



HORIZON EUROPE

THE EU RESEARCH & INNOVATION PROGRAMME

2021 – 2027

RESEARCH INFRASTRUCTURES

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Research Infrastructures Italian Infoday

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Research Infrastructures

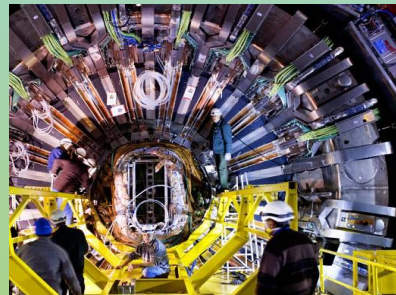
Research infrastructures are facilities providing resources and services for the research communities to conduct research and foster innovation (single site, distributed, virtual). They provide access to external users.



Knowledge-related facilities



Major scientific equipments



ICT infrastructures



e.g.: archives, collections, data infrastructures, telescopes, research vessels, FEL, computing systems, communication networks

Research Infrastructures contribute to:

- ✓ Extend the frontiers of knowledge
- ✓ Train the next generation of top researchers
- 2 ✓ Exchange and transmit knowledge
- ✓ Support industrial innovation

Horizon Europe structure

Pillar 1 Excellent Science

European Research Council

Marie Skłodowska-Curie Actions

Research Infrastructures
EUR 2,4 bn

Pillar 2 Global Challenges and European Industrial Competitiveness

- Clusters
- Health
 - Culture, Creativity and Inclusive Society
 - Civil Security for Society
 - Digital, Industry and Space
 - Climate, Energy and Mobility
 - Food, Bioeconomy, Natural Resources, Agriculture and Environment
- Joint Research Centre

Pillar 3 Innovative Europe

European Innovation Council

European innovation ecosystems

European Institute of Innovation and Technology

Widening Participation and Strengthening the European Research Area

Widening participation and spreading excellence

Reforming and Enhancing the European R&I system

Strategic orientations 2021-2024

- **Consolidate and enhance** the EU research infrastructures landscape
- Enhance the **international dimension** of RIs
- Support **Open Science and data-driven research** through the European Open Science Cloud (EOSC) and high capacity network
- Enable and drive the green and digital transformation through **research infrastructure services**
- Push the limits of **frontier research**
- Develop **cutting-edge technologies** for RIs and foster innovation



RIs in HE – Five destinations

- **INFRADEV :** Developing, consolidating and optimising European RIs landscape, maintaining global leadership
- **INFRAEOSC :** Enabling an operational, open and FAIR EOSC ecosystem
- **INFRASERV :** RI services to support health research, accelerate the green and digital transformation, and advance frontier knowledge
- **INFRATECH :** Next generation of scientific instruments, tools and methods and advanced digital solutions
- **INFNET :** Network connectivity - enabler for collaboration without boundaries



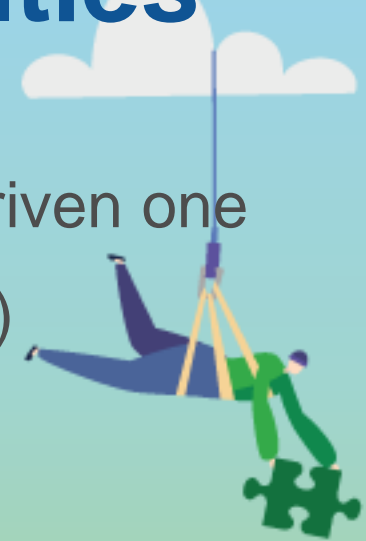
HE RI WP 2021-2022

- **5 Destinations:** packages of actions contributing to specific objectives and expected impacts
- **10 calls:** six 2021 calls - *deadlines: 23/9/2021 (4 calls), 2/9/2021 and 20/1/2022* and four 2022 calls - *deadlines: 20/4/2022 (3 calls) and 21/9/2022*
- **29 topics:** 22 in 2021 and 7 in 2022.
- **Other actions:**
 - **2 actions implemented without calls for proposal to address public health emergency** (art.195b) on COVID-19 (**early publication**)
 - **2 GIB:** ICRI 2022 Conference, FR Presidency event on ESFRI 20 year anniversary
 - **1 public procurement** for the EOSC core
 - **2 SGAs** for the Research and Education Networks FPA
 - **External expertise:** reviewers; individual experts; ERICs evaluators
- **607.7 M€ total budget:** 317.5 M€ on topics/actions 2021, 290.2 M€ on topics/actions 2022
- Section **Specific features for RIs:** conditions and requirements on TA and VA provision



RIs from H2020 to HE – Main novelties

- A new **challenge-driven approach** will join the science-driven one
- Emphasis on **customization and integration** of (different) **RI services** to better support research addressing global challenges and political priorities
- **Access provision** and **higher levels of integration**, now separated from research for the next generation of instrumentation
- Deployment and consolidation of **EOSC** (co-programmed Partnerships)
- Development of new **ICT-based tools**: eBRAINS and Digital twins
- New efforts to **consolidate** the existing landscape of European RI and enhance INCO and science diplomacy



DEVELOPING, CONSOLIDATING AND OPTIMISING
EUROPEAN RIS LANDSCAPE, MAINTAINING GLOBAL
LEADERSHIP

Destination INFRADEV



Destination **INFRADEV**: Aims

To contribute to a strong, excellent and impactful European Research Area, by **reinforcing RI capacities in Europe**, their **role at the global level** and the **policy-making** in this field

- To create a world-leading coherent, agile and attractive RI landscape in Europe, by:
 - ✓ ensuring coordination of efforts and fostering alignment of priorities among MSs and ACs,
 - ✓ consolidating it and reducing its fragmentation at European, national and regional level,
 - ✓ identifying the RIs of the future
- To support a European strategy for Research Infrastructures as well as activities to enhance the role of RIs for international cooperation and science diplomacy.



Destination **INFRADEV**: Expected impacts

- **Disruptive research and breakthrough science and innovation** through cutting-edge, interconnected and sustainable Research Infrastructures;
- **Strengthened** scientific excellence and performance and efficiency of **the European Research Area**, increasing its **attractiveness** to researchers from all over the world;
- **Coordinated research infrastructure capacity among countries and regions**;
- Reinforced R&I **capacities enabling systemic changes** needed for a truly transformative **societal and economic recovery** and a strengthened **resilience** of critical sectors, as outlined in the Recovery Plan;
- Improved **European response**, in cooperation with international players, to **emerging socio-economic** and related scientific and technological **challenges** at global level.



HE RI WP – Topics under Destination INFRADEV

	Research Infrastructures Work Programme
2021 1st call 22/6 – 23/9 2021	<ul style="list-style-type: none">- Support to the European Strategy Forum on Research Infrastructures <i>(CSA, 2.5 M€, 1 GA)</i>- Strengthen the bilateral cooperation on research infrastructures with Africa: improving the knowledge base on climate change in Africa <i>(CSA, 1.5 M€, TC conditions)</i>- Transition to digital/remote research infrastructure service provision: lessons learnt, needs and best practices <i>(CSA, 1.5 M€)</i>- Support to National Contact Points (NCPs) for Research Infrastructures <i>(CSA, 2.5 M€, 1 GA, NCP only)</i>- Support to the e-Infrastructure Reflection Group (e-IRG) <i>(0.3 M€, 1 GA, EOSC coord & access rights on results)</i>
2021 2nd call	<ul style="list-style-type: none">- Preparatory phase of new ESFRI research infrastructure projects- Consolidation of the research infrastructure landscape – Individual support for ESFRI projects
2022	<ul style="list-style-type: none">- Research infrastructure concept development

ENABLING AN OPERATIONAL, OPEN AND FAIR EOSC
ECOSYSTEM

Destination INFRAEOSC



Destination **INFRAEOSC**: Enabling an operational, open and FAIR EOSC ecosystem

Aims:

- **Develop EOSC** in a cohesive manner and **operationalize it** realizing the vision of a web of FAIR data and services for science.
- Consolidate the role of EOSC as a **data space for science, research and innovation**, articulated with the other data spaces set forth in the European Strategy for Data.

Expected Impact:

- **Mainstream open science practices** among researchers (initially), enabling the wide and early sharing of research outputs (publications, data, software, etc.) within and across disciplines.
- Enable the **seamless access to and management of increasing volumes of data** and ensure that they are **as FAIR and as open as possible**.
- Increase the **FAIRness** and **openness** of research data in Europe.

HE RI WP – Topics under Destination INFRAEOSC

Research Infrastructures Work Programme

2021

22/6 – 23/9 2021

Open Science practices and a digitally-skilled workforce

- Supporting an EOSC-ready digitally skilled workforce (CSA, 7 M€, 1 GA, access rights on results)
- Supporting the EOSC Partnership (CSA, 4 M€, 1 GA, access rights on results)

Supporting EOSC-Core: Enabling access to the Web of FAIR data and services

- Deploying EOSC-Core components for FAIR (RIA, 10 M€, 1 GA, access rights on results and IPR)
- Innovative and customisable services for EOSC (RIA, 20 M€, GA:3-5 M€, access rights on results)

Building with the scientific community a Web of FAIR data for open science

- Enabling discovery and interoperability of federated research objects across scientific communities (CSA, 10 M€, 1 GA, access rights on results and IPR, financial support to TP)
- FAIR & open data sharing in support of cancer research (RIA, 8 M€, 1 GA, access rights on results, deposition)

2022

- Services and tools to underpin a research assessment system that incentivises OS practices
- Improving & coordinating technical infrastructure for institutional OA publishing
- FAIR & open data in support of healthy oceans, seas, costal and inland waters
- Support for initiatives helping to generate global standards, specifications and recommendations for open sharing of FAIR research data, publications and SW
- Other actions: Delivering the EOSC core infrastructures and services (public procurement)

RI SERVICES TO SUPPORT HEALTH RESEARCH,
ACCELERATE THE GREEN & DIGITAL TRANSFORMATION,
AND ADVANCE FRONTIER KNOWLEDGE

Destination INFRA SERV



Destination **INFRA SERV**: Aims

Provision of efficient, customised and integrated RI services:

- ✓ to enable R&I addressing major societal challenges, notably in health, in support of the green and digital transformation
- ✓ to enable R&I ensuring resilience to crises
- ✓ to support curiosity-driven research and advancement of frontier knowledge in broad scientific domains

Development of specific alignments and synergies with priorities in Pillar 2

Research infrastructure contribution to the identified missions and partnerships under Horizon Europe.



Destination **INFRA SERV**: Expected impacts

- Reinforced RI capacity to provide across the EU services to support excellent research to address societal challenges, and HE missions and partnerships' objectives;
- **Enhanced** and increased society's long-term and consistent **problem-solving capacity** and **evidence-based policy making** for health, and the green and digital transition, through the provision of innovative, customised and efficient RI services;
- New **discoveries and knowledge breakthroughs** enabled by access provision to the best and in some cases unique state-of-the-art RIs;
- A new generation of **researchers trained** to optimally exploit all the essential and advanced tools for their research;
- **Cross-fertilisation** and a **wider sharing of knowledge** and technologies across disciplines and between academia and industry and businesses.



MAPS – RI WP 2021-2022 – Dest. INFRASERV

Challenge-driven topics in:

- Health: 3 topics on **infectious diseases; cancer and EBRAINS**
- Food and agriculture: 1 topic on **sustainable agriculture**
- Environment/atmosphere: 1 topic on **climate-change risks**
- Analytical physics for matter analysis: 1 topic on **sustainable materials**
- Socio-economic sciences: 1 topic on **recovery from socio-economic crisis – focus on global value chains**
- Data, Computing and Digital: 1 topic on acquisition and use of **imaging data**

Curiosity-driven topic domains:

- **Environment/Geosphere**, including geo-hazards and geo-resources
- **Environment/Biosphere**, including terrestrial biodiversity and ecosystems, such as Arctic and forest
- **Particle and nuclear physics**

***Astronomy, Energy, Humanities** → not proposed for the WP 2021-2022 because access provision in these domains is well covered by ongoing H2020 grants.*

To ensure continuity in the provision of access, these domains are proposed in 2023-2024

HE RI WP – Topics under Destination INFRASERV

	Research Infrastructures Work Programme
2021 22/6 – 23/9 2021	Challenge-driven provision (15 M€, TAVA, TC funding, Unit Cost, D&E plan not mand.)
	- RI services to support research addressing cancer
	- RI services for a sustainable and resilient agriculture and agro-ecological transitions (no GD)
	- RI services for responding to climate-related risks on the environment (JRC, no GD)
	- RI services enabling the development of materials for a circular economy (no GD)
	- RI services for sustainable and inclusive Global Value Chain and Europe recovery from socio-economic crises (10 M€)
	- Enabling RI services for better use of imaging data to address challenges in thematic research areas (9 M€, GA: 2.5-4.5 M€)
	Curiosity-driven provision (14.5 M€, TAVA, TC funding, Unit Cost, JRC, GD and D&E plan not mand.)
- RI services advancing frontier knowledge	
2022	- Implementing digital services to empower neuroscience research for health and brain inspired technology via EBRAINS

Common features of INFRASERV 2021 topics

- support the provision of **trans-national and/or virtual access** to researchers as well as **training** for using the infrastructures, and activities to **improve, customise and combine the services** the infrastructures provide, so as to facilitate and integrate the access procedures and to further **develop the remote or virtual provision** of services. ;
- adhere to the guidelines and principles of the **European Charter for Access to RIs**;
- duly address **data management** (and related ethics issues), interoperability, as well as the **connection of digital services** (e.g. data services) **to the EOSC**;
- make available to researchers the **widest and most comprehensive portfolio of RI services** which are relevant for the scope, involving, as beneficiaries or as third parties, the necessary interdisciplinary set of RIs of European interest that provide such services. The **inclusiveness** of the proposal will be taken into account in the Excellence score;
- outreach and engagement plan to actively advertise services to targeted research communities and, if applicable, to relevant industries, including SMEs
- comply with the conditions and requirements in the WP section “Specific features for RIs”
- **RIs from third countries** may be involved when appropriate, e.g. when they offer complementary or more advanced services than those available in Europe;

Access provision: main features

- EU grants **support sets of RI for the provision of access** to researchers (academic and industrial)
- EU funds cover the **costs incurred by RIs to provide** access under the grant and **T&S of users** when they need to visit the RI
- The grant will **advertise the access offered**, and, for TA only, open **calls for users** and **select** the best users applications through a selection panel
- Specific Provisions regulating TA and VA provision and eligibility of related costs (**art. 6.2.D.3, 6.2.D.4 of HE MGA**, and **art. 18 of MGA Annex V**)
- **Three ways to report TA and VA costs**: on the basis of unit cost, actual costs, a combination of the two.
- **Decision** authorizing the use of Trans-national and Virtual Access unit costs : **unit cost set up** in the proposal on the basis of **historical data** (2 years for TA, 1 year for VA)

Trans-national Access (TA)

- 'free of charge' provision of access to a research infrastructure to **selected** researchers or research teams usually working in a country other than the country where the RI is located. TA can be:
 - *in person ('hands-on'), to users visiting the infrastructure, e.g. access to a research vessel, or*
 - *remote scientific services, no visit needed, e.g. performance of sample analysis , provision of reference materials, remote access to a high-performance computing facility*

Virtual Access (VA)

- provision of open and free access to **digital resources** and **services** needed for research, **without selecting** the users to whom access is provided:
 - *OPTIONAL: Objective **eligibility criteria** (e.g. affiliation to a research or academic institution) are defined for specific users to whom access will be provided under the project*
 - *OPTIONAL: Information on the **traceability of the users** and the nature and quantity of access must be provided by the access providers*

NEXT GENERATION OF SCIENTIFIC INSTRUMENTATION,
TOOLS AND METHODS AND ADVANCED DIGITAL SOLUTIONS

Destination INFRATECH



HORIZON-INFRA-2021-TECH-01-01: Interdisciplinary digital twins for modelling and simulating complex phenomena at the service of research infrastructure communities

TYPE OF ACTION	BUDGET	OTHER CONDITIONS	TIMING
<ul style="list-style-type: none">Research and Innovation Action	<ul style="list-style-type: none">Total indicative budget for the topic: 28 M€Expected EU contribution per project: 9 – 12M€	<ul style="list-style-type: none">Co-design approach with the intended user communities is required due to the specific nature of this topic	<ul style="list-style-type: none">Call opening: 22 June 2021Deadline: 23 Sep. 2021

Expected Outcomes:

- **Pre-operational prototype** of an interdisciplinary Digital Twin, using the latest digital technologies, relevant to addressing challenges where multi-disciplinarity is the defining element of complexity;
- **Latest modelling and prediction technologies** in areas serving research communities widely and supporting interoperability of data and software, integration and collaboration across different scientific domains, disciplines and across the different research infrastructures involved;
- Robust framework enabling researchers to ensure **quality, reliability, verifiability of data**, information and outputs of DTs; max exploitation of existing and new data made available through European Data Spaces and the EOSC.

HORIZON-INFRA-2021-TECH-01-01: Digital twins

Scope:

- **Co-design approach with user communities** to converge traditional modelling with the increasing amount of real-time data in order to arrive at more accurate present-state assessments and predictions
- Development of more integrated systems and a consistent set of standard methods and protocols in the areas of (a) **model and data fusion** for optimal synergy between observations and models; and (b) **visualisation and AI based knowledge generation** from spatio-temporal information.
- Development of **quality measures and trust**, development of **standard quality mapping and indicators** for appropriately communicating differences in qualities of inputs and outputs from digital twins, addressing issues such as **data and model pedigree, accuracy and lack of knowledge**

In addition to addressing pertinent priority areas in an interdisciplinary manner, proposals should also:

- Deliver a breakthrough in terms of **accuracy and realism & optimally fuse** observations and models
- Integrate **downstream sectors** at the source of data production (adjacent science sectors)
- **Develop capabilities of the new digital continuum** enabling research communities to continuously learn and update themselves from data/information originating from different sources
- Reach a **sufficiently high TRL level (6-7) to be considered for integration into operational activities** of e.g. existing RIs, the EOSC platform, and undertaken in related fields.
- Link to relevant actions, when appropriate, under **Digital Europe Programme (e.g. Destination Earth):**
- Include a **rigorous handling of quality and confidence of information**

NETWORK CONNECTIVITY - ENABLER FOR
COLLABORATION WITHOUT BOUNDARIES

Destination INFRANET



HORIZON-INFRA-2021-NET-01-FPA: Framework Partnership Agreement (FPA) for Research and Education Networks

TYPE OF ACTION

- Framework Partnership Agreement (FPA)

BUDGET

- No budget

OTHER CONDITIONS

- The granting authority can fund a maximum of one project.

TIMING

- Call opening: 22 June 2021
- Deadline: 2 Sep. 2021

Expected Outcomes:

- Very high-bandwidth, end-to-end connectivity among research and education users all over Europe, and cross-border collaboration services that are reliable and secure, enabling Europe to overcome the remaining Digital Divide and to be at the forefront of global R&E, attracting data and talent;
- Secure access to computing facilities and data repositories for European and International RIs and paving the way for widespread access to common European Data Spaces;
- An integrated portfolio of services for connectivity, collaboration, security, trust and identity;
- Collaboration with international partners, to foster global RI connectivity in line with Europe's international cooperation policy objectives

HORIZON-INFRA-2021-NET-01-FPA

Scope:

- deliver **an action plan** on basis of jointly agreed objectives, over the next 7 years of work, covering the following areas of activity:
 - ✓ **High quality connectivity and collaboration services for excellence in Research and Education**
 - ✓ **State-of-the-art connectivity for the wider European Digital Infrastructure**
 - ✓ **International connectivity and collaboration**
- to ensure:
 - ✓ Faster, resilient, agile and secure connectivity services for enabling researchers and students to access near real-time applications that support development of solutions and evidence-based decision-making for society and a worldwide effective collaboration of virtual research communities.
 - ✓ Connectivity in the ERA in multiples of 100 Gbps, paving the way for Terabit connectivity in certain areas where higher bandwidth is required for both disciplinary and interdisciplinary research collaboration amongst the researchers and scientists across Europe and beyond.
 - ✓ cross-European educational dimension and provision to ERA researchers of optimal and secure access to RIs and data resources worldwide.

Thank you



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