

Horizon Europe Research Infrastructures Work Programme 2025-2027

Draft Orientation Paper

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This paper aims to identify the main challenges and the main objectives and impacts expected from actions to be launched as a result of calls for proposals in 2025-2027. These orientations will guide the shaping of the Research Infrastructures Work Programme 2025-2027.

Inputs used so far

In preparing this paper, the Commission services have based the draft on the findings of the ex-post evaluation of Horizon 2020 and the draft results of the interim evaluation of Horizon Europe.

They have also used: input from ESFRI consultations and surveys, such as on sustainable funding, environmental footprint of RIs, long-term funding for access to RIs, and RI technology roadmaps with industry; input from RI communities; input from the ERIC Forum and individual ERICs; input from the second ESFRI Stakeholder Forum, and input from the priorities jointly established with the EOSC Tripartite Governance and the research community, including in the frame of the multiannual roadmap and the fifth EOSC Symposium.

Contributions to the Key Strategic Orientations of the Strategic Plan 2025-2027

The Strategic Plan 2025-2027 defines interrelated Key Strategic Orientations for R&I as contributions to the green transition, to the digital transition and to a more resilient, competitive, inclusive, and democratic Europe.

The RI work programme should provide access for scientific communities and industry to a comprehensive catalogue of user-oriented services to address emerging challenges related to the twin transition. In addition, the programme should support initiatives to diminish the environmental footprint of RIs across scientific fields, and data, computing and digital research infrastructures will contribute to leveraging 'ICT for Green' and 'Green ICT'. The programme should also foster deep tech potential in the innovation ecosystems around Research Infrastructures. This innovation can both improve scientific performance and bring about new technologies outside scientific fields.

The programme should support the digital transition also via enabling an operational EOSC, providing access to open and FAIR (Findable, Accessible, Interoperable, Reusable) research data and results generated with public support. It will further support state-of-the-art connectivity across pan-European National Research and Education Networks.

Overall orientations

As part of Pillar I of Horizon Europe, the RI programme supports activities to consolidate, evolve, open, integrate and interconnect a world leading ecosystem of research services for researchers in Europe, encompassing both national and pan-European infrastructures. The aim is to cover the continuum of needs from the creation of fundamental knowledge to technology development and innovation, while supporting open science.

The programme will aim to improve the sustainability of the RI ecosystem and synergies amongst RI funding sources, support human resources and skills for an optimal functioning of RIs, and reinforce the international dimension of RIs, in particular with regards to shared global challenges.

To continue enabling transnational access to research infrastructure services both for curiosity driven research and the development of, and transnational access to, new challenge-driven customized services is a key objective of the programme, promoting also education and training dimensions of

access to RIs while making sure these new activities do not come at the cost of already overbooked transnational access services. The programme also aims at fostering the uptake of RI services in other pillars of the Horizon Europe programme in line with the Pact for R&I in Europe and the ERA Policy Agenda.

The programme will promote collaboration in upgrading and designing scientific instruments and tools, as well as in exploring applications of RI innovations outside the scientific market, including through cooperation with industry and through creating RI innovation ecosystems. Reduction of the environmental footprint of RIs will be a focus.

In line with the 2021-2030 European Open Science Cloud (EOSC) Strategic R&I Agenda, the programme will also aim at ensuring that Open Science policies, practices and skills become the 'new normal' across the ERA and that the EOSC federation is enlarged through connecting existing research infrastructures in Europe and providing additional value added services based on user needs, also with the view of enabling the European contribution to a web of FAIR data and services.

The further evolution of DestinE as a digital model of the Earth on a global scale will also be supported.

Finally, the programme will further provide opportunities to improve high-bandwidth networks and network services interconnecting researchers, data and computing resources to lay foundations of future resilient connectivity, strengthen above-the-net collaboration service catalogue, trust and identity services, and the overall access infrastructure.

Novelties, pilots and preparatory actions are proposed to respond to new policy needs, programme evaluation findings and priorities expressed by stakeholders, notably:

- *Sustainability and greening of RIs*: Actions are suggested to address RIs investment plans and potential synergies between European level funding sources and national funding instruments and to diversify RI funding streams. Other actions are suggested to support new technologies and solutions for reducing the environmental and climate footprint of RIs.
- *Integrated scheme for access to RIs*: This should cover both curiosity-driven and challenge-driven access schemes. A preparatory action is suggested to explore a more integrated and sustainable access scheme.
- *Fostering the deep tech potential in innovation ecosystems around RIs*: Actions are suggested for co-creation and engagement with industry and spin-off applications of RIs technologies, as well as at the creation of stable innovation ecosystems for RIs technologies. A preparatory action is suggested to target common technology development by identification of commonalities in technology needs across different types of infrastructures and domains.
- *International dimensions of RIs* should be reinforced through topics aiming at e.g. enlarging the geographical coverage for scientific fields; promoting globally European approaches to access, data management and open science; and contributing to aligning funding sources around international collaborations.
- *'AI for Science'* should be supported, e.g. by actions on machine-actionable research data repositories linked to the EOSC federation enabling FAIRness and AI-readiness, as well as by actions to enable the EOSC platform to host AI-ready data for large scale AI research.
- *Preparing for EOSC post-2027*: Continuation of the EOSC Platform, and the integration of R&I communities in the EOSC Federation should be supported.
- *Further evolution of DestinE as a digital model of the Earth on a global scale*: Support should be provided to core system components; new advancements in AI for the Earth System; future target areas and use cases; and digital twins for DestinE in new thematic areas.

1. Consolidation and evolution of RIs, RI services and technology development

1.1. Consolidation and evolution of RIs

The Commission, the Member States and Associated Countries collaborate closely, notably through ESFRI and 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 ERIC legal instrument facilitates the joint establishment and operation of large European infrastructures supported by several EU MS, ACs and third countries. Further consolidation and evolution of the European Research Infrastructure landscape is needed with the objective of enhancing its capacity and capability to support the continuum of research needs. Lastly, the participation of Widening countries should also be encouraged, including by exploring synergies with the widening programme.

Main challenges

- Improving the sustainability of the RI ecosystem and synergies amongst RI funding sources. 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. Synergies should cover different needs: Funding of RI construction and major upgrading; Funding of RI evolution and incremental upgrading; Funding of RI operations including access.
- Supporting human resources and skills for an optimal functioning of RIs. Highly skilled personnel play a vital role in constructing, evolving and operating RIs and serving users; thus, RIs must be able to attract, up-skill, and keep specialised staff. Support is needed for continuous professional training and upskilling of staff in charge of RIs for the development of knowledge and new competences.
- Reinforcing the international dimension of RIs. Global challenges require global collaboration, and RIs can be hubs for such collaboration by pooling facilities, data, expertise and other resources.

Main objectives and expected impacts

The programme will continue to support evolving, consolidating and optimising the European landscape of research infrastructures. This encompasses:

- Individual support to the early phases of the life cycle of pan-European research infrastructures, i.e. the design of new research infrastructures, the preparation phase of ESFRI projects and, when appropriate, the early implementation of ESFRI Landmarks.
- Support to the consolidation and optimisation of the research infrastructure ecosystem by support to individual or clustered pan-European research infrastructures and other world-class research infrastructures.
- Dedicated actions reinforcing European research infrastructure policy, research infrastructure potential for innovation, training, and international cooperation.

The programme will address activities of research infrastructure investment plans and potential synergies between EU/EIB funding sources, such as structural and investment funds, Recovery and Resilience Facility, Neighbourhood, Development and International Cooperation Instrument (NDICI) for the external dimension of RI, and national funding instruments. It will also include preparatory actions to identify novel approaches and operational steps towards longer-term and more integrated actions, which are currently funded under numerous grants from different RI programme parts. To this end, the programme will cover the identification of commonalities in technology needs across different types of infrastructures and domains and will explore new approaches to transnational access as a route to improve the overall sustainability of the ecosystem of research infrastructure services in Europe.

Support for research infrastructure-relevant training and skills will be maintained, 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. Activities could also include international collaboration and mobility opportunities that facilitate cross-cultural learning and promote innovation.

In addition, challenges in reinforcing the international dimension of RIs will be addressed, including: enlarging geographical coverage for scientific fields, like climate science; 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; and contributing to aligning different funding sources around an international collaboration, creating critical mass for global scientific goals. A special focus should be on supporting cooperation with Research Infrastructures and institutes based in Ukraine improving Ukraine's integration into the ERA to the mutual benefit for the EU and Ukraine as well as preventing a brain drain of researchers towards the EU. This should build on experiences from previous EU projects.

The programme will support international mobility, building on existing international collaboration activities.

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 programme also introduced new modalities of funding in 2023 through pilots for co-funding with Member States.

Main challenges

To ensure effective access of European researchers to the best RI services from national and pan-European RIs (such as ESFRIs/ERICs), several challenges must be addressed:

- RI services must be constantly improved 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.
- While providing curiosity-driven access is the core business of a RI landscape, the programme should continue to provide challenge-driven access, notably to foster the role of RIs in greening society and improving its resilience to crises.
- There must be an appropriate balance between curiosity-driven and challenge-driven access. Challenge-driven access must notably foster the role of RIs in greening society and improving its resilience to crises.
- There is a need for further opening national RIs and strengthening the access programmes of pan-European RIs (ESFRIs/ERICs) in the longer term. Sustainability challenges for transnational access to RIs must be addressed, and further synergies shall be explored.
- New users such as early-stage career researchers, researchers from other fields or sectors require specific attention. In addition, the role of transnational access in supporting early-stage career researchers and attract talents in Europe should be reinforced while making sure these news activities do not come at the cost of already overbooked transnational access services.

To optimise the complementary support to curiosity-driven and challenge-driven transnational access, there is a need 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.

- Support larger integrated consortia for curiosity-driven access and more targeted consortia for challenge-driven access (compared to the 2021-2024 WP cycle).
- Enable (to a larger extent compared to 2021-2024 WP cycle) joint research activities specifically aimed at harmonising and improving RI services.
- Promote the training and up-skilling of researchers through transnational access, with due attention to early-stage career researchers and researchers from Widening+ countries.
- Increase the visibility, efficiency, and sustainability of transnational access funding.

Main objectives and expected impacts

The objective is to continue enabling transnational access to research infrastructure services, while piloting a transition to new access models 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.

Both curiosity-driven and challenge-driven access should be funded, 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.

A preparatory action for a more integrated and sustainable access scheme is suggested to identify novel approaches and operational steps towards a longer-term, cross-domains and integrated access scheme. It will build on the experience of past and ongoing EU supported access projects (notably under Horizon 2020 INFRAIA and Horizon Europe INFRASERV), on national access schemes, positions papers from relevant communities, and ESFRI work. It will involve national funders (e.g. in advisory board) and the consortium must be representative of all large domains. In addition, the CSA will prepare the implementation of a pilot HE INFRASERV topic for 2027 (or for the next FP).

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 collaboration in joint technology development across similar facilities creates critical mass, avoids duplication and improves the effectiveness of public investment. The programme will continue supporting such collaborations, including in areas relevant for the environmental sustainability of research infrastructures. It will renew support for collaboration with industry from the early stages of technology development, and it will explore new support mechanisms aimed at providing the best conditions for large collaborations and for supporting innovation ecosystems in this area.

RIs are front-runners in the use of digital technologies. Still, the amount of quality data they produce, to be managed according to the FAIR principles, and the increasing request from scientific communities of simpler, more economic and environmental-friendly disciplinary and cross-disciplinary access, requires a faster digital transition through the development and adoption of advanced digital solutions.

Main challenges

- Ensuring state-of-the-art technologies. Given that RI operations rely in many cases on technical components or material for which Europe is strongly dependent on third countries, the programme should reinforce our resilience with respect to the availability of critical technical RI components.
- Fostering large collaborations for technology roadmapping and roadmap implementation.
- Encouraging collaboration with industry, leading to RI innovation ecosystems with a potential to

- generate applications beyond the scientific market.
- Accelerate the digitalisation of research infrastructures throughout their entire RI life cycle, including digitalisation of RI 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: advance and accelerate the reduction of the environmental footprint of RIs operations. This will, at the same time contribute to increasing their resilience towards energy crises or other resource restrictions such as water.

Main objectives and expected impacts

- Continued support to the development of new instrumentation, tools, methods and solutions for RI upgrades, fostering the resilience of the RI landscape and EU autonomy.
- Creation of a 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. There will be support for co-creation of technology with industry, notably to introduce new perspectives in design, opening up for new solutions, and seek longer-term engagement that leads to more robust innovation ecosystems.
- Maintained support for the greening of RIs, targeting specific domains or technologies but also offering opportunities for bottom-up actions. This could include sharing of experiences and best practices, identification and implementation of available technological solutions and development of new ones, adapting internal processes and evolution of access modes as well as, in many cases, substantial new investments.
- Encouraging advanced communities that have already developed technology roadmaps to incorporate greening challenges and exploring synergies with other communities notably for transversal technologies like ICT, robotics or AI.
- Transitioning to a more integrated and long-term planning and implementation of joint technology research, interacting also with preparatory action for common technology development.
- Exploration of applications of RI innovations outside the scientific market, via proof-of-concept support.
- Targeting all RIs in ESFRI (with other RIs as co-beneficiaries), grouped according to common technological roadmaps. The aim is to prepare communities with an existing roadmap for the longer term, and to stimulate other communities to develop their own technology roadmap approach.
- A preparatory action for common technology development is suggested to identify commonalities in technology needs across different types of infrastructures and domains. The action could map existing and developing strategies and roadmaps for future development of RI technologies by different RI communities in different domains. The action could identify commonalities in technology needs and synergies. It could also propose plans for joint implementation of relevant development of technology with attention to greening of RIs.

2. EOSC, DestinE and pan-European National Research and Education Networks

2.1. Enabling an operational, open and FAIR EOSC ecosystem

The European Open Science Cloud (EOSC) needs to constantly evolve to address emerging needs of the scientific community and provide cutting-edge solutions that foster interdisciplinary research to address major challenges.

The programme serves the EOSC long-term ambition of contributing to a web of FAIR 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. Activities will 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.

In line with the EOSC Strategic R&I Agenda (2021-2030), the 2025-2027 activities will continue to address and monitor the following high-level strategic objectives: (1) 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”; (2) 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; and (3) Ensure that Open Science policies, practices and skills are monitored, rewarded and taught, becoming the ‘new normal’ across the European Research Area (ERA).

Main challenges

- Demonstrate EOSC added value to the research process itself and increase the uptake of EOSC and Open Science by European scientists and research organisations of all types, including by providing support to early users of EOSC;
- Develop EOSC as an accelerator of the digital transition. Foster high FAIR data productivity, promote FAIR data literacy and sovereignty of FAIR research data; Develop the EOSC as a public good first and foremost for the researchers and then open it progressively to the public sector and to partners from the commercial sector that are dedicated to Open Science;
- Deploy EOSC as the Common European data space for research and innovation and support the interconnection of EOSC with other Common European data spaces;
- Ensure continuation of the operation of the EOSC Platform after the end of the first EOSC procurement contract;
- Promote interconnection of digital RIs within the EOSC federation and with other digital infrastructures:
 - Motivate the *linking between existing RIs as active nodes within the EOSC federation*;
 - Encourage the *linking between RIs and other relevant sectoral European data spaces* under the EU data strategy^[1] in view of becoming a source of data for innovation and economic development;
 - Advocate interconnection of RIs to other relevant digital infrastructures, including those funded under the Digital Europe Programme e.g. EuroHPC^[2] and TEFs^[3] or Horizon Europe programmes e.g. AI on Demand Platform^[4].
- Prepare for sustainable operation of the EOSC federation, explore sustainability options, business models and funding modalities; prepare for the evolution of the EOSC governance beyond 2027;
- Continue promoting the uptake of Open Science and EOSC through sharing best practices, demonstrators and successful use cases, and monitoring progress and impact continuously (with relevant links to the ERA monitoring Mechanism);

^[1] <https://digital-strategy.ec.europa.eu/en/policies/strategy-data>

^[2] EuroHPC will interconnect in the 2023-2027 period the main European supercomputing centres through high-speed links in order to establish in Europe a world-leading hyper-connected HPC and quantum infrastructure, linked with the data infrastructure ecosystem. https://eurohpc-ju.europa.eu/index_en

^[3] Testing and Experimentation Facilities for Artificial Intelligence co-funded under the Digital Europe Programme will be specialised large-scale reference sites open to all technology providers across Europe to test and experiment advanced AI-based soft-and hardware solutions and products. <https://digital-strategy.ec.europa.eu/en/activities/testing-and-experimentation-facilities>

[4] <https://www.ai4europe.eu/>

- Continue support to Horizon Europe missions with FAIR and open uses cases capitalising on EOSC resources made available through the EOSC federation;
- Increase focus on EOSC enabling citizen science.

Main objectives and expected impacts

The EOSC tripartite governance has identified points that shall also guide future EOSC activities:

- There will be a need for continued operation of an operational EOSC infrastructure allowing European scientists and research organisations to run research workflows in the EOSC federated environment and demonstrate EOSC added value beyond usual practices by the scientific disciplines. Key to the added-value will be the federation of e-infrastructures and integration of services in the EOSC core, as well as a capacity allowing for discovery and reuse of FAIR resources in the EOSC federation.
- A meaningful EOSC will require a meaningful amount of FAIR data and other digital outputs becoming accessible through the EOSC federation. Continued actions are required to turn FAIR (principles and metrics) into coherent practices across Europe by all research communities. This will imply reinforced efforts towards accelerating FAIR Data productivity by all research communities while safeguarding FAIR data sovereignty and autonomy by the research performing organisations generating the data, sustaining FAIR-enabling repositories ensuring FAIR data quality and long-term data preservation and connecting them to the EOSC federation, supporting the development of international, cross-domain FAIR data interoperability frameworks, reinforcing networking and capacity building activities in relation to skills for Open and FAIR practices and the supporting knowledge centres and networks of FAIR data stewards across Europe.
- Future EOSC governance and operation shall ensure the public good nature of EOSC. Main focus shall be on the public research sector during the ramp-up phase.
- The EOSC environment shall be primarily deployed as the Common European data space for research and innovation, properly interconnected with the other Common European data spaces, and shall benefit from ~~RDM~~ research data management initiatives and data spaces established at national level. State-of-the-art technologies and service elements for the EOSC Core and Exchange will have to be explored or incubated, improved and upgraded following user feedback.
- The EOSC federation shall build on a widely adopted EOSC Interoperability Framework (cross-domain and discipline-specific) of FAIR data and composable services. This framework shall be maintained with agreed guidelines to support common operation across the federation.
- It will be essential to ensure effective expansion and scalability of the EOSC federation involving an increasing number of research infrastructures, each of them providing FAIR data and services aligned in terms of community standards and EOSC acceptable use policies and rules of participation.
- A new governance model for operating, evolving and sustaining the EOSC federation after 2027 shall be detailed and agreed upon.
- Business models to sustain the EOSC federation and the FAIR data federation will have to move from high level considerations to operational models tailored to different EOSC user profiles/use scenarios.
- EOSC progress shall continue to be monitored along the agreed frameworks and targets developed by the EOSC Steering Board and the EOSC European Partnership. Good practices and thematic demonstrators shall be promoted to enrich mutual learning.
- As we go along with the expansion of the EOSC federation, increased focus shall be put on EOSC enabling citizen science.

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.

In addition, DestinE will eventually also provide to academia and research a unique array of resources to be exploited for further advancements in the field of Earth Science and beyond.

While the implementation of the operational Destination Earth information system with its underlying core components is funded under the Digital Europe Programme, DestinE is strongly rooted in science and requires dedicated research activities to continuously evolve, in particular to exploit the latest technological developments and expand beyond its initial focus on extreme weather events and climate change adaptation.

Main challenges

- 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 Union priorities and evolving end-user needs; Multi-disciplinary, horizontal, transversal infrastructure solutions to handle diverse end-to-end workflows spanning various areas.

Main objectives and expected impacts

- 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

Actions under this title should 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. It should focus on addressing development needs for future evolution of the GÉANT network. 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.

Main challenges

In this context and within the scope of the FPA, there is a need to further evolve and improve the:

- 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, where before it was not technically and economically feasible, and offer high-speed-terabit capable services in the network infrastructure to serve the intensive point-to-point data flows.

- Automation: new devices and services are introduced in the GÉANT network, and therefore traffic is increasing exponentially. There is a need to evolve the network configuration automation and services orchestration to have detailed live network knowledge and end-to-end visibility, to reduce downtime and meantime to repair.
- Security: the number and complexity of security incidents is getting bigger, and this requires security teams to work closely together. Therefore, GÉANT may put in place a Security Intelligence Hub:
 - to prevent, detect and mitigate security incidents and services' disruption at the network level. This shall be complemented with a security dashboard to show actual compliance with security standards while assisting NRENs to improve their security posture and address threats for their users.
 - to channel and analyze actual and evolving threats, using among others, big data analysis and machine learning to automate whenever possible.
- Autonomy: in line with EU policy for autonomy, and the EU Global Gateway initiative, GÉANT shall work to make future connectivity options as autonomous as possible. This will involve investing in new (subsea) fiber cables to be implemented and making sure that equipment on fibers is owned and operated by GÉANT or a trusted partner.

Main objectives and expected impacts

Activities shall continue building upon the FPA to:

- 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.

The focus shall be on:

- Keeping Europe at the forefront of Global Research and Education, by creating the necessary conditions to support researchers, students and talents in their work and collaborations,
- Ensuring very high burstable data transfer capabilities, with reliable and secure end-to-end cross-border connectivity among users, European and International Research Infrastructures, computing facilities and data repositories, and paving the way for widespread access to common European Data Spaces.
- Sustain connectivity globally and foster Europe's international cooperation policy objectives via enhanced connectivity with global Research & Education networks, by ensuring autonomous, resilient, and secure connections.
- Maintain support to highly visible ongoing initiatives in the domain of international cooperation by promoting the uptake in use of e-Infrastructures and showing tangible benefits for the EU and its partners.