Council of the European Union

Brussels, 11 October 2024
(OR. en)

14017/24

ERAC 29
RECH 428

NOTE

From:	General Secretariat of the Council
To:	Delegations
Subject:	Towards a European approach to Technology Infrastructures

European Research and Innovation Area Committee (ERAC) delegations will find attached a background note on the discussion "Towards a European approach to Technology Infrastructures," prepared by the Commission, with a view to the ERAC meeting on 24-25 October 2024.

ERAC Plenary on 24-25 October 2024, Budapest, item 4

Background note

Towards a European approach to Technology Infrastructures

1. Introduction - why is this topic discussed in ERAC?

Implementing the mandate of the Council during the Czech[1] and the Belgian Presidency[2] and the ERA Policy Agenda Action 12, the Commission, i.e. DG Research and Innovation, has made progress on the analysis of needs and a European approach for the provision of Technology Infrastructures for Europe. This note summarises the state of play and includes a set of questions for the Member States' feedback and guidance on preliminary outcomes of the Commission Expert Group, in view of the conceptualisation of the European approach to Technology Infrastructures.

To achieve the green and digital transitions and to strengthen Europe's competitiveness and strategic autonomy, it is essential to accelerate industrial R&I, its scale-up and deployment. With rising technological complexity, Union's innovation capacity and productivity heavily depend on facilities and services as provided by Research and Technology Infrastructures. The objective is to ensure, together with Research Infrastructures, an ecosystem of essential RD&I capacities, facilities and services supporting excellent science and technology development in the EU. They are instrumental notably for SMEs and start-ups to demonstrate their capacities and validate their new technologies, products and services to convince customers and investors, fostering EU competitiveness in new technologies. Research and Technology Infrastructures also play an important role in the training of highly skilled researchers, engineers and technology experts.

2. State of play

At present, the Commission is finalising a comprehensive evidence gathering on the situation of Technology Infrastructures in Europe. In September, the Commission published two reports[3]:

- detailed analysis of European, national and regional initiatives, strategies and programmes addressing investments in Technology Infrastructures,
- mapping of the existing landscape of Technology Infrastructures in clean and renewable energy technologies.

Evidence shows that the availability of such facilities and services in the EU is fragmented and geographically imbalanced. Few Member States have dedicated strategies, many Member States do not have specific policies addressing the needs for Technology Infrastructures or supporting companies in accessing them. There are often no overarching coordination mechanisms to oversee investments in TIs in in Europe, and no road mapping or long-term planning for investments. Mapping initiatives and investments in upgrading or new facilities and services are much bottom-

[1] 15429/22 Council conclusions of 2 December 2022 on Research Infrastructures Underlining that mapping users' needs for TIs, taking into account relevant work of ESFRI, is one of the prerequisites for the identification of a way forward for the implementation of the TI concept within the ERA Policy Agenda and a starting point for any future strategies and activities.

2 10182/24 Council Conclusions of 23 May 2024 on Knowledge Valorisation which called on the Commission to suggest a definition of Technology Infrastructures and to present the mapping of users´ needs by mid-2025

[3] All relevant reports are available at the website: Technology Infrastructures - European Commission (europa.eu)

up and often lack a common European vision and coordination, putting at risk the effective transformation of European industrial ecosystems.

Further analytical work is ongoing with the support of a Commission expert group on Technology Infrastructures, set up in February 2024. The Group consists of 22 members and includes representatives of Member States, research and technology Organisations, universities, industry, the financial sector as well as research infrastructures, including ESFRI. The work of this Group will be essential for responding to the requests of the Council and for advising the Commission on the main elements of a European approach to Technology Infrastructures as set out in ERA Action 12. The Group's final report, due in December 2024, will include the following elements:

- Reviewing the concept of Technology Infrastructures, proposing a European definition and typology,
- Analysis of user needs for Technology Infrastructures[4],
- Recommendations on increasing the visibility and accessibility of TIs,
- Recommendations for strategic TI pilot areas,
- Recommendations for TI investment prioritisation and coordination mechanism at European level, including its main components and governance.

3. For feedback and guidance from ERAC

In view of the conceptualisation of the European approach to Technology Infrastructures, ERAC is invited to provide Member States' feedback and guidance on preliminary outcomes of the Expert Group as follows.

1) Definition of Technology Infrastructures

With regard to the need for a clear definition and the distinction between Technology Infrastructures and other infrastructures supporting research and innovation activities, such as Research Infrastructures and industrial infrastructures[5], the Group reviewed the so far existing definition[6]. With the aim of capturing the distinct primary purpose, functions and business models of Technology Infrastructures, the Group suggests now the following definition:

Technology Infrastructures are facilities, equipment, capabilities and resources required to develop, test, upscale and validate technology, thereby fostering industrial competitiveness and accelerating societal/market adoption of technological innovations. They provide a wide range of capacities and services from pre-competitive applied research services, to industrially relevant demonstration of technology, up to small-scale production, accompanied by optional business

[4] A public survey targeting industrial users of TIs is open until 20 October 2024. By 30 September over 220 companies, two thirds of them being start-ups and SMEs, replied to the survey. This survey will help the Commission understand the needs of EU companies for TI services as well as the existing barriers, giving insights into the situation at the level of the European industrial ecosystems and technology areas. Preliminary results of the survey will be presented by the Commission during the ERAC meeting.

[5] Industrial infrastructures are understood as facilities developed typically with a focus on a specific product, technology or production process within an individual company. Industrial infrastructures are owned by (large) industry or high tech/deep tech start-ups/ scale-ups for their own use, sometimes embedded in production lines. They are not open to external users, though in fulfilling the needs of the owner company, they can be used for collaboration with a network of partners, including other companies, research organisations, etc.

[6] Commission Staff Working Document 'Technology Infrastructures', European Commission 2019, Technology infrastructures - Publications Office of the EU (europa.eu)

development and human resources support. They include, among others, test beds, demonstration and testing facilities, pilot lines or living labs, usually embedded within non-profit research organisations, technical universities or technology centres, which are open to private and public users. They can be public, semi-public or privately owned, place-based or digital.

- Does the definition offer clarity on what Technology Infrastructures are?
- Is the proposed definition adequate for use in the national R&I policy contexts?

2) Strategic pilot areas for Technology Infrastructures

An adequate offer of Technology Infrastructures plays an important role in the development of new technologies, their validation and scale-up in many industrial ecosystems and across technology areas. Due to the need for some prioritisation and selection of areas for policy initiatives supporting the development of Technology Infrastructures capacities and provision of services at European level, it is proposed that these (should) address specific challenges in selected priority areas.

For testing a European approach in this way, pilots as proposed by the Expert Group (see Annex 1 for a detailed description of the approach to pilot areas, the specific actions and the selection criteria) would develop and implement different strategies and instruments, and examine their feasibility, as well as learn from the implementation experience of a European approach in a given area and with a given objective. The implementation of a pilot would be closely accompanied and followed by an analysis of impact and lessons learnt. Pilots will therefore be a means for learning through 'first of a kind' endeavours – they are meant to pave the way for a wider application of the measures provided within the European approach.

The selection of pilot areas will take into account policy priorities of the EU, the commitment of relevant actors, in particular TI hosting organisations and industry, the impact potential as well as the availability of resources. Considering the ongoing work at the EU level, the pilot areas proposed by the Expert Group could include the aviation sector, advanced materials technologies, biotechnologies or clean and renewable energy technologies.

- Which criteria for the selection of pilot areas do you consider particularly important?
- Which specific industrial ecosystems or technology areas would be important to address with first pilot actions for TIs?

3) Objectives of an EU-level coordination mechanism for Technology Infrastructures

An effective EU-level coordination mechanism for Technology Infrastructures could have the following objectives:

- Identifying strategic priorities for an EU-level action on Technology Infrastructures;
- Identifying EU-level service / facility gaps for responding to the needs of industry, as primary users, to accelerate technology development and deployment in the most relevant technologies and industry sectors for EU policy goals;
- Rationalisation of public funding – exploiting synergies, avoiding duplication and overlaps between Technology Infrastructures and with other relevant infrastructures;
- Pooling and leveraging public and private funding for large-scale investments with broad EU relevance (upgrade of existing TIs or new TIs);

- Pooling of policy, organisational, technology and industrial expertise and know-how exchange of experience and best practices;
- Development of common standards and good practices (e.g. on access), exchange of experience, etc.;
- Stimulating networking and cooperation among existing Technology Infrastructures and with other relevant infrastructures;
- Strengthening the outreach and user base of TIs (e.g. beyond local ecosystems or to new users), also in the broader EU Single Market;
- Monitoring the implementation of agreed EU-level actions and their outcomes.

Policy guidance of ERAC is sought on the following questions:

- What should be the main characteristics of an effective coordination mechanism capable of fulfilling these objectives?
- What should be the role of different actors / stakeholders (national authorities, European Commission, TI hosting organisations, industry) in such a mechanism?

The feedback and guidance from ERAC will feed into the finalisation of the report of the Expert Group and into further work of the Commission on an EU strategy for Technology Infrastructures.

Annex I – Approach to TI pilot areas suggested by the Expert Group

1. Introduction – why identify strategic pilot areas for TIs?

The added value of an effective European approach will lie in achieving tangible and measurable impact in specific strategic areas and in identifying strategic "pilot areas" for the first respective policy initiatives supporting the development of TI capacities and provision of services at European level for this purpose.

Pilots and pilot areas are defined in this context as follows:

- Pilots as proposed by the Expert Group would test different strategies and instruments, and their feasibility, as well as learn from the implementation experience of a European approach in a given area and with a given objective. Overall, a pilot should therefore include: the identification of user needs, different options to address the needs, commitment of the main actors, strategy and choice of actual instruments to address the identified needs, and their implementation. The implementation of a pilot should be accompanied and followed by an analysis of impact and lessons learnt.
- Pilots are a way of learning through 'first of a kind' endeavours – they are meant to pave the way for a wider application of the measures provided by the EU policy.

Examples of such existing initiatives include the pilot initiative on Aviation Research and Technology Infrastructures for the aviation sector and the pilot lines agreed under the Chips for Europe initiative.

2. Goals of pilots

The overarching goal of a pilot is to improve the availability of infrastructure facilities and services in key technology areas for the future and their accessibility for companies across the entire EU, in or across industrial ecosystems.

A pilot action will examine, assess and respond to identified needs, existing expertise and the approach taken to address specific ecosystems (e.g. with regard to technologies as compared to industrial ecosystems or geographically defined ecosystems). For each selected pilot area (see criteria below), the decision on the goal(s) of pilot action would be based on a mapping of existing barriers, gaps and shortcomings, and an in-depth evidence-based analysis of the most suitable means to address them.

A TI pilot would therefore consist of any of the following measures (or combinations thereof):

- clear definition of the area of analysis, and the rationale (e.g. emerging markets and technological challenges),
- in-depth analysis of user needs for TIs (NB: also taking into account existing RIs and their services),
- a comprehensive mapping of relevant existing (and planned) RI and TI facilities and services,
- identification of existing gaps in TI facilities and services as well as obstacles to their use by industry,
- identification of relevant actors needed to implement operationally the pilot and the necessary financial resources, as relevant.

- support for linking different existing TIs in closer networks to allow for seamless cooperation to the benefit of their clients,
- a strategy, roadmap or agenda with identified policy and operational measures that would help overcome the existing gaps and barriers, including investment criteria,
- mapping of available support measures at EU and national/regional levels,
- Implementation of the pilot:
    - technical planning and market studies for specified facilities,
    - financial support for the establishment of new or for upgrade of existing TIs, investments
    - support for the development and deployment of new TI services,
    - measures to enable/facilitate access to TIs, in particular across regions and countries, including the development of remote access solutions,
    - support for the development of training capacities at TIs for private sector employees in technologies which the TI can support and bring to fruition,
    - provision of real-life testbeds, living labs and/or regulatory sandboxes for specific technology innovations.
    - developing and/or cultivating innovation ecosystems, including across borders, via concrete activities such as mapping of existing TIs and/or a platform for match-making of stakeholders, and for experience sharing,
    - addressing regulatory obstacles that may unintentionally hamper TI access or market potential (e.g. Waste Regulation in a circularity context) – a TI Pilot action could facilitate exemptions for research purposes,
    - Analysis of impact and lessons learnt.

The TIs addressed in the pilots could deliver one or more of the following services:
- research and innovation support related to new technologies, materials, data, etc.,
- technology testing and validation, including at systems level,
- technology scale-up for production,
- compliance with regulatory requirements and certification,
- access to / exploitation of existing data,
- training clients' staff in advanced technologies (within the remit of the TI's expertise or network).

3. How to approach the identification of priority areas?

For the selected pilot areas to reach the expected impacts, they will require a strong commitment of all relevant actors, including in particular TI hosting organisations and industry, and RIs if applicable, as well as sufficient human and financial resources dedicated to implement the pilot. To this end, the EU policy should put in place a robust governance model – including a strong role for industry representatives – for the selection of TI Pilots that ultimately will be realized and the choice of instruments to do so.

The list of proposed TI pilot areas should remain open to ensure flexibility to include additional areas depending on the evolving industry and policy needs.

Selected TI pilot areas should be relevant for reaching specific goals for Europe, such as industrial competitiveness, digital transition and technology adoption, decarbonization and climate neutrality, strategic autonomy or economic security (e.g. critical technologies). Potential TI pilot areas could therefore concern either specific technology areas (e.g. key enabling technologies, critical technologies, outcomes of technology foresight) or industrial ecosystems (e.g. as defined in the EU Industrial Strategy).

4. Selection criteria for TI pilot areas

Potential TI pilot areas in which an EU action would be implemented should be selected based on their relevance, and their ability/potential to demonstrate impact and deliver lessons learned on different types of actions. Application of these criteria should allow for a 'mix' of diverse pilot types to a) maximize the learning experience, b) remain flexible to evolving industry needs and c) be able to accommodate different budget scenarios [7].

Specific criteria for their selection could include:

- Quick wins for fast impact at European level: start with sectors and technologies that already made some initial steps or have established communities, such as aviation, hydrogen, clean and renewable energy technologies, or other specific areas addressed by European Partnerships;
- Signaling effect: which challenges are so urgent & important that industry – across sectors – is already starting to get engaged;
- Urgency of ensuring an appropriate Technology Infrastructures offer:
  - Consider how fast are developments, what is the competition,
  - How big are the gaps, need for accessibility, closing the gaps;
- Potential for stimulating cooperation between large industry, SMEs and startups, thus addressing both scale and innovativeness;
- Potential for cooperation between different types of TIs (e.g. specializing in enabling technologies and focusing on industrial sectors) or between TIs and RIs, and with other relevant infrastructures;
- Gaps in facilities and services related to technologies:
  - Novelty and importance of the new technologies, potential of major breakthroughs in the future, e.g. quantum computing has a huge (and disruptive) potential, similarly biotech, which are critical technologies,
  - Emerging technologies, developments/progress, emerging markets – future needs;
- Support for training and skills development in response to identified industry needs;
- Expected impact of the TI pilot:
  - serving as a link between research and companies/markets,
  - ecosystem building (as TIs are placed in the middle with connections upstream and downstream),
  - bringing together advanced high-tech sectors with lower tech, traditional sectors,
  - enhanced innovation performance of SMEs and start-ups (including scale-up).

([7]) If an area is already examined more deeply or a European initiative or strategy exists already, these criteria should nevertheless be applied and demonstrated.

- Identified gaps in accessibility: geographically (how many, how close for companies) - depending on user needs, the overall 'business case' for new TIs and/or existing barriers to access;
- Implementation feasibility (e.g. existing governance structure, organised stakeholder community, available resources);
- Financial support needed for establishment/transformation of first-of-a-kind TIs or significant upgrades of existing TIs, where this TI will facilitate the development of technologies that:
  - benefit more than one sector, or
  - significantly contribute to increasing the competitiveness of European industry, or
  - contribute to reaching EU climate and sustainability goals.

The selected pilot actions can have different nature and different approaches. There can also be a different starting point due to existing preparatory work or specific needs, or the aim to examine different instruments, as well as different outcomes. This variety is needed to ensure the more comprehensive lessons learnt possible.