

22 May 2025



Response to the European Commission Consultation on a European Strategy for Research and Technology Infrastructures

A low-angle photograph of a modern building facade, likely the INESCTEC building. The facade is covered in a large mural that includes the INESCTEC logo at the top, a circuit board graphic, and the text "CREATING A FULFILLING AND SUSTAINABLE FUTURE THROUGH IMPACTFUL SCIENCE, TECHNOLOGY AND INNOVATION." in bold, white, sans-serif font. The building has a grid-like structure of windows and balconies.

INESCTEC

CREATING A FULFILLING
AND SUSTAINABLE FUTURE
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Position paper

Executive Summary

INESC TEC welcomes the European Commission's consultation on a strategic framework for Research and Technology Infrastructures (RTIs). From the perspective of a leading Portuguese Research and Technology Organisation, we emphasise the need for a cohesive ecosystem approach to RTIs. These infrastructures must be treated as enablers across the full research and innovation chain, from advanced training and frontier research to technology validation and deployment. The response highlights systemic policy gaps, recommends governance and investment reforms, and calls for integrated access models and widened participation. A European RTI strategy must coordinate action across sectors, governance levels, and funding instruments to unlock the full transformative potential of RTIs.

1. Agreement with Identified Problems

INESC TEC fully concurs with the European Commission's assessment of the core bottlenecks affecting RTIs. The challenges of fragmented governance, inadequate lifecycle funding, regional asymmetries, and limited coherence across policy and funding instruments are consistent with our institutional experience and strategic foresight work. The sections that follow reinforce these diagnoses and propose concrete, systemic solutions.

From the perspective of INESC TEC, a leading Portuguese Research and Technology Organisation, the future European strategy on RTIs must be grounded in a systemic policy vision. RTIs are not discrete assets operating in isolation, they are public policy instruments that enable the entire research and innovation value chain. Their strategic role spans advanced training, frontier research, applied development, and deployment, thereby serving as foundational elements of both scientific excellence and industrial competitiveness.

INESC TEC's experience confirms that when RTIs are embedded in dynamic ecosystems, with stable governance, mission-driven orientation, and user-oriented access frameworks, they catalyse academia-industry relations, cross-sectoral collaboration, and cross-fertilization, talent development, and long-term technological upgrading. RTIs deliver their highest impact when positioned as integrated components of broader strategies addressing societal transitions, strategic autonomy, and regional cohesion.

However, European-level fragmentation persists. While Research Infrastructures (RIs) benefit from structured governance through the ESFRI process, Technology Infrastructures (TIs) lack an equivalent policy framework. The absence of coordination across governance levels, EU, national, and regional, and funding programmes leads to inconsistent support, inefficient duplication, and reduced alignment with long-term societal goals. Infrastructures that could otherwise bridge TRL gaps, serve multiple user communities, and adapt to fast-evolving priorities are often left underfunded, disconnected, or inaccessible.

Moreover, despite the growing recognition of their strategic importance, RTIs across Europe continue to face major structural and operational challenges that undermine their effectiveness and long-term sustainability. These challenges are not isolated technical or financial bottlenecks - they reflect systemic policy gaps across governance, funding, access, and alignment with broader R&I goals.

Fragmented Governance and Policy Architecture: There is no unified governance model or strategic framework integrating RIs and TIs at the European level. While RIs benefit from the ESFRI roadmap and supporting instruments, TIs remain scattered across funding programmes and policy domains, lacking a dedicated strategic structure. This fragmentation undermines synergies across the TRL continuum, weakens ecosystem integration, and leads to inefficiencies in planning and resource allocation.

Lack of Lifecycle Investment Models: Current funding instruments typically support infrastructure construction or project-based upgrades but fail to ensure lifecycle sustainability, including long-term operation, continuous upgrading, and strategic repurposing. This leaves many infrastructures underutilised or obsolete before their full impact can be realised. The lack of investment stability also deters long-term planning and institutional commitment, particularly for TIs.

Limited Interoperability and Cross-Infrastructure Synergies: Operational and governance silos prevent RTIs from offering interoperable services. Despite increasing convergence in technology needs and research capabilities, there are few mechanisms to support shared access protocols, joint service development, or inter-infrastructure knowledge exchange. This results in missed opportunities for RI-TI co-creation and reinforces institutional fragmentation.

Access and Visibility Barriers: Many RTIs remain difficult to access, particularly for SMEs, start-ups, and actors from less-connected regions. Access models often favour large or established users, while early-stage innovators lack the navigation tools, financial support, or institutional guidance to engage meaningfully. These barriers limit infrastructure inclusiveness and reduce their transformative potential across Europe.

Geographical Asymmetries and Widening Gaps: There is a persistent underrepresentation of RTIs in Widening Countries and less-developed regions. These structural asymmetries are linked to national investment capacities, skills availability, and connectivity to European networks. Without targeted support and integration into broader innovation ecosystems, infrastructures in these regions risk isolation and marginalisation, independently of their capabilities and potential.

Incoherence Across Policy and Funding Levels: RTIs are influenced by multiple policy frameworks - Horizon Europe, Digital Europe, cohesion policy, recovery and resilience plans, and national strategies - yet there is little coordination across these instruments. As a result, infrastructures often fall between funding mandates, receive fragmented support, or are excluded from long-term strategic alignment. Coherence across EU, national, and regional levels is essential to ensure that infrastructures can contribute effectively to Europe's missions.

2. Additional Challenges vis-à-vis Global Competitors

In addition to the challenges identified by the Commission, Europe faces intensifying competition from jurisdictions where RTIs are embedded in vertically integrated industrial and defence strategies. For example, the U.S. CHIPS & Science Act and China's "New-Type Infrastructure" plan provide multi-decade, cradle-to-grave funding streams, integrated digital platforms, and AI-based management systems that accelerate time-to-innovation and enhance strategic autonomy.

Without a comparable systemic approach, European RTIs risk strategic obsolescence. A European strategy must therefore explicitly position RTIs as tools for geopolitical resilience, technology sovereignty, and global leadership in frontier science and innovation.

Furthermore, RTIs must become pillars of crisis-readiness, enabling rapid retooling in response to health, energy, and material shocks. They should also integrate AI-driven asset management systems to boost utilisation, reduce cost, and increase operational resilience.

These concerns go beyond the structural challenges and touch on Europe's ability to lead under rapidly evolving conditions. Strategic foresight and planning for RTIs must therefore account for both competitive benchmarking and future shock scenarios.

3. Adequacy of Proposed Actions & INESC TEC Recommendations

The Commission's proposed actions constitute a robust starting point; however, three residual gaps persist:

1. Absence of a permanent TI monitoring mechanism with ESFRI-like authority;
2. Lack of integrated lifecycle finance instruments;
3. Limited measures to mainstream RTIs into mission-oriented industrial policy.

Our six recommendations below are designed to close these gaps and build on the Commission's proposed direction.

1. Establish a Cohesive Governance Framework

- Develop a unified policy framework that integrates both RIs and TIs as complementary, co-dependent infrastructures supporting the full TRL spectrum.
- Institutionalise a coordination mechanism involving Member States, research organisations, regional authorities, and user communities to align priorities, avoid duplication, and ensure responsiveness to emerging needs.
- Ensure that infrastructures are embedded in national roadmaps, industrial strategies, and smart specialisation platforms.
- Establish an EU Observatory for Technology Infrastructures, aligned with ESFRI, to track KPIs, publish an annual RTI barometer and advise on mid-course corrections.

2. Secure Lifecycle Investment Instruments

- Create EU-level funding schemes that support infrastructure sustainability throughout their lifecycle, from design and construction to operation, upgrading, and reconfiguration.
- Encourage blended funding models that combine EU programmes, national investments, and private co-financing in coordinated calls.
- Establish dedicated envelopes within Horizon Europe's successor, cohesion funds, and regional innovation tools for RTI infrastructure support.

3. Improve Interoperability and Integration

- Support the development of common access standards, metadata structures, and user interfaces to enable seamless service delivery across infrastructures.
- Fund cross-infrastructure pilots that foster interoperability between RIs, TIs, and industrial platforms, with shared service models and talent mobility frameworks.
- Facilitate data and knowledge exchange across infrastructures by embedding open science, FAIR data, secure IP regimes, and AI-based digital infrastructure operations.

4. Enhance Access and Support Mechanisms

- Design access schemes that are transparent, mission-aligned, and supportive of early-stage innovators and SMEs.
- Launch a European voucher mechanism and pre-commercial procurement schemes for RTI access by underrepresented user communities.

5. Address Regional Asymmetries and Promote Widening Participation

- Allocate targeted support to infrastructures in Widening Countries and regions with structural disadvantages in R&I performance.
- Require cross-border consortia and shared access platforms to include partners from underrepresented regions in exchange for investment prioritisation.
- Promote capacity-building and infrastructure embedding through joint training programs and regional innovation accelerators.

6. Align RTIs with Mission-Oriented Policy Frameworks

- Ensure that RTIs are explicitly integrated into the implementation mechanisms of European flagship actions and across the full scope of R&I-related funding programmes and instruments.
- Link infrastructure planning and investment to the green and digital transition objectives, health resilience, and technological sovereignty goals.
- Require that all major EU-funded infrastructure initiatives demonstrate alignment with both local and European strategic objectives.

Conclusion

INESC TEC is fully committed to supporting the design and implementation of a cohesive European strategy on Research and Technology Infrastructures. As a Portuguese RTO operating at the intersection of science, technology, and innovation, INESC TEC integrates excellence in research with close engagement with industry, public administration, and civil society.

Through its participation in the RITIFI project, INESC TEC has led efforts to identify and validate infrastructure needs across multiple sectors, map funding and governance ecosystems, and design methodologies for strategic investment planning. It coordinated case studies and contributed to roadmapping and policy analysis that informed both national and European discussions.

INESC TEC also plays a key role in national foresight and smart specialisation initiatives and maintains operational collaborations with infrastructures across Europe in areas including digital transformation, sustainable energy, health technologies, and advanced manufacturing.

Moving forward, INESC TEC is ready to:

- Support the co-design of multi-level governance models that align RTI strategies across European, national, and regional levels;
- Contribute technical and strategic expertise to RTI interoperability, infrastructure access models, and cross-TRL service platforms;
- Participate in capacity-building and widening initiatives through partnerships, staff exchanges, and regional development programs.

INESC TEC remains strongly engaged with the European RTI agenda and looks forward to supporting the Commission in advancing a coherent, inclusive, and strategic approach to infrastructure policy that reinforces Europe's research excellence and innovation leadership.