

Strategy Report on Research Infrastructures
ROADMAP 2021

Landscape of Research Infrastructures and evolution
of the ESFRI Roadmap

Inmaculada Figueroa
EB member

InfoDay
25th September 2019
Brussels



RESEARCH INFRASTRUCTURES

A European Research Infrastructure is a facility or (virtual) platform that provides the scientific community with resources and services to conduct top-level research in their respective fields. These research infrastructures can be single-sited or distributed or an e-infrastructure, and can be part of a national or international network of facilities, or of interconnected scientific instrument networks.

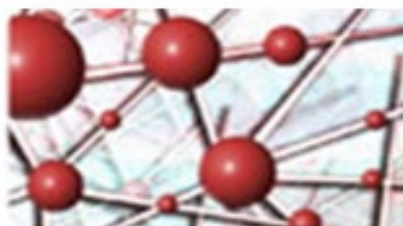
A BROAD CONCEPT

- Great scientific equipment or set of instruments.
- Scientific collections, archives and structured information.
- Electronic infrastructures (e-infrastructures).
- Any other entity of a unique nature necessary for research.

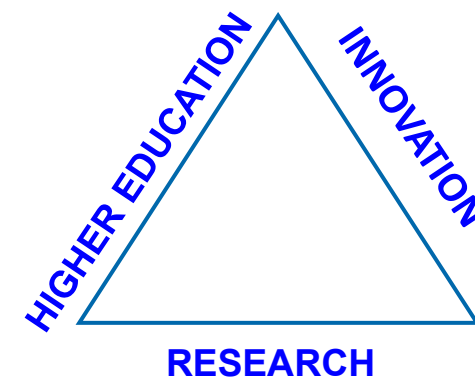
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RESEARCH INFRASTRUCTURES



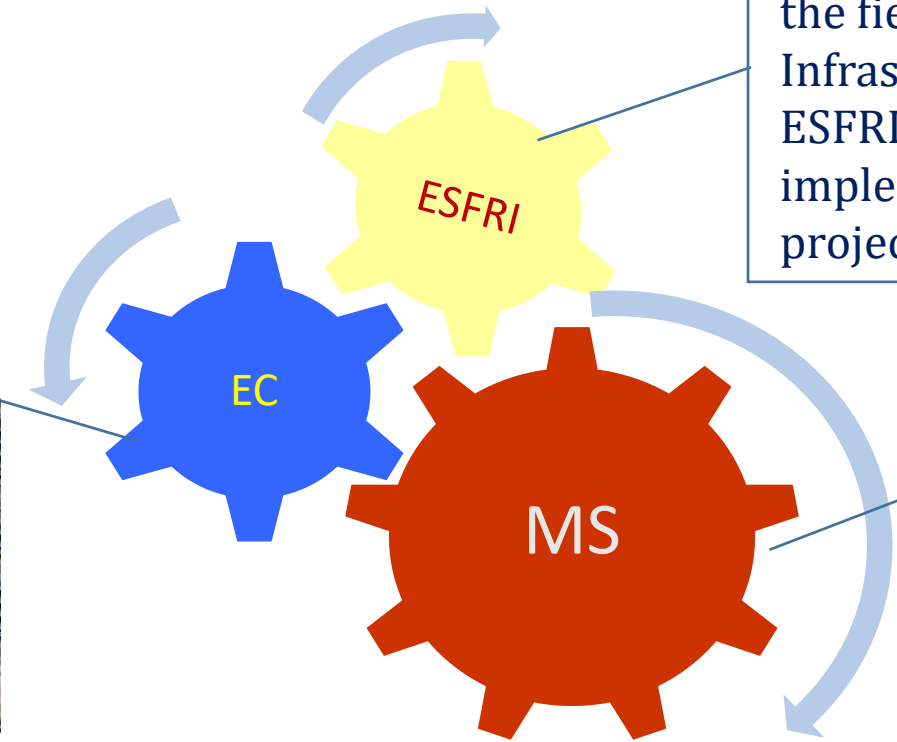
- One of the pillars of the European Research Area (ERA Priority 2b).
- Essential for European researchers to remain at the forefront of R&I
- Key element for European competitiveness
- At the centre of the knowledge triangle
- **MAIN CHALLENGES:**
 - Overcoming European fragmentation
 - Facing increasing costs and complexity
 - Improve the efficiency of services and access offered by the facilities
 - Develop the full potential of data and e-infrastructures





Actors in the definition of policies in RI

Funds actions for implementation through European R&I Framework Programme.



Support to the establishment of policies in the field of Research Infrastructures. ESFRI helps to achieve the implementation of the projects of the "Roadmap".

Commitment of national resources for the construction and sustainability of Research Infrastructures.





ROLE OF ESFRI

The European Strategy Forum on Research Infrastructures (ESFRI) was established in 2002 with a mandate from the Council of the European Union to:

- support a coherent and strategy-led approach to policy-making on research infrastructures in Europe
- facilitate multilateral initiatives leading to the better use and development of research infrastructures

ESFRI brings together representatives of Ministers of the 28 Member States, 12 Associated States, and of the European Commission that are the decision makers and financers of the ESFRI Research Infrastructures

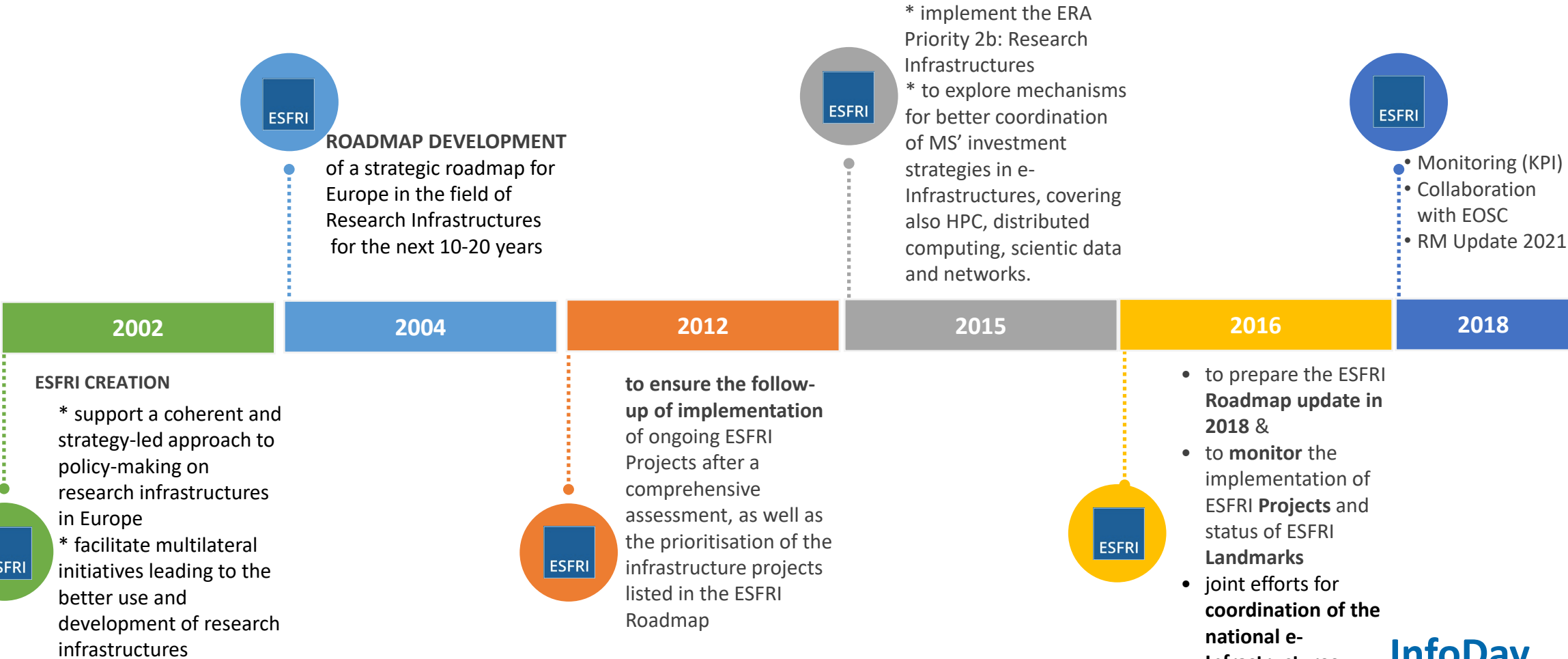
- Indicates strategies for the necessary major financial investment (~20 b€) and long-term commitment for operation (~2 b€/year, +15% of current effort)
- Upon mandate of Competitiveness Council of the European Union, ESFRI has completed the ESFRI Roadmap 2018 and starts now the update process that will lead to the

ESFRI Roadmap 2021

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Mandate of the Competitiveness Council evolution





ESFRI RM EVOLUTION

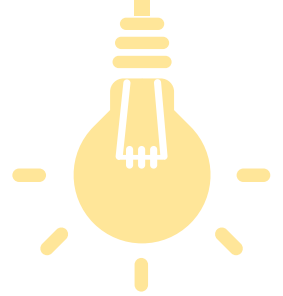
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ROADMAP 2021

ESFRI

**Hans Chang
2002**



2002



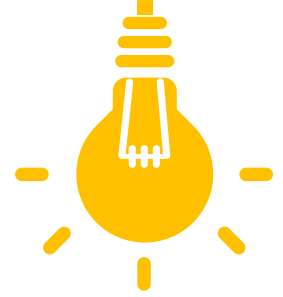
ESFRI Creation

established in 2002 with a **mandate** from the **Council of the European Union**

**John Wood
2006**



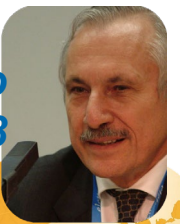
2006



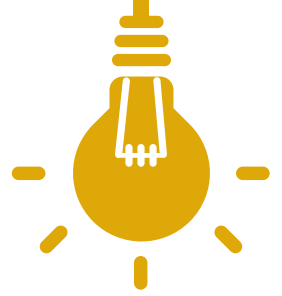
ESFRI published its first roadmap

for the construction and development of the next generation of pan-European research infrastructures.

**Carlo Rizzuto
2008**



2008



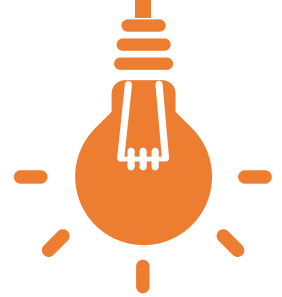
1st update

Increasing the number of RIs of pan-European relevance

**Beatrix Vierkorn-Rudolph
2010**



2010



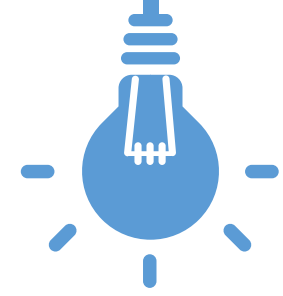
update of the ESFRI Roadmap,

focusing on Energy, Food and Biology,

**John Womersley,
2016**



2016



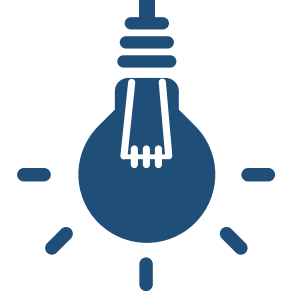
update process

identified projects that were expected to move to implementation in less than 10 years from their first inclusion on the Roadmap. Landmark

**Giorgio Rossi
2018**

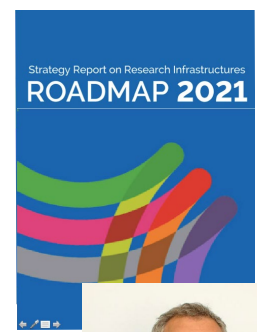


2018



Consolidation & incorporation of the mandates of Council:

sustainability, innovation, and hub of funders of e-infra



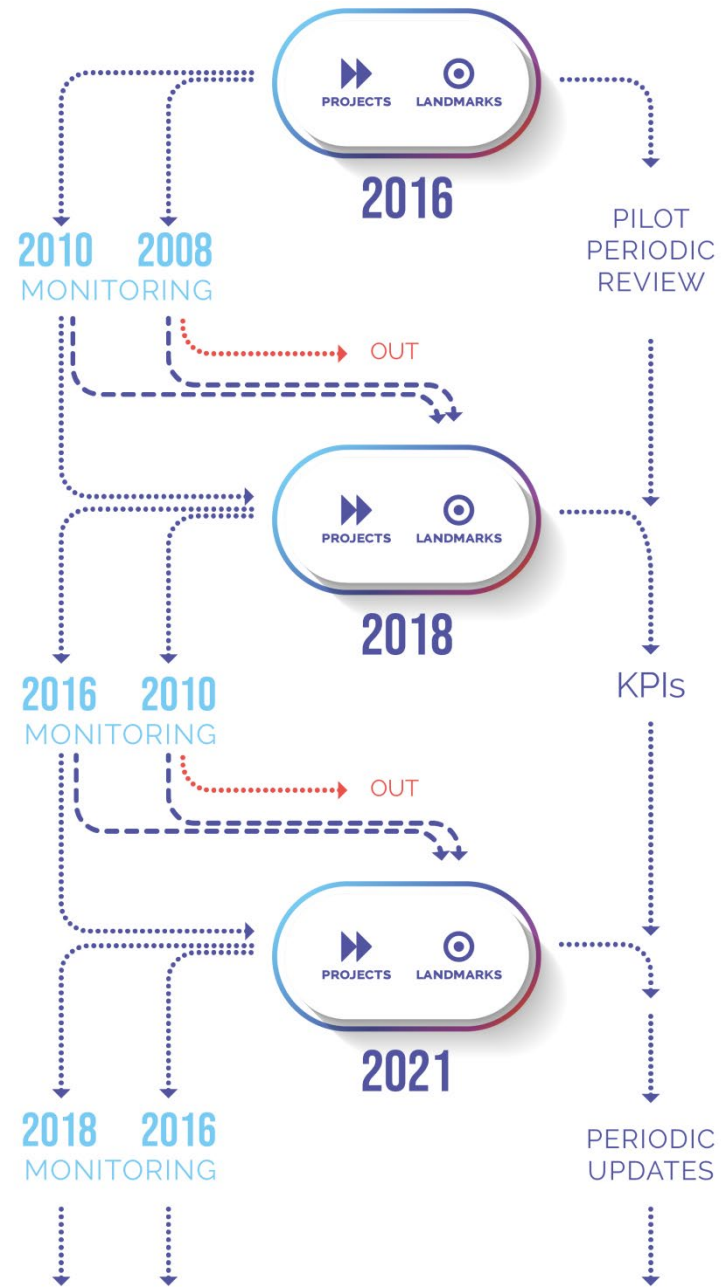
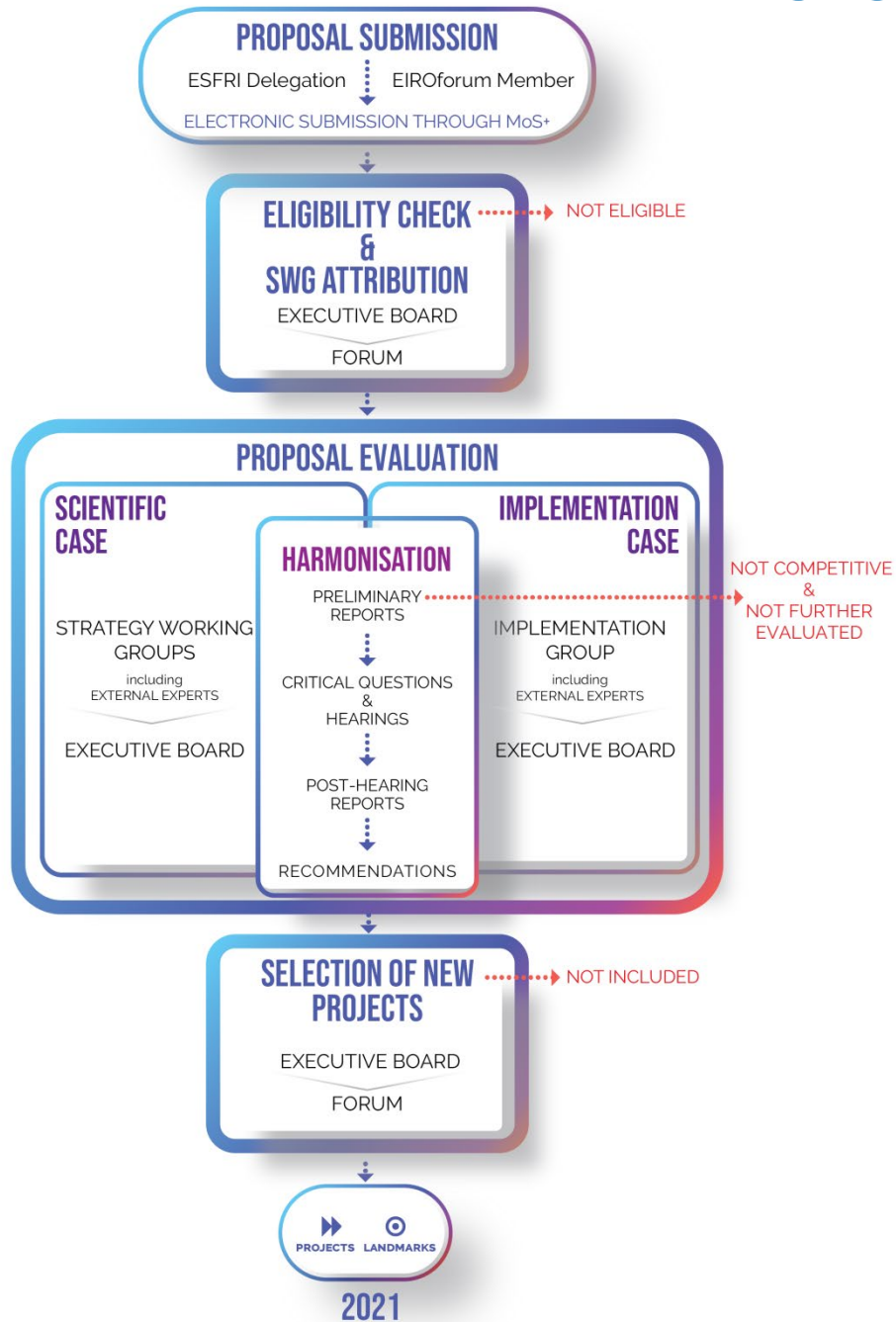
2021



**Jan Hrusak
2021**

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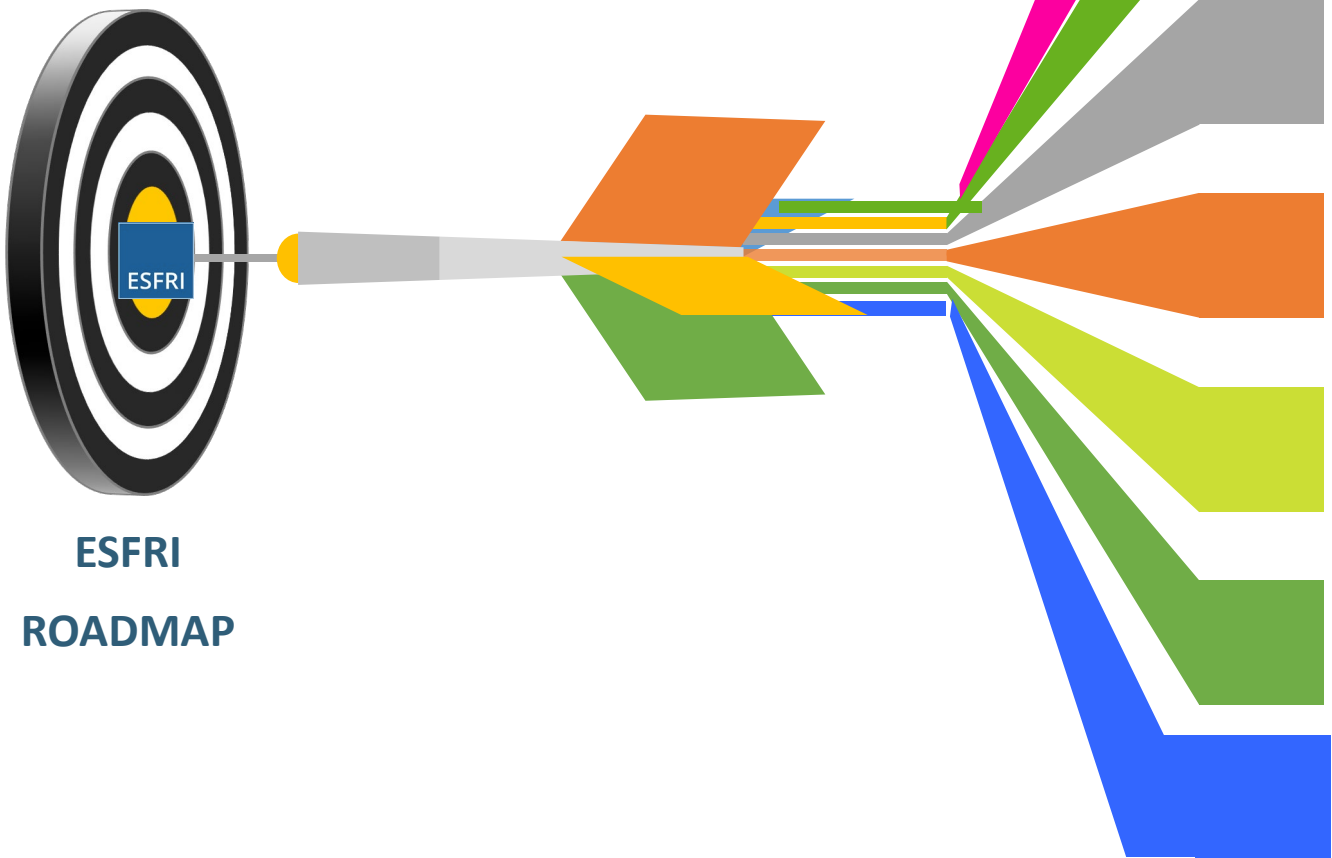
RM EVOLUTION. METHODOLOGY





RM Evolution. ESFRI STRUCTURE

Establishment of permanent SWG (scientific excellence) & IG (Maturity).



SWG SOCIAL & CULTURAL INNOVATION



Bente Maegaard

SWG ENVIRONMENT



Jean-marie Flaud

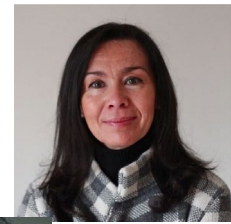
SWG DATA, COMPUTING AND DIGITAL RESEARCH INFRASTRUCTURES



Ana Proykova

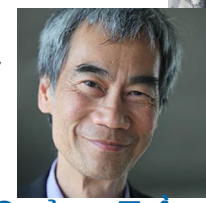
SWG HEALTH & FOOD

Gabriela Pastori



SWG ENERGY

Minh-Quảng Trần



PHYSICAL SCIENCE & ENGINEERING



Jose Luis Martinez

IMPLEMENTATION WG

Jeannette Ridder-Numan



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ESFRI

Scientific Domains

2006

2008

2010

2016

2018

Social Sciences & Humanities	Social Sciences & Humanities	Social Sciences & Humanities	Social & Cultural Innovation	Social & Cultural Innovation
Environmental Sciences	Environmental Sciences	Environmental Sciences	Environment	Environment
Biomedical and Life Sciences	Biomedical and Life Sciences	Biomedical and Life Sciences	Health & Food	Health & Food
Energy	Energy	Energy	Energy	Energy
Material Sciences	Material Sciences	Material Sciences	Physical Science & Engineering	Physical Science & Engineering
Astronomy, Astrophysics, Nuclear and Particle Physics	Physical Science & Engineering	Physical Sciences & Engineering		
Computer and Data Treatment	e-Infrastructures	e-Infrastructures	e-Infrastructures	DIGIT

Introduction of the Landmark Concept RM 2016

- *PROJECT: selected by scientific excellence & maturity.*
- *LANDMARK: RIs implemented or started implementation under the ESFRI Roadmap and at the moment of the evaluation are established as major elements of competitiveness of the European Research Area.*
 - **successfully implemented ESFRI projects that are featuring top science services or effectively advancing in their construction.**
 - *The ESFRI Landmarks need continuous support for successful completion, operation and upgrade in line with the optimal management and maximum return on investment.*
 - demonstrated successful delivery of **the Innovation Union Flagship Initiative that 60% of the strategic European RI identified by ESFRI in 2010** had completed or launched the construction by 2015 with the support of the Member States and the European (EC).



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
ESFRI Project

Scientific and
maturity evaluation

Pan-European
added value

Monitoring

Assessment





ESFRI PROJECTS

DIGIT

ENE

ENV

H&F

PSE

SCI

EU-SOLARIS

AnaEE

MYRRHA

ISBE

WindSanner

MIRRI

2010

ACTRIS

EMPHASIS

EST

E-RIHS

DANUBIUS-RI

KM3NeT 2.0

2016

IFMIF-DONES

DiSSCo

EU-IBISBA

EHRI

eLTER

METROFOOD-RI

2018

NAME	FULL NAME	TYPE	LEGAL STATUS(Y)	ROADMAP ENTRY (Y)	OPERATION START (Y)	CONSTRUCTION COSTS (M€)	OPERATION COSTS (M€/Y)
EU-SOLARIS	European Solar Research Infrastructure for Concentrated Solar Power	distributed		2010	2020*	6	0,2
IFMIF-DONES	International Fusion Materials Irradiation Facility - DEMO Oriented NEutron Source	single-sited		2018	2029*	420	50
MYRRHA	Multi-purpose Hybrid Research Reactor for High-tech Applications	single-sited		2010	2027*	1.352	74
WindScanner	European WindScanner Facility	distributed		2010	2021*	6,1	2

ACTRIS	Aerosols, Clouds and Trace gases Research Infrastructure	distributed		2016	2025*	190	50
DANUBIUS-RI	International Centre for Advanced Studies on River-Sea Systems	distributed		2016	2022*	222	28
DISSCo	Distributed System of Scientific Collections	distributed		2018	2025*	69,4	12,1
eLTER	Long-Term Ecosystem Research in Europe	distributed		2018	2026*	94	35

AnaEE	Infrastructure for Analysis and Experimentation on Ecosystems	distributed	ERIC Step1, 2018	2010	2019*	1,1	0,8
EMPHASIS	European Infrastructure for Multi-scale Plant Phenomics and Simulation	distributed		2016	2021*	73	3,6
EU-IBISBA	Industrial Biotechnology Innovation and Synthetic Biology Accelerator	distributed		2018	2025*	11	65,1
ISBE	Infrastructure for System Biology Europe	distributed		2010	2019*	10	5,2
METROFOOD-RI	Infrastructure for promoting Metrology in Food and Nutrition	distributed		2018	2019*	78,8	31
MIRRI	Microbial Resource Research Infrastructure	distributed		2010	2021*	0,8	0,7

EST	European Solar Telescope	single-sited		2016	2029*	200	12
KM3NeT 2.0	KM3 Neutrino Telescope 2.0	distributed		2016	2020*	151	3

E-RIHS	European Research Infrastructure for Heritage Science	distributed		2016	2025*	20	5
EHRI	European Holocaust Research Infrastructure	distributed		2018	2022*	0,8	2

NA-Not Available
*expected

NAME	FULL NAME	TYPE	LEGAL STATUS(Y)	ROADMAP ENTRY (Y)	OPERATION START (Y)	CAPITAL VALUE (M€)	OPERATION COSTS (M€/Y)
ECCSEL ERIC	European Carbon Dioxide Capture and Storage Laboratory Infrastructure	distributed	ERIC, 2017	2008	2016	1.000	0,85
JHR	Jules Horowitz Reactor	single-sited		2006	2022*	1.800	NA
EISCAT_3D	Next generation European Incoherent Scatter radar system	single-sited	EISCAT Scientific Association, 1975	2008	2022*	123	5,1
EMSO ERIC	European Multidisciplinary Seafloor and water-column Observatory	distributed	ERIC, 2016	2006	2016	100	20
EPOS	European Plate Observing System	distributed	ERIC Step2, 2018	2008	2020*	500	18
EURO-ARGO ERIC	European contribution to the international Argo Programme	distributed	ERIC, 2014	2006	2014	10	8
IAGOS	In-service Aircraft for a Global Observing System	distributed	AISBL, 2014	2006	2014	9,2	7
ICOS ERIC	Integrated Carbon Observation System	distributed	ERIC, 2015	2006	2016	116	24,2
LifeWatch ERIC	e-Infrastructure for Biodiversity and Ecosystem Research	distributed	ERIC, 2017	2006	2017	150	12
BBMRI ERIC	Biobanking and BioMolecular Resources Research Infrastructure	distributed	ERIC, 2013	2006	2014	195	3,5
EATRIS ERIC	European Advanced Translational Research Infrastructure in Medicine	distributed	ERIC, 2013	2006	2013	500	2,5
ECRIN ERIC	European Clinical Research Infrastructure Network	distributed	ERIC, 2013	2006	2014	5	5
ELIXIR	A distributed infrastructure for life-science information	distributed	ELIXIR Consortium Agreement, 2013	2006	2014	125	95
EMBRIC ERIC	European Marine Biological Resource Centre	distributed	ERIC, 2018	2008	2017	164,4	11,2
ERINHA	European Research Infrastructure on Highly Pathogenic Agents	distributed	AISBL, 2017	2008	2018	5,8	0,7
EU-OPENSREEN ERIC	European Infrastructure of Open Screening Platforms for Chemical Biology	distributed	ERIC, 2018	2008	2019*	82,3	1,2
Euro-BiImaging	European Research Infrastructure for Imaging Technologies in Biological and Biomedical Sciences	distributed	ERIC Step2, 2018	2008	2016	90	1,6
INFRAFRONTIER	European Research Infrastructure for the generation, phenotyping, archiving and distribution of mouse disease models	distributed	GmbH, 2013	2006	2013	180	80
INSTRUCT ERIC	Integrated Structural Biology Infrastructure	distributed	ERIC, 2017	2006	2017	400	30
CTA	Cherankov Telescope Array	single-sited	gGmbH, 2014	2008	2024*	400	20
ELI	Extreme Light Infrastructure	distributed	AISBL, 2013	2006	2018	950	80
ELT	Extremely Large Telescope	single-sited	ESO*	2006	2024*	1.120	45
EMFL	European Magnetic Field Laboratory	distributed	AISBL, 2015	2008	2014	170	20
ESRF EBS	European Synchrotron Radiation Facility Extremely Brilliant Source	single-sited	ESRF*	2016	2023*	128	82
European Spallation Source ERIC	European Spallation Source	single-sited	ERIC, 2015	2006	2025*	1.843	140
European XFEL	European X-Ray Free-Electron Laser Facility	single-sited	European XFEL*	2006	2017	1.490	118
FAIR	Facility for Antiproton and Ion Research	single-sited	GmbH, 2010	2006	2025*	NA	234
HL-LHC	High-Luminosity Large Hadron Collider	single-sited	CERN*	2016	2026*	1.408	126
ILL	Institut Max von Laue-Paul Langevin	single-sited	ILL*	2006	2020*	188	97
SKA	Square Kilometre Array	single-sited		2006	2027*	1.000	77
SPRAL2	Système de Production d'Ions Radioactifs en Ligne de 2e génération	single-sited	GANIL	2006	2019*	281	6
CESSDA ERIC	Consortium of European Social Science Data Archives	distributed	ERIC, 2017	2006	2013	117	39
CLARIN ERIC	Common Language Resources and Technology Infrastructure	distributed	ERIC, 2012	2006	2012	NA	14
DARIAH ERIC	Digital Research Infrastructure for the Arts and Humanities	distributed	ERIC, 2014	2006	2019*	NA	0,7
ESS ERIC	European Social Survey	distributed	ERIC, 2013	2006	2013	NA	2,5
SHARE ERIC	Survey of Health, Ageing and Retirement in Europe	distributed	ERIC, 2011	2006	2011	250	18
PRACE	Partnership for Advanced Computing in Europe	distributed	AISBL, 2010	2006	2010	500	60

NA-Not Available
*expected
*ERForum member

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.





ESFRI LANDMARKS

DIGIT

ENE

ENV

H&F

PSE

SCI

PRACE

JHR

EMSO ERIC

BBMRI ERIC

ELI

CESSDA ERIC

EURO-ARGO ERIC

EATRIS ERIC

ELT

CLARIN ERIC

IAGOS

ECRIN ERIC

ESS ERIC

DARIAH ERIC

ICOS ERIC

ELIXIR

European XFEL

ESS ERIC

LifeWatch ERIC

INFRAFRONTIER

FAIR

SHARE ERIC

INSTRUCT ERIC

ILL

SKA

SPIRAL2

2006

ECCSEL ERIC

EISCAT_3D

EMBRC ERIC

CTA

EPOS ERIC

ERINHA

EMFL

EU-OPENSOURCE ERIC

Euro-Biomed

2008

ESRF EBS

HL-LHC

2016



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Content

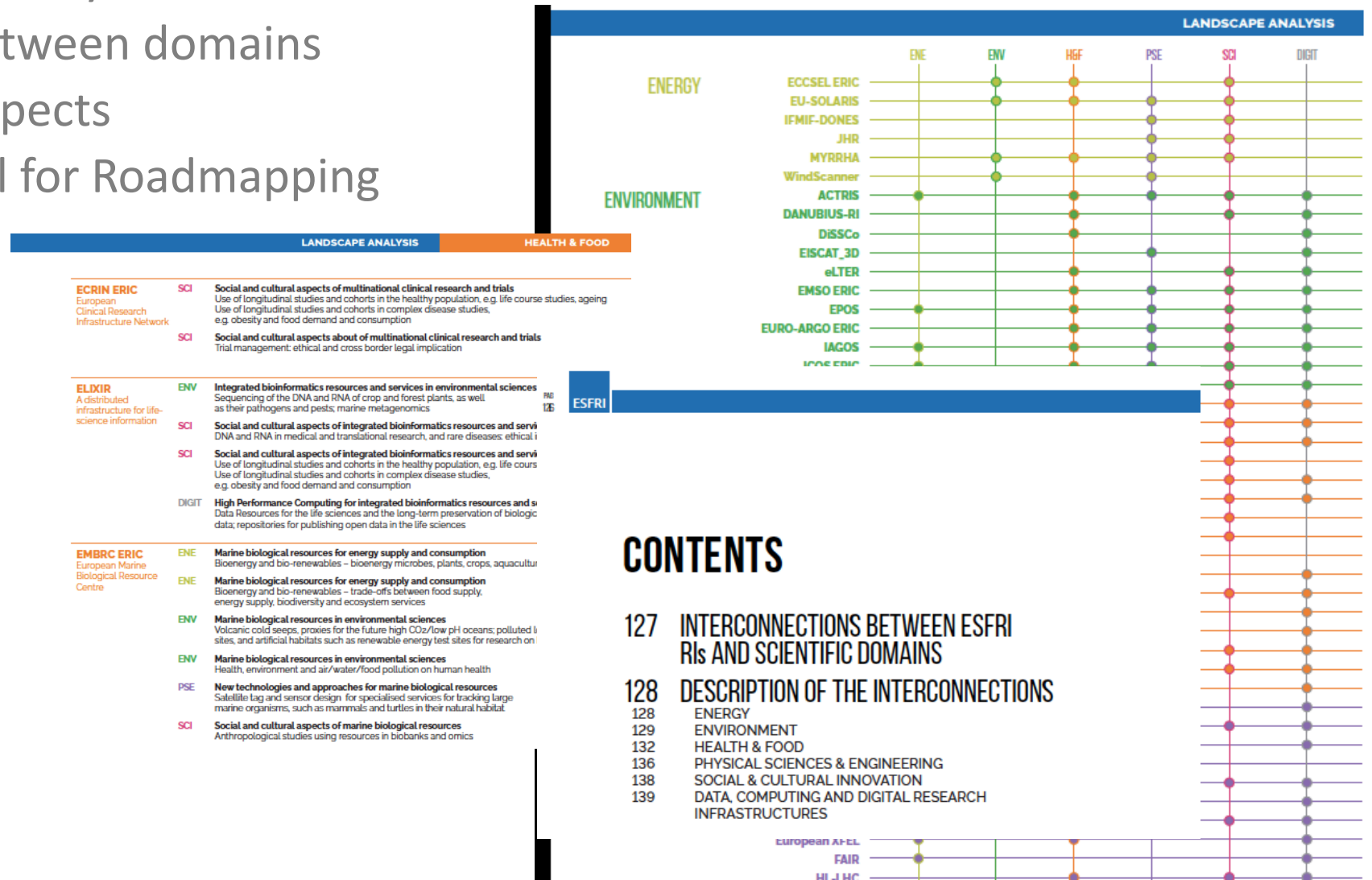
Organised in 3 Sections:

- 1. Describes the **state of play of all Research Infrastructures in the corresponding thematic area**, their contributions to support frontier research and to provide key data necessary to address the Grand Challenges.*
- 2. is an all-new analysis effort to render explicit the **relevant connections that already exist among different thematic areas** by means of the ESFRI RIs, and to identify the **critical needs and opportunities for new links and new research practices**.*
- 3. describes the **state of play of the Research Infrastructures in addressing transversal issues** like education and training, needs for digital infrastructure, contribution to innovation along with the horizontal analyses like socio-economic impact, territorial impact, pan-European and global dimensions that are carried out by all RIs.*



Landscape becoming more strategic

- Multidisciplinarity.
- Interfaces between domains
- Horizontal aspects
- Strategic Tool for Roadmapping



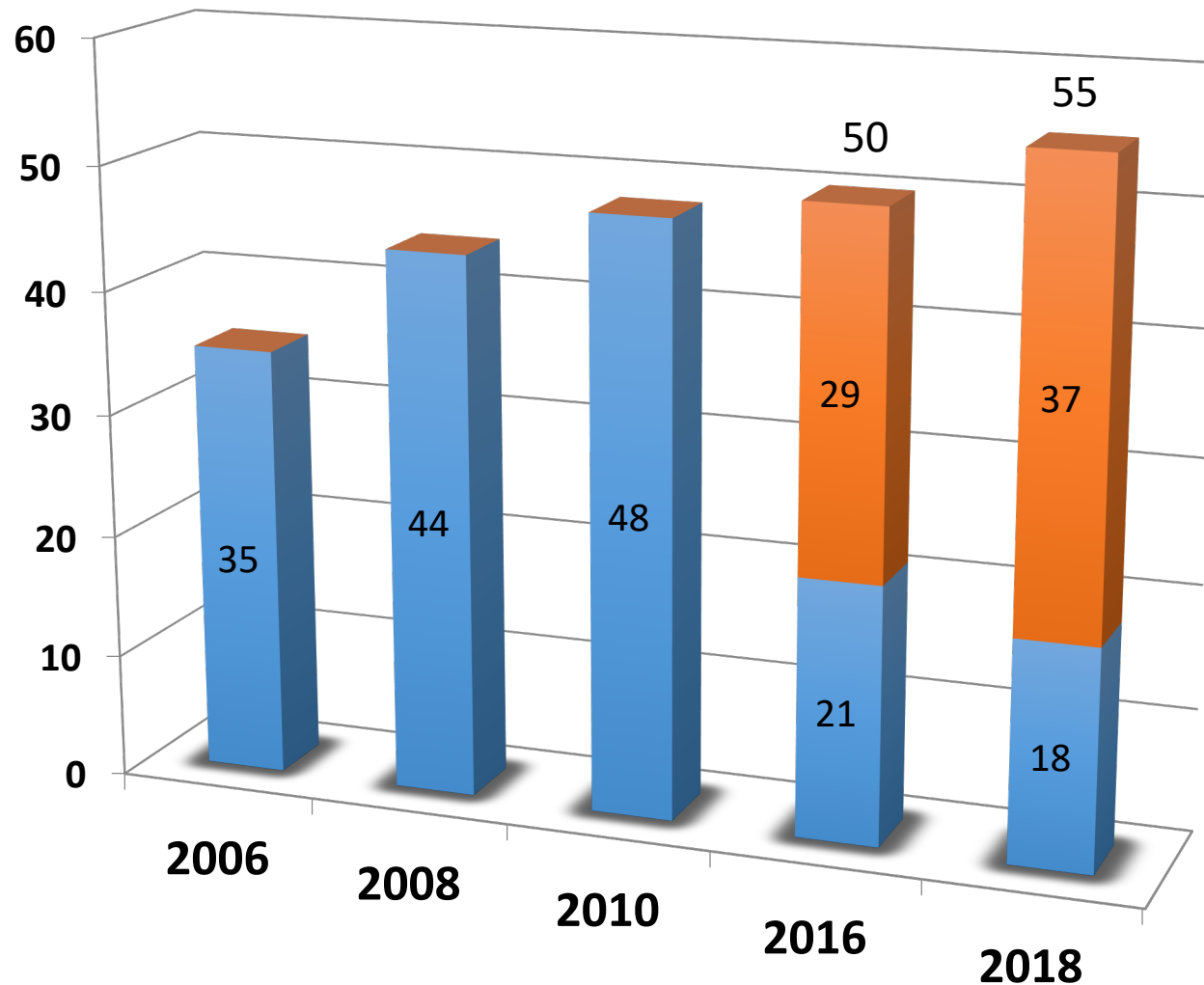


Projects & Landmarks evolution

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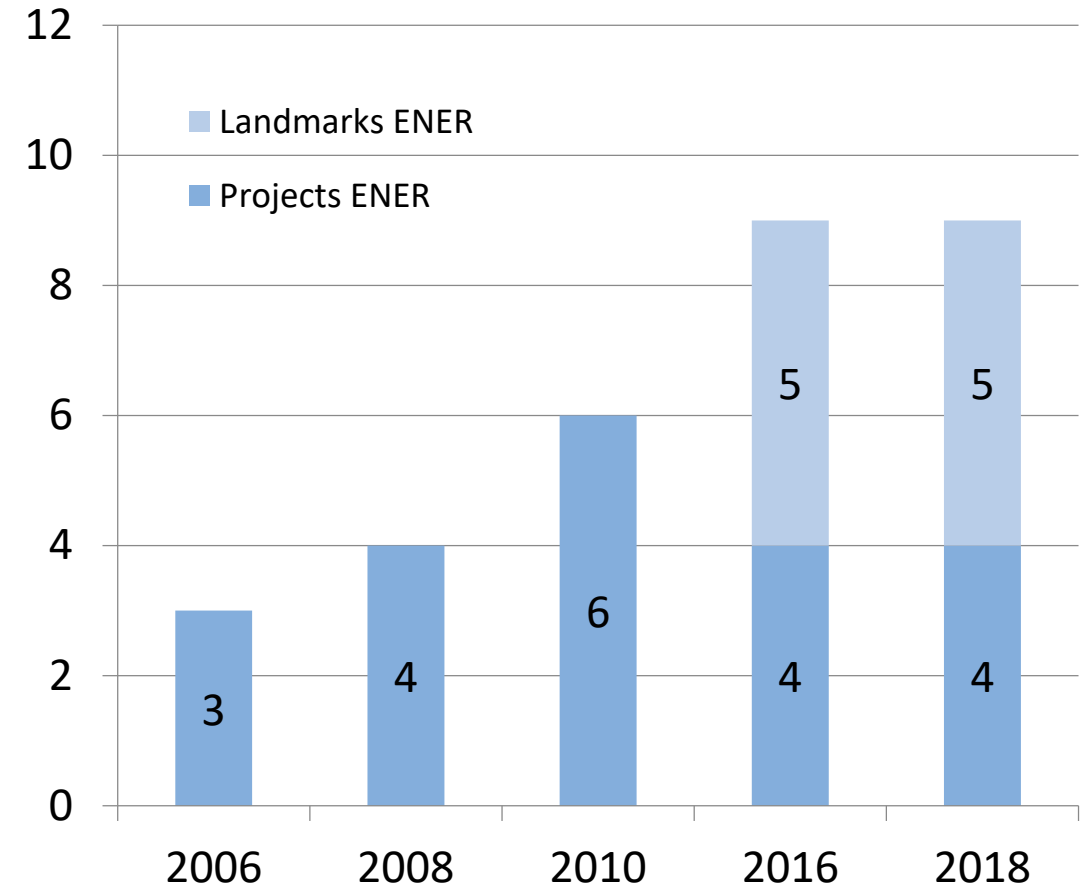
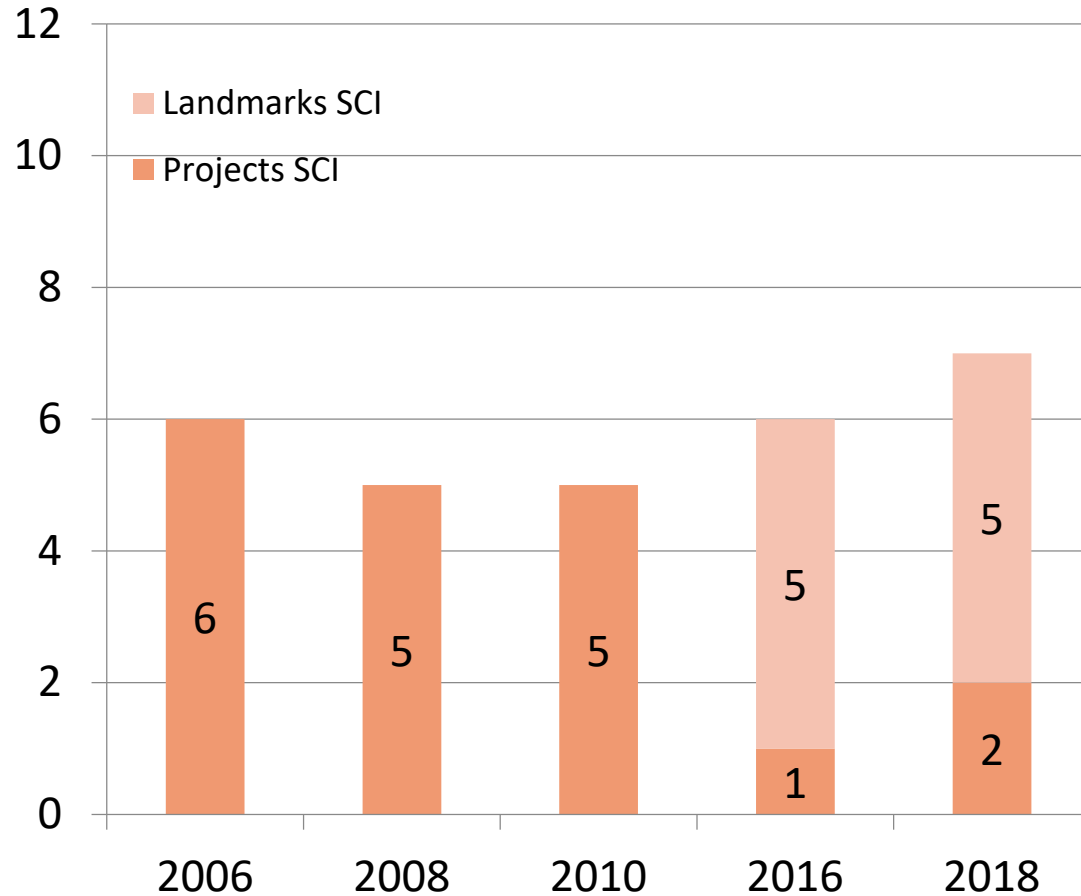


Landmarks
Projects

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Scientific domains: View of the evolution

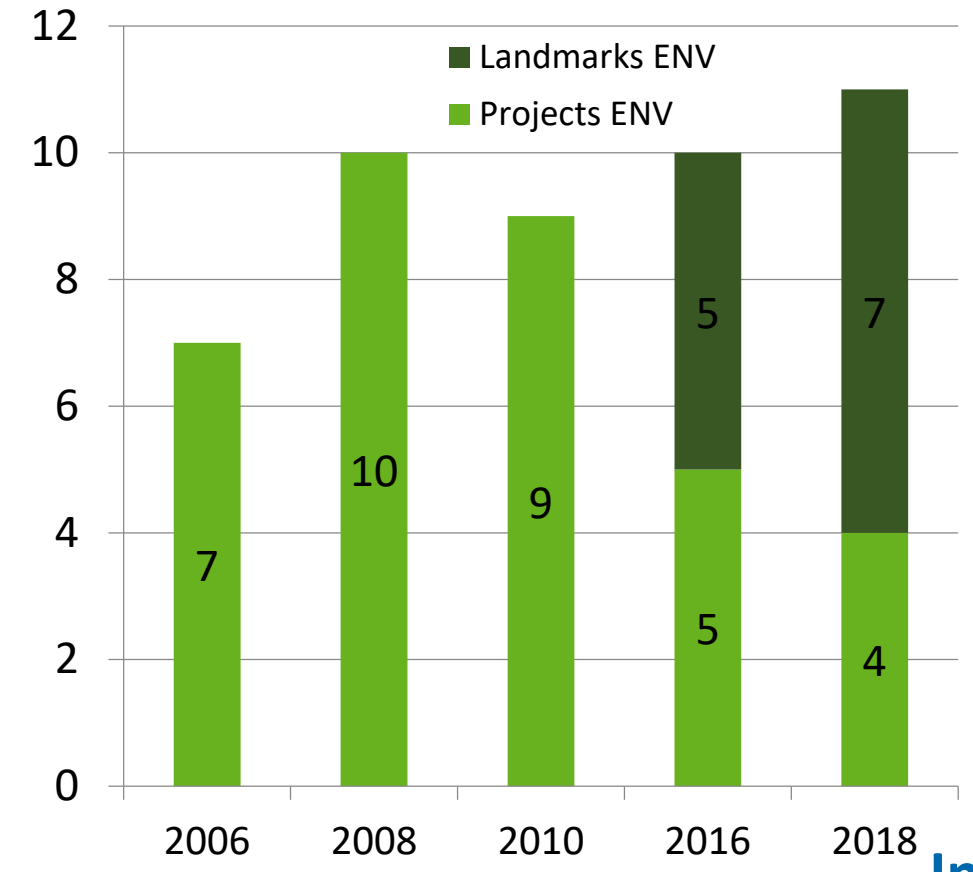
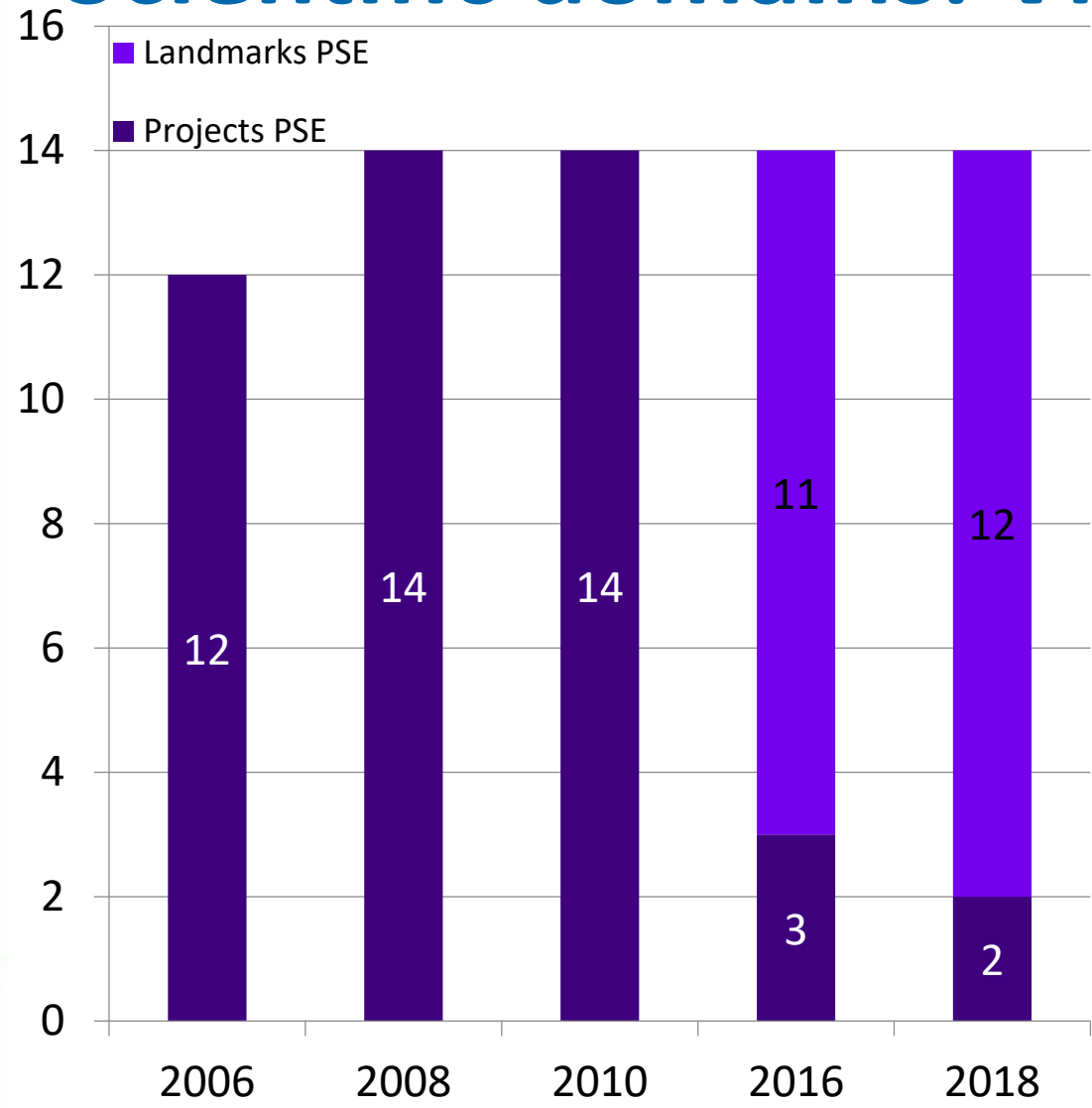




Scientific domains: View of the evolution

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ESFRI



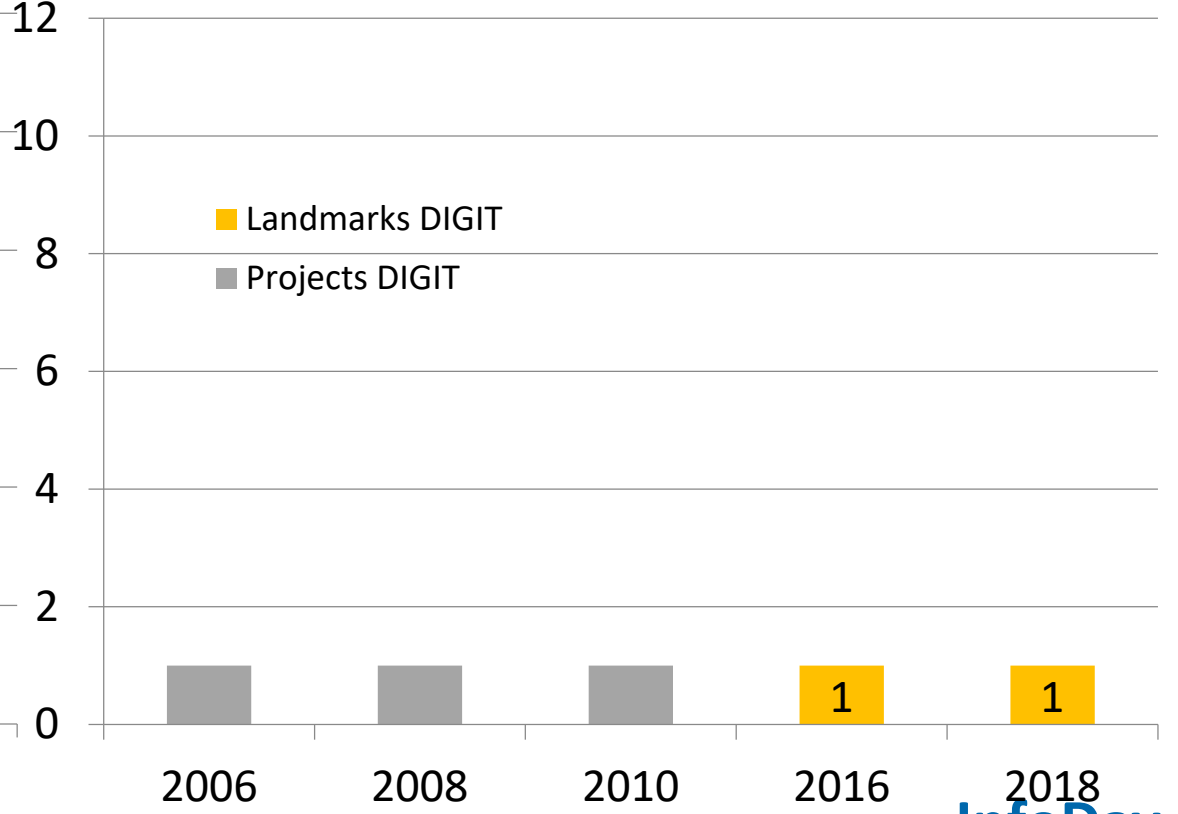
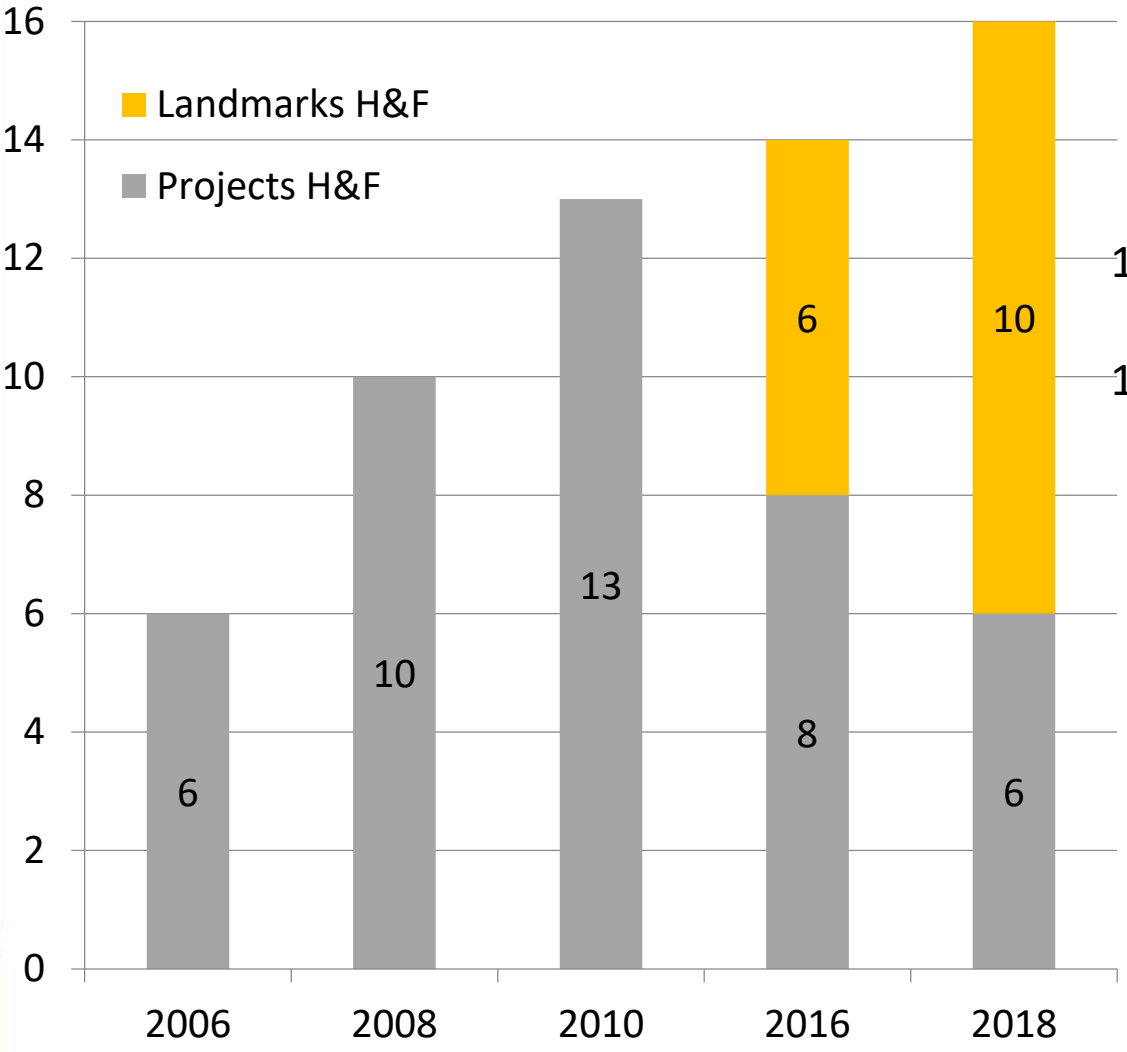
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Scientific domains: View of the evolution

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ESFRI & RI beyond RM

- ad-HOC WG, (scripta series)
- Commissioned studies

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ESFRI



ESFRI & RI beyond RM

- The role of Research Infrastructures & ESFRI in EOSC
- Consolidation of the European Research Landscape
- Promoting effective access to RI
- ESFRI in the monitoring of the RI Performances
- National Roadmaps & Funding Models
- Research Infrastructures in the evolving ERA



WHITE PAPER.
Future of ESFRI

- WORKSHOP La Palma, SPAIN. 6-8 Nov

ESFRI

ABOUT ESFRI ROADMAP EVENTS

HOME > EVENTS > ESFRI EVENTS

ESFRI Workshop on the Future of Research Infrastructures in the Evolving ERA

About Agenda Venue & Social Travel & Accomodation

Los Cancajos, La Palma, Canary Islands

06.11.2019 to 08.11.2019

Important note: Registration has now been closed, as maximum number of attendees has been reached. If you are interested to participate but have not managed to register yet, please let us know at info@str-eu.eu

With the next Roadmap of European Research Infrastructures (ERI) publication in 2021, ESFRI will end the second cycle of its funding. The editions of 2006, 2008, 2010, 2016 and 2018. The last edition demonstrated clearly how the landscape of research infrastructures has evolved and matured.

As demonstrated through the work on long-term sustainability of research infrastructures over the last three years, the facilities that have



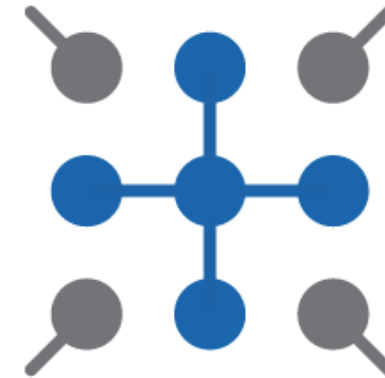
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Monitoring System (MOS)

ESFRI Roadmap 2018

Monitoring System (MOS)

Roadmap Archive



MoS

Welcome to the ESFRI Monitoring System (ESFRI-MOS)

ESFRI-MOS is the central online platform for information on the ESFRI Projects and ESFRI Landmarks. The overall objective provide efficient knowledge management for supporting political decision making and public awareness on the ESFRI Res Infrastructures.

ESFRI-MOS has been developed by StR-ESFRI to provide essential information required for ESFRI's dedicated workflows at Roadmaps and its instruments, namely – the Strategy Working Groups, the implementation Group and the European Comr, and to offer general information to the public.

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CALL FOR PROPOSALS

New Proposals Submission Deadline: 5 May 2020

[DOWNLOAD THE GUIDE](#)



Latest News



New study: 'Guidelines on Cost Estimation of Research Infrastructures' by StR-ESFRI

August 07, 2019 A new study has been added to the ESFRI library...



Upcoming events

25 Roadmap 2021 InfoDay

Sep Note: registrations for this event are now closed, since the maximum room capacity has been exceeded. For any



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ROADMAP 2021

Thank you for the attention!