-sited

DESCRIPTION

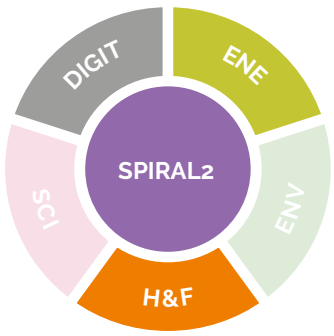
The Système de Production d'Ions Radioactifs en Ligne de 2e generation (SPIRAL2) is a linear particle accelerator facility to extend significantly the actual possibilities of Radioactive Ion Beam (RIB) to study fundamental nuclear physics and related applications. The impact of SPIRAL2 is enabling a scientific programme based on unique high-intensity beams of light, heavy-ions and neutrons well suited to address the most challenging nuclear and astrophysics questions aiming at the deeper understanding of the nature of atomic nucleus. SPIRAL2 will contribute to the physics of nuclear fission and fusion based on the collection of unprecedented detailed fundamental nuclear data, and to the production of rare radioisotopes for medicine, to radiobiology and to materials science.

SPIRAL2 LINAC (LINear ACcelerator) is part of the GANIL facility in Lower Normandy (Caen, France), one of the leading laboratories in the world engaged in research with ion beams. Entered in the ESFRI Roadmap in 2006, the SPIRAL2 project has been almost financed by the regional authority and the French funding agencies CNRS and CEA. It started the Preparation Phase in 2007 with the main goal to develop and sign the consortium agreement allowing for the construction and operation of the facility as a fully international structure. Commissioned since 2010, SPIRAL2 can accelerate lighter nuclei than the GANIL cyclotrons, thereby extending the research done until now. In Operation Phase since 2020, it is currently delivering science as a scientific and technologic complement to the existing infrastructure GANIL.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
FR

CESSDA ERIC

Consortium of European Social Science Data Archives

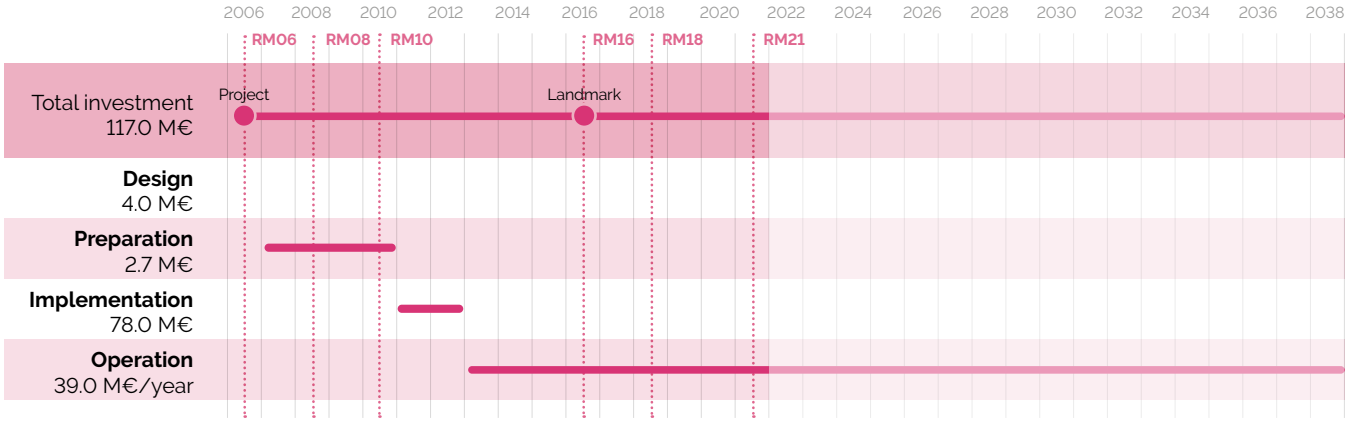
Website	Headquarters	Legal status	Type
www.cessda.eu	CESSDA ERIC Bergen, Norway	ERIC, 2017	distributed

DESCRIPTION

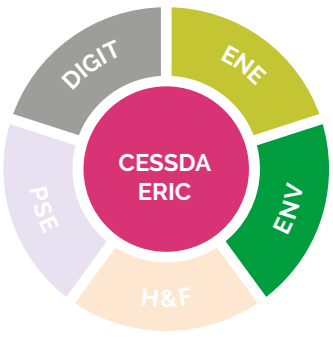
The Consortium of European Social Science Data Archives (CESSDA) is a distributed Research Infrastructures serving as a large-scale, integrated and sustainable platform for data services relevant to the Social Sciences. It supports high-quality, national and international research and cooperation by bringing together Social Science data archives across Europe, and expand easy access to data and metadata regardless of borders. CESSDA is aiming at facilitating social, economic and political research, thus contributing to the production of effective solutions to the major challenges facing society today. CESSDA supports continuous learning and training of its data providers and user community to cover research data management, data discovery and reuse, digital preservation and data archiving.

Since its establishment in 1976, CESSDA served as an informal umbrella organisation for European national Social Science data archives. In the ESFRI Roadmap since 2006, CESSDA has been listed as success story in the Roadmap 2010 and was recognised as ESFRI Landmarks in 2016. It became a legal institution limited company under Norwegian law (CESSDA AS) in 2013 and then an European Research Infrastructure Consortium (ERIC) in 2017. Norway is hosting CESSDA, and the main office is located in Bergen. Presently 16 countries are Members of the Consortium and one country is a formal Observer, each represented by a national institution providing relevant services. Additionally, Social Science data archives from other European countries are cooperating, taking part to some activities or aiming at membership.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
NO

Member
AT, BE, CZ, DE, DK, EL, FI, FR, HR, HU, IE, IS, IT, MK, NL, PT, RS, SE, SI, SK, UK

Observer
CH

CLARIN ERIC

Common Language Resources and Technology Infrastructure

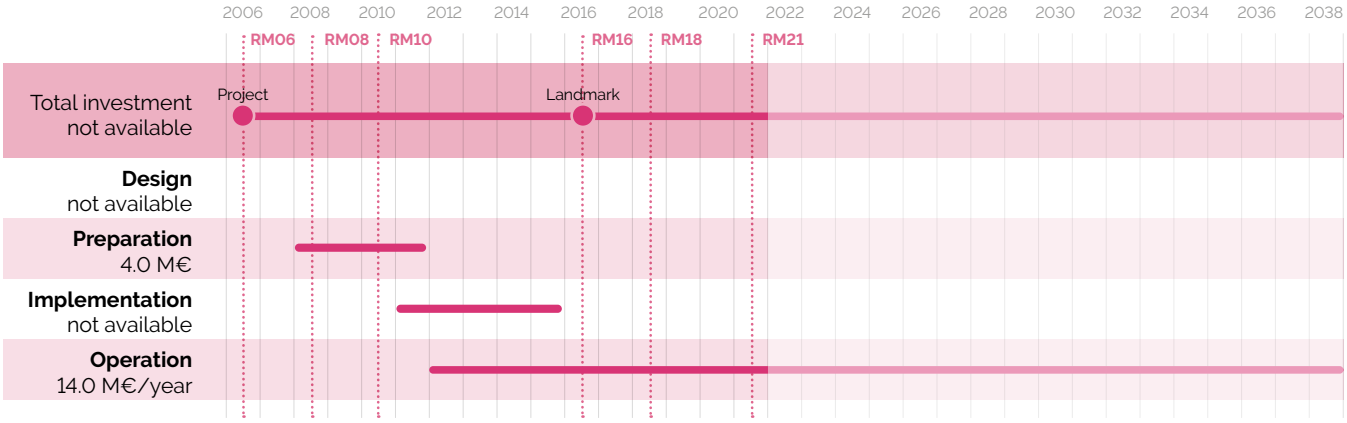
Website	Headquarters	Legal status	Type
www.clarin.eu	CLARIN ERIC Utrecht, The Netherlands	ERIC, 2012	distributed

DESCRIPTION

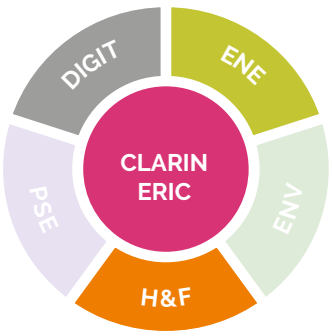
The Common Language Resources and Technology Infrastructure (CLARIN) is a distributed Research Infrastructure that provides easy and sustainable access for scholars in the Humanities and Social Sciences to FAIR digital language data – in written, spoken or multimodal form – and advanced tools to discover, explore, exploit, annotate, analyse or combine them, independent of their location. CLARIN is building a networked federation of language data repositories, service centres and centres of expertise, with single sign-on access for all members of the academic community in all participating countries. Tools and data from different centres are interoperable, so that data collections can be combined and tools from different sources can be chained to perform complex operations to support researchers in their work.

Entered in the ESFRI Roadmap 2016, CLARIN became a European Research Infrastructure Consortium (ERIC) in 2012. Since then several countries have joined either as full Member, or as Observer. The ultimate goal is to include all European countries as well as any interested third countries in or outside Europe. The majority of operations, services and centres of the CLARIN infrastructure is provided and funded by CLARIN Members (and Observers). They set up a national consortium, typically consisting of universities, research institutions, libraries and public archives, of which at least one has the status of CLARIN Centre which is expected to create and provide access to digital language data collections, and digital tools and expertise for researchers to work with them.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
NL

Member
AT, BE, BG, CZ, CY, DE, DK, EE, EL, FI, HR, HU, IS, IT, LT, LV, NO, PL, PT, SE, SI

Observer
FR, UK, ZA

DARIAH ERIC

Digital Research Infrastructure for the Arts and Humanities

Website
www.dariah.eu

Headquarters
DARIAH ERIC
Paris, France

Legal status
ERIC, 2014

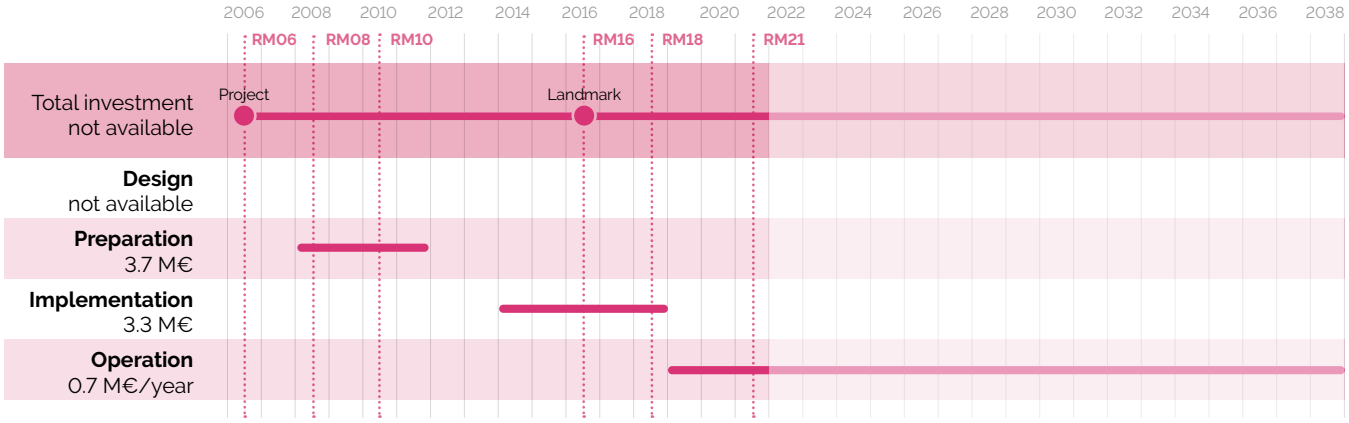
Type
distributed

DESCRIPTION

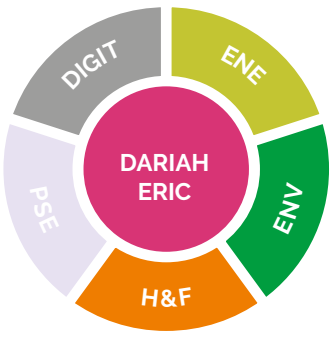
The Digital Research Infrastructure for the Arts and Humanities (DARIAH) is a distributed Research Infrastructure to enhance and support digitally-enabled research and teaching for Arts and Humanities. DARIAH is a network of people, expertise, information, knowledge, content, methods, tools and technologies from its member countries. It develops, maintains and operates an Infrastructure that sustains researchers in building, analysing and interpreting digital resources. By working with communities of practice, DARIAH brings together state-of-the-art digital arts and humanities activities and scales their results to a European level. It preserves, provides access to and disseminates research that stems from these collaborations and ensures that best practices, methodological and technical standards are followed.

Entered in the ESFRI Roadmap 2006, DARIAH was established as a European Research Infrastructure Consortium (ERIC) in 2014. DARIAH was awarded Landmark Status in 2016 as a Research Infrastructure that reached its Implementation Phase and was considered a pan-European hub of scientific excellence. Currently, DARIAH has 20 Members, one Observer and several Cooperating Partners in six non-member countries. Structurally, DARIAH operates through the Europe-wide networks of the Virtual Competency Centres (VCCs) and their constituent Working Groups. Each of the four VCCs is cross-disciplinary, multi-institutional, international and centred on a specific area of expertise. Within this structure, DARIAH has over 20 dynamic Working Groups to integrate national services under specific operational categories.

TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT

Lead
FR

Member
AT, BA, BE, BG, CY, CZ, DE, DK, EL, HR, IE, IT, LU, MT, NL, PL, PT, RS, SI

Observer
CH

ESS ERIC

European Social Survey

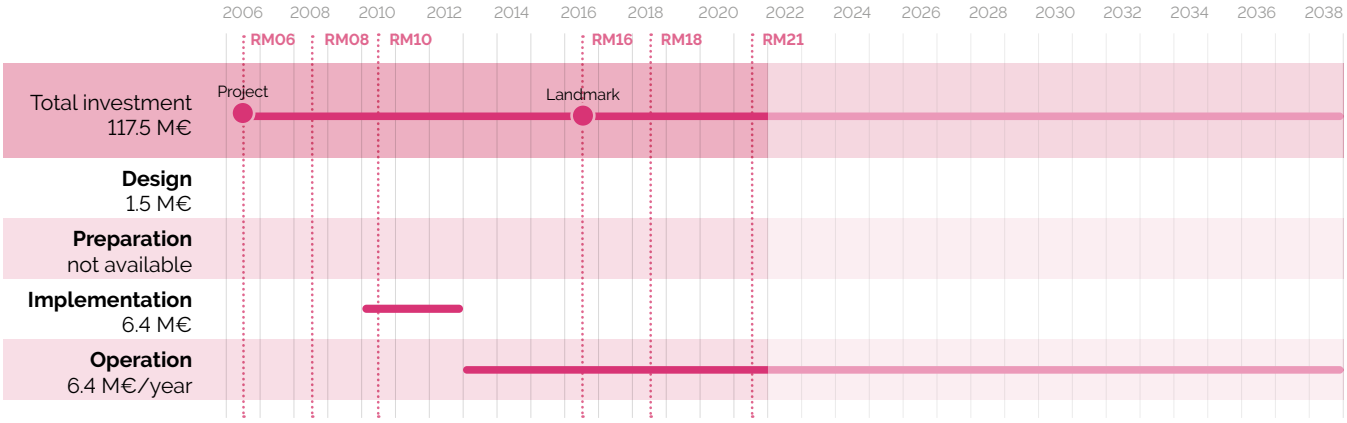
Website	Headquarters	Legal status	Type
www.europeansocialsurvey.org	ESS ERIC London, United Kingdom	ERIC, 2013	distributed

DESCRIPTION

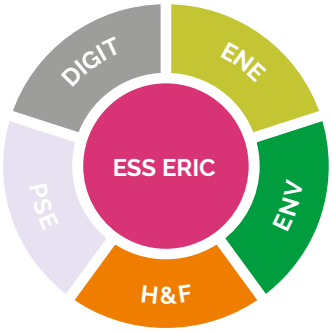
The European Social Survey (ESS) is an academically driven cross-national survey that has been conducted across Europe since 2001. Every two years, face-to-face interviews are conducted with newly selected, cross-sectional samples. The ESS RI assembles, interprets and disseminates data on social attitudes and behaviours that are gathered in each of the participating countries. It responds to the academic, public policy and societal needs to understand social stability and change within the European context. The topics of the ESS include: citizen involvement and democracy, family and working life, personal and social well-being, attitudes to and experiences of ageism as well as trust in institutions. The survey allows for new topics to be introduced over time via an open academically-led competition.

The ESS was established as European Research Infrastructure Consortium (ERIC) in November 2013. Currently, 25 countries are Members, one Observer and 6 Guest providing data on attitudes, beliefs and behaviour. ESS is coordinated by the Centre for Comparative Social Surveys (City University, London) in partnership with the Catholic University of Leuven (BE); GESIS (DE); NSD (NO); SCP (NL) and the University of Amsterdam. Ten round surveys have been run since 2001 monitoring change and continuity in a range of social variables including social and public trust; political interest and participation; socio-political orientations; media use; moral, political and social values; social exclusion, national, ethnic and religious allegiances; well-being, health and security; demographics and socio-economics.

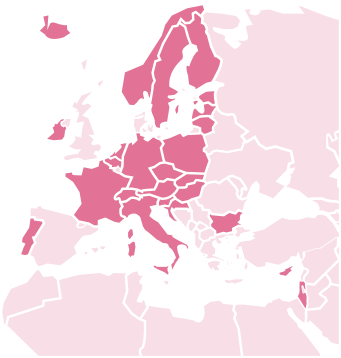
TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT



Lead
UK

Member
AT, BE, BG, CY, CZ, DE, EE, FI, FR, HR, HU, IE, IL, IS, IT, LT, LV, NL, NO, PL, PT, SE, SI, SK

Observer
CH

SHARE ERIC

Survey of Health, Ageing and Retirement in Europe

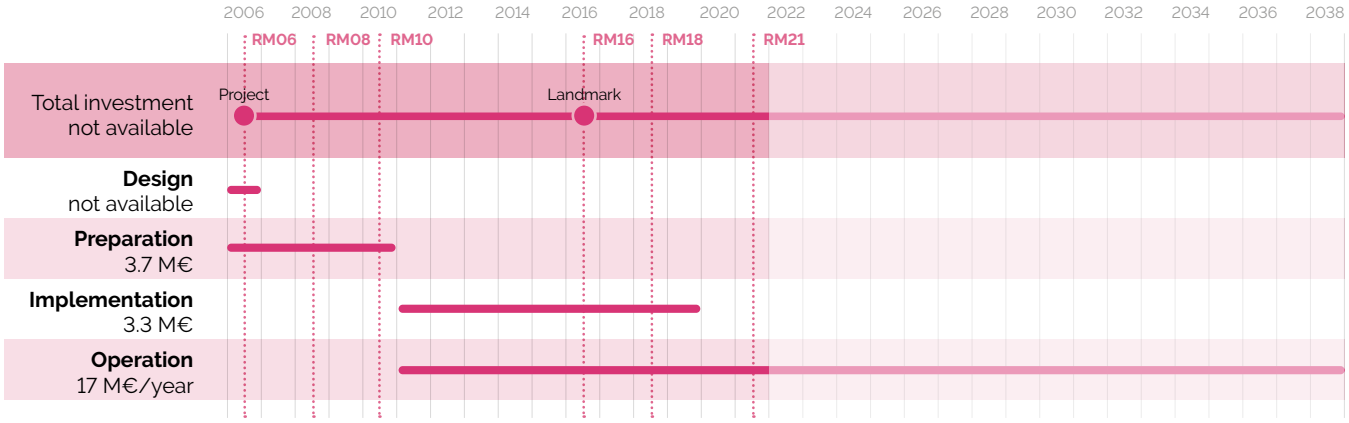
Website	Headquarters	Legal status	Type
www.share-project.org	SHARE ERIC Munich, Germany	ERIC, 2011	distributed

DESCRIPTION

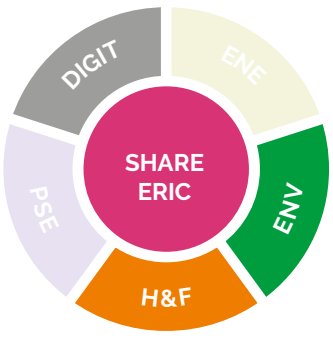
The Survey of Health, Ageing and Retirement in Europe (SHARE) is a Research Infrastructure for studying the effects of health, social, economic and environmental policies over the life-course of European citizens and beyond. From 2004 until today, 480,000 in-depth interviews with 140,000 people aged 50 or older from 28 European countries and Israel have been conducted. Thus, SHARE is the largest pan-European social science panel study providing internationally comparable longitudinal micro data which allows insights in the fields of public health and socio-economic living conditions of European individuals, both for scientists and policy makers. SHARE has global impact since it additionally is embedded in a network of sister studies all over the world, from the Americas to Eastern Asia.

SHARE was selected in the ESFRI Roadmap 2006 and given a new legal status as the first ever European Research Infrastructure Consortium (ERIC) in 2011. SHARE is centrally coordinated at the Munich Center for the Economics of Aging (MEA), a division of the Max Planck Institute for Social Law and Social Policy. To date, SHARE has collected eight panel Waves of current living circumstances and two waves of retrospective life histories. In March 2020, the outbreak of COVID-19 hit SHARE in the middle of its 8th Wave of data collection and the fieldwork had to be suspended. A first release of SHARE's new Wave 8 COVID-19 data has been published in December 2020. In 2021, regular SHARE Wave 8 data is published and a second SHARE Corona Survey is implemented in all SHARE member countries.

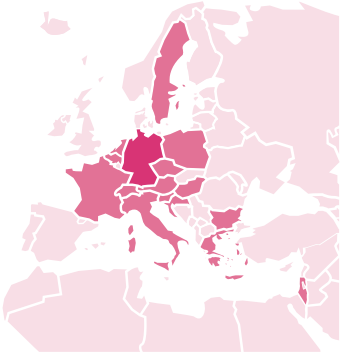
TIMELINE & ESTIMATED COSTS



INTERCONNECTIONS



POLITICAL SUPPORT



Lead
DE

Member
AT, BE, BG, CZ, EL, FR, HR, HU, IL, IT, NL, PL, SE, SI

Observer
CH