Feedback opportunity for the work programme 2025

Research Infrastructures

Destination 1: Consolidation and evolution of research infrastructures, research infrastructures services, and technology development

Draft expected impacts:

1.1. Consolidation and evolution of research infrastructures (RIs)

The Commission, the Member States and the Associated Countries collaborate closely, notably through the European Strategy Forum for Research Infrastructures (ESFRI) and the European Open Science Cloud (EOSC), to develop an integrated European ecosystem of RIs, including single-sited facilities, distributed facilities and networks of facilities providing services jointly. At the same time, the European Research Infrastructures Consortium (ERIC) legal instrument facilitates the joint establishment and operation of large European infrastructures supported by several EU Member States, Associated Countries, and third countries.

The expected impact of the EU intervention for the upcoming period includes:

- Further consolidation, evolution and optimisation of the European Research Infrastructure landscape, with the objective to enhance its capacity and capability to support the continuum of research needs, while also encouraging the participation of Widening countries.
- Improved sustainability of the RI ecosystem and synergies amongst RI funding sources, considering that funding an increasing number and size of pan-European RIs weighs on national research budgets, raising the question of their long-term sustainability and of the EU programme's contribution to the various stages of their life cycle.
- Support for human resources and skills for an optimal functioning of RIs, through continuous professional training and upskilling of staff in charge of RIs for the development of knowledge and new competences, considering that highly skilled personnel play a vital role in constructing, evolving and operating RIs and serving users; and thus, RIs must be able to attract, up-skill, and keep specialised staff.
- Reinforced international dimension of RIs, considering that global challenges require global collaboration, and RIs can be hubs for such collaboration by pooling facilities, data, expertise and other resources.

1.2. RI services to support large research domains, societal challenges and EU priorities

Transnational access to RIs has radically transformed the availability of state-of-the-art facilities for researchers, reinforcing Europe's strong research performance. Horizon Europe marked a shift towards new types of transnational access grants, awarded to large consortia of diverse types of facilities providing access to broader portfolios of installations and scientific services relevant for a large research

domain ('curiosity-driven' access) or in support of societal challenge and EU priorities ('challenge-driven' access).

The expected impact of the EU intervention for the upcoming period includes:

- Effective access of European researchers to the best RI services from national and pan- European RIs (such as ESFRIs/ERICs), while ensuring a proper balance between curiosity-driven access and challenge-driven access, considering also that challenge-driven access must notably foster the role of RIs in greening society and improving its resilience to crises.
- Improved RI services to address evolving scientific and societal challenges, including those related to EU priorities, and to reinforce the excellence, attractiveness and competitive edge of the ERA and its capacity to address future challenges and priorities, considering that this increasingly requires interdisciplinarity and cross-domain collaboration.
- Further opening of national RIs and strengthened access programmes of pan-European RIs in the longer term, addressing sustainability challenges for transnational access and further exploration of synergies, so as to ensure continued and seamless access to the best RI services, avoiding access gaps over time or redundant offers from facilities crossing different domains and challenges.
- Improved transnational access to new users such as early-stage career researchers, and researchers from other fields or sectors, while making sure that these new activities do not come at the cost of already overbooked transnational access services.

1.3. Next generation of scientific instrumentation, tools, methods, and advanced digital solutions of RIs and fostering innovation and co-creation with industry

Research Infrastructures require constant technology development to maintain and upgrade their services and to create new ones. The manufacturing capacity of industry is often required for this, and the co-creation of technological components is a defining feature of many research infrastructures.

The expected impact of the EU intervention for the upcoming period includes:

- Reinforced EU resilience with respect to the availability of critical technical RI components, considering that RI operations rely in many cases on technical components or material for which Europe is strongly dependent on third countries.
- More robust RI innovation ecosystems, building also on activities funded in the past on the development of RI technology roadmaps and co-creation activities with industry.
- Accelerated digitalisation of RIs throughout their entire life cycle.
- Greening of RIs, by advancing and accelerating the reduction of the environmental footprint of RIs operations, while at the same time contributing to increasing their resilience towards energy crises or other resource restrictions such as water.

Main expected outcomes:

1.1. Consolidation and evolution of RIs

- Effective support to evolve, consolidate and optimise the European landscape of RIs, encompassing support to the design of new RIs, the preparation phase of ESFRI projects and, when appropriate, the early implementation of ESFRI Landmarks, and to individual or clustered pan-European RIs and other world-class RIs.
- Improved synergies between European level funding sources, such as structural and investment funds, Recovery and Resilience Facility, Neighbourhood, Development and International

Cooperation Instrument for the external dimension of RI, and national funding instruments.- Improved RI-relevant training and skills, targeting specialised research infrastructures staff, notably in relation to: the large increase of remote access and the need to support users in data analysis and curation; and new non-specialist users including from industry.

- Reinforced international dimension, including through: enlarging geographical coverage for scientific fields; promoting globally European standards and approaches to access, data management and open science; facilitating the development of RI capacities in less research-intensive world regions through collaboration with European RIs; contributing to aligning different funding sources around an international collaboration, creating critical mass for global scientific goals; and supporting international mobility, by building on existing international collaboration activities.
- Improved integration of Ukraine into the European Research Area to the mutual benefit of the EU and Ukraine, through supporting cooperation with Research Infrastructures and institutes based in Ukraine.

1.2. RI services to support large research domains, societal challenges and EU priorities

- Further improved balance between curiosity-driven and challenge-driven access to RI services, enabling bottom-up user proposals while also fostering the creation of customised services for emerging user communities or for fields that are aligned with EU policy priorities.
- Piloting of new approaches to transnational access that would create more sustainable and seamless access opportunities, bearing in mind that the structuring of pan-European transnational access opportunities plays a role in how RIs attract users beyond their national research systems.
- Trained and up-skilled researchers through transnational access, with due attention to early-stage career researchers and researchers from Widening countries.

1.3. Next generation of scientific instrumentation, tools, methods, and advanced digital solutions of RIs and fostering innovation and co-creation with industry

- New instrumentation, tools, methods and solutions for RI upgrades, fostering the resilience of the RI landscape and EU autonomy.
- Stable RI innovation ecosystem that will also build on activities funded in the past on the development of RI technology roadmaps and co-creation activities with industry, including exploration of applications of RI innovations outside the scientific market, via proof-of-concept support.
- Digitalisation of RIs instruments, fostering high FAIR data productivity by RIs, promoting FAIR data literacy and sovereignty of FAIR research data, and harnessing the potential of AI, in synergy with the EOSC objectives and actions.
- Greening of RIs, targeting both specific domains or technologies and bottom-up actions, including e.g. sharing of best practices, implementation of technological solutions, adapting internal processes, evolution of access modes, and supporting advanced communities to incorporate greening challenges and explore synergies with other communities notably for transversal technologies like ICT, robotics or AI.
- Identification of commonalities in technology needs across different types of infrastructures and domains, laying the ground for common technology development.

Feedback opportunity for the work programme 2025

Research Infrastructures

Destination 2: European Open Science Cloud (EOSC), Destination Earth (DestinE) and pan-European National Research and Education Networks

Draft expected impacts:

2.1. Enabling an operational, open and FAIR EOSC ecosystem

The first part of this destination serves the European Open Science Cloud (EOSC) long-term ambition of contributing to a web of FAIR (Findable, Accessible, Interoperable, Reusable) data and services for science and providing first and foremost all research communities in the EU and Associated Countries with a pan-European accessible, trusted and open federated ecosystem of research infrastructures ("EOSC federation") where they can publish, find and re-use FAIR data and tools for research, innovation and educational purposes.

The expected impacts for the upcoming period are in line with the EOSC Strategic R&I Agenda (2021-2030) and its high-level strategic objectives:

- Enable the alignment of common practices and definition of common standards for FAIR data of high quality and the development of tools and services to allow researchers to find, access, reuse and combine FAIR research results as a European contribution to a "Web of FAIR data";
- Develop, deploy and demonstrate value to the research communities of the core components and services of EOSC and enlarge the EOSC federation through connecting existing research infrastructures in Europe;
- Ensure that Open Science policies, practices and skills are monitored, rewarded and taught, becoming the 'new normal' across the European Research Area (ERA)

Activities should continue to transform the research landscape in Europe by bringing cohesion and addressing common needs of the research communities. The programme should catalyse a fully operational environment covering the whole research data lifecycle across borders and communities. To further advance this ambition, EU must continue investing in dedicated EU-funded activities and ensuring synergies between ongoing EOSC-related actions at EU, national, institutional and community levels.

2.2. Destination Earth (DestinE)

Destination Earth (DestinE) is a flagship initiative of the European Commission to develop a highly-accurate, interactive digital model of the Earth (a digital twin of the Earth) to model, monitor and simulate natural phenomena, hazards and the related human activities. DestinE will provide an operational system to support decision-makers in designing accurate and actionable climate change adaptation strategies and mitigation measures.

The expected impact of the EU intervention for the upcoming period includes:

- Exploitation of the rapid advances in modelling, observations, digital technologies and ML/AI, ensuring that European leadership in this field is maintained;
- Verification of modelling results using observations of RIs in relevant fields;

- New Digital Twins and use cases to cover unexplored areas/domains, becoming part of the overall ecosystem, addressing EU priorities and evolving end-user needs; multi-disciplinary, horizontal, transversal infrastructure solutions to handle diverse end-to-end workflows spanning various areas.

2.3. Ensure state-of-the-art connectivity across Pan-European National Research and Education Networks

Actions under this title will be framed within the scope of the Framework Partnership Agreement (FPA) signed with the GÉANT association in January 2022 and lasting until the end of Horizon Europe. The GÉANT network is a key enabler for researchers' projects and students connected through their European NREN (National Research and Education Networks), or partner organisations across the world, as well as a service provider for endeavours from CERN, Copernicus, EUMETSAT, ECMWF, and others. GÉANT is also a contributor to "A Europe fit for the Digital Age" and the "Digital transformation" priority areas, and serves important European initiatives such as data lakes, Destination Earth, EOSC, and EuroHPC.

The overall expected impact of the EU intervention for the upcoming period includes:

- Improve Terabit connectivity across the EU: the latest and largest GÉANT backbone network upgrade, completed in 2023, is the foundation for the next generation cross-border connectivity system, which caters for an ever-increasing traffic demand and non-discriminatory access. Still there is a continuous need to further expand and upgrade the network infrastructure to the edges of Europe and offer high-speed- terabit capable services.
- Network configuration automation and services orchestration to have detailed live network knowledge and end-to- end visibility, to reduce downtime and meantime to repair. This is particularly crucial as new devices and services are introduced into the GÉANT network, and therefore traffic is increasing exponentially.
- Improved security by putting in place a Security Intelligence Hub, considering that the number and complexity of security incidents is getting bigger, and this requires security teams to work closely together.
- Improved autonomy of future connectivity options, in line with EU policy for autonomy, and the EU Global Gateway initiative.

Main expected outcomes:

2.1. Enabling an operational, open and FAIR EOSC ecosystem

- Demonstrated EOSC added value to the research process and increased uptake of EOSC and Open Science by European scientists and research organisations of all types, including by providing support to early users of EOSC;
- EOSC as an accelerator of the digital transition, fostering high FAIR data productivity, promoting FAIR data literacy and sovereignty of FAIR research data, developing the EOSC as a public good first and foremost for the researchers and then opening it progressively to the public sector and to partners from the commercial sector that are dedicated to Open Science;
- EOSC deployed as the Common European data space for research and innovation, federating RIs, repositories, digital infrastructures and other nodes, and interconnected with other Common European data spaces;

- Preparations for sustainable operation of the EOSC federation, exploring options for business models, funding modalities, and governance beyond 2027;
- Sharing of best practices, demonstrators and successful use cases, and monitoring progress and impact continuously;
- Continued support to Horizon Europe missions with FAIR and open uses cases capitalising on EOSC resources made available through the EOSC federation;
- Increased focus on EOSC enabling citizen science.

2.2. Destination Earth (DestinE)

- Evolve further through science & technology innovation, provide novel digital solutions and capabilities at operational level and accelerate science-technology synergies to achieve breakthroughs in the area of earth-system science;
- Invest on the design of a robust development framework and respective pre-operational infrastructure for advanced AI/ML tools and applications, ensuring the quality, reliability, and verifiability (repeatability) of the methods applied and outcomes created;
- Expand to new thematic areas and fields based on identified user needs and structured feedback provided by relevant stakeholders and communities.

2.3. Ensure state-of-the-art connectivity across Pan-European National Research and Education Networks

- Delivering state-of-the-art secure and resilient connectivity.
- Strengthening above-the-net collaboration service catalogue including access to commercial Clouds and other services through framework procurements.
- Further developing Trust and Identity services based on GÉANT's AAI Core service.
- Evolving the overall access infrastructure to all users of the key Research instruments and Research Infrastructures, as well as for example EuroHPC, EOSC and European Data Spaces.
- Evolving international connectivity and collaboration with like-minded research partners globally