ITINERIS

Access to Research Infrastructures: process and modalities - 2

Introduction

- Carmela Cornacchia, CNR-IMAA

Finanziato dall'Unione europea NextGenerationEU

Ministero dell'Università e della Ricerca

Italiadomani
PIANO NAZIONALE DI RIPRESA E RESILIENZA

Agenda 18 - 20, march 2025

ITINERIS

18 MARCH

Time		Training Module - Topic	Speaker
08:45 – 09:00		Registration of participants	
09:00 – 09:15	15m	Introduction and Presentation of the Course	Carmela Cornacchia, CNR
09:15 – 11:15	2h00m	Access to RI services and basic definitions (modulo 1)	Carmela Cornacchia, CNR
11:15 – 11:30		*Coffee Break*	
11:30 – 12:30	1h00m	Access to RI - Services (modulo 2a)	Rosa M. Petracca Altieri, CN
12.30 – 13.30	1h00m	Access legal framework, I (modulo 3)	Simone Gagliardi, CNR
13:30 – 14:00		*Lunch Break*	
14:00 – 15:30	1h30m	*Hands-on session for the ITINERIS Access Policy (modulo 3)*	Simone Gagliardi, CNR
15:30 – 15:45		*Coffee Break*	
15:45 – 16:45	1h00m	Access legal framework, II (modulo 3)	Simone Gagliardi, CNR
16:45 – 18:00	1h15m	*Hands-on session for the ITINERIS Service Level Agreement (modulo 3)*	Rosa M. Petracca Altieri, CNR

I. Introduction to Research Infrastructure services

II. Access legal framework

3/2025

2

Agenda 18 - 20, march 2025

ITINERIS

19 MARCH

Time		Training Module - Topic	Speaker
09:00 – 11:00	2h00m	Access to RI - Services (modulo 2b)	Rosa M. Petracca Altieri, CNR
11:00 – 11:15		*Coffee Break*	
11:15 – 13:30	2h15m	*Hands-on session for the ITINERIS Catalogue of Services (modulo 2)*	Rosa M. Petracca Altieri, CNR
13:30 – 14:00		*Lunch Break*	
14:00 – 15:00	1h00m	Visit to CIAO Observatory (modulo 4)	CIAO staff, CNR
15:00 – 15:30	30m	Access to RI Services – Process (modulo 4)	Rosa M. Petracca Altieri, CNR
15:30 – 15:45		*Coffee Break*	
15:45 – 18:00	2h15m	Access to RI Services – Process (modulo 4)	Rosa M. Petracca Altieri, CNR

Agenda 18 - 20, march 2025

ITINERIS

20 MARCH

Time		Training Module - Topic	Speaker
09:00 – 11:00	2h00m	Access Financial framework (modulo 5)	Rosa M. Petracca Altieri, CNR
11:00 – 11:15		*Coffee Break*	
11:15 – 13:30	2h15m	Access Financial framework - Access cost estimation (modulo 5)	Rosa M. Petracca Altieri, CNR
13:30 – 14:00		*Lunch Break*	
14:00 – 15:30	1h30m	*Hands-on session on the ITINERIS Access cost estimation (modulo 5)*	Rosa M. Petracca Altieri, CNR
15:30 – 15:45		*Coffee Break*	
15:45 – 18:00	2h15m	*Hands-on session for the ITINERIS Access Management Plan (modulo 5)*	Rosa M. Petracca Altieri, CNR

Introduce ourselves

- Chi sono?

- Quale è la mia expertise?

- Quale è il mio coinvolgimento in ITINERIS?

- Quale è il mio ruolo in una IR partecipante ad ITINERIS?

- Quale è la mia esperienza/conoscenza sui temi del Corso

- Quali sono le mie aspettative

Who we are

SAMU – Service Access Management Unit della Direzione Generale di ACTRIS ERIC

Il CNR-IMAA ospita il SAMU – Service Access Management Unit, unità della Direzione Generale di ACTRIS-ERIC, dedicata alla gestione del processo di accesso fisico e remoto a tutta la IR europea.

L'accesso è regolato dalla ACTRIS access policy ed è implementato attraverso l'ACTRIS Access management Plan.

www.actris.eu

Who we are

ITINERIS

European projects

14 IR in diversi domini scientifici

IRISCC (Integrated Research Infrastructure Services for Climate Change Risks). HORIZON-INFRA-2023-SERV-01-01 Grant Agreement no. 101131261 Horizon Europe, 1 April 2024 – 30 September 2028

CARGO-ACT (Cooperation and AgReements enhancing Global interOperability for Aerosol, Cloud and Trace gas research Infrastructures) Project number: 101132093 Horizon Europe, 01 March 2024 – 28 February 2027.

Collaborazione con USA

RI-Urbans (Research InfRastructures Services Reinforcing Air Quality Monitoring Capacities in European Urban & Industrial AreaS). Funded under the programme H2020-LC-GD-2020 – Grant Agreement n. 871115 – (1 October 2021 – 30 September 2025).

IR & network air quality

ATMO-ACCESS (Access to Atmospheric Research Facilities) Funded in the frame of the programme H2020-EU.1.4.1.2 – Grant Agreement n. 101008004 – (1 April 2021 – 31 March 2025).

3 IR nel dominio atmosferico

ACTRIS-IMP (Implementation project). Funded in the frame of the programme H2020-EU.1.4.1.1. – Grant Agreement 871115 – (1 January 2020 – 31 December 2023).

The Italian Integrated Environmental
Research Infrastructures System - ITINERIS

ITINERIS: Empowering Italy's Environmental Future

ITINERIS will build the Italian Hub of Research Infrastructures in the environmental scientific domain for the observation and study of environmental processes in the atmosphere, marine domain, terrestrial biosphere, and geosphere.

The main goal is to develop a whole-system, cross-disciplinary and integrated approach for understanding and predicting the Earth's system and developing effective action strategies to address the most pressing environmental challenges.

The project

ITINERIS

ITINERIS -Italian Integrated Environmental Research Infrastructures System is a project funded by EU – Next Generation EU PNRR- Mission 4 "Education and Research" – Component 2: "From research to business" – Investment 3.1: "Fund for the realisation of an integrated system of research and innovation infrastructures".

The project is coordinated by the CNR (National Research Council). It started in November 2022, and will continue for 36 months.

CNR | INFN | INGV | ISPRA | OGS | UNIVERSITÀ DEGLI STUDI DI FIRENZE

Project at a glance

€ 155M INVESTMENT

7 PARTNERS

39 OPERATING UNITS

75 INTERMEDIATE OBJECTIVES

208 DELIVERABLE

8 WORK PACKAGES

89 ACTIVITIES

A network of excellence

ITINERIS coordinates a network of national nodes from 22 RIs belonging to or relevant for the ENV domain.

Different levels of maturity, ranging from ESFRI Landmarks/Projects which already deliver services and provide access to data and facilities at EU level, to new EU and national RIs.
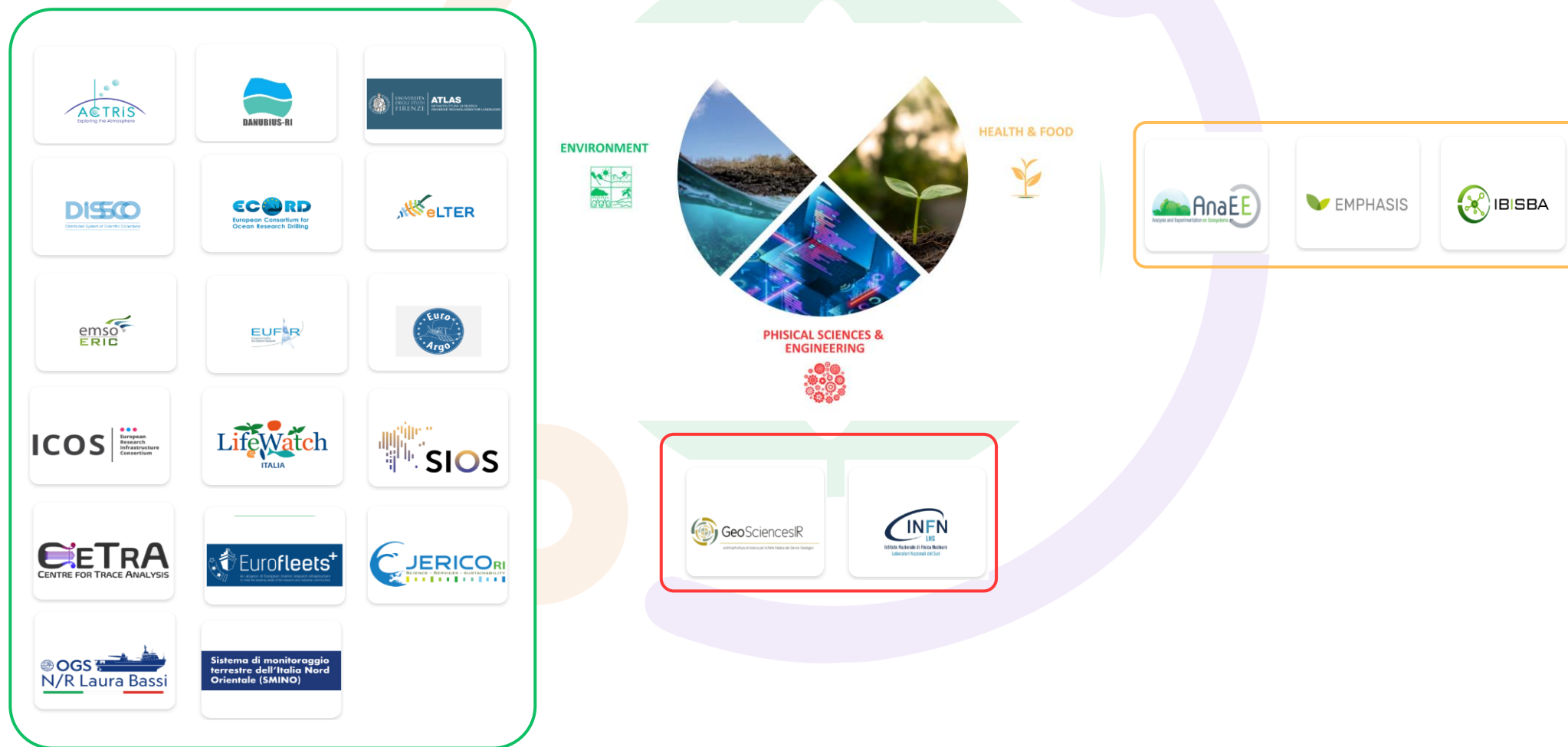
Work Packages and interconnections
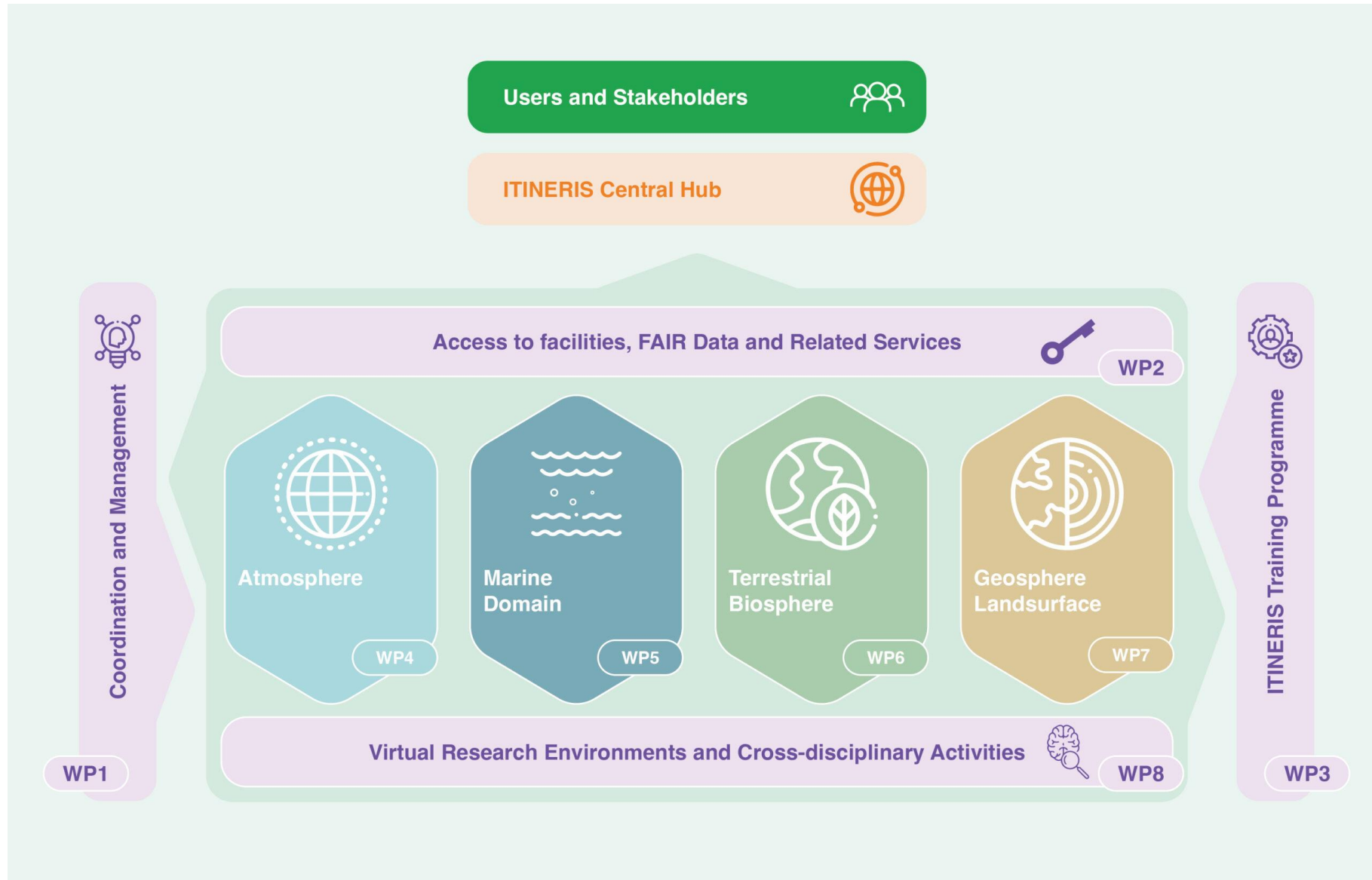
The ITINERIS HUB

The ITINERIS HUB fulfills the core objective of the project: to establish a single access point to the wide range of data, cutting-edge facilities, analytical tools, and services provided by the Italian environmental RIs, breaking down traditional disciplinary silos and promoting a multidisciplinary approach.

Why use ITINERIS HUB ?

- For Researchers: Save time and effort in locating and accessing integrated datasets and cutting-edge service and tools for innovative environmental research.

- For Policymakers: Gain reliable, up-to-date environmental data to inform evidence-based decisions, monitor environmental trends and assess the impact of policies.

- For Stakeholders: Leverage environmental data and collaborate with researchers and institutions to address shared challenges and develop sustainable solutions in sectors such as agriculture, energy, and urban planning.

An integrated digital ecosystem

ITINERIS

ITINERIS Catalogue

ITINERIS Virtual Research Environment (VRE)

ITINERIS Training Centre

ITINERIS Access Platform

Moving beyond simple resource aggregation, ITINERIS HUB provides a truly integrated digital ecosystem offering user-friendly interfaces, advanced capabilities, and integrated tools designed to enhance impact on research, collaborative potential, and user experience.

ITINERIS Catalogue

ITINERIS Catalogue

ITINERIS Virtual Research Environment (VRE)

ITINERIS Training Centre

ITINERIS Access Platform

A seamless interface to explore and discover a wide range of metadata. It features a robust integration framework focused on harmonizing the development of different RIs and rigorously implementing FAIR data principles:

- Standardized protocols, formats, ontologies, and metadata.

- Integration of data across environmental domains (atmosphere, marine, terrestrial, geosphere) and multiple spatial and temporal scales.

- Geospatial visualization tools for intuitive exploration and analysis of data coverage.

- Integration of existing and new data to deliver rich, comprehensive insights for research and decision-making.

- Tools and services to support the entire data lifecycle, from collection and analysis to storage and sharing.

ITINERIS Virtual Research Environment (VRE)

ITINERIS

ITINERIS Catalogue

ITINERIS Virtual Research Environment (VRE)

ITINERIS Training Centre

ITINERIS Access Platform

Advanced digital platforms designed to empower users with cutting-edge tools for cross-disciplinary environmental analysis. ITINERIS VREs integrate data, models, and computational resources from multiple RIs, enabling researchers, policymakers, and stakeholders to address complex environmental challenges through collaborative and innovative approaches.

Thematic VREs

Critical Zone Services

Aquatic Biomass Services

Crops, Plants, and Pests

Essential variables

Aerosol-Biosphere
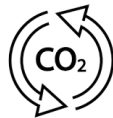
Carbon Cycle Services

Climate Change Indicators and Impacts

Downstream Effects

Isotope Database

ITINERIS Training Centre

ITINERIS

ITINERIS Catalogue

ITINERIS Virtual Research Environment (VRE)

ITINERIS Training Centre

ITINERIS Access Platform

A dedicated platform offering courses, hands-on training, workshops and educational resources to enhance researchers', technicians', and stakeholders' skills in utilizing data, tools, and VREs developed from environmental RIs.

It promotes best practices, interdisciplinary collaboration, and equips the next generation of scientists with advanced knowledge and practical skills for innovation and sustainable solutions.

ITINERIS Access Platform

ITINERIS Catalogue

ITINERIS Virtual Research Environment (VRE)

ITINERIS Training Centre

ITINERIS Access Platform

A centralized and efficient system to request physical and remote access within the available access programs, offering clear guidance on access modes, eligibility, and application procedures.

A cornerstone of ITINERIS' mission to establish a national access framework, aimed at harmonizing access protocols, promoting interoperability, transparency and efficiency in accessing RI resources and supporting open science initiatives.

Work Packages and interconnections
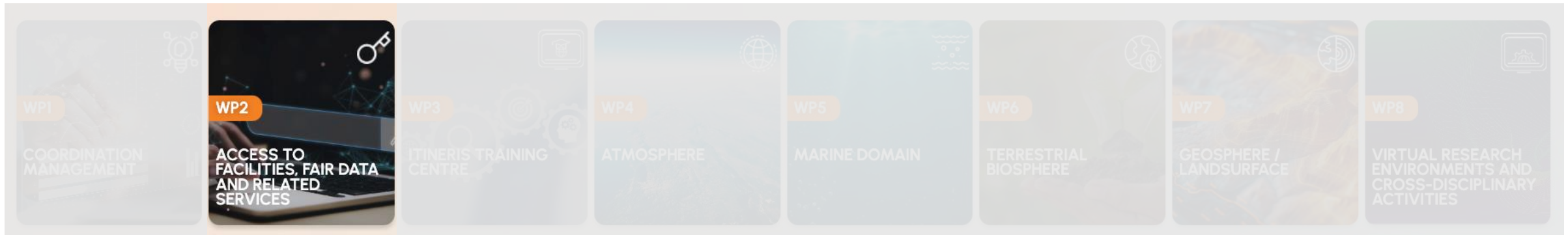
Major Objectives

➤ Networking and harmonisation of National Environmental RIs to build a community around a central HUB enabling access to the environmental data of distributed national RIs;

➤ Definition of a common framework for Access Provision and implementation of a single entry point to the whole national network of environmental RIs and to their facilities, resources and knowledge to reinforce the national contribution to scientific excellence in Europe;

➤ Encourage the application of FAIR principle to support the advancing cross-disciplinary research through environmental domains.

Module 1 - ACCESS to Research Infrastructure Services and basic definition

ACCESS to Research Infrastructure Services and basic definition

- 🌐 **Relevance and objectives of Research Infrastructures**

- 🌐 **European RI ecosystem**

- 🌐 **RI Services & Access – Concepts**

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What is a Research Infrastructure (RI)?

Research Infrastructures are **facilities, resources and services** that are used by the research communities to conduct research and foster innovation in their fields

- Major scientific equipment or sets of instruments

- Knowledge-based resources – collections, archives, scientific data

- Data, computing systems and communication networks

- Any other research and innovation infrastructure of a unique nature open to users to achieve excellence

Why do we need Research Infrastructure (RI)?

Research Infrastructures are **facilities, resources and services** that are used by the research communities to conduct research and foster innovation in their fields

- Excellence in European research and innovation

- Pan-European interest and sustainability

- Reduce fragmentation and avoid duplication of skills and efforts

- Sharing knowledge and resources

- Joining forces – international collaboration and networking

- Tackling key societal challenges

I. Introduction to Research Infrastructure Services

Training current RIs staff and user communities: "Access to Research Infrastructures: Process and Modalities", Tito, 18-20/03/2025   26

Types of Research Infrastructures

Single-sited research infrastructure

Geographically localized in a single site or in a few complementary sites, designed for user access, with European or international governance

Distributed research infrastructure

The facilities, resources and services are geographically scattered, consisting of a central hub, with a single point of access for all users.

Virtual research infrastructure

E-infrastructure for digital online services to users: electronic services, networks, archives, databases and databanks, computing.

I. Introduction to Research Infrastructure Services

Single-sited vs distributed RIs
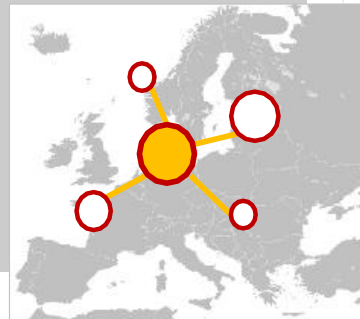
→ High level of integration

→ Common policies

- User support structure to optimise access to the relevant site

- Accommodation arrangements and logistics

- Long-term planning for the site throughout the life-cycle

- Effective operation of Central Hub

- Single point of access for all users with support structure to optimise access for research

- Joint investment strategy through the National Nodes and common/shared facilities

RI Organisational Elements

Human resources policy

Legal status and governance structure

Unique access policy and single access point and user strategy and user support structure

Data management system

Measurable KPIs for scientific excellent services and sustainability

Central hub

*and interlinked national notes, legally binding coordination structures and joint investment strategy

*) Distributed RIs

European RI Ecosystem – The ESFRI Roadmap

The European Strategy Forum on RI (ESFRI) is a strategic body, set up in 2002 and mandated by the EU council, to support a coherent and strategy-led approach to policy making on Research Infrastructures in Europe.

ESFRI

- ⊕ Competitive and open access to high quality RI
- ⊕ Attracting best researchers world-wide
- ⊕ Better use and development of RI on EU and international level
- ⊕ **Establish a European Roadmap for RI**

✓ Leading role in the development of pan-EU RIs / Global RI, incubator role

✓ Appointed ESFRI delegates from 28 EU MS, other associated countries and the EC

✓ 6 Strategic working groups, implementation group, task forces, ad hoc working groups
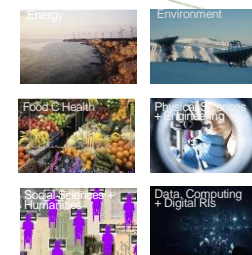
ESFRI Strategic Roadmap

2002

2006

35 ESFRI Projects for new large-scale RI of pan-EU relevance and scientific excellence

2008

44 ESFRI Projects (of which 4 are distributed Ris)

2010

48 ESFRI Projects Focus on energy and biology-medical sciences

2016

21 ESFRI Projects and 29 "Landmarks"

18 ESFRI Projects and 37 Landmarks, Landscape Analysis

2018

22 ESFRI projects and 41 landmarks Relevant ESFRI RIs for SDG, capacity to rapid responses to emergencies, contribution to green + digital transformation

2021

2026

Building a robust and sustainable European RI Ecosystem

RI Lifecycle Approach

- Bottom-up clustering of scientific communities

- Proof of scientific concept of technical feasibility

- Centrally coordinated RI, developing the organisational, financial, operational and strategic framework

- Governance and management structure, political and financial support, legal entity and service launching

- Delivering excellent science services and generating frontier research

- Termination

I. Introduction to Research Infrastructure Services

Periodic Monitoring of ESFRI Landmarks

Thorough evaluation process: questionnaire, hearing, site visits

Monitoring of ESFRI Roadmap projects (10-year term)

- **Scientific case - minimal key requirements (operation phase)**
  - Scientific excellence
  - Pan-European relevance
  - Socio-economic impact
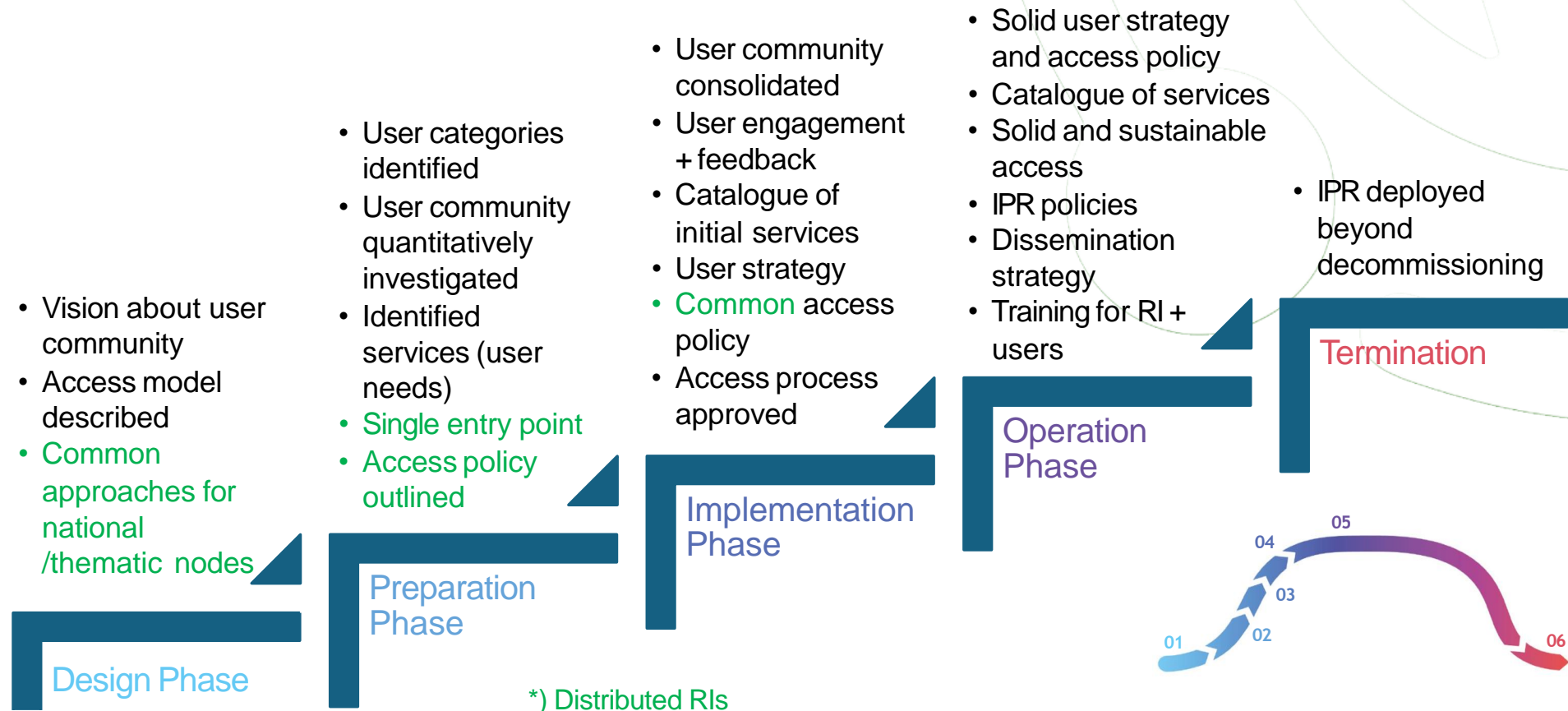 - User strategy and access policy
  - e-Needs
- **Implementation case:** stakeholder commitment, preparatory work and planning, governance, management and human resources, finances, risks
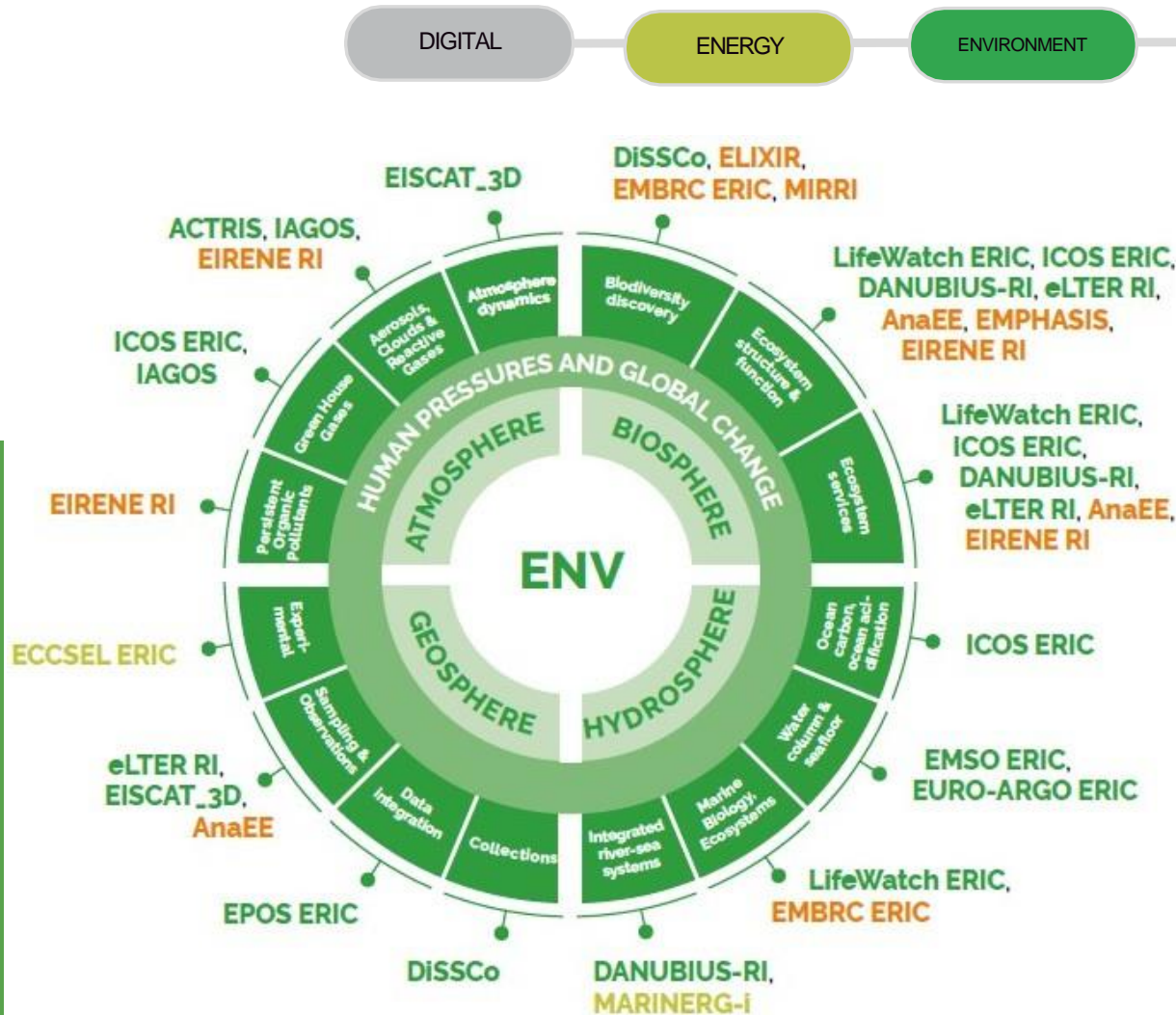

I. Introduction to Research Infrastructure Services
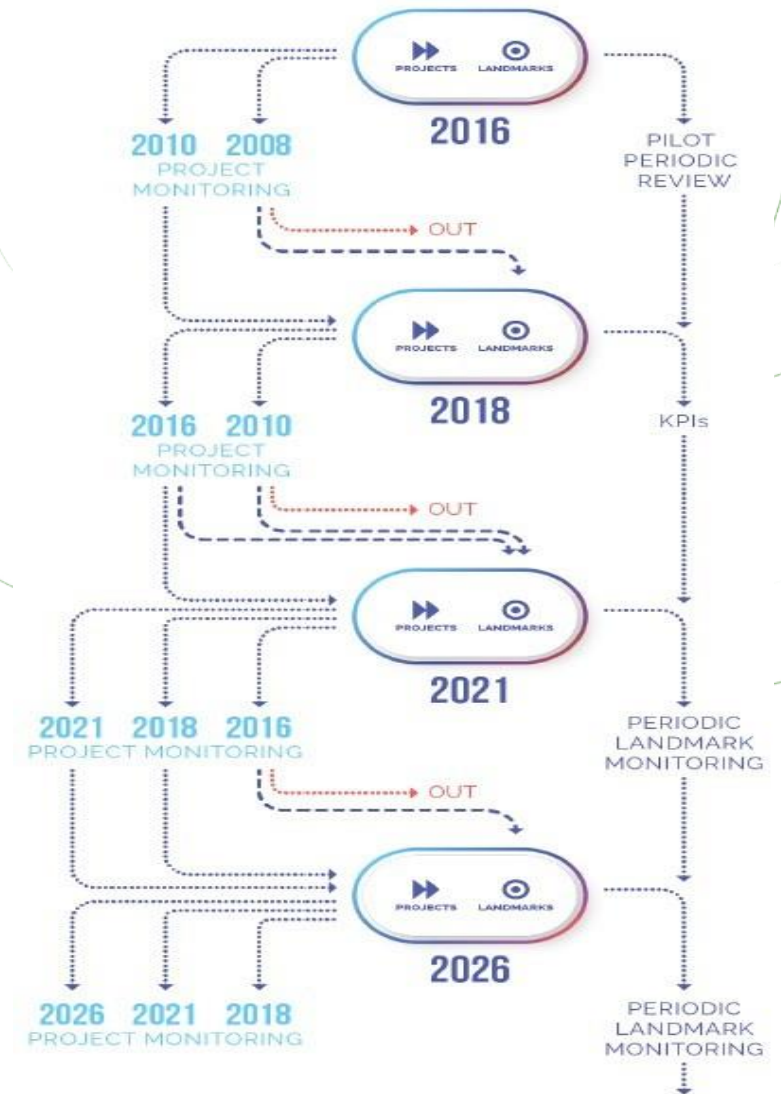
Minimal Key Requirements – Users & Access

criteria for evaluating the RI maturity level with respect to users & access

- Vision about user community
- Access model described
- Common approaches for national /thematic nodes

Design Phase

- User categories identified
- User community quantitatively investigated
- Identified services (user needs)
- Single entry point
- Access policy outlined

Preparation Phase

- User community consolidated
- User engagement + feedback
- Catalogue of initial services
- User strategy
- Common access policy
- Access process approved

Implementation Phase

- Solid user strategy and access policy
- Catalogue of services
- Solid and sustainable access
- IPR policies
- Dissemination strategy
- Training for RI + users

Operation Phase

- IPR deployed beyond decommissioning

Termination

*) Distributed RIs

01 02 03 04 05 06

European RI Landscape – 2021 ESFRI Roadmap

- Overview of European RI ecosystem
- Identifying gaps and promoting inter- and cross-disciplinary aspects
- 6 reference scientific domains
- Best European science facilities, including national, regional, international facilities and consortia
- Synergies and complementarities of interfaces between RIs and across areas

Challenges and Strategy

- Addressing specific challenges (climate change, environmental sustainability, food, health, …) cutting across scientific disciplines

- Global dimension, requiring multiple platforms and types (including mobile and virtual capacities)

- Pushing the frontiers of scientific knowledge producing socio-economic impact

- Long-term sustainability and sustainable development goals

- Interconnecting RIs – Forming a new RI ecosystem

  - Serving society – integrated RI services

  - Be part of the innovation ecosystem

National RIs, Roadmaps and Process
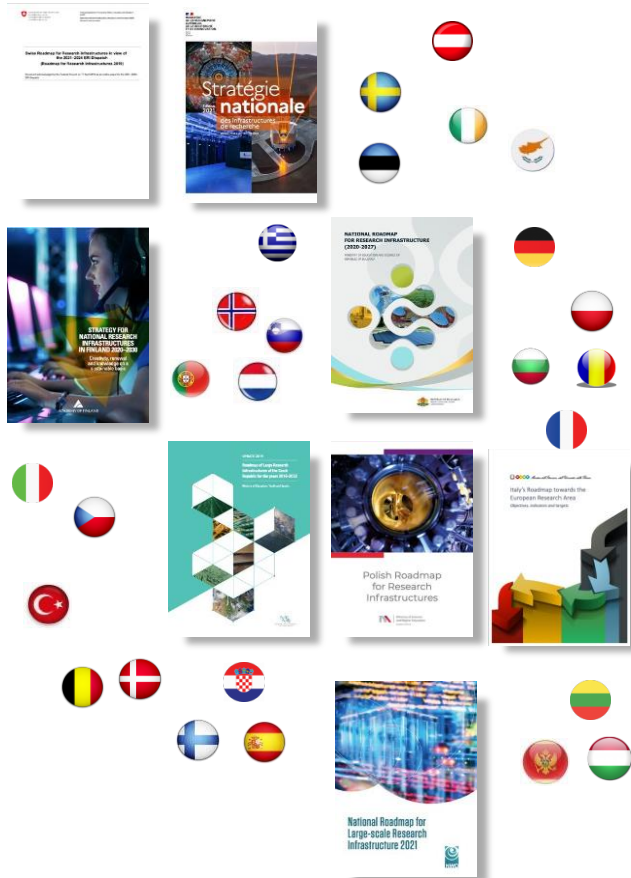
- National Research Infrastructure roadmaps developed, updated or under preparation in >25 European countries

- Often aligned with European ESFRI Roadmap process for coordinating at national and EU level

- Key pillar of national research and innovation ecosystem

- Strategic piloting tools for national governments, for setting national priorities and funding programmes

National vs

European vs

Global Research Infrastructures

Global RIs
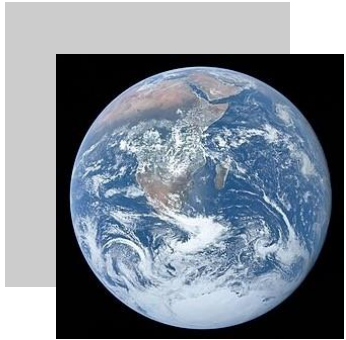
- International collaboration facilitated by RI

- Need for global data and observations

- Fostering scientific collaboration worldwide

- Addressing complex scientific and societal challenges with global scope

- Sharing common needs and efforts

The Group of Senior Officials (GSO) on research infrastructures is a working group under the G7 (with a broader membership).

Vision: A world with Global Research Infrastructures (GRI) that offer robust and coordinated scientific services to promote an effective international response to societal and scientific grand challenges.

Mission: The GSO exchanges experiences, and identifies and promotes guidelines, opportunities and practices for the advancement of the landscape of GRI within its members.

EU Funding & RIs

| FP1 (1984-1987) | FP2 (1987-1991) | FP3 (1990-1994) | FP4 (1994-1998) | FP5 (1998-2002) | FP6 (2002-2006) | FP7 (2007-2010) | H2020 (2014-2020) | Horizon Europe (2021-2027) | FP10 (2028-2024) |

Multi-annual Framework Programmes (FP)

Strategic tool to finance, streamline and support research and innovation activities across scientific domains

I. Introduction to Research Infrastructure Services

EU funding to support opening and developing RIs at European level

→Supporting ESFRI

→Catalysing and leveraging role the development and financing of EU RIs

→Pooling of resources across Europe

→Structuring effect for integrating and consolidating RI development and landscape

→Tackling complexity and diversity of RIs and investments

EU RI Funding Instruments

INFRA DEV — Consolidation and evolution of the EU RI landscape, to develop an integrated European ecosystem of research infrastructures, including single-sited, distributed and networks of facilities providing joint services

INFRA EOSC — Enabling an operational, open and FAIR EOSC ecosystem, to contribute to a web of FAIR research data and provide a trusted and secure federated system of research data and services

INFRA SERV — RI services to support health research, accelerate the green transition and the digital transformation, and advance frontier knowledge

INFRA TECH — Next generation of scientific instrumentation, tools, methods, and advanced digital solutions of research infrastructures and foster innovation and co-creation with industry

INFRA NET — Network connectivity in Research and Education – Enabling collaboration without boundaries

I. Introduction to Research Infrastructure Services

EU Funding to finance access to RIs

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| FP1 (1984-1987) | FP2 (1987-1991) | FP3 (1990-1994) | FP4 (1994-1998) | FP5 (1998-2002) | FP6 (2002-2006) | FP7 (2007-2010) | H2020 (2014-2020) | Horizon Europe (2021-2027) | FP10 (2028-2024) | ? |

- Initiatives for support of RIs ("use of major installations") date back to FP2

- The concept of **trans-national access (TNA)** has been in the core of all initiatives for RIs supported since FP2 to ensure wider and more efficient access to and use of the existing infrastructures

- FP2-FP5: Individual "TNA" contracts

- FP6-H2020: Integrated Infrastructure Initiatives (I3) / Integrated Activities (IA)

  - TransNational access

  + Virtual access to support "free" access for users to identified key research infrastructures

- **Horizon Europe: Research infrastructure services to provide challenge-driven and curiosity driven access opportunities**

  - Efficient and customised cross-RI services to address societal challenges on dedicated topics

  - Access to RI services to advance frontier knowledge

Sustainable access funding
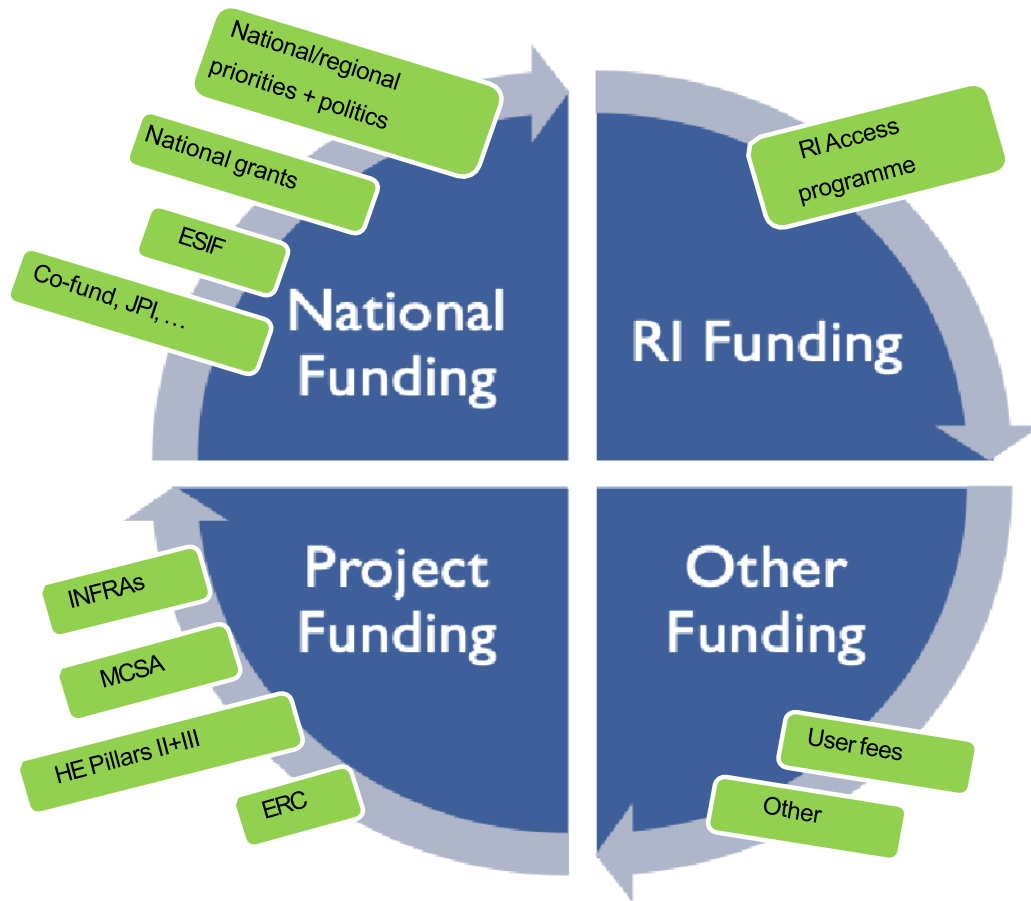
- Synergy of available funding sources and mechanisms
- Flexibility and attractiveness
- Recognize funding as strategic investment to address complex societal challenges
- Joint effort and common sharing of responsibilities and resources among all stakeholders
- Due to diversity of RIs, no one-size-fits-all solution → adapting funding mechanisms to long-term operation needs of each individual RI
- Aim: Ensuring a medium to long-term funding commitment

Revised Charter for Access to Research Infrastructures to foster open science, innovation, and research security

Non-regulatory principles and guidelines for defining access policies

Principles

Access policies

Acknowledgments

Legal conformity

Costs and fees

Ethical integrity

Non-discrimination

Implementation

Data management

User instructions

Guidelines

Access policies
Access modes
Access restrictions
Access processes
Support measures
Education and training
Regulatory framework
Transparency
Data management plan
Safety and environment
Quality assurance
Limitations

European Commission

European Charter for Access to Research Infrastructures

This is a key outcome of the European Research Area (ERA) Policy Agenda action on Research Infrastructures (2022-2024).

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Promoting open science and FAIR principles

The revised Charter champions open science, and advocates for the transparent sharing of knowledge, results and tools. It also emphasises compliance with the FAIR (Findable, Accessible, Interoperable, and Reusable) principles, ensuring that research data and results are widely accessible, usable, and reproducible.

Adapting to new users

Recognising the growing role of Research Infrastructures in fostering innovation and entrepreneurship, the revised Charter considers the needs of new users, particularly from industry and small and medium-sized businesses (SMEs) so that they can access cutting-edge facilities and expertise.
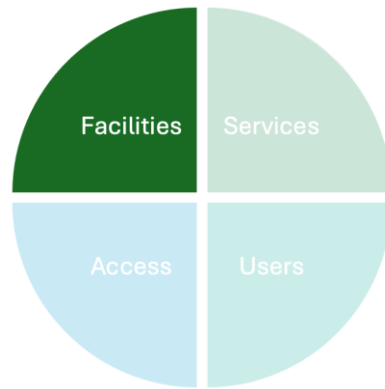
RI Services & Access – Concepts

"**Research Infrastructures*** are facilities, resources and services that are used by the research communities to conduct research and foster innovation in their fields"

I. Introduction to Research Infrastructure Services

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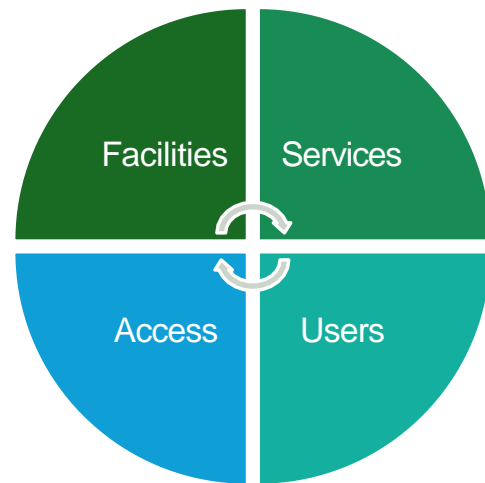
RI Concepts – Facilities

Definition

→ Physical infrastructure, buildings, and equipment within a research organization or institution that support the day- to-day activities of research, experimentation, and collaboration, including specialized scientific equipment.

→ Not necessarily organised at single locations

→ Operated by one or several research institutions

What are the types of facilities within Ris or within your RIs?
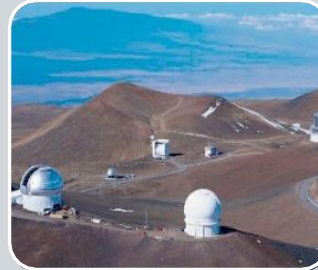
RI Concepts – Facility Types

I. Introduction to Research Infrastructure Services

Core Facilities	**Data & Computing facilities**	**Observational Facilities**	**Exploratory Facilities**	**Mobile Facilities**
- European-level - Support C expertise - QA/QC + standards	- HPC, servers, cloud-systems - storing, processing, managing data	- Ground-based, fixed, ambient - Monitoring, collecting, recording data	- Investigating processes + phenomena - cutting edge technologies + discoveries	- Transportable systems - Specialised equipement - ground-based, air, ship

- o User origin
- o User type
- o User profile + gender
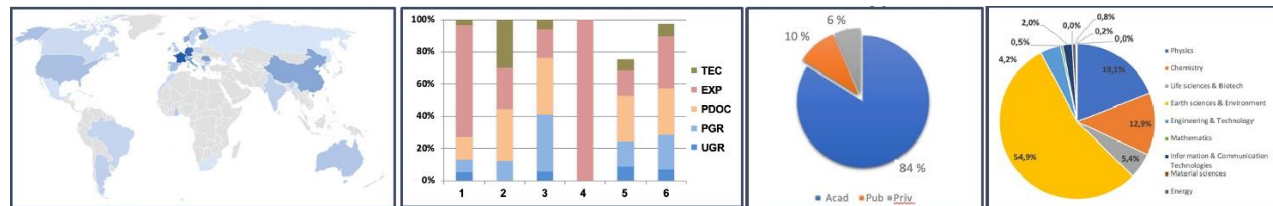- o User scientific field
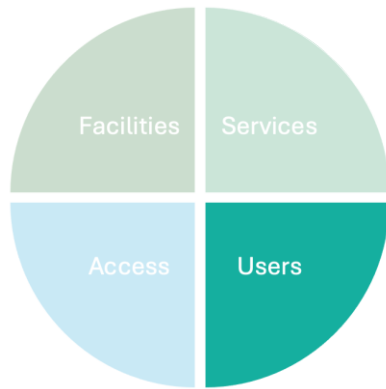
Definition

→ "Individuals, teams and institutions from academia, business, industry and public services. They are engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of projects"

Article 3 (b) of the European Charter for Access to Research Infrastructures

→ They make use of RI data, resources, equipment or other services provided by these to conduct their own activity or research or development work.

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Digital Services — Use of quality data and data products and other digital services including data documentation, compilation, archiving, preservation, traceability, citation and attribution

Scientific Services — Use of experimental research facilities equipped with state-of-the-art instrumentation and equipment for scientific exploration and realisation of experiments

Technical Services — Use of scientific expertise centres to ensure instrument quality, high performance measurements and methodologies, calibrations and intercomparisons, quality procedures and tools

Innovation Services — Use of scientific facilities for technological development, prototype testing, industrial or market-oriented applications including private sector use
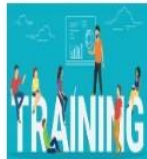
Training Services — Training of scientists, new generations of researchers, and facility personnel to acquire knowledge and skills and provide good practices to exploit all essential tools for science

RI Concepts – Access
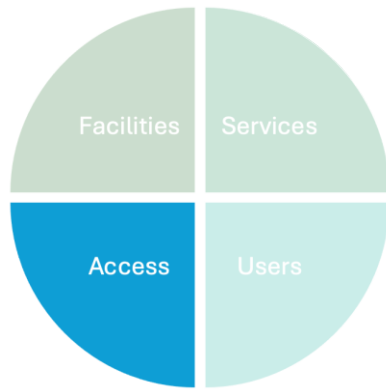
Definition

→ 'Access' refers to the legitimate and authorised physical, remote and virtual admission to, interactions with and use of Research Infrastructures and to services offered by Research Infrastructures to Users.

Article 3 (c) of the European Charter for Access to Research Infrastructures

→ = Ability to utilize the resources, equipment, and services of a facility to conduct research or experiments. Access can vary in terms of the scope, type, and conditions under which users can engage with the infrastructure.

RI Concepts – Access Types

What types of access exist in RIs? How do users access the services?
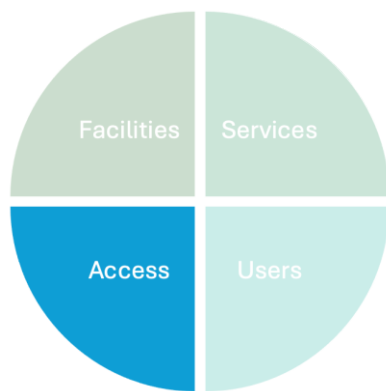
PHYSICAL ACCESS
« Hands-on » access of users who physically visit a facility

REMOTE ACCESS
Access to a facility without users physically visiting the facility

HYBRID ACCESS
Combination of physical and remote access

Access is made to resources that are not unlimited → competitive selection process

VIRTUAL ACCESS
Wide and free access through communication networks

Access can be simultaneously made by an unlimited number of users → no selection, free access

I. Introduction to Research Infrastructure Services

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