



Title	Options for sustainable RI access strategies to atmospheric facilities
Work package n°	8
Milestone/Deliverable n°	D8.2
Lead beneficiary	WMO
Author(s)	Paolo Laj, Julie Bourdeu (WMO), Sabine Philippin (CNRS, ATMO- ACCESS Coordination), Matilde Oliveri (CNRS-UCA Project Office), Ariane Dubost Oliveri (CNRS Project Office), Zhuoqun Wu (CNRS, Project Office), members from ORP and NFFA projects.
Deliverable Type	Report
Dissemination Level	Public
Estimated delivery date	M54
Actual delivery date	M54
Version	V2 (updated 25.02.2026)
Reviewed by	Project Office, SSC ATMO-ACCESS
Accepted by	
Comments	V2: Following the final external review, the deliverable was corrected according to the recommendations.



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1 Introduction

Deliverable 8.2 presents a strategic access plan that builds upon the outcomes of the ATMO-ACCESS project while extending its scope to incorporate insights from two additional Horizon 2020 pilot projects - ORP and NFFA. These projects, operating in distinct scientific domains, provide complementary perspectives on access provision to distributed Research Infrastructures (RIs). The aim of D8.2 is to formulate recommendations that are not only grounded in the atmospheric sciences but also applicable across a broader spectrum of RI communities, thereby contributing to a more inclusive and sustainable European access framework.

While Deliverable 8.1 focused on recommendations specific to the atmospheric science domain, drawing directly from the operational experience and evaluation of ATMO-ACCESS, Deliverable 8.2 seeks to generalize and expand these findings. It does so by integrating the shared lessons and strategic reflections captured in the joint white paper authored by the three pilot projects. This white paper, once finalized and endorsed by all three consortia, will be annexed to D8.2 as a foundational reference. However, it is important to note that the current draft of the white paper, which feeds into the content of D8.2, may differ from the final version. These differences may reflect the specific viewpoints and priorities of ATMO-ACCESS, which are particularly relevant to the recommendations presented here. The joint ATMO-ACCESS/NEP/ORP White paper is attached as Annex of this deliverable.

Deliverable 8.3, a concise policy brief developed within ATMO-ACCESS, provides targeted recommendations on co-funding mechanisms for access provision. Its findings are directly relevant to the broader strategic considerations addressed in D8.2, especially in relation to financial sustainability and the integration of access into RI governance and funding models. D8.2 therefore incorporates the key messages of D8.3, while situating them within a wider policy and operational context that includes cross-domain perspectives and long-term strategic planning.

Together, D8.1, D8.2, and D8.3 form a coherent set of deliverables that reflect the evolution of access thinking within ATMO-ACCESS and its alignment with broader European RI policy. D8.2, in particular, serves as a bridge between domain-specific recommendations and strategic planning across scientific domains, offering a roadmap



for future access programs that are both scientifically robust and operationally sustainable.

2 Rationale for the white paper

The white paper is a joint initiative of the three pilot projects funded under H2020 INFRAIA-03-2020 - Pilot for a new model of Integrating Activities. All three projects are tasked to provide guidance to the EU Commission on best options for future access projects. The three projects concern three different scientific domains.

Nanoscience Foundries and Fine Analysis – Europe | PILOT (NFFA-Europe PILOT / NEP)

The NFFA-Europe PILOT (NEP), launched in March 2021, extends and consolidates the NFFA-Europe distributed infrastructure for nanoscience by providing free, transnational access to a comprehensive suite of nanoscience and nanotechnology facilities across Europe coordinated by the Italian Research Council's Institute of Materials (CNR-IOM). The project builds on past experience, offering services from material synthesis and nanofabrication to nano-characterization using large-scale X-ray and neutron sources, electron microscopy, ultra-fast pulses, cleanroom facilities, free-electron lasers, and simulation tools to meet multi-disciplinary research needs. NEP fosters integration and interoperability among its distributed nodes, supported through a Single-Entry Point and a Metadata-rich "Metastore," aiming for FAIR-by-design data management and seamless access both on-site and virtually. Automated metadata tools, AI/ML-enhanced search capabilities, and virtual access channels enhance accessibility for users constrained by mobility limitations, particularly in the post-COVID context. A high throughput of quarterly proposal calls sustains strong user demand, with over 888 proposals and 2700 laboratory sessions delivered across multiple calls by mid-2024. The science-proposal evaluation pipeline, driven by ARP and TLNet, delivers a robust selection process with typically around 63 % success rate. Data stewardship follows the Horizon 2020 Open Research Data Pilot, with guidelines ensuring data and metadata are findable, accessible, interoperable, and reusable across the EOSC network. NEP pursues long-term sustainability with strategies including a memorandum of understanding and examination of European Grouping models in anticipation of post-2026 continuity. The infrastructure framework is dynamic, continually integrating new Virtual Access services and joint activities that



enhance interoperability, user tools, and cross-node coordination. NEP has already influenced national recovery and infrastructure programs and is recognized as a model for future INFRA-SERV calls. The project spans until early 2027, has an EU budget of approximately €15 million, and coordinates 22 core partners across EU Member States plus associated countries, augmented by additional third-party service providers. Throughout its lifetime, NEP has maintained strong outreach, user training (e.g., in FAIR data and AI methods), and engagement with other pilot initiatives, reinforcing its role as a leading-edge European research infrastructure.

Opticon-RadioNet Pilot (ORP)

The Opticon-RadioNet Pilot (ORP), funded under Horizon 2020 and launched in March 2021, represents the integration of the optical astronomy network OPTICON and the radio astronomy network RadioNet into Europe's largest ground-based astronomy pilot infrastructure coordinated by CNRS, University of Cambridge, and the Max Planck Institute for Radio Astronomy. With a budget of about €15 million and a consortium of roughly 37 institutions spanning 15 European countries plus global partners, ORP provides harmonized transnational access to a wide array of optical, infrared, sub-millimetre, and radio observatories, including ALMA nodes, Effelsberg, LOFAR, NOEMA, and ESO facilities. ORP introduces unified access procedures, enabling seamless multi-wavelength observations and rapid response capabilities essential for transient astronomy and multi-messenger science. It simplifies and standardizes proposal, scheduling, and training workflows for multi-disciplinary astronomers, and enhances synergy between optical and radio communities, previously operating under separate access systems. The project sustains and improves existing access models while developing new, sustainable frameworks for long-term funding beyond EU support, including harmonization of procedures and long-term access models. ORP fosters training and capacity building for a new generation of multi-wavelength astronomers and promotes shared data interfaces across observatories. By integrating optical and radio infrastructures under one umbrella, ORP supports complex observations of transient and variable phenomena across the electromagnetic spectrum. The pilot emphasizes interoperability, standardization, and cross-community collaboration, aiming to shape the future European astronomy infrastructure landscape. ORP's launch is intended to mark a milestone in infrastructure integration for astrophysics



reinforcing Europe's leadership in multi-messenger and multi-wavelength observational science.

Exchange of information initiated from project start

The preparation of this white paper was the result of a long process of consultation and collaboration among the three pilot projects launched in 2021. From the very beginning, the projects set up a series of frequent joint discussions that took different forms: regular annual meetings specifically dedicated to common issues, cross-invitations to each project's annual meetings both online and in person, and targeted sessions to discuss recommendations from the projects' outcomes and dedicated to the joint drafting of the white paper. The full list of joint meetings (12) organized within the course of the project is available in Table 1 below.

These exchanges created an environment in which experiences could be compared and shared, even if the projects themselves were designed around very different scientific communities and RIs at different stages of formal recognition (in particular when considering the ESFRI maturity scale). ATMO-ACCESS entered the pilot phase with the strong foundation of three established and mature RIs (all being recognized ESFRI landmarks, including two ERICs and one AISBL) and therefore benefited from an advanced level of organizational and legal integration. By contrast, NEP was driven by scientific and technical expertise and is not yet part of the ESFRI roadmap, giving its experience a different character, more focused on coordinating distributed expertise than on embedding services within a formal European infrastructure. ORP, for its part, represents the outcome of a merger between two long-standing communities in astronomy, bringing together radio and optical astronomers into a single pilot framework.

These differences inevitably shaped both the opportunities for convergence and the limits of alignment of the three pilot projects. While the dialogue between the projects was constant and constructive, not all perspectives could be fully reconciled. There was an explicit recognition that certain ideas were not shared across all three domains, and this explains why the white paper and the official deliverable D8.2 are not fully identical.

The white paper should therefore be read as the product of a collective and iterative process that captured both the common ground and the diversity views



that naturally emerge when bringing together scientific communities at different stages of infrastructure development.

Table 1. List of meetings held to prepare the white paper

N°	Date	Name	Partner(s) Involved	Meeting Type
12	September 10, 2025	Joint EU & H2020 Pilot Meeting	ATMO-ACCESS, ORP, NEP (NFFA), CNRS, EC	On site, (Bruxelles)
11	September 4, 2025	Preparation for Joint EU & H2020 Pilot Meeting Part 2	ATMO-ACCESS, ORP, NEP (NFFA)	Online
10	June 26, 2025	Preparation for Joint EU & H2020 Pilot Meeting Part 1	ATMO-ACCESS, ORP, NEP (NFFA)	Online
9	January 16, 2025	Joint pilot meeting on status of ATMO-ACCESS /NEP /ORP projects and outcomes	ATMO-ACCESS, ORP, NEP (NFFA), ACTRIS-ERIC	Online
8	March 19-21, 2024	ATMO-ACCESS General Meeting 2024	ATMO-ACCESS, ORP, NEP (NFFA)	On-site (Wuppertal), online
7	January 30, 2024	Workshop on RI Access Models	ATMO-ACCESS, ORP, NEP, DGT RTD, REA	Online
6	November 22, 2023	ORP Consortium Meeting	ATMO-ACCESS, ORP, NEP (NFFA),	On-site (Munich), online



5	March 29-31, 2023	ATMO-ACCESS General Meeting 2023	ATMO-ACCESS, ORP, NEP (NFFA),	On-site (Valencia), online
4	October 20, 2022	ICRI Side meeting	ATMO-ACCESS, ORP, NFFA	On-site (Brno)
3	May 30, 2022	Hybrid meeting with ORP and NFFA	ATMO-ACCESS, ORP, NFFA	On-site (Grenoble), online
2	October 13, 2021	NEP Kick-off Meeting	ATMO-ACCESS, ORP, NFFA	Online
1	May 10, 2021	ATMO-ACCESS Kick-off Meeting	ATMO-ACCESS, ORP, NFFA	Online

3 Main recommendations from joint Pilot access projects

The following paper is based on the experience gained in performing the three Pilot distributed RI projects launched at the end of H2020 delivering TA services and improved interoperability in favour of three large, specialized science communities.

Recommendation 1: Users access is at the core of the Research Infrastructure paradigm.

RIs are designed, created and operated to generate maximum and excellent scientific output from the engagement of the widest and most qualified community of researchers.

By offering access, RIs serve as engines for frontier science. While the full impact of the pilot projects on science and innovation cannot be assessed at the end of the projects, all three pilots have supported ambitious initiatives that have enriched the broader scientific ecosystem. The transnational dimension of user access plays a crucial role, enabling benchmarking between infrastructures and fostering collaboration across



borders. The constant demand for access (TA/VA) within the three pilot projects is a key indicator of their relevance and illustrates the need for such projects.

EU-funded programmes play a unique and indispensable role in this ecosystem. They provide dedicated funding for access to distributed RIs—particularly those lacking a business model to support such access independently. The EU public support is essential for ensuring that scientific excellence, rather than financial barriers, determines who can benefit from and contribute to Europe's research facilities. While we acknowledge that sustainable access funding must be based on synergistic mechanisms, considering various potential sources and that EU TA-VA funding cannot be the unique source, a survey with potential funding agencies (National Science Foundations in Europe) evidenced that currently no alternative to EU-funded programs is currently on the table. The three pilot projects strongly recommend maintaining EU-funded opportunities for access (TA/VA) as a key tool. ERICs may facilitate additional funding mechanisms to support access but there are clear difficulties to overcome.

Continued EU support for Transnational and Virtual Access (TA/VA) is essential to foster scientific excellence and openness – no viable alternatives currently exist.

Recommendation 2: Decoupling RI development and management from users' policy and programmes, including TA, risks weakening the effectiveness of those measures.

The H2020 INFRAIA Pilot formula of >60% support to access and remaining support to (joint) research and management of the consortium to improve the technical offer has been successful in all three domains. The Horizon Europe INFRA programme introduces a functional separation between INFRADEV, INFRATECH, INFRAEOSC, and INFRASERV — with only the latter allowing for user involvement through Transnational Access. This structure may make it more challenging for RIs to develop an integrated strategy that combines the creation of new services with user access, requiring deliberate coordination and governance.

As it is now, the planning of support measures for technical upgrades and access provision follows separate timelines, which can be overcome, but more importantly, has become increasingly uncertain due to the competitive selection process for project



funding and the timing of TECH, SERV and DEV calls. The differing EU selection criteria applied to competing INFRA project proposals and the requirement for challenge-driven INFRA-SERV projects to be organized around societal challenges lead to consortia and objectives that differ significantly between TECH, DEV, and SERV projects. This divergence makes it extremely difficult to map the user needs effectively and to define and implement a coherent service development strategy integrating TECH and DEV projects with the access dimension in SERV.

Faced with such complexity, RIs are now struggling to formulate and follow a strategy that is both coherent and widely understandable. Maintaining a development component within INFRA-SERV projects appears to us as an effective and appropriate way to support the evolution of services within a single RI or a consortium of RIs - ultimately for the benefit of all users, even as RIs are "meant to work for them." This is a real issue, complicated by the fact that in SERV projects, structured around societal challenges, the needs of the users may be hard to identify within the broader scope of such project. Users rely on clear, stable service offerings to plan their experiments and collaborations. Including multiple services under a single societal theme makes it difficult for users to find the specific service they need which may be counterproductive to enhancing user engagement (or may even undermine the effectiveness of TA programmes). In addition, in large, challenge-driven SERV projects, users may be unaware of new tools or upgraded RI capabilities, and advanced, cross-RI services are not always aligned with their needs.

Strong alignment of RI development, management, and access ensures coherent and effective services. Allowing limited TA/VA within INFRADEV, INFRA TECH & INFRAEOSC would enable timely validation of development priorities.

Recommendation 3: Avoid structurally incoherent large consortia

Building large, challenge-based or multi-topic consortia by grouping RIs with fundamentally different scientific goals and operational models creates structural difficulties for access provision. Very large grants, such as the €35 million foreseen in INFRA-SERV WP2027, create significant administrative burdens, and risk forming unmanageable consortia and undermining the focus of the projects' objectives. Based



on the experience of the H2020 Pilots, a budget of between €10 and €15 million is much better suited to support focused, topic-based consortia (e.g. in atmospheric science, astronomy, nanoscience), where roles are clear, coordination is effective, and scientific objectives remain central.

Access policies, technical requirements, and user expectations vary greatly across disciplines. Forced integration often necessitates redundant development of access systems for each new project and results in poor alignment between project design and actual user needs and ultimately uses resources inefficiently. Overly complex in their coordination and performance monitoring, large, multi-domain consortia can discourage scientifically-driven leadership, limit the pool of eligible coordinators, and alienate users who prefer to engage directly with the RI relevant to their work rather than navigate through layers of generalized governance and challenge-driven expectations.

Instead of defaulting to broad ESFRI domains or artificial aggregations, calls should be built around well-defined scientific communities, with realistic funding scales that reflect their absorptive capacity and ensure quality outputs, including FAIR data.

For the academic communities, curiosity-driven approaches appear most effective in maintaining coherence in access projects, although challenge-driven initiatives may be appropriate within a limited scientific focus (e.g., atmosphere and health domain). The European Commission could introduce a flexible system in which project funding reflects the number of RIs involved, allowing for projects of varying size (while setting an optimal upper limit) and consistently addressing user needs. Such a flexible funding mechanism had been implemented in the past to establish infrastructure clusters.

Medium-sized (€10–15M), focused projects ensure coherence, strong coordination, and user relevance, and avoids fragmentation and inefficiency of very large consortia.

Recommendation 4: Simplify financial rules and project structures for Transnational Access

The current organization of TA projects is overly complex and increasingly difficult to manage (starting from the project preparation). Provisional allocation of access, integration of all facilities as project partners, strict reimbursement mechanism under



existing TA/VA rules, lead to inefficiencies, and managerial challenges for coordinators, beneficiaries and users. There is a need for more flexibility in the financial rules to accommodate the variety of user requests. The successful schemes adopted by the EC, such as the use of “lump sums” and “cascade grants”, should be extended to RIs, positioning them as trusted actor to efficiently and flexibly manage access costs and service provision, while reducing administrative overhead. Where applicable, delegating greater responsibility to ERICs, through existing governance frameworks, to manage and oversee TA activities would clearly increase effectiveness. Together, these changes would enable more flexible and sustainable access models that better serve both providers and users.

Flexible financial rules and delegated responsibility can cut complexity, improve efficiency, and deliver more sustainable transnational access.

Recommendation 5: Ensuring continuity of access by optimizing timing of INFRA calls

Even though the ways to engage with users can be diverse and tailored to the specific scope of different measures (DEV, TECH, EOSC, SERV), the disruption of service provision should be avoided. It is therefore crucial that access provision remains continuous and predictable for the users, and in particular for non-academic users.

The experience of launching the project Pilots only at the end of H2020 illustrates this point clearly. Their delayed start limited the opportunity to contribute to Horizon Europe planning and created gaps in TA provision, which led to a surge in user applications, particularly during the final call, driven by concern that future opportunities would not materialise in a timely or foreseeable manner. Disruptions in access services undermine trust, interrupt long-standing collaborations, and significantly reduce the effectiveness of subsequent calls when time gaps occur.

To avoid such situations, we strongly recommend that the timing of INFRA calls be better anticipated to ensure continuity of access and to support the long-term engagement of scientific communities. Timing of INFRA calls may also be adjusted to avoid concurrent deadlines for RIs expected to respond to multiple call. A more



coherent and forward-looking schedule of calls would reinforce the credibility, usability, and scientific impact of Europe's Research Infrastructures.

This goes hand in hand with the need for thematic continuity in project calls. Constant changes in the scope of calls (as noted in the previous section) create difficulties for users in understanding how to access available opportunities and, ultimately, reduce the optimal use of RI services. A well-timed, sustainably organized access system - one that is understandable even to non-academic users - would be far more effective in encouraging the optimal use of RI.

Predictable timing and thematic stability of INFRA calls are essential for continuous access, sustained user engagement, and maximised scientific impact.

Recommendation 6: Expanding TNA opportunities beyond INFRA in FP10

The concept of TA/VA to RIs is restricted to the INFRA Work Programme in Horizon Europe (Pillar 1). Where they exist, ERICs, as legal entities, should be empowered and entrusted with greater responsibility to organize and manage access schemes not only within INFRA in Pillar 1 but also in support of projects funded under Pillars 2 and 3.

In Pillars 2 and 3, projects relevant to the thematic clusters such as the Green Deal, digital transformation, health, and security are funded without clear alignment with existing RIs although target-driven basic research often utilize RI services to address societal challenges. TA/VA concepts should be more explicitly embedded and required in these projects to ensure access to high-quality data and facilities. At present, associated proposals often do not have a clear path to utilize RI services (and their use is not explicitly required in the financial report framework), highlighting the need for more transparent and structured access mechanisms. Similarly, Pillar 3 ("Innovation and Industrial Competitiveness") should promote the use of RI services by the private sector, with access serving as a key mechanism to facilitate collaboration between academic and industrial partners. Private sector access could greatly be encouraged by amending the transnationality rule, for example allowing national private sector access under RI supervision.



This calls for unified/simplified policies, reporting, and reimbursement mechanisms, in both INFRA and Cluster-RTD projects. Because RTD projects often provide additional funding sources, such mechanisms would support co-funded and co-programmed calls involving Member States and the EU, enabling TA in thematic areas beyond RI development. Such strategy could also serve as a benchmark for national funding strategies.

Opening to TA/VA projects in Cluster-RTD projects would capitalize on investments done by Member States for developing RIs while ensuring the continuity and legacy of TA/VA services. We recommend including ERICs as eligible beneficiaries in EU projects to coordinate and sustain access services across funding streams, to help facilitate continuity and sustainability of access services.

Embedding TA/VA in Pillars 2 & 3 ensures optimal RI use, strengthens academic–industrial engagement, and supports EU strategic objectives through effective funding.

Recommendation 7: Promote the international dimension of RIs

European RIs must fully embrace their international dimension to strengthen scientific excellence and foster global collaboration. The three pilot projects have demonstrated this potential, receiving and funding a substantial number (around 10%) of applications from international researchers (affiliated to entities outside the European Research Area), and enabling access to facilities located beyond Europe's political boundaries and/or operated by international consortia.

As world-class research facilities emerge increasingly in other regions of the world, developing mechanisms to enable European researchers to access these infrastructures is essential to maintain their connection to cutting-edge science that may no longer be hosted in Europe. At the same time, European RIs can serve as leading training hubs for researchers from other regions, reinforcing reciprocal value and promoting European expertise.

It is therefore recommended that the EU develops modalities to promote reciprocal access agreements to ensure mutual benefit, allowing European researchers to access international facilities under comparable conditions. Co-funded programmes involving

both EU and third-country stakeholders could offer a sustainable model to support such international access.

A dedicated financial framework to integrate the international consortia into RI access projects is currently lacking. Strategies that position global engagement as a core RI objective, backed by harmonized administrative procedures and interoperable access systems, would benefit all stakeholders, particularly European researchers.

Expanding remote and hybrid access models would further enhance inclusivity and strengthen Europe's global scientific presence.

Finally, monitoring tools documenting scientific outcome and other key indicators should be developed to track international access flows and measure outcomes, support strategic planning and demonstrate the impact of these initiatives.

By fostering a globally connected RI ecosystem, Europe can continue to lead in scientific innovation while contributing meaningfully to global policy, capacity-building and collaboration efforts.

European RIs should expand their international dimension through reciprocal agreements, dedicated funding, enhancing excellence, inclusivity, and global leadership.

4 Summary and Conclusions

Deliverable 8.2 has drawn on the collective experience of three pilot projects ATMO-ACCESS, NEP, and ORP, launched at the end of Horizon 2020. Together, these initiatives have demonstrated the essential role of transnational and virtual access in driving scientific excellence, fostering collaboration across borders, and building communities around Europe's distributed RIs.

Their diversity of contexts has been a strength: ATMO-ACCESS is grounded in established ERICs, NEP is built around cutting-edge scientific and technical expertise not yet integrated into the ESFRI roadmap, and ORP uniting two distinct astronomical communities. The Pilot projects have allowed us to test a variety of access models, governance approaches, and user engagement strategies. At the same time, they have demonstrated that no single formula can address all needs: flexibility, continuity, and

proportionality must be at the core of future EU policies on access to ensure that the administrative and funding requirements are appropriate to the scale and nature of access.

Looking forward, the lessons from these pilots are especially timely as Europe prepares for FP10, whose structure is not yet defined. FP10 represents a critical opportunity to consolidate and expand access schemes while avoiding the risks of fragmentation created by separating development, technology, EOSC, and service dimensions into different instruments. A more coherent framework would ensure that user access and infrastructure development evolve together, enabling scientific communities and ERICs and RIs to better program their access strategies. Continuity of calls, better alignment of funding timelines, and realistic budget sizes adapted to the absorptive capacity of communities are all essential conditions for success.

A further step should be taken to strengthen co-funding mechanisms. The pilots have underlined that EU funding alone cannot sustain transnational access in the long term, yet at present no alternative model is in place. Joint programming between ERICs, National Agencies, and the European Commission could provide a pragmatic and sustainable pathway but this is not easy to achieve. By pooling resources, aligning priorities, and sharing governance responsibilities, such co-funding structures could guarantee stability for users, efficiency for access providers, and resilience for the overall European research ecosystem. In this perspective, FP10 should explore flexible arrangements that allow ERICs and other established governance frameworks to manage access resources in cooperation with the EU and its Member States.

The three pilots converge on the conviction that user access must remain at the heart of RI policy. It is the most effective way to ensure that European investments translate into world-class science, global collaboration, and societal impact. With FP10 still to be shaped, now is the right time to anchor these principles into the future framework and to design mechanisms that will secure Europe's leadership in open, integrated, and sustainable access to RIs.



ATMO ACCESS
Access to Atmospheric Research Facilities

5 Annex 1: White paper in final form



This work has received funding from the European Union's Horizon 2020 research and innovation programme through the ATMO-ACCESS Integrating Activity under grant agreement No 101008004

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■ Introduction

The purpose of this White Paper is to present recommendations on the most appropriate models, mechanisms, and best practices to establish optimal conditions for implementing access programmes for distributed research infrastructures. It is the result of a long process of consultation and collaboration among the three Pilot projects funded under H2020 INFRAIA-03-2020 – Pilot for a new model of Integrating Activities, all launched in 2021. From the very beginning, the projects set up a series of joint meetings (12) to address common issues, including annual project meetings, cross-attendance at each project's events, and targeted sessions to discuss recommendations from the projects' outcomes. These exchanges fostered an environment for sharing and comparing of experiences, across the three Pilots that cover different scientific communities and research infrastructures (RIs), with varying levels of maturity in governance and legal recognition:

- **ATMO-ACCESS** (Solutions for Sustainable Access to Atmospheric Research Facilities) brings together three established and mature RIs (ACTRIS ERIC, ICOS ERIC, IAGOS-AISBL) in the atmospheric domain, recognised as landmarks on the ESFRI roadmap, and benefiting from an advanced level of organizational and legal integration.
- **NEP** (NFFA-Europe Pilot) is an advanced nanoscience research infrastructure that is being evaluated for inclusion in the 2026-ESFRI Roadmap. Operating since 2016, it offers coordinated access through a Single Entry Point to a variety of facilities, from large RIs to unique academic laboratories, supporting multi-approach user projects.
- **ORP** (Opticon RadioNet Pilot) represents the consolidation of two long-standing astronomical research infrastructure communities, OPTICON and RadioNet, uniting optical and radio astronomers within a single pilot framework.

Dialogue among the three Pilot projects has been constant and constructive. Based on the experience gained, this White Paper reflects a collective, iterative process capturing both shared insights and the diversity of views that naturally arise among the RIs at different stages of development and across diverse scientific domains. It presents the key recommendations derived from these discussions.



Key recommendations from joint H2020 Pilot projects

The following seven recommendations summarise the joint outcomes of the three H2020 Pilot projects. They highlight key conditions for strengthening user access and ensuring the efficient use of RI services through improvements in the design of Horizon Europe Infrastructure projects.

RECOMMENDATION 1: USER ACCESS IS AT THE CORE OF THE RESEARCH INFRASTRUCTURE PARADIGM

RIs are designed, created and operated to generate maximum and excellent scientific output from the engagement of the widest and most qualified community of researchers.

By providing access, distributed research infrastructures act as engines of frontier science with an international dimension, offering a unique entry point to facilities for users who lack equivalent resources in their own countries. While the impact of the Pilot projects on science and innovation can be fully assessed only in the long-term after the end of the projects, all three Pilots have supported ambitious initiatives that have enriched the scientific and innovation ecosystem. The transnational dimension of user access plays a crucial role, motivating and testing RI upgrades, enabling benchmarking between infrastructures and fostering collaboration across borders. The constant demand for access (TA/VA) within the three Pilot projects is a key indicator of their relevance and illustrates the need for such projects.

EU Framework programmes play a unique and indispensable role in sustaining the RI ecosystem. They provide dedicated funding for access to distributed RIs, particularly where no sustainable business model exists to support user access. This EU-level, public support is essential to ensure that scientific excellence, rather than financial capacity, determines who can benefit from and contribute to Europe's research facilities. While sustainable access funding should ultimately rely on a combination of complementary sources, a survey with potential funding agencies (e.g., national science foundations in Europe) revealed that no viable alternative to EU-funded programmes currently exists. The three Pilot projects therefore strongly recommend maintaining EU-funded opportunities for transnational and virtual access (TA/VA) as a key instrument. ERICs, as well as other recognised RIs operating within existing governance frameworks, may help facilitate additional funding mechanisms, but significant challenges remain.

Key message 1:

Continued EU support for Transnational and Virtual Access (TA/VA) is essential to foster scientific excellence and openness, as no viable alternative funding mechanisms currently exists.





RECOMMENDATION 2: AVOID DECOUPLING RI DEVELOPMENT AND USER ACCESS

The H2020 Pilot project formula of >60% support to access and remaining support to (joint) research and management of the consortium to improve the technical offer has been successful in all three domains. The Horizon Europe INFRA programme introduces a functional separation between INFRADEV, INFRA TECH, INFRAEOSC, and INFRA SERV, with only the latter allowing for user involvement through transnational access. This structure makes it more challenging for RIs to develop user-focused service upgrades and incorporate user feedback effectively. Certain RI developments, such as new instrumentation or data management pipelines, need validation by selected external users before reaching the maturity level to become standard offerings.

Currently, the planning of support measures for technical upgrades and access provision has become increasingly uncertain due to the competitive selection process for project funding and the timing of the different INFRA calls. Moreover, the requirement for challenge-driven INFRA SERV projects to align with societal challenges results in consortia and objectives that differ significantly between INFRA TECH and INFRA DEV projects.

Differences in scope and design across the INFRA calls make it challenging for RIs to implement strategies that are both coherent and widely understandable. Maintaining a development component within INFRA SERV projects is adequate to support the short-term evolution of services within a single RI or a consortium of RIs, ultimately benefitting all users. Nonetheless, opportunities of support for users to contribute as co-developers or beta-testers in major RI upgrades remain limited.

Key message 2:

Maintaining close alignment between RI development, management, and user access helps ensure that services remain coherent and effective. Allowing a limited fraction of TA-VA in INFRA DEV, INFRA TECH and INFRAEOSC projects could provide highly valuable, timely validation of new strategies and development priorities.





RECOMMENDATION 3: AVOID STRUCTURALLY INCOHERENT, OVERLY LARGE CONSORTIA

Building overly large, challenge-based or multi-topic consortia by grouping RIs with fundamentally different scientific goals and operational models creates structural difficulties for access provision. Very large grants, such as the €35 million large-scale pilot foreseen in INFRASERV in the 2026–2027 Work Programme, impose significant administrative burdens, risk forming unmanageable consortia, create harmful fragmentation, and can dilute focus on the projects' scientific objectives. Experience from the Pilot projects indicates that budgets around €10–15 million are better suited to support focus, strategy-oriented consortia, where roles are clear, coordination is effective, and scientific objectives remain central.

Access policies, technical requirements, and user expectations vary greatly across disciplines. Forced integration often requires redundant development to harmonise access processes, resulting in poor alignment with actual user needs and in inefficient use of resources. Large, multi-domain consortia can also complicate coordination and performance monitoring, discourage scientifically-driven leadership, limit the pool of eligible coordinators, and alienate users who prefer direct engagement with the RIs relevant to their work.

Calls should be structured around well-defined scientific communities, rather than prioritising broad ESFRI domains or artificial groupings, with funding levels aligned to their ability to deliver projects effectively and produce quality outputs, including FAIR data.

INFRASERV projects should continue to prioritise curiosity-driven, excellent science. For the academic communities, curiosity-driven approaches are most effective in maintaining coherence in access projects, although challenge-driven initiatives may be appropriate within a limited scientific focus (e.g., atmosphere and health domain). A flexible funding system, reflecting the number of RIs involved, could support projects of varying size while consistently addressing user needs. This model has successfully been implemented in past infrastructure cluster projects.

Key message 3:

Medium-sized (€10–15 million), focused projects work best, enabling consortia to remain coherent, maintain clear roles and effective coordination, and better align scientific objectives with user needs, while avoiding the administrative burden and fragmentation associated with very large, multi-topic consortia.





RECOMMENDATION 4: SIMPLIFY FINANCIAL RULES AND PROJECT STRUCTURES FOR TRANSNATIONAL ACCESS

The current organization of TA projects is overly complex and increasingly difficult to manage, starting from the project preparation. Provisional allocation of access, the integration of facilities' host organisations as project beneficiaries, and strict reimbursement mechanism under existing TA/VA rules lead to inefficiencies and managerial challenges for coordinators, beneficiaries and users. Greater flexibility in financial rules is needed to optimise access management and accommodate the variety of user requests.

Successful schemes previously adopted by the EC, such as "lump sums" and "cascade grants", or "service contracts" should be extended to RIs, positioning them as trusted actors capable of managing access costs and service provision, while reducing administrative overhead. Where appropriate, delegating greater responsibility to ERICs and well-established RI consortia, identified in the ESFRI landscape, to manage and oversee TA activities would further increase effectiveness.

Furthermore, some large and active research communities (such as in the astronomy domain) require distributed facilities across multiple countries, often including Widening countries, and may not involve ESFRI or ERIC legal partners, highlighting the need for complementary mechanisms to ensure access and coordination for these fields.

Together, these measures would enable more flexible and sustainable access models that better serve both providers and users.

Key message 4:

Greater flexibility in financial rules, including lump sums, cascade grants, and service contracts, combined with delegating responsibility to well-established RI consortia, can reduce complexity, streamline management, and enable more effective and sustainable transnational access.





RECOMMENDATION 5: ENSURING CONTINUITY OF ACCESS BY OPTIMIZING TIMING OF INFRA CALLS

While engagement with users can take diverse forms tailored to the specific scope of different measures (INFRADEV, INFRATECH, INFRAEOSC, INFRASERV), disruptions in service provision must be avoided, as they jeopardise collaboration and reduce the effectiveness of subsequent, time-gapped projects. Continuous and predictable access is therefore crucial for all users, particularly non-academic users.

The experience of launching the Pilot projects only at the end of H2020 illustrates this point clearly. Their delayed start limited opportunities to contribute to Horizon Europe planning and created gaps in TA provision, resulting in a surge of user applications, particularly during the final call, driven by concerns that future opportunities might not materialise in a timely or predictable manner. Disruptions in access service provision undermine trust, interrupt long-standing collaborations, and significantly reduce the effectiveness.

To prevent such situations, we strongly recommend to better synchronise the timing of INFRA calls to ensure continuity of access and support the long-term engagement of scientific communities, while clustering of deadlines and resulting resource overload should be avoided.

This should be complemented by maintaining thematic continuity in INFRA calls. Frequent changes in call scope, as noted previously, make it difficult for users to understand how to access available opportunities and, ultimately, reduce the optimal use of RI services. A well-timed, sustainably organised access system, clear and understandable even to non-academic users, would be far more effective in promoting the optimal use of RI.



Key message 5:

Better timing and thematic stability of INFRA calls are crucial to ensure continuous, predictable access, support long-term user engagement, and maximise the scientific impact and usability of Europe's research infrastructures.



RECOMMENDATION 6: EXPANDING TNA OPPORTUNITIES BEYOND INFRA IN FP10

The concept of TA/VA to RIs is restricted to the INFRA Work Programme in Horizon Europe under Pillar 1- "Excellent Science". Where they exist, ERICs and other recognised RIs should be empowered and entrusted with greater responsibility to organise and manage access schemes. This approach should apply not only under Pillar 1 but also to projects funded under Pillars 2 and 3.

Under Pillar 2- "Global Challenges and European Industrial Competitiveness", projects aligned with thematic clusters such as the Green Deal, digital transformation, health, and security are funded without clear integration with existing RIs, even though target-driven basic research often relies on RI services to address societal challenges. TA/VA concepts and mechanisms should be explicitly embedded in these projects funded under Pillar 2 to better promote access to high-quality data and facilities. Currently, associated proposals often lack a clear pathway to utilise RI services, and their use is not explicitly accounted for in financial reporting, highlighting the need for more transparent and structured access mechanisms.

Similarly, Pillar 3- "Innovation and Industrial Competitiveness" should actively promote the use of RI services by the private sector, with access serving as a key mechanism to facilitate collaboration between academic and industrial partners. Private sector engagement could further be encouraged by adapting the transnationality rule, for example by allowing national private sector access under RI supervision.

This calls for unified and simplified policies, reporting, and reimbursement mechanisms, in both INFRA and Cluster/Research and innovation (RTD) projects. Linking TA/VA into Cluster/RTD initiatives would leverage EU Member State investments, support co-funded calls, and ensure the continuity and legacy of access services, while also providing a model for national funding strategies. The dual role of RIs, to address global challenges and competitiveness in industrial innovation, can be realised by coordinating INFRASERV projects with Pillar 2 and Pillar 3 initiatives.

Key message 6:

Embedding transnational and virtual access into Pillar 2 and 3 projects ensures optimal use of RI services, strengthens academic and industrial engagement, and supports these objectives through effective use of funding.





RECOMMENDATION 7: PROMOTE THE INTERNATIONAL DIMENSION OF RIS

European RIs must fully embrace their international dimension to strengthen scientific excellence and foster global collaboration. The three Pilot projects have demonstrated this potential, receiving and funding a substantial number of applications (around 10%) from international researchers affiliated to entities outside the European Research Area, and enabling access to facilities located beyond Europe's political boundaries and/or operated by international consortia.

As world-class research facilities increasingly emerge in other regions of the world, mechanisms that enable European researchers to access these infrastructures is essential to maintain connection to cutting-edge science that may no longer be hosted in Europe. At the same time, European RIs can serve as leading training hubs for researchers from other regions, reinforcing reciprocal value and promoting European expertise.

While some international access is already possible, the EU should develop clear modalities to promote reciprocal access agreements, ensuring mutual benefit and allowing European researchers to access international facilities under comparable conditions. Co-funded programmes involving both EU and third-country stakeholders could offer a sustainable model to support such international access.

A dedicated financial framework to integrate international consortia into RI access projects is currently lacking. Strategies that position global engagement as a core RI objective, supported by harmonised administrative procedures and interoperable access systems, would benefit all stakeholders, particularly European researchers. Expanding remote and hybrid access models would further enhance inclusivity and strengthen Europe's global scientific presence. Dedicated monitoring tools should be developed to track international access flows and measure outcomes, thereby supporting strategic planning and demonstrating the impact of these initiatives.

By fostering a globally connected RI ecosystem, Europe can continue to lead in scientific innovation while contributing meaningfully to global policy, capacity-building and collaboration efforts.

Key message 7:

European RIs should promote their international dimension by developing reciprocal access agreements, expanding hybrid and remote access models, and providing dedicated funding to support global collaboration, thereby enhancing scientific excellence, fostering inclusivity, and strengthening Europe's global research presence.





■ Conclusion

The three H2020 Pilot projects (ATMO-ACCESS, NEP, ORP) highlight the central role of transnational and virtual access in the European RI ecosystem. They demonstrate that **flexibility, continuity, and proportionality** are essential in access policies, with stable and predictable support being key to strengthening Europe's scientific excellence, global competitiveness, and societal impact. These findings are translated into seven concrete recommendations, which together illustrate how the principles identified by the Pilots can guide policy and practice. The future EU Framework Programme (FP10 and beyond) offers a unique opportunity to embed these principles to consolidate Europe's leadership in an open, integrated, and sustainable RI landscape.



ATMO ACCESS

Access to Atmospheric Research Facilities

September 2025

Recommendations from the H2020 PILOT
Projects ATMO-ACCESS, NEP, ORP



Funded by the European Union



This work has received funding from the European Union's Horizon 2020
research and innovation programme through the ATMO-ACCESS Integrating
Activity under grant agreement No 101008004

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