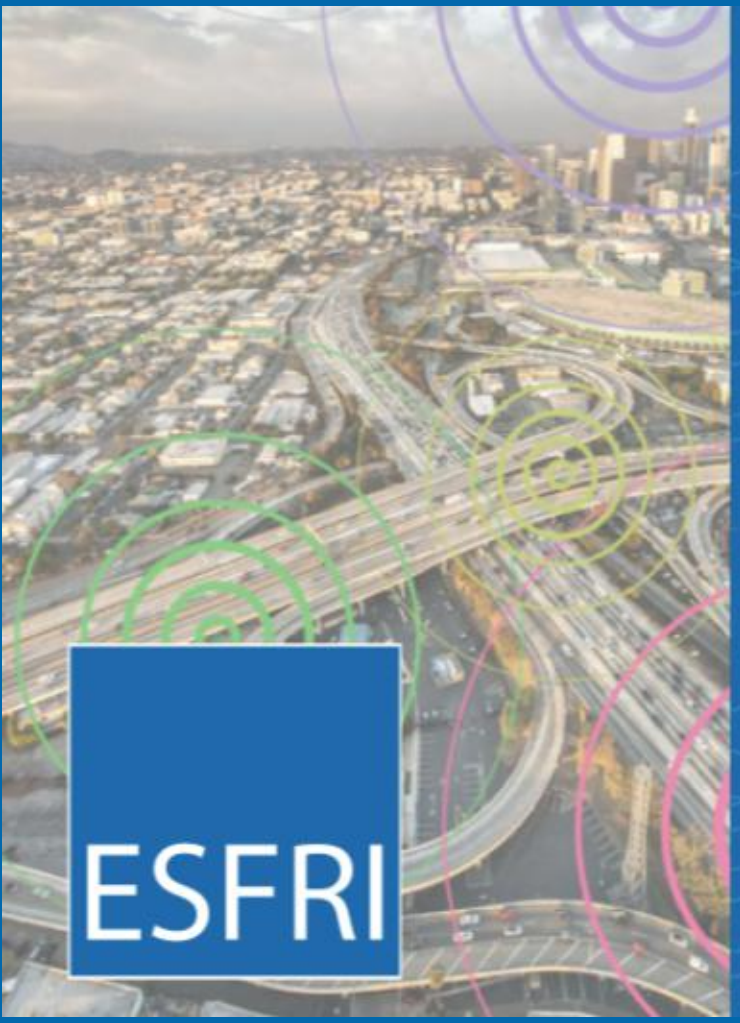
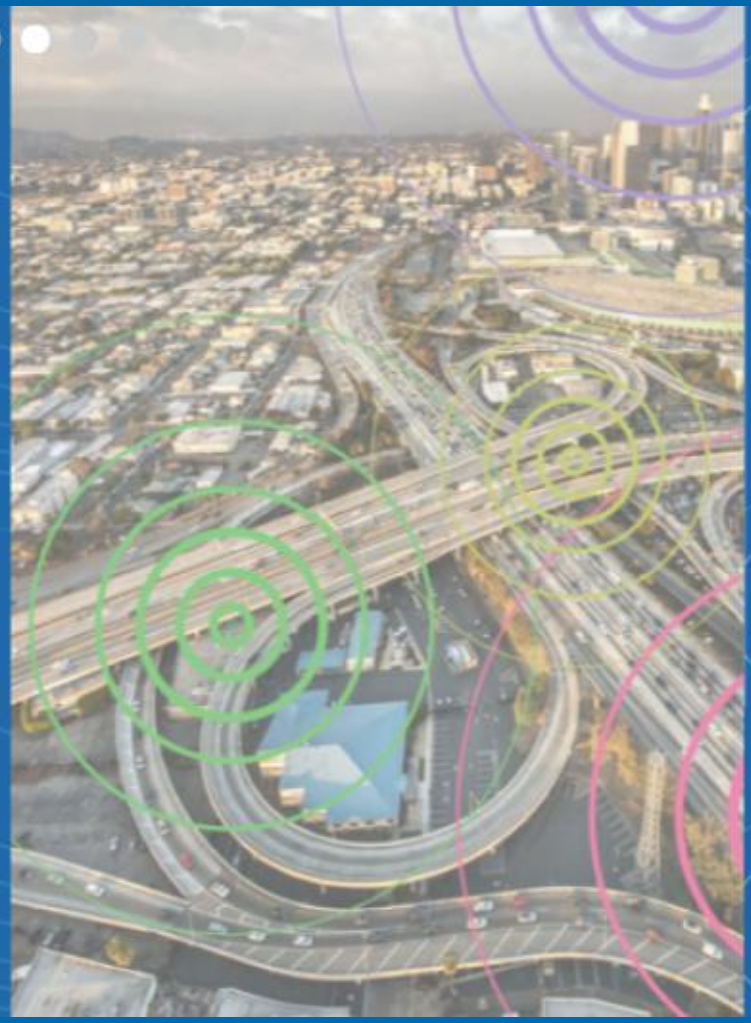


ESFRI

Roadmap 2018
Info Day
17.01.2017
Malaga,Spain



2nd Exchange
of Experience
Workshop
18.01.2017
Malaga,Spain

European Strategy Forum
on Research Infrastuctures

ESFRI

MONITORING AND PERIODIC REVIEW AS KEY ELEMENTS CONTRIBUTING TO THE LONG-TERM SUSTAINABILITY OF THE ESFRI RI PORTFOLIO

Strategy Report on Research Infrastructures
ROADMAP 2018

Giorgio Rossi
ESFRI Chair

EoE Workshop – 18th January 2017

Málaga
Spain

Strategy Report on Research Infrastructures
ROADMAP 2018

ESFRI

ESFRI ROADMAP

The Roadmap identifies new pan-European Research Infrastructures or major up-grades to existing ones, corresponding to the needs of European research communities in the next 10 to 20 years, in all fields of research

The Roadmap was realised in:

- 2006, 35 RIs
- 2008, 44 RIs
- 2010, 48 RIs

NEW SINCE 2016:

The Roadmap 2016 also identifies the ESFRI Landmarks that are implemented projects leading in their domain and structuring the European and global landscape.

- 2016, 21 Projects & 29 Landmarks

Workshop – 18th January
Málaga, Spain

Strategy Report on Research Infrastructures

ROADMAP 2018

ESFRI

ESFRI PROJECTS

	NAME	FULL NAME	ROADMAP ENTRY (YEAR)	OPERATION (YEAR)	LEGAL STATUS (AS OF 10 MARCH 2016)	CONSTRUCTION COSTS (M€)	OPERATIONAL ANNUAL BUDGET (M€/YEAR)
ENERGY	ECCSEL	European Carbon Dioxide Capture and Storage Laboratory Infrastructure	2008	2016	ERIC under preparation	80-120	1**
	EU-SOLARIS	European SOLAR Research Infrastructure for Concentrated Solar Power	2010	2020*	ERIC under preparation	120	3-4
	MYRRHA	Multi-purpose hYbrid Reactor for High-tech Applications	2010	2024*		NA	100
	WindScanner	European WindScanner Facility	2010	2018*		45-60	8
ENVIRONMENT	ACTRIS	Aerosols, Clouds and Trace gases Research Infrastructure	**2016**	2025*		190	50
	DANUBIUS-RI	International Centre for Advanced Studies on River-Sea Systems	**2016**	2022*		222	28
	EISCAT_3D	Next generation European incoherent scatter radar system	2008	2021*		74	6
	EPOS	European Plate Observing System	2008	2020*	ERIC under preparation	53	15
	SIOS	Svalbard Integrated Arctic Earth Observing System	2008	2020*		80	2-3
HEALTH& FOOD	AnaEE	Infrastructure for Analysis and Experimentation on Ecosystems	2010	2018*		200	2-3**
	EMBRC	European Marine Biological Resource Centre	2008	2016	ERIC under preparation	4,5	6
	EMPHASIS	European Infrastructure for multi-scale Plant Phenomics and Simulation for food security in a changing climate	**2016**	2020*		73	3,6
	ERINHA	European research infrastructure on highly pathogenic agents	2008	2018*		NA	NA
	EU-OPENSCREEN	European Infrastructure of Open Screening Platforms for Chemical Biology	2008	2018*	ERIC under preparation	7	1,2
	Euro-BioImaging	European Research Infrastructure for Imaging Technologies in Biological and Biomedical Sciences	2008	2017*	ERIC under preparation	NA	1,55
	ISBE	Infrastructure for Systems Biology Europe	2010	2018*		30	7,2
	MIRRI	Microbial Resource Research Infrastructure	2010	2019*		6,2	1
PHYSICAL SCIENCES & ENGINEERING	CTA	Cherenkov Telescope Array	2008	2023*		297	20
	EST	European Solar Telescope	**2016**	2026*		200	9
	KM3NeT 2.0	KM3 Neutrino Telescope 2.0: Astroparticle & Oscillations Research with Cosmics in the Abyss	**2016**	2020*		92	3
SOCIAL & CULTURAL INNOVATION	E-RIHS	European Research Infrastructure for Heritage Science	**2016**	2022*		4	5
e-RI							

*expected **for centralised services NA=Not Available

21 Projects

29 Landmarks

ESFRI LANDMARKS

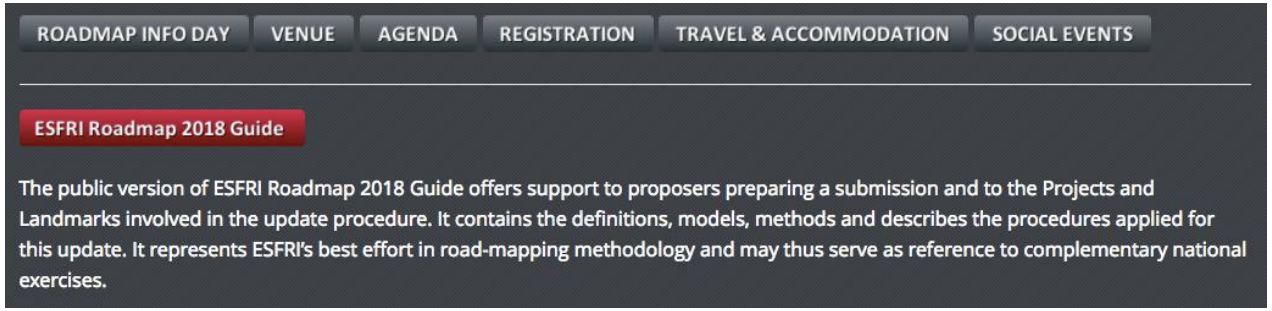
	NAME	FULL NAME	ROADMAP ENTRY (YEAR)	OPERATION (YEAR)	LEGAL STATUS (AS OF 10 MARCH 2016)	CAPITAL VALUE (M€)	OPERATIONAL ANNUAL BUDGET (M€/YEAR)
ENERGY	JHR	Jules Horowitz Reactor	2006	2020*		1.000	NA
ENVIRONMENT	EMSO	European Multidisciplinary Seafloor and water-column Observatory	2006	2016	ERIC under preparation	108	36
	EURO-ARGO ERIC	European contribution to the International Argo Programme	2006	2014	ERIC, 2014	10	8
	IAGOS	In-service Aircraft for a Global Observing System	2006	2014	AISBL, 2014	25	6
	ICOS ERIC	Integrated Carbon Observation System	2006	2016	ERIC, 2015	48	24-35
	LifeWatch	e-Infrastructure for Biodiversity and Ecosystem Research	2006	2016	ERIC under preparation	66	10
HEALTH& FOOD	BBMRI ERIC	Biobanking and BioMolecular resources Research Infrastructure	2006	2014	ERIC, 2013	170-220	3,5
	EATRIS ERIC	European Advanced Translational Research Infrastructure in Medicine	2006	2013	ERIC, 2013	500	2,5
	ECRIN ERIC	European Clinical Research Infrastructure Network	2006	2014	ERIC, 2013	1,5	2
	ELIXIR	A distributed infrastructure for life-science information	2006	2014	ELIXIR Consortium Agreement, 2013	125	95
	INFRAFRONTIER	European Research Infrastructure for the generation, phenotyping, archiving and distribution of mouse disease models	2006	2013	GmbH, 2013 ERIC under preparation	180	80
	INSTRUCT	Integrated Structural Biology Infrastructure	2006	2012	International Consortium Agreement, 2012 ERIC under preparation	285	25
PHYSICAL SCIENCES & ENGINEERING	E-ELT	European Extremely Large Telescope	2006	2024*	Programme of ESO	1.000	40
	ELI	Extreme Light Infrastructure	2006	2018*	AISBL, 2013 ERIC under preparation	850	90
	EMFL	European Magnetic Field Laboratory	2008	2014	AISBL, 2015	170	20
	ESRF UPGRADES	Phase I Phase II: Extremely Brilliant Source	2006 **2016**	2015 2022*	Programme of ESRF	180 150	82
	European Spallation Source ERIC	European Spallation Source	2006	2025*	ERIC, 2015	1.843	140
	European XFEL	European X-Ray Free-Electron Laser Facility	2006	2017*	GmbH, 2009	1.490	115
	FAIR	Facility for Antiproton and Ion Research	2006	2022*	GmbH, 2010	1.262	234
	HL-LHC	High-Luminosity Large Hadron Collider	**2016**	2026*	Programme of CERN	1.370	100
	ILL 20/20	Institut Max von Laue-Paul Langevin	2006	2020*	Programme of ILL	171	92
	SKA	Square Kilometre Array	2006	2020*	SKAO, 2011	650	75
	SPIRAL2	Système de Production d'Ions Radioactifs en Ligne de 2e génération	2006	2016	Programme of GANIL	110	5-6
SOCIAL & CULTURAL INNOVATION	CESSDA	Consortium of European Social Science Data Archives	2006	2013	Norwegian limited company, 2013 ERIC under preparation	NA	1,9
	CLARIN ERIC	Common Language Resources and Technology Infrastructure	2006	2012	ERIC, 2012	NA	12
	DARIAH ERIC	Digital Research Infrastructure for the Arts and Humanities	2006	2019*	ERIC, 2014	4,3	0,6
	ESS ERIC	European Social Survey	2006	2013	ERIC, 2013	NA	6
	SHARE ERIC	Survey of Health, Ageing and Retirement in Europe	2006	2011	ERIC, 2011	110	12
e-RI	PRACE	Partnership for Advanced Computing in Europe	2006	2010	AISBL, 2010	500	120

*expected NA=Not Available

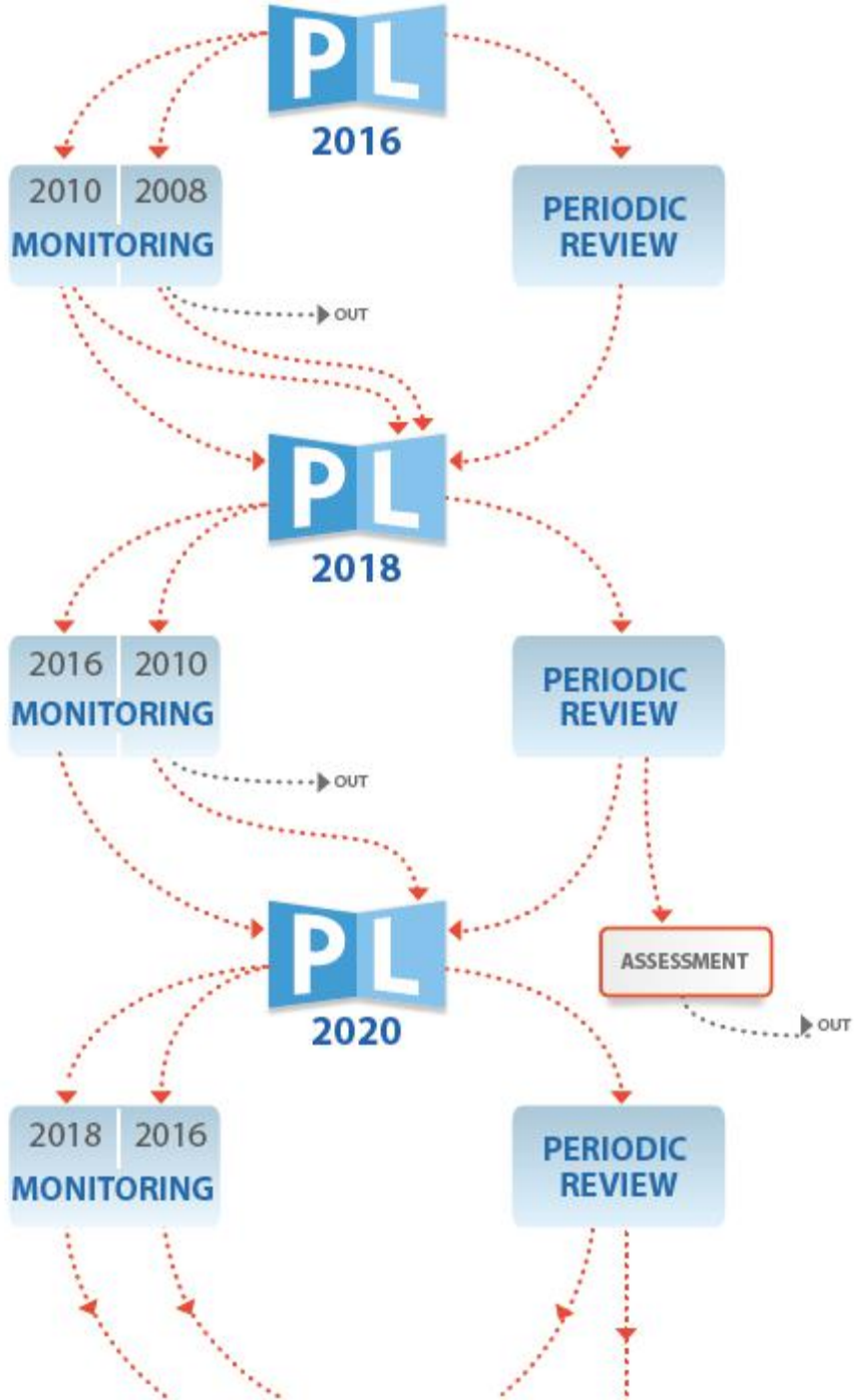
Strategy Report on Research Infrastructures
ROADMAP 2018

ROADMAP DYNAMICS

- Guide for Projects & Landmarks for Users is online



- Exchange of Experience Workshop for Projects & Landmarks in Malaga on 18th January 2017
- various publication dates & deadlines for specific questionnaires



ESFRI

ESFRI PROJECTS

The ESFRI Projects listed in **Part 1** are individually described in the following pages. They were selected for scientific excellence and maturity and represent strategic objectives for strengthening the European Research Infrastructure system.

Fifteen projects were listed in previous editions of the ESFRI Roadmap – nine in the 2008 update, and six in the 2010 update. Five new entries and one reoriented project integrate the Roadmap 2016. They were selected among the 20 eligible proposals through the evaluation procedure outlined in **Part 1.**

The ESFRI Projects have a maximum term of "residency" on the Roadmap of 10 years. After that term the fully implemented projects may become Landmarks. Non-implemented projects leave the Roadmap: if desired they can be re-submitted with a revised programme and will compete with other new projects.

10 years maximum Term for status of ESFRIProject

Scientific and maturity evaluation

Pan-European added value

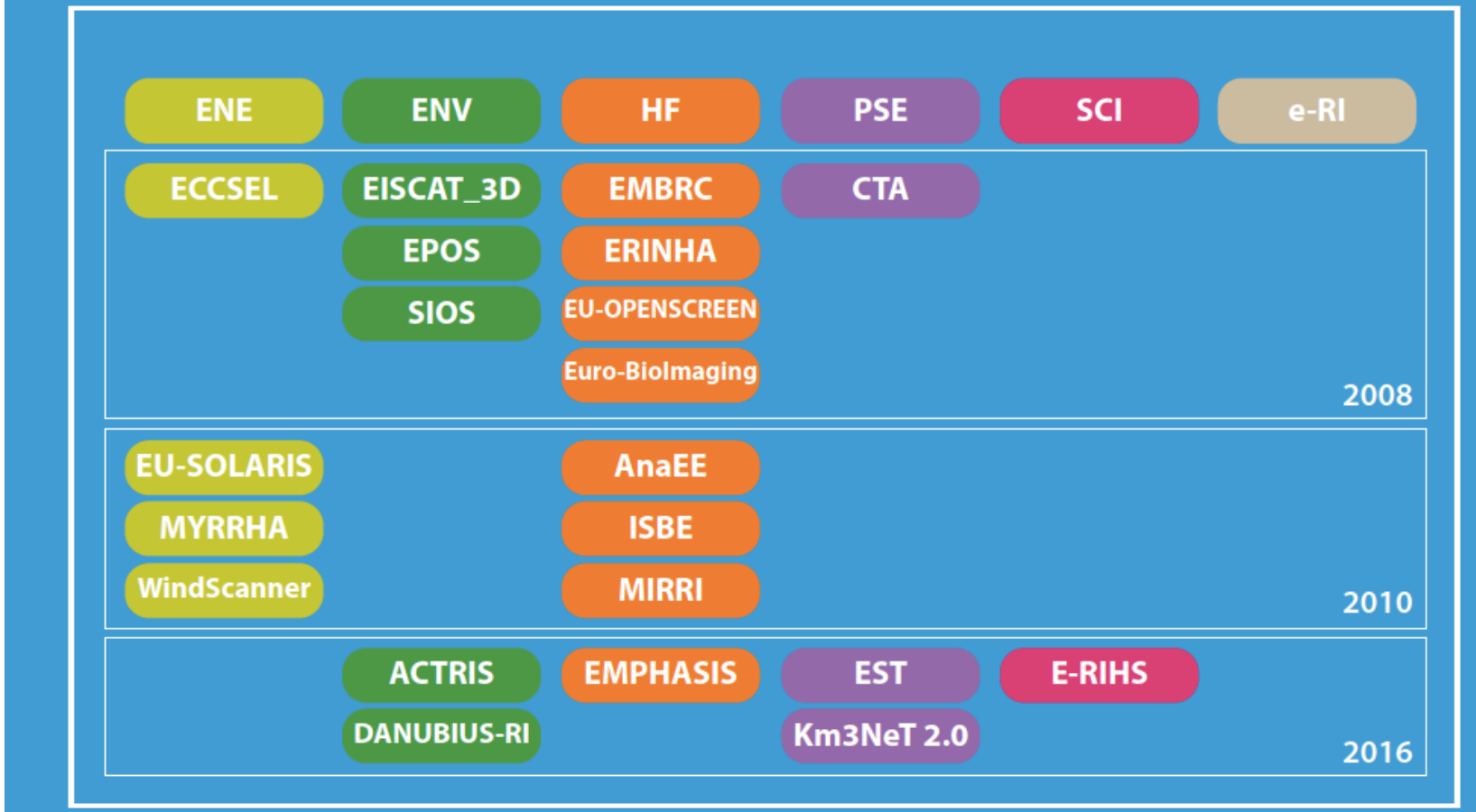
Hearings

Monitoring

Assessment

Strategy Report on Research Infrastructures
ROADMAP 2018

ESFRI PROJECTS



MONITORING 2018

- **NINE**, 2008 PROJECTS
- **SIX**, 2010 PROJECTS

Workshop – 18th January
Málaga, Spain

ESFRI

Energy

Carbon Dioxide Capture and Storage technologies to enable low to zero CO_2 emissions to combat global climate change

ECCSEL

European Carbon Dioxide Capture and Storage Laboratory Infrastructure

TYPE: distributed
COORDINATING COUNTRY: NO
PROSPECTIVE MEMBER COUNTRIES:
CH, EL, ES, FR, IT, NL, NO, PL, UK

TIMELINE
- ESFRI Roadmap entry: 2008
- Preparation phase: 2011-2014
- Construction phase: 2014-2030
- Operation start: 2016

ESTIMATED COSTS
- Capital value: 1.000 M€
- Preparation: 5 M€
- Construction: 80-120 M€
- Operation: 1 M€/year (Central HUB)

HEADQUARTERS
Norwegian University of Science and Technology-NTNU
Trondheim
Norway

WEBSITE
http://www.eccsel.org/

NORWAY

Description

The European Carbon Dioxide Capture and Storage Laboratory Infrastructure (ECCSEL) aims at opening access to top quality research devoted to next generation Carbon Capture and Storage (CCS) technologies with an efficient and structured approach to help enabling low to zero CO_2 emissions from industry and power generation to combat global climate change. ECCSEL implements and operates a distributed, integrated European Research Infrastructure based on a selection of the best research facilities in Europe for CO_2 capture, storage and transport research. ECCSEL provides a scientific foundation to respond systematically to the R&D needs in CCS in a short and long-term perspective. It maintains Europe at the forefront of the international CCS scientific community making the European Research Area more attractive for European and international scientists and reinforces cooperation between research institutions.

Background

Carbon Abatement Technologies (CATs) enable fossil fuels to be used with substantially reduced CO_2 emissions. CCS is the most innovative of these technologies by reducing up to 85% of CO_2 emissions from fossil fuels used for power generation as well as from industrial processes. Global demand is large, in particular from emerging economies. Further research and technological development is urgently needed if CCS is to become a viable and cost-effective technology. It involves the deployment of a chain of technologies for CO_2 capture, transportation and storage, rather than developments focused on the combustion plant alone. Most of the technologies needed to implement CCS are currently available through other applications but there is an urgent need to validate the operation of the whole CCS technology chain and to reduce its cost. CCS has the potential to be an essential technology to significantly reduce greenhouse gas emissions and allow the continued use of fossil fuels for energy security, without damaging climate security. Additionally CCS combined with biomass, known as Bio-CCS offers the only large scale means of going carbon negative.

Development of new CCS research facilities and upgrades to existing ones have been proposed by ECCSEL, and will require large investments by the parties involved. The facilities being developed will enable more advanced levels of research in CCS. Examples of existing facilities that are initially part of the ECCSEL RI are: High pressure oxy-fuel combustion test rig & Tiller CO_2 capture pilot plant & Transport test facility (SINTEF/NTNU, NO); Sotacarbo Research Center - Coal to Hydrogen pilot plant with CO_2 capture (Sotacarbo, IT); High pressure absorber and desorber pilot plant (TNO, NL); Hontomín CO_2 Storage Technology Development Plant & Centre for CO_2 Capture, León (CIUDEN, ES); Chemical Looping Combustion facility (CERTH, GR); Rock Mechanical & Geophysical Property Testing System & Near surface gas monitoring facility (BGS, UK); High pressure hydrostatic flow cell to measure permeability (ETH-Z, CH); High pressure facility to perform percolation and transfer experiments on fluid-rock interactions (BRGM, FR); PANAREA off-shore & LATERA on-shore CO_2 leaking natural laboratories (OGS, IT); Fixed bed reactor for clean coal technologies studies & Pilot-scale moving bed reactor (GIG, PL).

Steps for Implementation

ECCSEL was conceived and included in Roadmap 2008. Coordinated by the Norwegian University of Science and Technology (NTNU), ECCSEL has been planned by a consortium comprising leading European CCS research institutions over two Preparatory Phases (2011-2014). ECCSEL, currently in the implementation phase, is expected to be in operation and to prepare for establishing the European Research Infrastructure Consortium (ERIC) in 2016. Ambition is to become a key instrument that the European Commission can utilise and support to meet the objectives of the European Strategic Energy Technology Plan (SET-Plan), and to interact with relevant bodies such as European Energy Research Alliance (EERA), the ZEP-TP, Lighthouse projects, EII and others.

2008

Environment

An upgrade of the EISCAT systems to investigate the atmosphere and near-Earth space environment

EISCAT_3D

Next generation European incoherent scatter radar system

TYPE: distributed
COORDINATING COUNTRY: SE
PROSPECTIVE MEMBER COUNTRIES:
CN, FI, JP, NO, SE, UK

PARTICIPANTS: FR, KR, RU, UA

TIMELINE
- ESFRI Roadmap entry: 2008
- Preparation phase: 2010-2014
- Construction phase: 2015-2021
- Operation start: 2021

ESTIMATED COSTS
- Capital value: 128 M€
- Preparation: 6 M€
- Construction: 74 M€
- Operation: 6 M€/year

HEADQUARTERS
EISCAT Scientific Association
Kiruna
Sweden

WEBSITE
https://www.eiscat3d.se

SWEDEN

Description

The next generation European incoherent scatter radar system upgrade (EISCAT_3D) will be a three-dimensional imaging radar 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 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 such as magnetometers and auroral cameras. The radar system is designed to investigate how the Earth's atmosphere is coupled to space but it will also be suitable for a wide range of other scientific targets including climate change, space weather, plasma physics, space debris and near-Earth object studies.

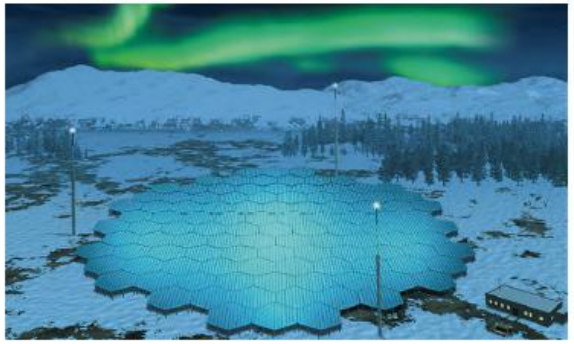
Background

The incoherent scatter radar technique is one of the most powerful methods for detailed measurements of the conditions in the ionosphere, the uppermost and partially ionised part of the atmosphere. Similar to the case of standard radar techniques, the incoherent scatter radar technique involves transmission of a radio signal in the direction of a target, and detection and analysis of the signal returning back. The main difference is that with the incoherent scatter radar technique the target is the electrons in the ionosphere in a volume filling the full radar beam. The returned signal from the electrons is very weak, requiring a powerful radiowave emission and efficient detectors in order to receive a good return signal/noise. The typical set of parameters obtained from an incoherent scatter radar measurement includes the electron density, the electron and ion temperatures, and the bulk plasma velocity along the direction of the radar beam: their time and the distance dependence from the receiver are recorded. By using three or more geographically separated receivers looking at the same volume of the ionosphere it is also possible to determine the full three-dimensional bulk plasma flow velocity within that common volume. Thus, a system using the incoherent scatter radar technique can be seen as a weather station making detailed observations of the state of the ionosphere above the radar system.

The EISCAT_3D system will consist of five phased-array antenna fields each with around 10.000 crossed dipole antenna elements. The core site will transmit radio waves at 233 MHz, and all five sites will have sensitive receivers to measure the returned radio signals. Digital control of the transmission and low-level digitisation of the received signal will permit instantaneous electronic steering of the transmitted beam and measurements using multiple simultaneous beams. The central antenna array at each site will be surrounded by smaller outlying arrays which will facilitate aperture synthesis imaging to acquire sub-beam transverse spatial resolution. The central array of each site will be of a size of about 70 m from side to side, and the sites will be located from 90 km to 250 km from the core site in order to be able to maximise the coverage by the system.

Steps for Implementation

EISCAT_3D will be an integral part of EISCAT Scientific Association which has successfully managed incoherent scatter radars on the mainland and on Svalbard for more than thirty years. The present EISCAT systems are fully integrated in the global network of incoherent scatter radars. A staged approach to the construction and commissioning of the EISCAT_3D system was prepared. In the first stage the core site will be built near Skibotn in Norway and the first two receiver sites will be built in areas near Bergfors in Sweden and Karesuvanto in Finland. For the later stages of the construction, areas on Andøya (Norway) and near Jokkmokk (Sweden) were identified as locations for receiver sites. Full operation of the EISCAT_3D configuration is expected in 2021.



EPOS

European Plate Observing System

A long-term plan for the integration of national and transnational facilities and resources for solid Earth science

Description

The European Plate Observing System (EPOS) aims at creating a pan-European infrastructure to monitor and unravel the dynamic and complex solid Earth System, by integrating the diverse and advanced research facilities and resources for solid Earth science and relying on new e-science opportunities. 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 tsunami 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 as well as Earth sciences applications to environment and to human welfare.

Background

Solid Earth science is concerned with the internal structure and dynamics of planet Earth, from the inner core to the surface; it deals with physical and chemical processes covering wide temporal and spatial scales, from microseconds to billions of years and from nanometres to thousands of kilometres. Integration of data and services from different disciplines in Earth science is an essential step to unravel and monitor these processes with the final goal of forecasting their impact on the environment. Indeed, the solid Earth science community has chosen to establish an all-encompassing framework including all the different solid Earth disciplines: seismology, near-fault observatories, geodetic data and products, volcanic observatories, satellite data and products, geomagnetic observatories, anthropogenic hazards, geological information and modelling, multi-scale laboratories and geo-energy test-beds for low-carbon energy.

EPOS is developing such a holistic, sustainable, multidisciplinary research platform to provide coordinated access to harmonized and quality controlled data from diverse Earth science disciplines, together with tools for their use in analysis and modelling. EPOS brings together 25 European nations and combine national Earth science facilities, the associated data and models together with the scientific expertise into one integrated delivery system for the solid Earth. This infrastructure will allow the Earth sciences to achieve a step change in our understanding of the planet; it will enable us to prepare for geo-hazards and to responsibly manage the subsurface for infrastructure development, waste storage and the use of Earth's resources.

Steps for implementation

The EPOS implementation phase builds on the achievements of the EPOS Preparatory Phase and will last from 2015 to 2019. During this phase two key outcomes will be achieved: the implementation of the community and integrated services — Thematic Core Services (TCS) and Integrated Core Services (ICS) — and the legal establishment of the EPOS European Research Infrastructure Consortium (ERIC). EPOS will build the new research platform by ensuring sustainability, governance and integration within the whole EPOS delivery framework of the community services (TCS), by developing the integrated services (ICS) for interoperability and data management, by creating optimal conditions for the central coordination as well as designing the access to distributed computational resources, and by ensuring long-term financial and legal sustainability through the harmonization of the EPOS research infrastructure with national priorities and strategies.
With an ERIC to be located in Rome (Italy), EPOS will provide an opportunity for Europe to maintain world-leading European Earth sciences and will represent a model for pan-European federated infrastructure.

TYPE: distributed
COORDINATING COUNTRY: IT
PROSPECTIVE MEMBER COUNTRIES:
CH, CZ, DK, EL, ES, FI, FR, IE, IS, IT, NL, NO, PL, PT, RO, SI, SK, TR, UK

PARTICIPANTS: AT, BE, BG, DE, HU, SE

TIMELINE
- ESFRI Roadmap entry: 2008
- Preparation phase: 2010-2014
- Implementation phase: 2015-2019
- Construction phase: 2019-2022
- Operation start: 2020

ESTIMATED COSTS
- Capital value: 500 M€
- Preparation: 4,5 M€
- Implementation: 32 M€
- Construction: 53 M€
- Operation: 15 M€/year

HEADQUARTERS
Istituto Nazionale di Geofisica
e Vulcanologia-INGV
Rome
Italy

WEBSITE
http://www.epos-eu.org/

ITALY

2008

SIOS

Svalbard Integrated Arctic Earth Observing System

An integrated organisation for systematic observations for Earth System Science studies in the European Arctic

TYPE: distributed
COORDINATING COUNTRY: NO
PROSPECTIVE MEMBER COUNTRIES:
CN, FI, FR, JP, IT, NO, PL, SE, UK

PARTICIPANTS: CZ, DE, ES, IN

TIMELINE
- ESFRI Roadmap entry: 2008
- Preparation phase: 2010-2014
- Interim phase: 2015-2018
- Construction phase: 2018-2019
- Operation start: 2020

ESTIMATED COSTS
- Capital value: Not Available
- Preparation: 6 M€
- Construction: 80 M€
- Operation: 2-3 M€/year

HEADQUARTERS
The University Centre in Svalbard-UNIS
Longyearbyen
Norway

WEBSITE
http://www.sios-svalbard.org

NORWAY

Description

The Svalbard Integrated Arctic Earth Observing System (SIOS) SIOS is a distributed world-class research infrastructure that will establish a regional observational system in and around Svalbard to address Earth System Science (ESS) questions related to Global Change. SIOS is offering a single-point access to infrastructure, tools and services as well as providing a continuous development of methods, ground-based observations and a substantial capability for utilising remote sensing resources. SIOS will link with other observational infrastructures across the Arctic to share data and best practice, contributing to a pan-Arctic observational structure that facilitates better regional modelling and understanding of the role of the Arctic in the Earth System.

Background

Environmental change is one of the most important challenges facing humankind and nature today. Global climate models demonstrate that polar regions play a crucial role in the Earth's climate system. The Arctic region will probably experience the most severe climate change worldwide with an anticipated warming of four to eight degrees (annual average) and a significant increase in precipitation until the end of the 21st century. Svalbard is consequently an important arena for investigations of environmental and climate change. Additionally, it is acknowledged a need for a better overview of Svalbard as a research platform, and a political need for better research infrastructure coordination. Understanding the local, regional and global implications of Arctic environmental and climate change requires state-of-the-art research services and coordinated observations.
Located in a region of the Arctic where the physical, biological and chemical exchange processes are particularly dynamic and relevant for a systems understanding, the systematic collective efforts facilitated by SIOS will permit solving globally relevant ESS questions. SIOS will prioritize measurements of variables whose interactions are believed to be significant in Svalbard (e.g. ocean-atmosphere, ocean-biology, atmosphere-biology). In particular, the coordinated core observation program, guided by a joint strategy and development plan, will provide measurements that are assumed able to elucidate important processes acting on annual to decadal time-scales, allowing detection, attribution and understanding climate changes and consequences.
SIOS, through the Knowledge Centre (KC), will provide expertise and services aiming at securing the core programme, building capacity and enabling research of relevance to the Earth System Science. The SIOS-KC will build capacity by stimulating regular development of the core program and new observational techniques that are clean, energy efficient and robust in the Arctic environment. Using a multidisciplinary approach, involving the coupling of vertical and horizontal processes, the SIOS-KC will foster an intellectual environment where sampling strategies and observational practices are developed with an Earth System Science perspective.

Steps for implementation

After entering the ESFRI Roadmap in 2008, SIOS is a priority for the international scientific communities working with long-term observations in and around Svalbard. Since 2013 SIOS is included in the SAON — Sustaining Arctic Observing Network — implementation plan. The interim phase of SIOS is since June 2015 funded by the Norwegian Research Council in a three-year project, with commitments provided by 10 international partners. The interim project gradually implements the SIOS-KC by establishing pilot projects for all components of SIOS. The observational upgrade will gradually be implemented on the basis of case studies related to relevant scientific topics and/or international initiative/campaigns. The interim phase will seamlessly transform the SIOS-KC from a project organisation to an independent legal organisation with international membership that will maintain and develop SIOS as of 2018 and beyond.

EMBRC

European Marine Biological Resource Centre

A world-class platform for fundamental and applied research on marine bioresources and marine ecosystems

TYPE: distributed
COORDINATING COUNTRY: FR

PARTICIPANTS: BE, EL, ES, FR, IL, IT, NO, PT, UK

TIMELINE
- ESFRI Roadmap entry: 2008
- Preparation phase: 2011-2014
- Construction phase: 2014-2016
- Operation start: 2016

ESTIMATED COSTS
- Capital value: 126 M€
- Preparation: 3,9 M€
- Construction: 4,5 M€
- Operation: 6 M€/year

HEADQUARTERS
University Pierre and Marie Curie-UPMC
Paris
France

WEBSITE
http://www.embrc.eu/

FRANCE

Description

The European Marine Biological Resource Centre (EMBRC) is a distributed RI aiming at providing a strategic delivery mechanism for excellent and large-scale marine science in Europe. EMBRC offers services to users from academia, industry, technology and education in all sectors in the fields of marine biology and ecology, particularly supporting the development of blue biotechnologies. The services will be provided at the EMBRC nodes in EMBRC member countries. Users will be able to easily search EMBRC services and prices and make requests on the EMBRC access portal on the EMBRC website. 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 to 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.

Background

Marine biodiversity is becoming a major target for fundamental science as well as an increasingly important resource for food, energy and industrial applications. EMBRC will provide key facilities, equipment and services to access and study marine ecosystems and biodiversity, to develop key enabling technologies and to deliver training for staff and users as well as joint development activities to improve access to marine biological resources and marine models. EMBRC will develop system administration and data integration and connect to important e-infrastructures in life and environmental sciences. The RI is at a pivotal position between biological sciences, biomedical sciences and agronomical, ecological and environmental science, with a unique potential to attract new actors in marine biology. It will deliver new resources and new services, leading to new processes and products for Blue Growth. EMBRC addresses Europe's Grand Challenges, including Biodiversity, Food Security and Competitive Industry. In particular, the RI complies with the following demands: respond to growing demand for bioresources, develop sustainable new materials, strengthen knowledge for health research and train future scientists.

EMBRC will act as a centre for knowledge transfer and as a core technology infrastructure for the utilisation of marine bioresources. It will provide the framework to significantly enhance interactions between science and industry, notably in the key domains of resource management and conservation, aquaculture and blue biotechnology. It will offer access to the infrastructure sites, on-site or remote access to biological resources and analytical services as well as virtual access to data. It will help to coordinate the negotiation of Material Transfer Agreements and host and collaborative agreements, in order to avoid restrictions in accessing the RI.

Steps for Implementation

EMBRC has completed a Preparatory Phase from February 2011 to February 2014, which was funded by the European Union under the 7th Framework Programme for Research Infrastructures. During the Preparatory Phase, EMBRC has developed a blueprint of the infrastructure including a plan for EMBRC activities and services, governance structure and business plan.

Until mid 2016, EMBRC aims at establishing a legal structure in the form of a European Research Infrastructure Consortium (ERIC). It will also be an important period for building the EMBRC headquarters, for initiating and intensifying international collaborations, and for developing the EMBRC services.

EMBRC will be operational from mid 2016. However, some services will be available to the user community before this date, such as the European Marine Training Portal.

2008

ERINHA

European Research Infrastructure on Highly Pathogenic Agents

The European coordination for the study of highly pathogenic micro-organisms

TYPE: distributed
COORDINATING COUNTRY: FR

PARTICIPANTS: AT, BE, DE, EL, ES, FR, HU, IT, PT, RO, SE, UK

TIMELINE
- ESFRI Roadmap entry: 2008
- Preparation phase: 2010-2017
- Construction phase: 2017-2018
- Operation start: 2018

ESTIMATED COSTS
- Capital value: Not Available
- Preparation: 4,8 M€
- Construction: Not Available
- Operation: Not Available

HEADQUARTERS
INSERM
Lyon
France

WEBSITE
http://www.erinha.eu/

FRANCE

Description

The European Research Infrastructure on Highly Pathogenic Agents (ERINHA) aims 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, with high risks for public health, society and the economy. 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 facilities to all interested European scientists by establishing a pan-European distributed RI. ERINHA encompasses basic research into pathogen isolation/characterisation, the pathogenesis of human diseases caused by dangerous microorganisms. It enables translational research to develop new counter measures including diagnostics, therapeutics and prophylactics and applied research to improve knowledge, skills and the evidence-base around high containment working practices.

Background

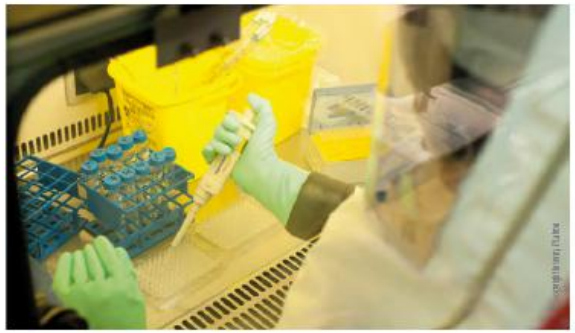
One of the great challenges of the 21st century is the capability to react on human and animal highly pathogenic micro-organisms which are characterised by a high mortality rate induction, unavailability of prophylactic or therapeutic means and easy human-to-human transmission. All infectious micro-organisms are classified by risk group according to the pathogenicity, modes of transmission and host range of the organism. The most highly infectious pathogens are classified as risk group 4. To protect environment from spread and to protect scientists from infection, these micro-organisms must be handled and stored in Biosafety Level 4 facilities. The current epidemic context – outbreak of Ebola, Nipah and SARS – have demonstrated the reality of dangerous infectious threats and the worldwide vulnerability towards emerging and re-emerging infectious diseases and has highlighted the need for such an infrastructure to prevent and respond to the spread of epidemics more effectively and efficiently. A European coordinated strategy is needed to ensure preventing each European citizen from pandemics or bioterrorist attack involving suspected group 4 pathogens. It implies the construction and implementation of a pan-European high security BSL-4 research infrastructure.

ERINHA is the sole European research infrastructure specifically dedicated to BSL-4 capacities. It is a unique and innovative infrastructure that intends to bring Europe to the forefront of research on highly virulent agents and offer European expertise to overcome and prevent the spread of epidemics.

ERINHA contributes to the H2020 societal challenge "Secure societies – protecting freedom and security of Europe and its citizens" and "Health, Demographic Change and Wellbeing".

Steps for Implementation

ERINHA is included in the ESFRI Roadmap since 2008 and is currently in its Preparatory Phase (I and II), which runs from November 2010 to June 2017 during which founding members of the RI will agree on the legal status, host country for the Central Coordination Unit, operational procedures and funding. ERINHA will be organised through a Central Coordination Unit headed by a Director General and based on capacities provided by all founders of the infrastructure. A Central Coordinating Unit will be headed by a Director General acting as CEO of ERINHA under the mandate given by the RI steering committee. National nodes will link the relevant national activities with the activities of ERINHA. A scientific advisory board and an ethics advisory board will advise the steering committee in evaluating the research programmes submitted to ERINHA. Financial and business plans are under implementation in the framework of the Preparatory Phase II. ERINHA aims to reach the final decision stage on legal status and implementation by June 2017 as the result of the H2020 Preparatory Phase II so to be able to start operation in 2018.



EU-OPENSCREEN

European Infrastructure of Open Screening Platforms for Chemical Biology

The high-throughput screening platforms and database for chemical biology applied to Life Sciences

Description

The European Infrastructure of Open Screening Platforms for Chemical Biology (EU-OPENSCREEN) is a distributed RI that aims to develop 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 also support basic mechanistic studies addressing fundamental questions in cellular physiology (across human, animal and plant systems) using the methods of chemical biology. As a large-scale RI with an "open" pre-competitive character, EU-OPENSCREEN is a cost-effective solution to the need of the broad scientific community providing access to Europe's leading screening platforms and chemistry groups, constructing a jointly used compound collection and operating an open-access database accessible on a global basis. The European Chemical Biology Database (ECBD, https://www.eu-openscreen-data.eu/) serves as a collaborative data-sharing environment among partner sites and their users.

Background

Understanding how biological processes operate and how the underlying mechanisms function at the organismic, cellular, and molecular level is fundamental to a knowledge-based management of the needs and risks of the world's growing population. This understanding touches all aspects of life such as human health and well-being, nutrition and environment. Ground-breaking insights into cellular and organismic metabolic or signalling pathways, which are involved, for example, in the progression of diseases, are gained by studying the effect of chemical compounds on biological systems (i.e. pharmacology). This forms the basis for the development of novel diagnostic and therapeutic approaches in health research and opens novel opportunities in many other areas of the Life Sciences.

EU-OPENSCREEN integrates high-capacity screening platforms throughout Europe, which jointly use a rationally selected compound collection, comprising up to 200.000 commercial and proprietary compounds collected from European chemists. By testing systematically and repeatedly this chemical collection in hundreds of assays originating from very different biological themes, the screening process generates enormous amounts of information about the biological activities of the substances and thereby steadily enriches our understanding of how and where they act. EU-OPENSCREEN supports all stages of a tool development project, including assay adaptation, high-throughput screening, and chemical optimisation of the hit compounds. All tool compounds and data are made available to the scientific community.

The broad biology approach of EU-OPENSCREEN will promote the availability of safe, efficacious and sustainable chemical products for unmet needs in medicine, nutrition, agriculture and the environment. Academic stakeholders, providing the physical screening infrastructure, are joined by industrial stakeholder companies (large, medium and small) of the Pharmaceutical, Agri-Science and Biotechnology sectors. By doing so, EU-OPENSCREEN will advance the development of solutions for the Grand Challenges and guarantee the European competitiveness.

Steps for Implementation

EU-OPENSCREEN is included in the ESFRI Roadmap since 2008. It adopts a distributed network of several partner sites with a broad collaborative scope. It successfully initiated the formation of national chemical biology networks among the 16 partners of its Preparatory Phase that each nominated a national node institute. Thus, future partner sites are already operational now within national networks and offer screening services to local and external researchers. A centralised coordination of local activities is required for the individual partner sites to operate with common standards, joint training programs, and shared use of a common compound collection and database. The legal structure will be an ERIC. Currently, 11 governmental partners and 1 international organisation (EMBL) signed the MoU and collaborate together with two observers in the Intergovernmental Transition Committee.

TYPE: distributed
COORDINATING COUNTRY: DE
PROSPECTIVE MEMBER COUNTRIES: CZ, DE, DK, EL, ES, FI, FR, NO, PL, RO, (EMBL)

PARTICIPANTS: AT, BE, HU, IT, NL, SE

TIMELINE
- ESFRI Roadmap entry: 2008
- Preparation phase: 2010-2013
- Transition phase: 2013-2016
- Construction phase: 2017-2018
- Operation start: 2018

ESTIMATED COSTS
- Capital value: Not Available
- Preparation: 3,7 M€
- Construction: 7 M€
- Operation: 1,2 M €/year

HEADQUARTERS
Leibniz-Institut für Molekulare Pharmakologie-FMP
Berlin
Germany

WEBSITE
http://www.eu-openscreen.eu

GERMANY

2008

Euro-BioImaging

European Research Infrastructure for Imaging Technologies in Biological and Biomedical Sciences

The large scale open physical user access to state-of-the-art biological, molecular and medical imaging technologies

Description

The European Research Infrastructure for Imaging Technologies in Biological and Biomedical Sciences (Euro-BioImaging, EuBI) will provide open physical user access to a broad range of state-of-the-art technologies in biological and medical imaging for life scientists in Europe and beyond. It will offer image data support and training for infrastructure users and providers and continuously evaluate and include new imaging technologies to ensure cutting-edge services in a sustainable manner. The EuBI will consist of a set of complementary, strongly interlinked and geographically distributed Nodes – specialised imaging facilities – to reach European scientists in all Member States. The infrastructure will be empowered by a strong supporting and coordinating entity, the EuBI Hub. The Hub will provide the virtual access entry point from which users will be directed to their desired imaging technology as served by the respective EuBI Nodes. Within the Hub, dedicated data management and training activities tailored to the needs of users of the imaging infrastructure will be coordinated.

Background

Advanced and innovative imaging technologies are becoming increasingly important for analysis of molecular dynamics in cells and organisms, delivering certain information easier than standard biochemical methods. Nevertheless, European life scientists lack access to innovative imaging technologies. Euro-BioImaging believes that this gap could be reduced by creating a distributed imaging infrastructure offering open access to external users from other European institutions. Such open access model will not only bring scientific benefits. It could mitigate the high costs of innovative imaging technologies and the scarcity of expert staff, increase international cooperation and boost transfer of knowledge among European researchers.

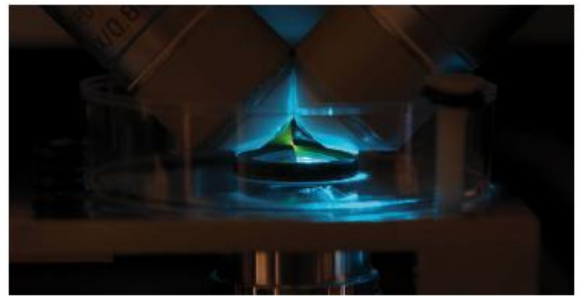
EuBI will allow life scientists working in academia, health care and industry to gain access to a broader range of much-needed advanced imaging technologies and knowledge, building bridges from basic biological to medical and clinical research as well as interdisciplinary research. It will provide: i) physical access to cutting-edge imaging technologies – including advanced probes, expertise and training, methods, software and analysis tools – at the Nodes, and ii) virtual access to common image data services provided by the Hub – software tools for image processing, common repositories for reference image data sets for sharing and re-use, academically owned cloud storage and compute services.

The massively improved research conditions for life scientists will increase European competitiveness, exchange the brain drain for a brain gain and open new research fields to European research and fundamentally advance the molecular understanding of health and disease. New and faster drug development processes will be enabled, leading to better diagnosis, therapy and disease prevention.

Steps for Implementation

In Roadmap since 2008, EuBI will be established as a European Research Infrastructure Consortium (ERIC). The ERIC Consortium will have its own decision-making body which will be responsible for the EuBI ERIC strategy, governance and scientific development; an executive body and an advisory body. The Scientific Advisory Board will be responsible for advising the Board on all scientific and technological matters, and regularly evaluate EuBI Nodes and Hub services. The Hub will coordinate dedicated data management and training activities tailored to the needs of users.

Since March 2014, the EuBI Memorandum of Understanding has been signed by 14 countries and EMBL, which together aim to implement the EuBI infrastructure. The EuBI Interim Board have recently approved the proposal of a tripartite coordinating Hub – hosted by Finland (by Turku BioImaging at Åbo Akademi University and University of Turku), Italy (by University of Torino) and the European Molecular Biology Laboratory (EMBL Heidelberg) – and ratified the nomination of 28 imaging facilities as candidates to become the first generation of EuBI Nodes. Operations are planned to start by 2017.



TYPE: distributed
COORDINATING COUNTRY/ENTITY: FI, IT, (EMBL)
PROSPECTIVE MEMBER COUNTRIES/ ENTITY: BE, BG, CZ, ES, FI, FR, IL, IT, NL, NO, PL, PT, SK, UK, (EMBL)

PARTICIPANTS: AT, DE, HU, SE

TIMELINE
- ESFRI Roadmap entry: 2008
- Preparation phase: 2010-2014
- Construction phase: 2014-2017
- Operation start: 2017

ESTIMATED COSTS
- Capital value: Not Available
- Preparation: 7,3 M€
- Construction: Not Available
- Operation: 1,55 M€/year

HEADQUARTERS
ERIC Seat: Finland
Hub for Medical Imaging: Italy
Hub for Biological Imaging: EMBL

WEBSITE
http://www.eurobioimaging.eu/

FINLAND, ITALY, EMBL

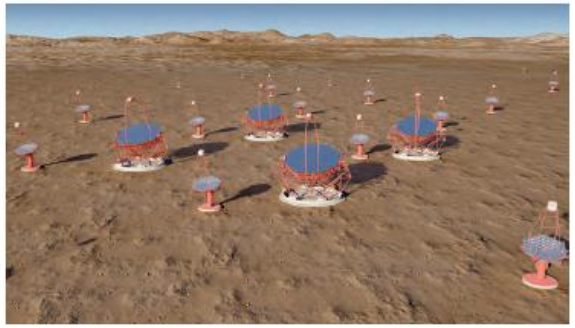
CTA
Cherenkov Telescope Array

Cherenkov Telescope Array for High-Energy Gamma-Ray Astronomy to probe a non-thermal Universe

Description
The Cherenkov Telescope Array (CTA) will be an advanced facility for ground-based very high-energy gamma-ray astronomy. With two sites, in the southern and northern hemispheres, it will extend the study of astrophysical origin of gamma-rays at energies of a few tens of GeV and above, and investigate cosmic non-thermal processes. 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.

Background
High-energy gamma-rays probe a non-thermal Universe because, apart from the Big Bang, there is nothing hot enough in the known Universe to emit such gamma-rays. These gamma-rays can be generated when highly relativistic particles collide with ambient gas, or interact with photons and magnetic fields (bottom-up process). By studying their energy and flux spectrum, it is possible to trace these cosmic rays and electrons in distant regions of our own Galaxy or even in other galaxies. High-energy gamma-rays can also be produced in a top-down fashion by decays of heavy particles such as the hypothetical dark matter particles. Therefore, gamma-rays provide a window to the discovery of the nature and constituents of dark matter, relics which might be left over from the Big Bang.
The present generation of imaging atmospheric Cherenkov telescopes (H.E.S.S., MAGIC and VERITAS) has in recent years opened the realm of ground-based gamma ray astronomy in the energy range above a few tens of GeV. The Cherenkov Telescope Array will explore our Universe in depth in Very High Energy (VHE, E>10 GeV) gamma-rays and investigate cosmic non-thermal processes, in close cooperation with observatories operating at other wavelength ranges of the electromagnetic spectrum, and those using other messengers such as cosmic rays and neutrinos.
The CTA Research Infrastructure will consist of arrays of Cherenkov telescopes that will be built at two separate sites, one in the southern hemisphere with wide gamma-ray energy range and high resolution to cover the plane of the Milky Way, and the second in the northern hemisphere specialised for lower energies, which will focus on extragalactic and cosmological objects. The array will allow the detection of gamma-ray induced cascades over a large area on the ground, increasing the number of detected gamma rays dramatically, while at the same time providing a much larger number of views of each cascade. The design foresees an improvement in sensitivity of a factor of 5–10 in the current very high-energy gamma ray domain from ~ 100 GeV to some 10 TeV – and an extension of more than three orders of magnitude in the accessible energy range, up to above 100 TeV.

Steps for Implementation
CTA is included in the ESFRI Roadmap since 2008 and it is a priority for scientific communities in astronomy at an international level. It represents one of the "Magnificent Seven" of the European strategy for Astroparticle Physics published by ASPERA, and highly ranked in the strategic plan for European astronomy of ASTRONET. In addition, CTA is a recommended project for the next decade in the US National Academies of Sciences Decadal Review.
After a 5-years preparation phase, CTA is now in a pre-construction phase and is about to transit to the implementation phase. On July 2015, the CTA Resource Board decided to enter into detailed contract negotiations for hosting CTA on the European Southern Observatory (ESO) Paranal grounds in Chile and at the Instituto de Astrofísica de Canarias (IAC), Roque de los Muchachos Observatory in La Palma, Spain. The CTA facility will be operational as a proposal-driven observatory, with a Science Data Centre providing transparent access to data, analysis tools, and user training.



TYPE: distributed
COORDINATING COUNTRY: DE

PARTICIPANTS: AM, AR, AT, AU, BG, BR, CA, CH, CL, CZ, DE, EL, ES, FI, FR, HR, IE, IN, IT, JP, MX, NA, NL, NO, PL, SE, SI, TH, UA, UK, US, ZA

TIMELINE
- ESFRI Roadmap entry: 2008
- Preparation phase: 2011-2016
- Construction phase: 2017-2023
- Pre-operation start: 2019
- Operation start: 2023
- Legal status: CTAO gGmbH, 2014

ESTIMATED COSTS
- Capital value: 400 M€
- Preparation: 8 M€/year
- Construction: 297 M€
- Operation: 20 M€/year

HEADQUARTERS
Cherenkov Telescope Array Observatory, gGmbH
Heidelberg
Germany

WEBSITE
https://portal.cta-observatory.org

GERMANY

2008

EoE Workshop – 18th January
Málaga, Spain

EU-SOLARIS

European SOLAR Research Infrastructure for Concentrated Solar Power

An effort to coordinate public and private sectors on Concentrating Solar Thermal and Solar Chemistry technologies

Description

The European SOLAR Research Infrastructure for Concentrated Solar Power (EU-SOLARIS) will provide the scientific community and industry with the Concentrating Solar Thermal and Solar Chemistry (CST) technologies devoted to the use of solar energy, mainly for electricity generation. The distributed Research Infrastructure aims to become the reference for CST and maintain Europe at the forefront of these technologies by providing the most complete, high quality scientific portfolio and facilitating the access of researchers to highly specialised facilities 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. It increases the efficiency of the economic and human resources required to achieve excellence and provide efficient resources management to complement research and avoid redundancies.

EU-SOLARIS is aiming at creating a new legal entity to explore and implement new and improved rules and procedures for Research Infrastructures (RIs) for Concentrating Solar Thermal and Solar Chemistry technologies, in order to optimise RI development and Research and Technology Development (RTD) coordination. It is expected to be the first of its kind, where industrial needs will play a significant role and private funding will complement public funding. EU-SOLARIS is envisioned as distributed large-scale RI with a strong central node in Spain (the CST RIs of CIEMAT-PSA and CTAER) and additional CST facilities in Cyprus (CyI), France (CNRS), Germany (DLR), Greece (CRES, APTL), Israel (WEIZMANN), Italy (ENEA), Portugal (LNEG, U.EVORA), and Turkey (GÜNAM and SELCUK U). Partnership includes also the industrial sector as a main actor on the decision-making processes leading to the definition, development, siting and implementation of future CST RIs and as a prominent user of most, if not all, RIs of EU-SOLARIS.

Background

Concentrating Solar Thermal (CST) technologies are expected to become a considerable supplier of green energy throughout the world. When Concentrating Solar Technologies are deployed with thermal energy storage, they can provide a dispatchable source of renewable energy. CST technologies use mirrors or lenses to concentrate the sunlight onto a small area. According to the focusing principle, there are two main concentration mechanisms: line focus and point focus. Line focus principle is represented mainly by the Parabolic Trough and the Linear Fresnel, whereas point focus principle by the Central Receiver and the Parabolic Dish. The different types of concentration mechanisms produce different peak temperatures and correspondingly varying thermodynamic efficiencies, due to the differences in the way that they track the sun and focus the light. Therefore, each technology is used for specific applications in a variety of fields: Power, Steam, Cooling, Desalination and Thermochemical plants.

Steps for Implementation

EU-SOLARIS was included in Roadmap 2010 and started the Preparatory Phase (PP) in 2012. The 4-year Preparatory Phase of EU-SOLARIS is carrying out by a consortium composed of 13 research institutions plus the Spanish Ministry of Economy and Competitiveness (MINECO) and the Euro-Mediterranean Solar Thermal Electricity Industry Association (ESTELA).

At this stage on the PP of EU-SOLARIS, the participation of the various non-RTD stakeholders, such as national and regional governments, renewable energy agencies and other funding bodies, is channelled through an Advisory Board for Funding and Administration. The success of this PP will be the establishment of EU-SOLARIS as an international legal entity devoted to further the integration of the main CST RIs of the countries participating in EU-SOLARIS, ensuring that they are efficiently managed and operated as one large and distributed RI, presenting a single point of access to the EU and international research community and industry.

TYPE: distributed
COORDINATING COUNTRY: ES

PARTICIPANTS: CY, EL, ES, DE, FR, IL, IT, PT, TR

TIMELINE
- ESFRI Roadmap entry: 2010
- Preparation phase: 2012-2017
- Construction phase: 2018-2022
- Operation start: 2020

ESTIMATED COSTS
- Capital value: 120 M€
- Preparation: 7,2 M€
- Construction: 120 M€
- Operation: 3-4 M€/year

HEADQUARTERS
Centro Tecnológico Avanzado de Energías Renovables-CTAER
Seville
Spain

WEBSITE
http://www.eusolaris.eu

SPAIN

2010

MYRRHA

Multi-purpose hYbrid Research Reactor for High-tech Applications

A multi-purpose hybrid nuclear research reactor for high-tech applications

TYPE: single-sited
COORDINATING COUNTRY: BE

PARTICIPANTS: CH, BE, ES, FR, DE, IT, JP, KR, KZ, NL, PT, RO, RU, SE, SI, UK

TIMELINE
- ESFRI Roadmap entry: 2010
- Preparation phase: 2012-2018
- Construction phase: 2019-2034
- Operation start: 2024

ESTIMATED COSTS
- Capital value: 1.500 M€
- Preparation: Not Available
- Construction: Not Available
- Operation: 100 M€/year

HEADQUARTERS
Belgian Nuclear Research Centre
SCK•CEN
Mol
Belgium

WEBSITE
http://myrrha.sckcen.be/

BELGIUM

Description

The Multi-purpose hYbrid Research Reactor for High-tech Applications (MYRRHA) is a first-of-a-kind, innovative nuclear research reactor designed to operate as an Accelerator Driven System (ADS), able to operate in sub-critical and critical modes. It contains a proton accelerator of 600 MeV, a spallation target and a multiplying core with MOX fuel, cooled by liquid lead-bismuth (Pb-Bi). MYRRHA will demonstrate the ADS concept intended for the efficient treatment of the high level nuclear waste through partitioning & transmutation. It will also fulfil the role of European Technology Pilot Plant (ETPP) in the roadmap for the development of the lead fast reactor (LFR) technology, but its design integrates the function of multi-purpose flexible fast neutron spectrum research reactor (50-100 MWth). Its catalogue of applications includes R&D in support of the partitioning and transmutation of long-lived radioactive waste, the production of neutron-irradiated silicon for renewable energies, the production of radioisotopes for medical applications as well as fundamental and applied research in support of the development of fast spectrum reactor and fusion technology.

Background

MYRRHA has been put in the high priority list of the ESFRI roadmap of 2010 under the category ENERGY. In the framework of the European Sustainable Nuclear Industrial Initiative (ESNII), a R&D platform aiming to demonstrate Generation-IV Fast Neutron Reactor technologies, MYRRHA has been identified in 2010 as a major facility contributing to the EU's Strategic Energy Technology Plan (SET plan). Also the Nuclear Physics European Collaboration Committee (NuPECC), whose aim is to promote collaborative ventures between nuclear physicists within Europe, has selected ISOL@MYRRHA to be part of its long-range plan of the top facilities for nuclear physics in Europe.

MYRRHA is designed as a flexible fast spectrum irradiation facility. This means that a fast neutron spectrum is present at every location in the reactor and that every fuel assembly position can be loaded with a driver MOX fuel assembly, a minor actinides fuel experimental assembly, a dedicated experimental rig for material irradiation or Radioisotopes production rig. In this way, the entire reactor volume offers possibilities of loading experimental fuel assemblies in conditions similar to the reactor conditions, being a fast neutron spectrum, and in contact with the flowing liquid lead-bismuth at reactor operating temperatures. MYRRHA will be able to host at least 8 in-pile sections (IPS) (representing a total volume of 8 x 3.700 cm3) with a core-loading pattern optimised to obtain the most appropriate irradiation conditions in the IPS. In this double-walled IPS, a different coolant (Na, NaK, He, H2O) can be present with temperature and pressure conditions optimized for the experimental fuel/material loaded in the IPS. The R&D programme supporting the design of MYRRHA aims at validating solutions on the main design challenges: lead-bismuth liquid metal in reactor conditions, MOX fuel qualification, materials qualification, resilience of innovative components, reactor physics and modelling of fast and sub-critical cores.

Steps for Implementation

The R&D programme is being performed in an international context: the European Framework Programmes and bilateral agreements. European partners carry out general research in support of MYRRHA, but also specifically targeted R&D for MYRRHA. In this way, the supporting R&D programme for MYRRHA is much larger than the sole efforts at SCK•CEN that concentrate mainly on fission reactor technology. SCK•CEN assures the integration of the accelerator in the MYRRHA concept and evaluates the specific aspects related to the coupling of an accelerator to a sub-critical core.

MYRRHA is currently in the front-end engineering design (FEED) phase. Next are the completion of the pre-licencing phase and the evaluation of the options for large components and materials. In 2014 the EC and EIB selected MYRRHA for the InnovFin Advisory support to help developing the financial model and overall investment plan. The MYRRHA Research Infrastructure Support Action (MARISA) Preparatory Phase of Euratom-FP7 is on-going up to end-2016.

WindScanner

European WindScanner Facility

A large scale mobile experimental facility to better measure, model and exploit the wind and its energy resource

Description

The European WindScanner Facility (WindScanner) is a coordinated and joint European development and dissemination programme for full scale atmospheric boundary-layer experimental research in wind and turbulence fields for wind energy. The WindScanner infrastructure builds upon recent advances in remote sensing-based technology developed on ground-based scanning wind lidars, able to measure and quantify the atmospheric wind fields and turbulence aloft. As well as being deployed onshore, the infrastructure can be operated offshore from stable and floating platforms or by doing measurement of near-coastal wind farms. WindScanners provides unique services for the scientific community and wind industry, a one-point of entry and a joint access programme, joint R&D development activities, joint training and educational programme, stable and effective management and a strategic approach for planning and implementing measurement campaigns in Europe.

Background

Wind energy is about to become the leading electricity generating technology across Europe. In 2015, 43% of the electricity produced in Denmark came from wind energy. However, a massive increase in installed wind power capacity throughout Europe is still required to meet the political goals for this sustainable energy system. The energy system of the future must provide secure, affordable and climate-friendly energy, while at the same time creating new jobs and growth. Significant progress in lowering cost of energy (LCoE) has already been achieved, but there is still potential for cost reductions, through market development, research and innovation, for wind energy to reach its full potential.

WindScanner is conceived as a new unique European distributed, mobile research infrastructure to provide the experimental data needed by the European wind energy's research community for high-quality full-scale atmospheric measurements of the wind fields surroundings today's huge wind turbines, wind farms, bridges, buildings, forests and mountains. The European WindScanner facility uses remote sensed wind measurements from space and time synchronized scanners to provide detailed wind field maps of the wind and turbulence conditions from the individual turbine scale to entire wind farms extending several kilometres. Via excessive data analysis WindScanner provides detailed inflow and wake measurements for validation and verification of wind turbine design and siting and for future optimisation of design making wind energy become cheaper and more reliable for the benefit of the society.

WindScanners generate very detailed and huge amounts of data, which are challenging for researchers and other users to analyse and interpret. Therefore, in the forthcoming years, the WindScanner data acquisition and post processing needs to become faster accessible to users and the scanned 3D wind velocity data interpretation less complex. The WindScanner infrastructure has its primary use within the fields of measurements around large wind turbines, on and off shore. However, it also serves other purposes such as atmospheric boundary layer research, air safety, wind loads on buildings and bridges, wind circulation in streets and the urban environment in general.

Steps for Implementation

WindScanner was included in the Roadmap in 2010 as a European joint effort to coordinate a network between distributed WindScanner systems and demonstration nodes embedded within leading European organizations for wind energy research. WindScanner has recently terminated the Preparatory Phase 1 projects funded by FP7 and aims to be operational from 2018. Once fully established, the WindScanner Facility is expected to consist of 6-8 National Nodes throughout Europe, each node having its own portable rapid deployable short and/or long-range WindScanner System. The mobile distributed research infrastructure will be led from a WindScanner Central Hub (WCH) located in Denmark, hosted by DTU. The participants are all partners of the European Energy Research Alliance (EERA) and the WindScanner vision is to develop a European Research Infrastructure underpinning the EERA Joint Programme on Wind Energy.

TYPE: distributed
COORDINATING COUNTRY: DK

PARTICIPANTS: DE, DK, EL, ES, NL, NO, PT

TIMELINE
- ESFRI Roadmap entry: 2010
- Preparation phase: 2012-2015
- Construction phase: 2016-2017
- Operation start: 2018

ESTIMATED COSTS
- Capital value: 45-60 M€
- Preparation: 4,35 M€
- Construction: 45-60 M€
- Operation: 8 M€/year

HEADQUARTERS
DTU Wind Energy
Roskilde
Denmark

WEBSITE
http://www.windscanner.eu

DENMARK

2010

AnaEE

Infrastructure for Analysis and Experimentation on Ecosystems

Integrated experimentation to forecast the impacts of climate and land-use changes on ecosystems

Description

The Infrastructure for Analysis and Experimentation on Ecosystems (AnaEE) is a Research Infrastructure designed to provide the knowledge needed to support a sustainable future. This infrastructure aims, through state-of-the-art experimental facilities, to support scientists in testing the potential impacts of climate change and land use in Europe, and forecasting the risks on European ecosystems, including agricultural systems. AnaEE will thus enable policy-makers, scientists and the industry to develop climate mitigation strategies and provide solutions to the challenges of food security, with the aim of stimulating the growth of a vibrant bio-economy.

Background

In the context of unprecedented anthropogenic alterations of the Earth system, the key to anticipating and predicting long-term ecosystem changes lies not only in better understanding the complexity of the processes, but also in ensuring that new knowledge helps us better plan for a changing future. Developing this knowledge and the facilities to foster it has tremendous potential to enrich science, elucidate and tackle unknown problems, and offer decision-support tools in the event of critical loss of ecosystem functions and services.

Without sufficient understanding of the sensitive interdependencies between ecosystems and the environment, Europe will be unable to assess the impacts, control the risks, or potentially reap the benefits of anticipated large changes in ecosystems structure and function, for the production of nutritious food and goods which are environmentally sustainable and in balance with growing energy demands. Key benefits will include greenhouse gas mitigation and climate adaptation. AnaEE will adopt an experimental approach built around manipulation, measurements, modelling, mitigation and management. At the core of AnaEE's approach are the distributed experimental facilities needed to expose ecosystems to future conditions to quantify the role of each of the drivers of change and to identify their interactions.

To produce results that will inform predictive models and deliver realistic simulations, AnaEE research has to be process-oriented and address how major biogeochemical cycles, biodiversity and the relationship between biodiversity and ecosystem functions, including agricultural systems' function, will change under the various experimental drivers. The AnaEE experimental facilities will be equipped with state-of-the-art instrumentation and Information Technology Tools and will use common standards of measurements and analysis. Facilities will be highly flexible and open to new experiments in order to be able to address the research questions of the future. AnaEE provides a nexus between the environment and health and food domains, and aims to cover the greatest number of ecosystem types, soil types, pressures and other factors in terms of experimentation on terrestrial and freshwater ecosystems. The infrastructure will include in natura, in vitro, analytical and modelling platforms.

Steps for Implementation

AnaEE is currently a Preparatory Phase consortium with FP7 funding. However, the long-term governance will be in the form of ERIC, with a General Assembly or Council representing Member States, a Central Hub headed by a Director General, and three supranational Service Centres – Technology Centre, Data and Modelling Centre, Interface and Synthesis Centre. While the statutes are being drafted and negotiated by a working group, Letters of Intent are being requested from all participating countries. The coordination and integration of the national platforms, through these supranational centres, will ensure international access, improved measurements and data harmonization, technology development, links between data and models, open access to raw data and syntheses. The research infrastructure will be based on distributed advanced experimental platforms that are sustainably funded and responding to a number of key commonly agreed-upon criteria in terms of quality and state-of-the-art equipment. AnaEE is currently working on access policies to better define how to adapt the infrastructure to the needs of all public and private users in the ecosystem research community in the widest sense possible.

TYPE: distributed
COORDINATING COUNTRY: FR
PROSPECTIVE MEMBER COUNTRIES: BE, FI, FR, IT, UK

PARTICIPANTS: CZ, DK, EE, IL, NO, PL, SE, TR

TIMELINE
- ESFRI Roadmap entry: 2010
- Preparation phase: 2012-2016
- Construction phase: 2014-2018
- Operation start: 2018

ESTIMATED COSTS
- Capital value: 135,5 M€
- Preparation: 3,4 M€
- Construction: 200 M€
- Operation: 2-3 M€/year (centralised services)

HEADQUARTERS
Institut National de la Recherche Agronomique-INRA
Paris
France

WEBSITE
http://www.anaee.com/

FRANCE

ISBE

Infrastructure for Systems Biology Europe

A single entity to interconnect the best experimental and modelling facilities in Europe for systems biology

Description

The Infrastructure for Systems Biology Europe (ISBE) is a distributed RI that will enable efficient access to the best systems biology expertise, resources and services (state-of-the-art facilities, data, models, tools and training) by interconnecting national systems biology centres and making them easily accessible for all European researchers. ISBE will set, improve and promote standardisation of biological data, tools and models as well as operating procedures, ensuring that resources from different laboratories, countries and sectors can be integrated and become re-usable. ISBE is key to developing the ERA and the European bio-economy by providing resources and services to academia, industry and the public that enable life science researchers to deliver solutions that address Grand Challenges in healthcare, food production, quality of life, bio-economy and sustainable bioenergy. The Business Plan, published in July 2015, offers a robust and sustainable solution to the challenge of providing access to systems biology approaches that bolsters both scientific productivity and the potential for innovation.

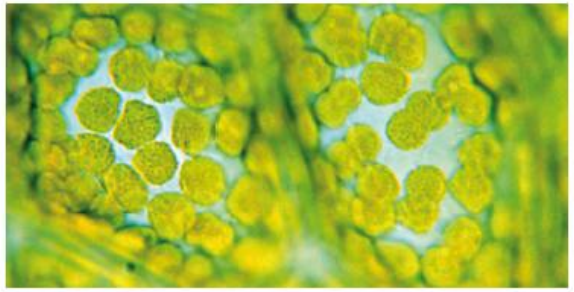
Background

Biological processes are the result of complex dynamic interactions within and between molecules, cells, organs and entire organisms. Systems biology aims to reach more quantitative and predictive understanding through integrating multiple and diverse data sets in quantitative computational models. This combines biological and biomedical data and expertise with knowledge and technologies from the fields of mathematics, computer science, physics and engineering. National governments and the European Commission have recognised the importance of systems biology, investing considerably over the past decade.

ISBE is a knowledge-based RI that plans to add value to national and European investments by combining expertise, resources and training through its national Systems Biology Centres (nSBCs), offering interconnected and complementary services and resources. nSBCs will serve their national user-base including academia and industry, transnational users, as well as multinational projects. During the Preparatory Phase, ISBE successfully implemented a European Systems Biology Community website (http://community.isbe.eu) which provides a public interface to a community database and easy access to information about researchers and institutions in the field of systems biology.

Steps for Implementation

ISBE ended its Preparatory Phase in autumn 2015, coordinated by Imperial College London with support from a Steering Committee made of the work package leaders, and with independent advice from a Scientific Advisory Board. During the construction phase, from 2016 onwards, a core network of ISBE centres will be put in place, initially, and made operational. This network will then be expanded to provide a fully operational comprehensive infrastructure with ISBE centres located throughout Europe and coordinated through the Central ISBE Office (CIO). ISBE will start the delivery of a portfolio of web-based services and resources, including: i) modelling services to aid biologists incorporate computational modelling into their research; ii) access to tools, standards and model compliant data and maps through the existing FAIRDOM initiative, a joint action of ERASysAPP with ISBE; iii) education and training via dissemination and training courses in systems biology, in collaboration with ERASysApp; iv) liaison with scientific journals, including developing and disseminating community standards and standard operation procedures in the systems biology. ISBE has already forged key links with ELIXIR as part of CORBEL and RItrain awards. Both will continue to work closely to develop a common strategic framework for delivery of services and resources that avoids duplication and redundancy of provision. ISBE has endorsed ERIC as the legal structure for the operational phase under which ISBE Governing Board will provide central decision making and high-level oversight on behalf of Member States. It will approve ISBE strategy and budgets, as well as prospective nSBCs.



TYPE: distributed
COORDINATING COUNTRY: UK

PARTICIPANTS: CZ, DE, EL, ES, FI, IE, NL, NO, SE, SI, UK

TIMELINE
- ESFRI Roadmap entry: 2010
- Preparation phase: 2012-2015
- Construction phase: 2016-2018
- Operation phase: 2018

ESTIMATED COSTS
- Capital value: Not Available
- Preparation: 4,7 M€
- Construction: 30 M€
- Operation: 7,2 M€/year

HEADQUARTERS
Imperial College London
London
United Kingdom

WEBSITE
http://project.isbe.eu/

UNITED KINGDOM

2010

MIRRI

Microbial Resource Research Infrastructure

A coordinated pan-European platform to manage microbial resources to support research in the field of biotechnology

TYPE: distributed
COORDINATING COUNTRY: DE
PROSPECTIVE MEMBER COUNTRIES: BE, DE, ES, FR, IT, NL, PL, PT, RU, SE, UK

PARTICIPANTS: CZ, DK, EL, FI, LV, RO, SK

TIMELINE
- ESFRI Roadmap entry: 2010
- Preparation phase: 2012-2016
- Construction phase: 2017-2019
- Operation start: 2019

ESTIMATED COSTS
- Capital value: Not Available
- Preparation: 3,1 M€
- Construction: 6,2 M€ (CCU)
- Operation: 1 M €/year

HEADQUARTERS
Leibniz-Institut DSMZ
Braunschweig
Germany

WEBSITE
http://www.mirri.org/

GERMANY

Description

The Microbial Resource Research Infrastructure (MIRRI) is a distributed RI that aims to coordinate access to individually managed resources by developing a platform to support research and development in the field of biotechnology. Until now, microbial domain Biological Resource Centres (mBRC) provide live cultures to foster and support the development of basic and applied sciences in European countries. MIRRI, a coordinated approach to mBRC activity, will foster European research and innovation in the academic and bio-industrial areas by improving access to high quality authentic microbial resources and their associated data in a legally compliant framework with the objective to alleviate the current fragmentation of bioresource holdings and information, and eliminate duplication and redundancy at the national and pan-European level.

Background

Microbial resources have been recognised as essential raw materials for the advancement of health and for biotechnology, agriculture, food technology and research in the life sciences. To date, less than 1% of the estimated number of species are described and available to be harnessed by man and less than 0,1% of prokaryote strains published in the scientific literature were deposited in public service collections or mBRCs or simply retained for future study and use. About 0,5 million strains are supplied each year by collections registered with the World Data Centre for Microorganisms (WDCM). It is estimated that 70% of strains used in published research are not coming from collections, thus tens of thousands resource strains are sourced for research often without proper authentication and provenance. MIRRI will provide a wealth of additional information and linking to datasets such as literature, environmental data, sequences and chemistry that will facilitate scientists to select organisms suitable for their research and enable innovative solutions to be developed. MIRRI will support researchers from academia and bio-industry offering a facilitated access to genetic resources via the envisioned MIRRI portal (a one-stop-shop for material, data and expertise), broader coverage of genetic resources (coordinated approach towards isolation and deposit of microorganisms), improved tailored service offer from mBRCs also coordinating smaller collections, interoperability of data (facilitated mining of trusted data), increase knowledge transfer to users and implementation of best practices for transition to a mBRC. MIRRI offers expert knowledge and user access in areas not provided by other ESFRI RIs and coordinates national mBRC networks to make best use of current capacity thus bridging gaps. It also contributes to the enhancement of the ERA by providing a single portal which acts as an umbrella structure for access to a large range of resources, data and expertise. By offering long-term deposition of raw material of high scientific and economic value for basic research and innovation in biotechnology, MIRRI will contribute to the H2020 societal challenge to improve health, food security, agriculture, forestry, marine and maritime and inland water research and to address aspects of clean and efficient energy.

Steps for Implementation

MIRRI was included in the ESFRI Roadmap 2010. The Preparatory Phase was conducted in 2012-2016. MIRRI's governance structure consists of the Central Coordinating Unit (CCU), the Governing Board and the Assembly of Members. The MIRRI CCU will function as the core of MIRRI of the future ERIC (application is expected in 2017). National Nodes and national mBRCs will retain their own legal entity but the future MIRRI-ERIC will control some elements of their operations, such as quotas of user access to facilities, services and resources as well as the deposits identified in the MIRRI common accession policy and the participation in the expert clusters. mBRC participation in the MIRRI National Nodes will be governed by commitments made in the Partner Charter which will include delivery of high quality data to agreed standards, participation in capacity building programmes and a commitment to deliver the MIRRI communication and outreach strategy to stakeholder.

Periodic monitoring for confirmation of status of ESFRI Landmark

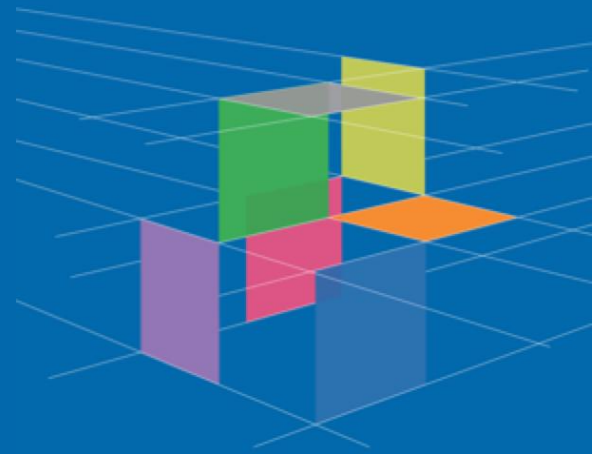
Scientific impact and good management evaluation

GLOBAL dimension
GLOBAL access
GLOBAL data access

Possible evolution towards GRI

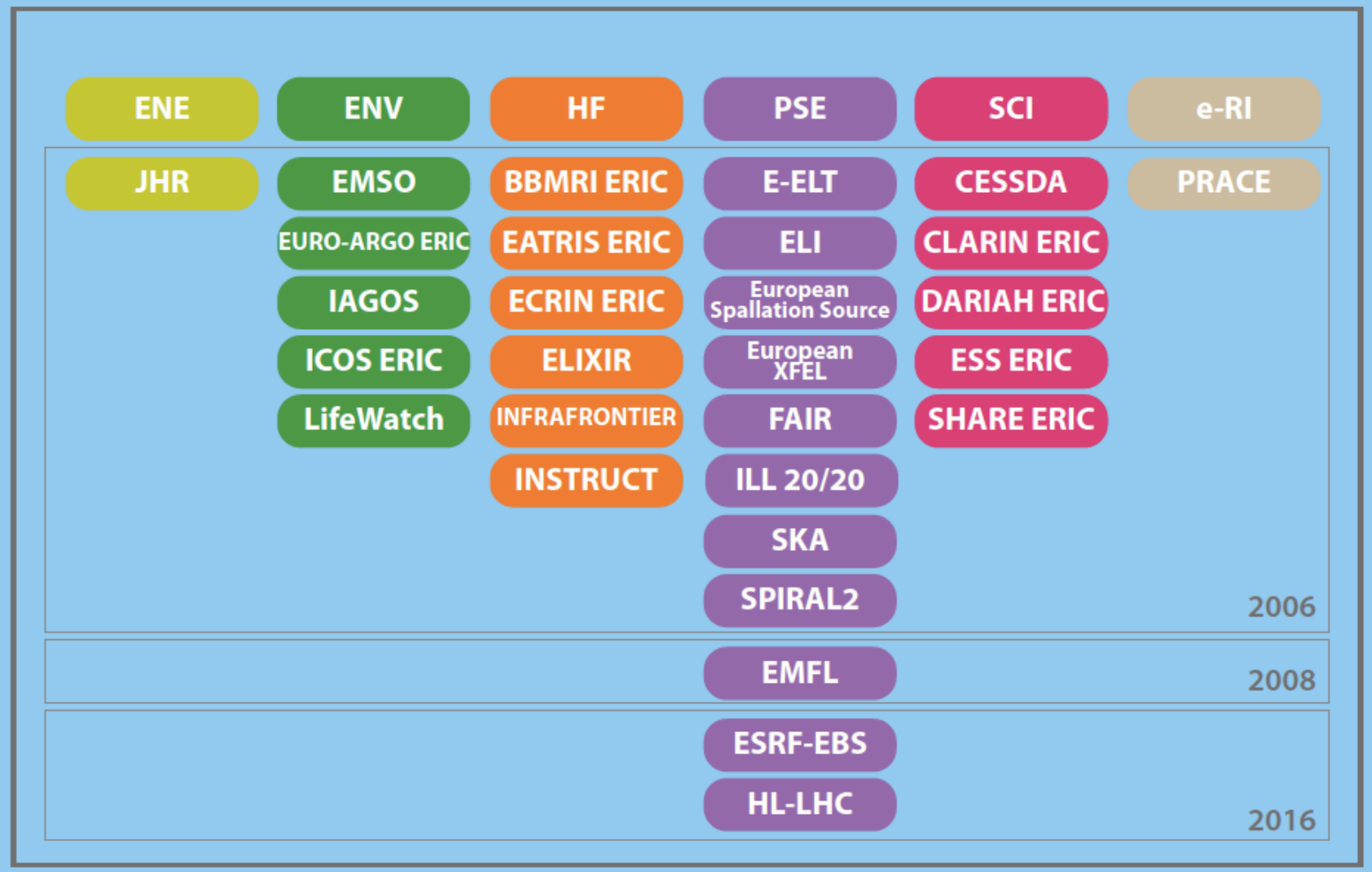
ESFRI LANDMARKS

The ESFRI Landmarks listed in **Part 1** are individually described in the following pages. These are former ESFRI Projects that have reached the implementation stage and are now established as major elements of competitiveness of the European Research Area.
Most of the Landmarks were first identified as ESFRI Projects in the Roadmaps 2006 and 2008. Two Landmarks were selected among the 20 eligible proposals through the evaluation procedure outlined in **Part 1** recognizing that their implementation is underway.
The ESFRI Landmarks need continuous support for successful completion, operation and upgrade in line with the optimal management and maximum return on investment criteria. Periodic review of the Landmarks will be carried out by ESFRI in order to verify the continuous fulfilment of the reference role in their respective domains.



Strategy Report on Research Infrastructures ROADMAP 2018

ESFRI LANDMARKS



PILOT PERIODIC REVIEW

- ICOS ERIS
- ELIXIR
- SPIRAL2
- European Social Survey ERIC

Workshop – 18th January
Málaga, Spain

ESFRI

Strategy Report on Research Infrastructures
ROADMAP 2018

ESFRI

Environment

ICOS ERIC

Integrated Carbon Observation System

High precision scientific data on carbon cycle and greenhouse gas budget and perturbations

TYPE: distributed
COORDINATING COUNTRY: FI
MEMBER COUNTRIES: BE, DE, FI, FR, IT, NL, NO, SE

PARTICIPANTS: CH, ES

TIMELINE
- **ESFRI Roadmap entry:** 2006
- **Preparation phase:** 2008-2013
- **Construction phase:** 2013-2016
- **Operation start:** 2016
- **Legal status:** ERIC, 2015

ESTIMATED COSTS
- **Capital value:** 48 M€
- **Operation:** 24-35 M€/year

HEADQUARTERS
ICOS ERIC
Helsinki
Finland

WEBSITE
http://www.icos-ri.eu

FINLAND

Description

The Integrated Carbon Observation System (ICOS) is a distributed research infrastructure to generate high-precision data and integrate knowledge on the carbon cycle and greenhouse gas (GHG) budgets and of their perturbations. ICOS collects long-term observations as required to understand the present state and extrapolate to the future behaviour of the global carbon cycle and GHG fluxes. Technological developments and implementations, related to GHGs, will be promoted by a close integration of research, education and innovation.

The structure of ICOS RI consists of ICOS National Networks, ICOS Central Facilities, and the ICOS ERIC that was established in November 2015. The Central facilities include the Atmosphere Thematic Centre, the Ecosystem Thematic Centre, the Ocean Thematic Centre, the Central Analytical Laboratories and the Carbon Portal. The management is organized on the principle of subsidiarity: all operative tasks are run autonomously by the nodes while ICOS ERIC manages and oversees the overall activities and strategic goals of ICOS.

Activity

The first objective of ICOS is to build a single and coherent data set and to open it for effective access to facilitate research on GHG concentration, related emissions and natural sinks. Data are assimilated in biogeochemical and ecological process models. ICOS aims at establishing a reference standard for the future development of similar integrated and operative GHG observation networks also beyond Europe. The second objective is to provide information for understanding of regional budgets of greenhouse gas sources and sinks, their human and natural drivers, and the controlling mechanisms. ICOS allows detecting changes in regional greenhouse gas fluxes, early warning of negative developments and the response of natural fluxes to extreme climate events. In order to provide this information ICOS builds National Networks of atmospheric, ecosystem and ocean stations. European level ICOS Central Facilities, are dedicated to collecting and processing the data received from the National Networks and to provide calibration gases or specific analyses. The ICOS RI data policy endorses full and open exchange of data, metadata and products that will be made available to the researchers with minimum time delay. It follows general data sharing principles as outlined by GEOSS.
The data and knowledge provided by ICOS will reduce the uncertainties in Earth System models and in predictions on future GHG concentrations as exploited in the Assessment Reports of the Intergovernmental Panel on Climate Change (IPCC).

Impact

Environmental Research Infrastructures in general, and ICOS in particular, generate important knowledge on our ecological life support systems that provide priceless services. This is particularly evident in the field of GHGs: not reaching our safe climate change target level by inadequate mitigation will lead to extremely large societal costs for adaptation and predictable high damages. The investments and running costs needed for a global GHG monitoring and analysis network are marginal compared to these costs and could be easily compensated due to improved effectiveness of the mitigation strategies. Additional benefit will come from detecting and pointing to surprise changes in the earth system and from detecting non-compliance of regions, sectors or countries with the agreed objectives. Furthermore, ICOS GHG observations and outreach activities, have already increased the public awareness and stimulated changes towards green economy and decarbonisation of agricultural, industrial and transport processes.
A substantial impact comes also from the harmonization and standardization of measurements and data formats including improved QA/QC standards and data protocols. These efforts support primarily the research community, but industry and policy makers also benefit from reliable and standardized openly accessible data sets.

Under Construction

Delivering Science Services

Health&Food

ELIXIR

A distributed infrastructure for life-science information

A sustainable infrastructure for interoperability of public biological and biomedical data resources

TYPE: distributed
COORDINATING COUNTRY: UK
MEMBER COUNTRIES/ENTITY: BE, CH, CZ, DK, EE, ES, FI, FR, IL, IT, NL, NO, PT, SE, UK, (EMBL)

PARTICIPANTS: EL, IE, SI

TIMELINE
- **ESFRI Roadmap entry:** 2006
- **Preparation phase:** 2007-2013
- **Construction phase:** 2013-2020
- **Operation start:** 2014
- **Legal status:** ELIXIR Consortium Agreement, 2013

ESTIMATED COSTS
- **Capital value:** 125 M€
- **Operation:** 95 M€/year

HEADQUARTERS
Wellcome Genome Campus
Hinxton
United Kingdom

WEBSITE
http://www.elixir-europe.org

UNITED KINGDOM

Description

The distributed infrastructure for life-science information (ELIXIR) is a unique initiative that consolidates Europe's national centres, services, and core bioinformatics resources into a single, coordinated infrastructure. By coordinating these resources, ELIXIR supports the data-related needs of Europe's 500.000 life-scientists and helps address the Grand Challenges across life sciences from marine research via plants and agriculture to health research and medical sciences.

In 2013, ELIXIR became a permanent legal entity following the ratification of the ELIXIR Consortium Agreement (ECA) by EMBL and the first five countries. The countries that have signed the ECA are full members of the ELIXIR Board. Additional Observer countries (Greece, Ireland and Slovenia) are progressing the ratification of the ECA.

Activity

ELIXIR is an inter-governmental organisation, which builds on existing data resources and services within Europe. It follows a Hub and Nodes model, with a single Hub located alongside EMBL-EBI at the Wellcome Genome Campus in Hinxton (Cambridge, UK) and a growing number of Nodes located at centres of excellence throughout Europe, which coordinate nationally the bioinformatics services within that country. The ELIXIR Hub accommodates the ELIXIR Executive Management and Secretariat, coordinates and supports integration of services run from the ELIXIR Nodes, has overall responsibility for developing and delivering the ELIXIR Programme and managing ELIXIR-funded activities carried out by Nodes.
ELIXIR Nodes, sited throughout ELIXIR Member States, run the resources and services that are part of ELIXIR. These include: data deposition resources for depositing data safely and securely; added-value databases providing researchers with access to well curated data; bio-compute centres for cloud computing and analysis; services for the integration of data, software, tools and resources; training; and standards, ontology and data management expertise. For example, the ELIXIR Tools and Service registry is a discovery portal for researchers to access over 2.100 life science databases and analysis tools.
ELIXIR will ensure that users – individual scientists, large consortia or indeed other research infrastructures – can easily access data resources that are sustainable, built on strong community standards, and safeguarded in the long-term.

Impact

Industry's interest in, and usage of, Europe's bioinformatics resources is high as demonstrated by the 110 million hits from commercial users to the EMBL-EBI website in 2014. Promoting the future innovation potential and industry impact is an important objective of ELIXIR. This clearly extends beyond the obvious industry "users" of data and related services, and includes professional data publishers, SMEs providing data and bioinformatics services and tools as well as hardware and infrastructure providers.
Open life science data drives major societal value and truly facilitates researchers to solve the Grand Challenges. For example the identification of novel risk factors for Alzheimer's disease based on a large-scale meta-analysis are founded on prior estimates on human genetic variation calculated from public datasets such as the 1.000 Genomes. The development and validation of drug-design tools, many of which are have been successfully commercialised, has relied on carefully curated datasets extracted from publicly archived data resources such as the Protein Data Bank. This integrated infrastructure is essential for European life science research as the enhanced technical architecture will facilitate access to well-curated data, international collaboration and ultimately play an integral role in the transformation of bio-industries.
ELIXIR's Innovation and SME programme ensures that high-tech companies across Europe can access the services run by ELIXIR partners; over one hundred such companies have so far benefitted from bespoke events targetting the pharma and agri-tech sectors.

The first installation to accelerate exotic nuclei and deliver radioactive ion beams

SPIRAL2

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

TYPE: single-sited
COORDINATING COUNTRY: FR
MEMBER COUNTRIES: FR

PARTICIPANTS: BE, CZ, DE, IN, IT, RO, PL, SE, US

TIMELINE
- ESFRI Roadmap entry: 2006
- Preparation phase: 2005-2010
- Construction phase: 2010-2016
- Operation start: 2016

ESTIMATED COSTS
- Capital value: 110 M€
- Operation: 5-6 M€/year

HEADQUARTERS
GANIL
Caen
France

WEBSITE
http://www.ganil-spiral2.eu

FRANCE

Description

The Système de Production d'Ions Radioactifs en Ligne de 2e generation (SPIRAL2) is a new facility to extend significantly the actual possibilities of Radioactive Ion Beam (RIB) physics and related applications. SPIRAL2 will produce the only ion beams of their kind in the world to support research from hadron and isotope therapy to the physics of the atom and its nucleus, from condensed matter to astrophysics. The study of the properties of nuclei forming these beams or their interactions with stable nuclei is a rapidly developing field of contemporary nuclear physics, astrophysics and interdisciplinary research. Novel research in nuclear physics at the limits of stability will be covered at SPIRAL2, including the study of the r and rp-process nuclei, shell closure in the vicinity magic numbers as well as the investigation of very heavy elements. Further research areas will be material sciences, radiobiology, research for hadron and isotope therapy, energy, environment, social sciences, health, engineering, space, ICT as well as Inter and multi-disciplinary research in radiobiology.

SPIRAL2 is part of the GANIL infrastructure, which is the largest research infrastructure in Lower Normandy (Caen, France). Under construction since 2005, it will deliver science from 2018 as a scientific and technologic complement to the existing infrastructure.

Activity

The SPIRAL2 project is based on a multi-beam driver in order to allow both ISOL and low-energy in-flight techniques to produce RIB. SPIRAL2 comprises a linear accelerator (LINAC) and experimental areas with three halls for experiments with high flux of fast neutrons (Neutron for Science, NFS), with very high intensity beams of heavy-ions (Super Separator Spectrometer, S3) and with low-energy exotic nuclei (DESIR) produced at S3 and with SPIRAL1 facility. The construction of a new injector of the SPIRAL2 Linear Accelerator is planned in order to expand a range of available high-intensity beams up to Uranium. In addition, a Radioactive Ion Beam (RIB) production building is foreseen to produce RIB with an intensity that exceed by factor of 10 to 100 intensities available today worldwide. The superconducting light/heavy-ion LINAC, with an potential of about 40 MV capable of accelerating 5 mA deuterons up to 40 MeV and 1 mA heavy ions up to 14.5 MeV/u, is used to bombard both thick and thin targets. The beams could be used for the production of intense RIB by several reaction mechanisms (fusion, fission, transfer, etc.) and technical methods (ISOL, IGISOL, recoil spectrometers, etc.). The production of high-intensity RIB of neutron-rich nuclei will be based on fission of Uranium target induced by neutrons, obtained from a deuteron beam impinging on a graphite converter (up to 1014 fissions/s) or by a direct irradiation with a deuteron, 3He or 4He beam. The post acceleration of RIB in the SPIRAL2 project is assured by the existing CIME cyclotron, which is well adapted for separation and acceleration of ions in the energy range from about 3 to 10 MeV/u for masses A~100-150.

Impact

The impact of SPIRAL2 in the structuring of the European Research Area is enabling a scientific programme based on unique high-intensity beams of light, heavy-ions and neutrons delivered 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 basic nuclear data, to the production of rare radioisotopes for medicine, to radiobiology and to materials science. The SPIRAL2 facility is an intermediate step towards EURISOL, the most advanced nuclear physics research facility presently imaginable and based on the ISOL principle. The realisation of SPIRAL2 will substantially increase the know-how of technical solutions to be applied not only for EURISOL but also in a number of other European and world projects.

Under Construction

Delivering Science Services

A cross-national survey infrastructure which assembles, interprets and disseminates data on social attitudes and behaviours

ESS ERIC

European Social Survey

TYPE: distributed
COORDINATING COUNTRY: UK
MEMBER COUNTRIES: AT, BE, CZ, DE, EE, FR, IE, LT, NL, NO, PL, PT, SE, SI, UK

PARTICIPANTS: CH, DK, ES, FI, HU, IL, LV, SK

TIMELINE
- ESFRI Roadmap entry: 2006
- Preparation phase: 2007-2010
- Construction phase: 2010-2012
- Operation start: 2013
- Legal status: ERIC, 2013

ESTIMATED COSTS
- Capital value: Not Available
- Operation: 6 M€/year

HEADQUARTERS
ESS ERIC
City University London
London
United Kingdom

WEBSITE
http://www.europeansocialsurvey.org

UNITED KINGDOM

Description

The European Social Survey (ESS) is a pan-European survey, carried out every two years since 2001. The ESS infrastructure 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 the societal need 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 wellbeing, 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. In forthcoming survey rounds, ESS will also investigate attitudes to Grand Challenges such as climate change and energy security and the future of the welfare state. Data from the most recently completed round on the topics of immigration and health inequalities are currently being analyzed.

The European Social Survey research infrastructure was established in 2001, entered the Roadmap in 2006 and was awarded European Research Infrastructure Consortium (ERIC) status in November 2013.

Activity

The European Social Survey ERIC organises data that are gathered in each of the participating countries in accordance with Specifications issued by the Director of the ESS-ERIC. The main aims of the ESS include: i) to chart stability and change in social structure, conditions and attitudes in Europe and to interpret how Europe's social, political and moral fabric is changing; ii) to achieve and spread higher standards of rigour in cross-national research in the social sciences, including for example, questionnaire design and pre-testing, sampling, data collection, reduction of bias and the reliability of questions; iii) to introduce soundly-based indicators of national progress, based on citizens' perceptions and judgements of key aspects of their societies; iv) to undertake and facilitate the training of European social researchers in comparative quantitative measurement and analysis; v) to improve the visibility and outreach of data on social change among academics, policy makers and the wider public.
In order to achieve "optimal comparability" in the operation of the ESS, the Core Scientific Team produces a detailed project specification, which is revised in light of each successive round. National teams in participating countries are required to follow the specification to ensure that fieldwork is conducted and comprehensively documented, according to the same standards cross-nationally.
The main output of the ESS is its data and documentation which are available free of charge for non-commercial use and can be downloaded from the ESS website.
Another key aim of the ESS is to implement high quality standards in methodology and to improve standards in the field of cross-national surveys.

Impact

ESS is designed for use primarily by the academic community. However, the data is also used to provide direct and contextual evidence across a range of non-academic bodies, both governmental and agencies. ESS has helped inform the work of other surveys in Europe in terms of methodology and questionnaire content including the European Quality of Life Survey, the European Values Survey and the International Social Survey Programme. ESS data and methodology are used in academic teaching in many countries. The ESS on-line EdiMeS training package teaches university students how to use the data. ESS methodological work in areas such as mixed mode data collection, question quality, translation and archiving is acknowledged as being world leading. In addition, the ESS has a programme of knowledge transfer directly with policy makers and has held seminars at the European Parliament, Italian parliament and OECD amongst other locations.

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ESFRI INSTRUMENTS

-the Strategy Working Groups
-the Implementation Group
-ad-hoc Expert Working Groups

Experts of the research and innovation in the domain

Experts of e-infrastructures (specific and general)

Experts of research infrastructure management, risk analysis and human capital management

Covering the aspects of *users access strategy* and issues connected to siting, governance and financing

Chaired by a member of the Forum with specific competences or by an Expert, nominated by the Forum and permanently invited to the Forum meetings

ESFRI

Strategy Report on Research Infrastructures ROADMAP 2018

ESFRI

ESFRI INSTRUMENTS – SWGs

Assess the scientific excellence of the Research Infrastructure Projects and Landmarks

- carry out the ***Landscape Analysis***
- perform the scientific evaluation of ***new proposals***
- carry out the ***monitoring of Projects*** and the ***Periodic Review of Landmarks***
- engage, through the Forum, ***additional experts*** according to the specificity of the project
- consult ***external, international referees,*** with proven experience and declared absence of conflict of interest
- ***collaborate with the IG*** on evaluation/monitoring procedures
- ***report their results to EB and Forum***
- ***enforce the dialogue with the Projects and Landmarks***

Strategy Report on Research Infrastructures ROADMAP 2018

ESFRI

ESFRI INSTRUMENTS – IG

Assesses the maturity of the Research Infrastructure Projects and the implementation/strenghtening of the Landmarks

- assess the maturity of ***new proposals*** for an ESFRI roadmap update
- monitor the ***implementation of ESFRI Projects***
- contribute to the ***periodc review of ESFRI Landmarks***
- ***collaborate with the SWGs*** on evaluation/monitoring procedures
- ***report their results to EB and Forum***
- offer ***targeted and specific (non-financial) support*** to ESFRI Projects to move towards implementation and to ESFRI Landmarks
- contribute to the further development of the ***methodology*** for ESFRI roadmap updates

Strategy Report on Research Infrastructures
ROADMAP 2018

ESFRI

ESFRI INSTRUMENTS – MOS DATABASE

The Monitoring System of ESFRI has been implemented by the StR-ESFRI Project and will guarantee an ***updated description*** of the Projects and Landmarks as of the legal, membership, siting of headquarters, budgetary aspects as certified by the ***ESFRI National Delegations***

The modular design of ESFRI-MOS includes

- a ***repository*** for viewing, editing, adding, and querying basic ESFRI data and statistics on research infrastructures
- a ***monitoring system*** for performance data of corresponding research infrastructures.

The objectives of ESFRI-MOS are

- to ***support key target groups in their periodical monitoring / review process***
- to develop a user-friendly and user-targeted scalable system

Available online by login credentials

Long Term Sustainability expert working-group to prepare recommendations

- Costs of all the stages of the LIFECYCLE of the RI, including decommissioning
- Public perception of VALUE of RI is a key element for sustainability
- Strategic planning of resources according to LIFECYCLE
- Understanding the VALUE of Research Infrastructure investment in economic terms
- Training, impact in forming scientists and international managers of complex undertakings
- Understanding the optimal fraction of GERD to be invested in RIs

Strategy Report on Research Infrastructures
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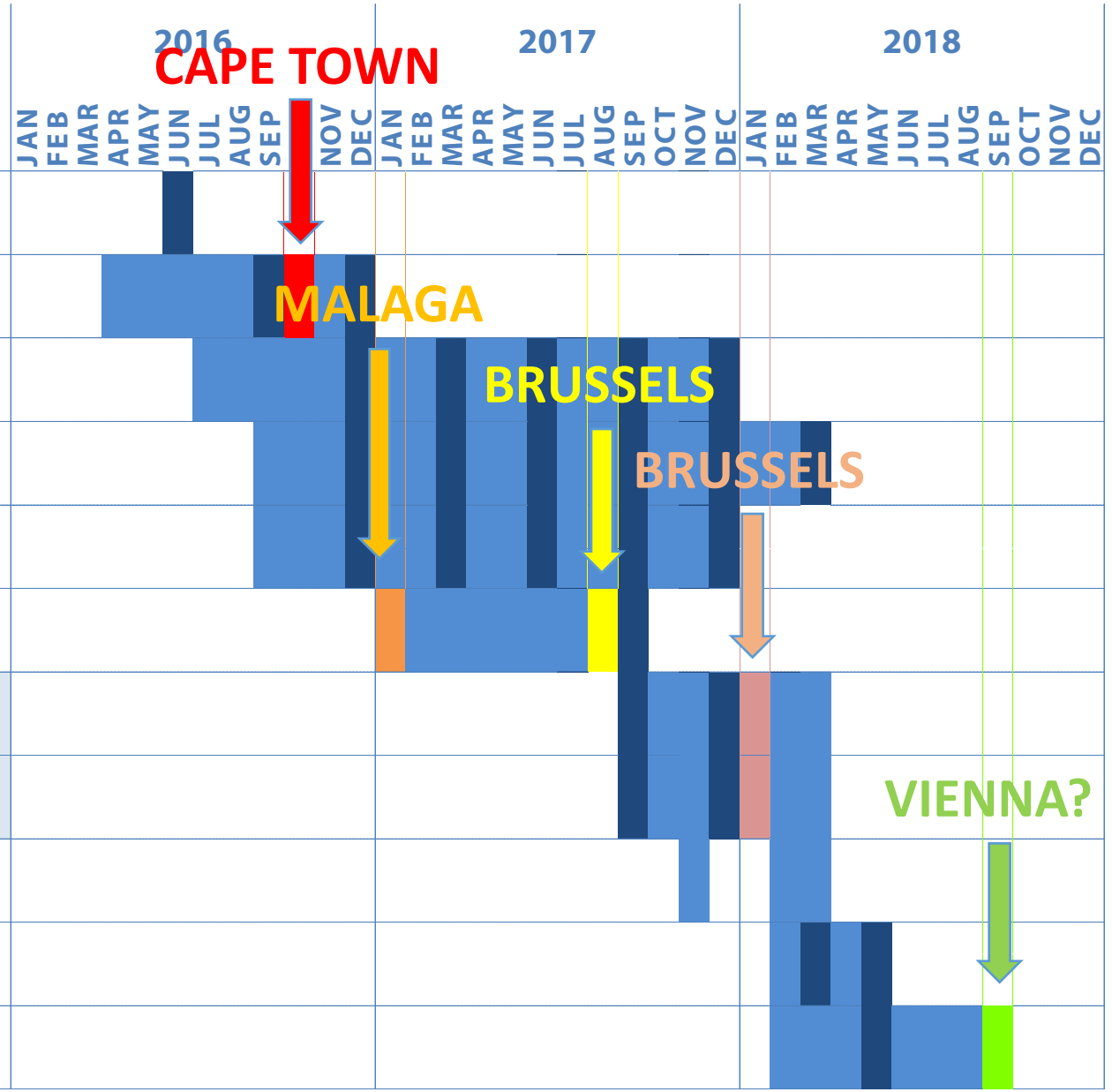
KEY DATES & TIMELINE



PHASE 1	DECISION-MAKING ON ROADMAP 2018 UPDATE
PHASE 2	PREPARATION FOR LAUNCH OF ROADMAP 2018 PROCESS AND CALL FOR PROPOSALS
PHASE 3	MONITORING OF ESFRI PROJECTS 2008 & 2010
PHASE 4	UPDATE OF LANDSCAPE ANALYSIS IN FIVE THEMATIC AREAS
PHASE 5	PILOT PERIODIC REVIEW OF LANDMARKS
PHASE 6	CALL FOR PROPOSALS, SUBMISSION OF PROPOSALS AND EXECUTION OF ELIGIBILITY CHECK
PHASE 7	EVALUATION OF THE SCIENTIFIC CASE BY SWGs, CRITICAL QUESTIONS, HEARINGS
PHASE 8	ASSESSMENT OF MATURITY BY IG, CRITICAL QUESTIONS, HEARINGS
PHASE 9	HARMONISE EVALUATION RESULTS
PHASE 10	DECISION-MAKING ON 2018 PROJECTS & LANDMARKS
PHASE 11	FINALISATION OF TEXTS AND LAUNCH OF ROADMAP 2018 DOCUMENT

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THANK YOU FOR YOUR ATTENTION

Strategy Report on Research Infrastructures
ROADMAP 2018

Giorgio Rossi
ESFRI Chair

EoE Workshop – 18th January 2017

Málaga
Spain