Project Title	EUSAIR
Programme	DIGITAL EUROPE PROGRAMME
Start of Project	December, 2024
Duration	24 months

The EU AI Ecosystem and AI Regulatory Sandboxes: Potential Synergies (preliminary assessment)

July 2025

Funded by the European Union

EUSAiR
BRIDGING INNOVATION AND COMPLIANCE IN AI

Notice

This report is a living document and may be updated with subsequent versions based on developments within EUSAiR and feedback and comments from the EU AI ecosystem.

Funded by the European Union

Executive Summary and Introduction

This report provides preliminary insights for **National Competent Authorities** (NCAs) on the potential for utilizing the **existing EU AI Innovation Ecosystem** to design and implement **AI Regulatory Sandboxes** (AIRS) as mandated by the **EU AI Act**. By **August 2026**, all Member States must establish or co-establish at least one AIRS aimed at facilitating the development, validation, and testing of **innovative AI systems** under regulatory oversight.

This report aims to assist NCAs in instrumentalizing existing EU AI Innovation Ecosystem services in establishing national or cross regional AI Regulatory Sandboxes (AIRS). The content is based on preliminary results of the conducted interviews by EUSAiR with TEFs, AI Factories, NCAs, and the first Co-creation Workshop with the whole ecosystem organized on May 5-6, 2025.

The AIRS building blocks and menu: The report deconstructs the AI Regulatory Sandboxes into its service components (building blocks) as per the AI Act's obligations, including legal, technical, and business facets. This deconstruction informed the following potential AIRS configurations (AIRS menu):

- AIRs 1.0 aimed at regulatory guidance
- AIRS 2.0 aimed at regulatory guidance and technical development, training and testing as well as monitoring for risk to health, safety and fundamental rights
- AIRS add-ons aimed at additional activities such as testing in real world conditions

Operationalizing AIRS through Existing EU AI Innovation Ecosystem Actors: The EU AI Innovation Ecosystem is vast and rich and there is ample opportunity for NCA's to leverage its various actors in operating AIRS. The report identifies potential alignment of each AIRS building block with different EU AI Innovation Ecosystem actors and their respective service offerings. An AIRS client journey model is provided (AIRS Pipeline), beginning with triage services via EDIHs and progressing through structured support AI Factories, TEFs, Data Spaces, and EuroHPCs, corresponding to various AIRS phases.

ANNEX I provides an in-depth mapping of the EU AI Innovation Ecosystem, emphasizing initiatives and services that align with AIRS objectives. Actors are classified according to their strategic roles, technological domains, sectoral focus, and geographical distribution. This preliminary analysis reveals the perceived strengths and capacity gaps within the ecosystem, notably regarding the concentration of Testing and Experimentation Facilities (TEFs) in specific regions and (only) four sectors, contrasted against a more evenly distributed network of European Digital Innovation Hubs (EDIHs) and Data Spaces. Additionally, the ANNEX highlights the emerging initiatives outlined in the AI Continent Plan.

Addressing Operational Challenges: Given that the EU AI Innovation Ecosystem consists of initiatives constrained by limited funding and a specific scope of expertise, the design of alternative funding mechanisms is critical to ensure the financial sustainability of these clusters. Additionally, the establishment of a robust communication channel is warranted, informed by insights from the EUSAiR's first Co-creation Workshop's breakout sessions and ecosystem interviews. The report proposes a dual communication strategy, top-down and bottom-up, derived from stakeholders' inputs.

Collectively, these preliminary insights and recommendations offer a pragmatic and comprehensive potential roadmap for NCAs to establish robust and context-sensitive AIRS by effectively leveraging and strengthening the existing EU AI Innovation Ecosystem initiatives. This work is also crucial for ensuring alignment and effective coordination with the European Commission as it drafts the forthcoming implementing act.

1. EU AI Regulatory Sandboxes

The EU's approach to AI regulation is underpinned by a dual objective, promoting innovation while ensuring the protection of health, safety and fundamental rights. This dual objective is embedded in the EU AI Act, with the promotion of regulatory sandboxes as a key instrument to this end. Regulatory sandboxes are controlled environments with the aim of enabling the innovators to develop, test, and validate new technologies under regulatory oversight of competent authorities. Sandboxes have gained prominence across diverse sectors such as fintech and blockchain, highlighting their effectivity in simultaneously fostering innovation and ensuring compliance with regulations.

In the context of AI, sandbox activities and services can vary based on the nature of the technology being tested, the needs of the participants, the resources and capacities of sandbox operators, and the delineation of regulations being assessed. However, a common feature across sandboxes lies in their dynamic nature, evolving based on regulatory insights, the needs of participants, and the capacities of competent authorities. Under the AI Act, each member state is required to establish or co-establish at least one regulatory sandbox by August 2026 (Artificial Intelligence Act, 2024: Art.57). According to Article 3(55), an AI Regulatory Sandbox, henceforth rereferred to as 'AIRS', is defined as " a controlled framework set up by a competent authority which offers providers or prospective providers of AI systems the possibility to develop, train, validate and test, where appropriate in real-world conditions, an innovative AI system, pursuant to a sandbox plan for a limited time under regulatory supervision" (ibid).

- **AI Regulatory Sandboxes Building Blocks and Menu**

The AI Act stipulates the creation of AIRS and outlines specific services they should or could provide. EUSAiR identified the following services as 'building blocks' of AIRS:

- Guidance on regulatory expectations outlined in Article 57.7, (which in our opinion includes risk classification of AI systems).
- Support for compliance with the requirements and obligations of the AI Act (Artificial Intelligence Act, Article 57.7)
- Guidance, supervision, and assistance related to the identification, testing, and Mitigation of risks, particularly concerning health, safety and fundamental rights ("H, S, FR") (Ibid, Articles 57.6 & 11).
- Guidance on how to evaluate the effectiveness of these mitigation methods in light of the AI Act and both Union and national regulations.
- Facilitating development, training, and testing (protocols) (Ibid, Articles 57.5 & 11)
- Monitoring services during sandbox operations to address significant risks to health, safety, and fundamental rights (Ibid, Article 57.11).

Funded by the European Union

- Facilitating the development of tools and infrastructure needed for testing, benchmarking, assessing, and explaining crucial aspects such as accuracy, robustness, and cybersecurity (Ibid, Article 58.2(i))
- Measures to mitigate risks to fundamental rights and society (Ibid, Article 58.2).
- Ensuring compliance with other Union and national laws, involving Data Protection Authorities and other competent authorities when relevant (Ibid, Article 57.10)
- Conducting testing in real-world conditions (Ibid, Article 60) (which in our opinion includes conformity assessment preparation).

These building blocks categorised into a structured 'menu' to make the services easier to implement and adapt to different national approaches. To this end, we delineated two versions of AI Regulatory Sandboxes:

- AIRS 1.0, which focuses mainly on regulatory guidance;
- AIRS 2.0, which combines regulatory guidance with technical support for developing, training, testing, and monitoring AI systems;
- Add-on services can also be added to either version as needed.

Building Blocks	AIRS 1.0	AIRS 2.0	Add-ons
Guidance on regulatory expectations (Scope, Definitions, Risk Classification, etc.)	✓	✓	
Guidance on AI Act Compliance	✓	✓	
Guidance on Health, Safety and Fundamental Rights risks identification, testing, mitigation and their effectiveness	✓	✓	
Development, Training, Testing		✓	
Monitoring and acting on significant risks to Health, Safety and Fundamental Rights arising during Sandbox operations		✓	
Facilitating development of tools, benchmarks for accuracy, robustness, cybersecurity etc.		✓	
Facilitating development of measures to mitigate risk Health, Safety and Fundamental Rights	✓	✓	

Compliance with other Union & national regulation and involvement of other NCAs			✓
Testing in real world conditions			✓
Conformity Assessment Preparation			✓

Table 2: AIRS Menu

2. Aligning and Matching AI Regulatory Sandboxes with Ecosystem Offerings

The EU AI Innovation Ecosystem consists if a vast array of actors providing services ranging from digital maturity assessments, training and upskilling and AI Act guidance, to infrastructure, compute, testbeds and AI components. This report aims to provide guidance on how to leverage the ecosystem within AIRS operations.

- **Quick overview of the EU AI Innovation Ecosystem Actors**

The following actors and their potential relevance for AIRS have been identified. For an extensive overview of each actor's strategic roles, technological domains, sectoral focus, and geographical distribution, please refer to the ANNEX.

European Digital Innovation Hubs (EDIHs)

EDIHs function as regional and thematic entry points for digital transformation, offering tailored services to SMEs, public authorities, and other organizations. They combine technological expertise with business support to accelerate digital uptake, especially in under-digitized regions and sectors (Europa, 2025d). Their integration within local innovation ecosystems provide access to a broad network of businesses, ranging from start-ups and SMEs to larger enterprises and as a result can serve as a bridge to AI providers (potential participants in AIRS).

Euro High Performance Computing Joint Undertaking (EuroHPC JU)

EuroHPC JU is a public-private initiative to position the EU as a global leader in supercomputing and quantum computing. It seeks to provide world-class infrastructure and foster innovation in computation-intensive sectors and applications.

AI Factories

AI Factories serve as centralized infrastructures for AI model development, offering advanced computing resources and a suite of services that facilitate the training, testing, deployment, and ongoing maintenance of general-purpose and application-specific AI systems.

Testing and Experimentation Facilities (TEFs)

TEFs are large-scale environments dedicated to testing, validating, and demonstrating advanced AI systems, both software and hardware, in real or close-to-real conditions. They are central to de-risking AI deployment and aligning with regulatory frameworks such as the AI Act.

AI on Demand Platform

The AI-on-Demand Platform (AIoDP) offers a wide range of services, with its most valuable feature being the platform itself. It serves as a collaborative space for the AI community, enabling engagement with peers and experts, sharing opportunities, applications, and knowledge, and accessing AI-related assets and tools.

Data Spaces

Data Spaces are designed as sector-specific data ecosystems that enable secure, sovereign, and interoperable data sharing among stakeholders. They establish a governance and trust framework for data exchange in compliance with EU regulations, particularly in relation to data protection, competition law, and ethical use.

Upcoming initiatives under the AI Continent Plan

The AI Continent Plan outlines the establishment of five Gigafactories, each designed to house over a million advanced processors dedicated to the development and training of sophisticated AI models. Moreover, the plan anticipates the operational launch of 15 AI Factories by 2026, each with a specific sectoral focus and equipped with a network of advanced antennas.

• Mapping of AIRS Building Blocks & AI Ecosystem Services

The vast and rich EU AI Innovation Ecosystem can be leveraged for the execution of several AIRS building blocks. EUSAiR identified complementarity in the potential services of AI Regulatory Sandboxes and the various EU AI Innovation Ecosystem actors which can play a crucial role in establishing an effective EU wide network of AI Regulatory Sandboxes and foster cross-regional AIRS. In this Chapter we map these complementarities in a structured manner, based on the AIRS services mandated by the AI Act.

Please note that the EU AI Innovation Ecosystem actors' services were identified through desk research and a set of first interviews and surveys with a number of actors. Many of the services, however, are currently being elaborated by the actors, and EUSAiR aims to provide more insights into them through the EUSAiR pilots and the Union AI

Regulatory Sandbox Framework (iterations of the framework are planned for October 2025 and 2026).

AIRS Building Block	Actor	Actor's Related Service
Guidance on regulatory expectations (Scope, Definitions, Risk Classification, etc.)	**EDIH** (Sector-agnostic)	• AI Maturity Assessment (In the upcoming EDIH round) • Training and upskilling for AI providers
Guidance on AI Act Compliance	**EDIH** (Sector-agnostic)	• AI Act Helpdesk (In the upcoming EDIH round) • Training and upskilling
	TEFs (Sectoral)	• Provide guidance on AI Act alignment
Guidance on Health, Safety and Fundamental Rights risks identification, testing, mitigation and their effectiveness	**TEFs** (Sectoral)	• Integration and validation of AI systems • Physical and virtual testbeds • Technical compliance testing
	AI Factories (Cross-sectoral)	• AI technical experimentation environments offering controlled space for development, training, and evaluation of AI systems • Technical documentation and developer support • AI testing, validation, and compliance assistance
Development, Training, Testing	**Data Spaces** (Sectoral)	• Data governance frameworks • Interoperability standards • Facilitation of data trading and sharing
	AI on Demand Platform	• Experimentation Services: exploring, testing, and creating with shared AI tools on the platform • Enabling collaboration with other teams • Accessing existing datasets, AI tools and services, use cases, scientific publications, funding opportunities, training resources, and upcoming AI-related events.
	AI Factories (Cross-sectoral)	• AI-optimized compute and storage infrastructure • Training and fine-tuning of models • Technical experimentation sandboxes offering controlled

Funded by the European Union

		environments for development, training, and evaluation of AI systems • Technical documentation and developer support • AI testing, validation, and compliance assistance • In-house management of software environments and data resources
	Euro HPC (Cross-sectoral)	• Access to top-tier supercomputing facilities • Support for R&D in HPC and quantum computing
	TEFs (Sectoral)	• Physical and virtual testbeds • Compliance testing and AI Act alignment
Monitoring and acting on significant risks to Health, Safety and Fundamental Rights arising during Sandbox operations	**TEFs** (Sectoral)	• Progress tracking via structured models (e.g., "graduation" schemes)
Facilitating development of tools, benchmarks for accuracy, robustness, cybersecurity etc.	**AI Factories** (Cross-sectoral)	• Technical experimentation sandboxes offering controlled environments for development, training, and evaluation of AI systems • Hosting benchmarks testing
Facilitating development of measures to mitigate risk Health, Safety and Fundamental Rights	**TEFs** (Sectoral)	• Integration and validation of AI systems • Physical and virtual testbeds • Compliance testing and AI Act alignment
	AI Factories (Cross-sectoral)	• technical experimentation sandboxes offering controlled environments for development, training, and evaluation of AI systems • Documentation and developer support • AI testing, validation, and compliance assistance
Compliance with **other Union & national regulation** and involvement of DPA and other NCAs	-	-

Testing in **real world conditions**	**TEFs** (Sectoral)	• Demonstration and real-world experimentation
Conformity Assessment Preparation	**TEFs** (Sectoral)	• Compliance testing and AI Act alignment • Progress tracking via structured models (e.g., “graduation” schemes)

Table 3: AIRS Synergies with the EU AI Ecosystem’s Services

Most AIRS building blocks align with both current and forthcoming services provided within the EU AI Ecosystem by different actors, highlighting the imperative for cohesive coordination to ensure streamlined implementation across the EU.

Identified Overlaps

Some AIRS services could be provided by more than one actor which may create a potential overlap. In this case, NCAs are advised to first align the needs of the AIRS participant with the sectoral scope, technological focus, geographic location, and level of regulatory guidance required by the targeted actor. For example, “Development, Training, Testing” is a service that includes diverse components which need to be considered separately, and different actors can offer a different component of the service. The AI on Demand Platform enables participants to access datasets, experiments, and try pit AI tools. Data Spaces also offer sectoral datasets which should be aligned with the participant’s sector of operations. EuroHPC and AI Factories can both provide infrastructure for AI development, training, and testing. AI Factories however offer a broader set of services which enable alignment with ethical and legal frameworks. Furthermore, TEFs can also provide testing services, but with a deeper AI Act alignment and real-world testing conditions, albeit only in four sectors.

Identified Gaps

The building block "Compliance with other Union and national regulations as well as engagement with Data Protection Authorities (DPAs) and other NCAs" is currently not addressed by any stakeholder. Based on insights gathered from the TEF interviews, it appears that a few TEF nodes are actively exploring this dimension. At this stage, these AIRS services remain unfulfilled by existing stakeholders which would require NCAs to develop this capacity internally.

- ### AI Ecosystem’s positioning along the AIRS Operational Pipeline

Drawing from the synergies identified between AIRS building blocks and the services within the EU AI Innovation Ecosystem, several feasible scenarios emerge for the implementation of AIRS. However, while institutional and infrastructural synergies are important, we emphasise the need to maintain a strong focus on the target end-users of AIRS with a special focus on SMEs and startups.

Funded by
the European Union

As such, we recommend AIRS to be underpinned by a framework that enables a successful SME client journey, one that serves as a value-add from an innovation and regulatory perspective (the AIRS Pipeline):

- Pre-participation
- Application & Selection
- Preparation
- Participation
- Evaluation & Exit
- Post-participation
- Reporting & Monitoring

To support this idea, below is a preliminary mapping of the various actors (considering their offerings) against the AIRS Pipeline. We propose the following pipeline **as an example** to illustrate the way in which the EU AI Innovation Ecosystem could serve prospective AIRS and their participants before, during, and after and AIRS process.

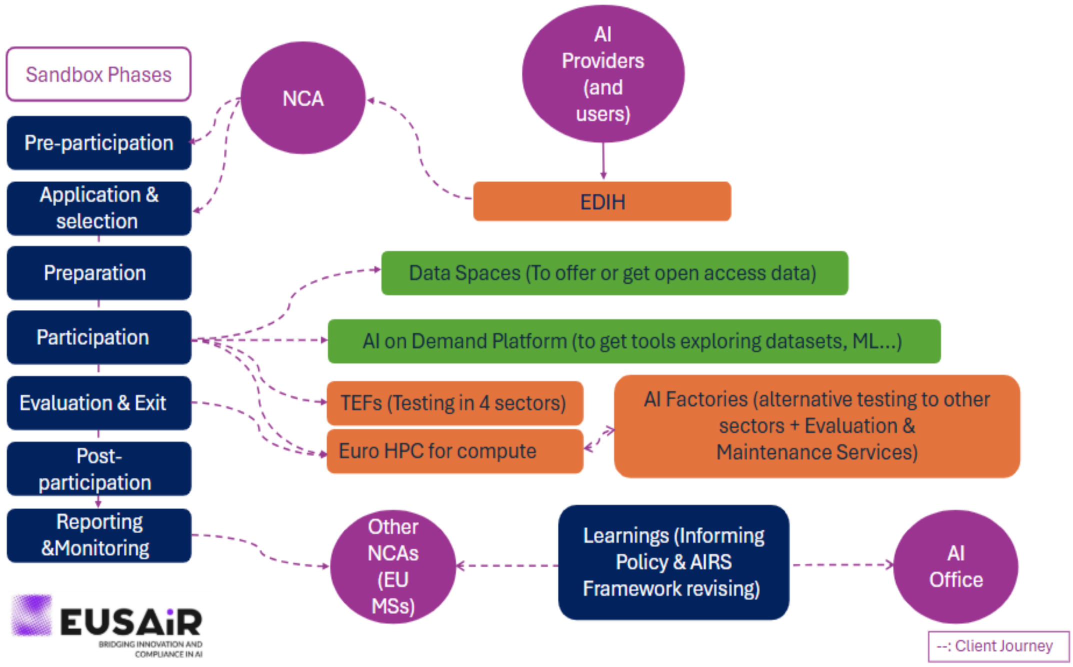


Figure 4: The EU AI Innovation Ecosystem Pipeline for AIRS

The funnel above is a **client journey example** to elucidate the interactions within the AIRS process facilitating a valuable reference for NCAs when setting up an AIRS, particularly in collaboration with established actors within the AI innovation ecosystem at both national and cross-regional levels, contingent upon their availability and engagement (the EU AI Innovation Ecosystem Pipeline for AIRS).

AIRS Pipeline and EDIHs

We envision EDIHs as the **first (single) point of contact in the AIRS Pipeline**. The purpose of EDIHs is to keep the innovatory needs of SMEs as a priority. To this end, EDIHs are well-suited to provide initial assessments towards technical, legal and market readiness, advise on funding processes, facilitate entry into an AIRS and support in the preparation of the AIRS process.

For example, for AI-providers situated at the ideation stage with only preliminary aspects of their solution articulated, an EDIH might first extend training services, direct them toward financing options, direct them toward the AI-on-Demand platform, offer a "test before invest" environment, or provide consultancy services tailored to their specific needs, rather than advising an AIRS process. Additionally, the EDIH can address preliminary regulatory inquiries that do not necessitate an AIRS process, such as evaluating the AI Act risk level associated with the provider's AI system. As such the EDIHs performs a **'triaging role'** ensuring that only AI-systems that are technically and legally suitable, enter an AIRS process.

Once the EDIH determines that a provider is prepared to participate in an AIRS, they can **support the AI provider in the application process, formulating the regulatory challenge, or directly liaise with the NCA** to relay insights from their assessments.

AIRS Pipeline and the AI-on-Demand Platform

While leveraging the AI-on-Demand platform is particularly useful in the pre-participation phase, it could also serve as a resource during the AIRS participation phase, granting **access to datasets, experimentation opportunities, and exploration of AI tools for (re- or up-) training purposes**.

AIRS Pipeline and TEFs

NCAs can collaborate with TEFs for comprehensive **support in AI testing across the four TEF sectors** (see ANNEX I) in which they specialize, including in real world conditions.

AIRS Pipeline and EuroHPC

During the participation phase, NCAs can collaborate with EuroHPC and AI Factories for **high-performance computing solutions**.

AIRS Pipeline and AI Factories

Alternatively, NCAs may collaborate with AI Factories, which services **extend beyond mere computational access** and encompass training, development, and testing support, ensuring alignment with ethical and regulatory standards. This approach similarly applies during the evaluation phase, where EuroHPC can be consulted for computational requirements, and the AI Factories can provide evaluation assistance in accordance with regulatory requirements.

AIRS Pipeline and Data Spaces

During the participation phase, NCAs can facilitate connections between providers and Data Spaces if **(additional) datasets are needed for AI development, training, testing and validation**. Data Spaces may also be engaged during the **evaluation phase** of the AIRS process to assess the AI technology against alternative datasets.

3. Which Level of Technological Maturity of AI for Regulatory Sandboxes?

- ## The TRL Scale for AI Technologies

The European Commission has been using the Technology Readiness Level (TRL) scale in its projects since 2020. We have also observed, through our interviews and desk research, that, among others, TEFs apply this scale to indicate the maturity levels of projects suitable for testing, by focusing on levels 6 to 8 (Europa, 2021). This further emphasizes the scale's significance for the overall EU AI Innovation ecosystem and the AIRS pipeline.

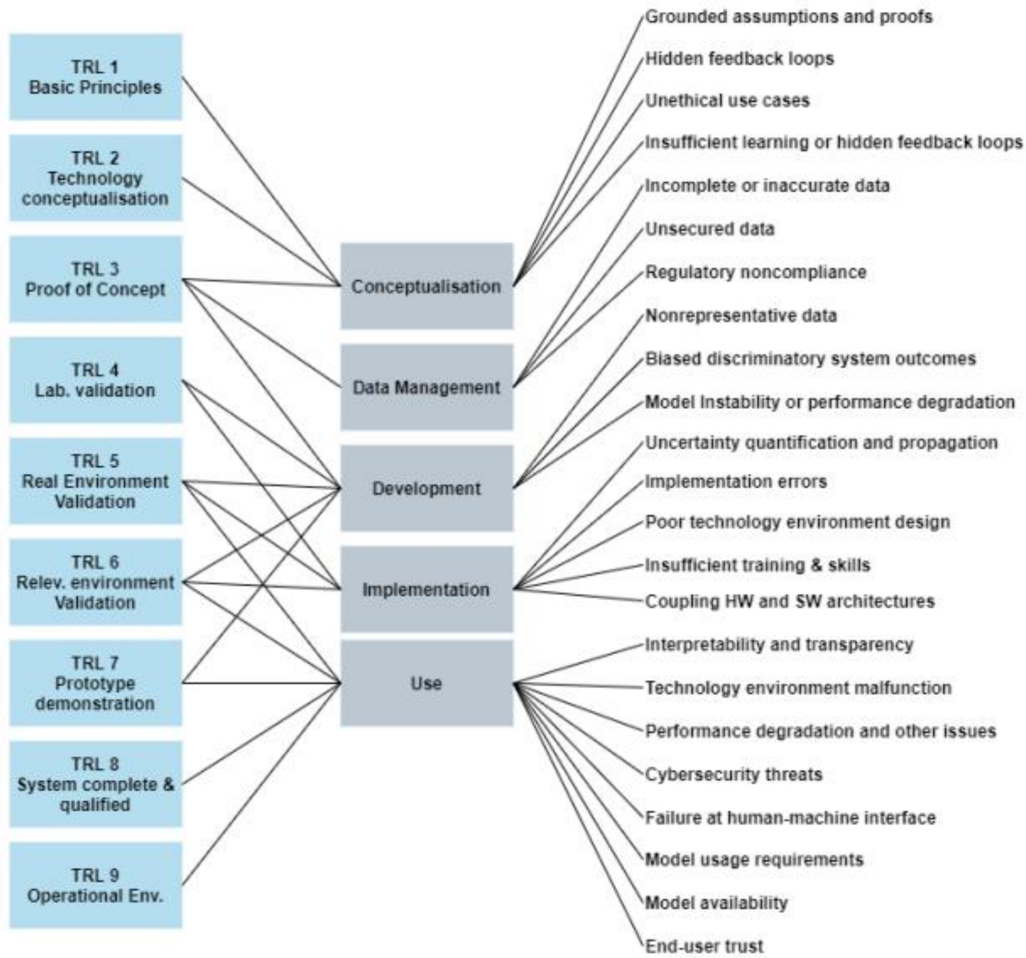


Figure 5: Updated TRL Scale for AI Technologies (European Commission, 2022)

TRL 1-2: Ideation and Conceptualization

Technologies at TRL levels 1-2 represent those in the conceptual and planning phases of AI development. At this stage, the focus is primarily on theoretical work and preliminary assessment, referred to as 'on paper' testing based on potential risks identified from the development plan.

At the stage of an AI technology at TRL 1-2 the goals could be to evaluate the proposed directional development of the AI solution, identify potential risks and flag any processes that may be unaligned / may not comply with existing AI regulation.

To this end, EDIHs could establish advisory support structures to additionally assist companies in addressing potential regulatory issues together with NCAs before progressing to the actual development phase. Early involvement of NCAs could be beneficial to provide clarity on regulatory expectations and guidance to ensure development is aligned with applicable requirements from the outset. Based on that, potential non-compliant approaches could be highlighted and mitigation proposals presented. However, we would not consider this involvement to take place in the context of an AIRS process, but rather as a separate service of NCAs, ideally directed at EDIHs.

TRL 3-7: Prototyping and Validation

Technologies at TRL levels 3-7 tend to progress rapidly as development transitions from concept to functional prototypes. Indeed, these levels include phases such as proof of concept, lab validation, real environment validation, relevant environment validation, and prototype validation. In these phases we see the potential for many risks to start materialising, including biased discriminatory system outcomes, implementation errors, model instability, and non-representative data. As such, we see the potential for AIRS participation at these TRL levels.

At TRL 3-5, the focus is on an experimental proof of concept, involving the active development, testing, and validation of algorithms. Apart from regulatory guidance, AI Act risk classification and health, safety and fundamental rights risk assessment (AIRS 1.0) participation in an AIRS could support a range of testing, validation, and compliance-focused activities. For example, it would be possible to test how the algorithm runs in relation to its intended purpose, identify and analyse potential risks that arise, and begin assessing for adherence to accuracy, transparency, and fairness requirements.

Hence, we propose these levels, specifically levels 4-5 where initial validation occurs, would serve as a natural entry point for engagement with AIRS environments. Additionally, an AIRS process that runs up to TRL 6-7 would benefit from the clearly defined use-case including details on the intended functionality, the intended types of data and the target end-user base, as well as definition of regulatory uncertainties that could be assessed in an AIRS, aspects which are usually concertised at TRL 6-7.

TRL 8-9: Real-world Validation and Late-Stage Compliance

Technologies at TRL 8-9 represent those at the final stages of AI development, where solutions are deployed in their operational environments and evaluated for market readiness. As such, the AI solution is typically mature enough to be applied in real-world contexts using real-life data and interacting with end users.

Working with real-life data at this stage could introduce greater complexity compared to earlier TRL participation in AIRS, where test data could be used. This is primarily due to increased risks related to privacy, security, and accountability. However, overall, we envision later AIRS participation will still be valuable at these TRL levels due to the availability of real data and concrete use cases which will enable a more accurate and context-specific compliance assessment.

We envision TEFs and AIFs could serve as testbeds to support these late-stage evaluations by providing infrastructure for technical testing. Yet, due to those aforementioned potential complexities around privacy and security, AIRS should also be prepared for the eventuality that not all testing could occur under the remit of the EU AI infrastructure. Rather, in some cases, compliance assessments and testing may need to occur within the private environments of the AI developers themselves, especially when the system is already integrated into operational workflows.

- ### The TRL Scale and its Implications for the AIRS Pipeline

At lower TRL levels (1-2) the focus is on early-stage development and conceptualisation. To this end, solutions at this level could benefit from guidance and advice on regulatory expectations and requirements, risk identification and classification, and for trustworthy AI-by-design processes.

As said, while early involvement of NCAs could be beneficial to provide clarity on regulatory expectations and guidance to ensure development is aligned with applicable requirements from the outset, accepting AI-systems at lower TRL (1-2) levels might demand ample resources from NCAs, that are perhaps not available. Here we see a potential role for EDIHs in playing a ‘triaging’, accelerating and funnelling role. Triaging would include assessing the suitability, including the technical and legal readiness of an AI system for entering an AIRS. Accelerating would include supporting AI providers in moving their product to a higher TRL level by providing training services, funnelling guiding them to other actors within the EU AI ecosystem such as Data Spaces for datasets, the AI-on-Demand Platform for datasets, services, use cases, experimenting, or AI Factories for development, training and testing infrastructure.

NCAs could provide services encompassing legal, ethical, and strategic support services at this stage, however, we would however not consider these to take place in the context of an AIRS process, but rather as a separate service of NCAs, ideally directed at EDIHs.

Importantly, we maintain these advisory services are not exclusive to low TRL AI solutions. Given the iterative nature of AI development, it is necessary providers at higher TRLs receive this advisory support, which could take place in the context of an AIRS process. This could include navigating incoming standards, adapting models for new use cases, or ensuring ongoing compliance. Higher TRL stages indicate more mature AI solutions in a proof-of-concept stage, validated or demonstrated, that could have trained AI models, established solutions with targeted customers, defined use cases, and deployment pathways. As such, solutions in this phase require a more auditory approach, including technical capabilities evaluations, compliance assessments, sector-specific evaluations, and potentially real-world testing under regulatory supervision. However, it is important to note that with the current speed of development, it is likely AI projects can progress from concept to deployment (reaching TRL 7-9) within a short timeframe, thus potentially leaving lower TRL rankings obsolete for AIRS purposes.

We additionally underscore flexibility in accepting different TRL levels might be advisable for encouraging participation from companies with diverse innovation processes, as some may require support earlier in their development journey while others will engage at advanced stages.

How to effectively engage AI developers across different TRL stages of maturity needs careful consideration. On the one hand, NCAs must ensure that the primary purpose of AIRS is not merely a final-stage validation mechanism but a means to provide value throughout the innovation lifecycle. On the other hand, given the limited resources of NCAs, eligibility conditions should strike a balance between supporting promising projects without diverting excessive resources to very early 'idea- stage' low-TRL concepts. Therefore, we underscore the need for proactive and ongoing communication with AI providers and industry stakeholders to ensure AI Regulatory Sandboxes are well understood and attract the right level of participation.

The table below presents a preliminary alignment of AIRS building blocks with their respective minimum TRL thresholds necessary for ensuring the service's relevance and value. This will be updated following the EUSAiR pilots and stakeholders' feedback.

AIRS Building Blocks	Minimum TRL
Guidance on regulatory expectations (Scope, Definitions, Risk Classification, etc.)	**Min TRL 2-3**
Guidance on AI Act Compliance	**Min TRL 2-3**
Guidance on H, S, FR risks identification, testing, mitigation and their effectiveness	**Min TRL 2-3**
Development, Training, Testing	**Min TRL 3**

Monitoring and acting on significant risks to H, S, FR arising during Sandbox operations	**Min TRL 3**
Facilitating development of tools, benchmarks for accuracy, robustness, cybersecurity etc.	**Min TRL 4**
Facilitating development of measures to mitigate risk to H, S, FR	**Min TRL 4**
Compliance with other Union & national regulation and involvement of DPA and other NCAs	**Min TRL 2-3**
Testing in real world conditions	**Min TRL 4**
Conformity Assessment Preparation	**Min TRL 5-6**

Table 4: Alignment of AIRS Services with TRL Thresholds

- **AIRS Pipeline: Beyond the TRL Scale**

Insights from the first EUSAiR co-creation workshop revealed that the needs for different AIRS phases can vary significantly depending on the type of AI system and the profile of the AI provider, whether they are start-ups or large companies. For instance, start-ups may require more assistance in securing funding, whereas large companies might focus on compliance and scalability. TRLs, which measure the technical maturity of an AI system, are not enough on their own because they do not consider other factors like business maturity, market potential and funding.

Business maturity, market potential, and funding are closely linked stages in an AI company's lifecycle. Business maturity describes a company's established and stable state, typically indicated by a reliable customer base and steady revenue, which, for innovative AI systems could be decisive. Market potential concerns the growth opportunities available in the market, indicating how much a company can expand its sales or reach. Funding, finally, provides the financial resources needed for the company to achieve its objectives, whether that is expanding operations, investing in new AI products, or entering new markets. For example, an AI system with a high TRL might not succeed if the business lacks the market potential or required funding.

To address this two-fold analysis, the solution is to **consider both TRLs and business readiness indicators**, evaluating both technical and business maturity elements such as market potential and funding. For example, a start-up with innovative AI technology but lacking market insight will not fare well unless it's also assessed for business readiness. A detailed methodology for balancing these two dimensions in AIRS selection criteria will be presented in subsequent EUSAiR reports.

This dual framework would facilitate the alignment of sandbox activities with the building blocks that could be provided by key AI ecosystem stakeholders across the EU.

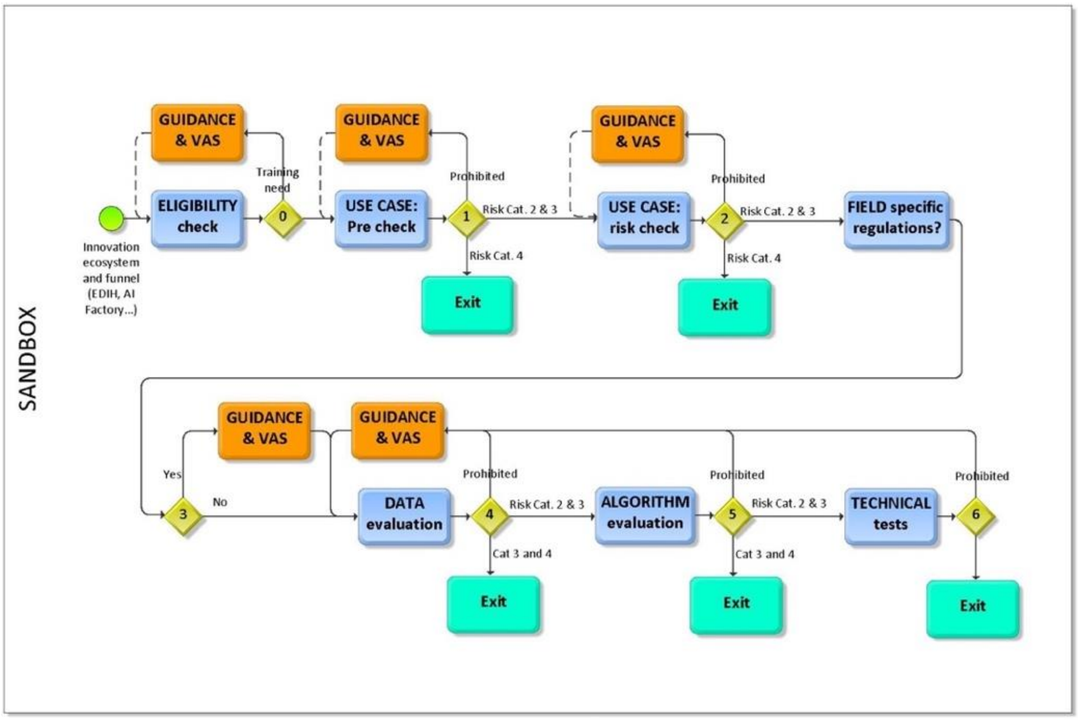
To achieve this, AIRS should be presented as a shared resource or tool that everyone involved in the EU's AI ecosystem can understand and use effectively. This means that stakeholders like national authorities, industry experts, AI providers, and deployers would have a common framework or language to evaluate and discuss how sandboxes can support AI projects. By sharing a clear understanding, they can better work together to guide AI systems from initial idea to fully developed, market-ready solutions. This shared perspective helps ensure that all parties are aligned on the purpose and benefits of using sandboxes, making the pathway from concept to deployment smoother and more coordinated across the EU.

One of the ways to frame this dual approach is adopting the **Stage-Gate model**, which incorporates both TRLs and business readiness to guide AIRS's practical execution. An initial description of this model is provided below. We suggest you directly refer to the article for a more detailed explanation (Heikkilä et al., 2025).

To conclude, the Stage-Gate model can serve as a foundational process for authorities to evaluate AI solutions, determine the necessary services, and decide whether the solution is ready for market entry or requires further development. The model specifies a sequence of steps where AI solutions must meet predefined criteria (gates) to advance from one phase (stage) to the next. At each gate (represented by yellow numbered diamonds), the solution can either proceed to the next stage, return to development with support from Value-Added Services (VAS) such as those offered by the EU AI ecosystem, or move directly toward market entry. It's important to note that although 'Exit' may be considered an outcome in this process, providers will still need to comply with the AI Act and undergo a third-party conformity assessment before their solution can be commercially available. Schematically, the process unfolds as follows:

- **Initial evaluation**: Assess whether the AI solution meets the necessary criteria to enter the sandbox or development phase.
- **Meet the gate**: At each gate (yellow numbered diamond), determine if the solution
    - meets all required standards to progress to the next stage
    - needs further development or refinement, supported by Value-Added Services (VAS)
    - is ready for market entry
- **Return for further development**: If improvements are needed, the solution is sent back to the development phase with support from relevant services.

- **Progress to next stage**: Solutions that pass the gate move forward to subsequent phases, getting closer to market readiness.
- **Market entry**: Once the solution reaches the final stage, it can be considered for market launch but still must undergo a conformity assessment in accordance with the AI Act.



VAS = Value Added Services (AI Factories, EDIHs, TEFs, other service providers)
------- optional flow

Figure 6: A potential AI regulatory sandbox process, applied from Heikkilä et al. (2025)

The process illustrated in Figure 6 demonstrates how, at each stage, only a subset of AI projects advances, with only a fraction reaching those final stages that involve technical sandbox services such as real data evaluation, algorithm evaluation (static solutions tests), and technical testing (dynamic solutions tests). This staged filtering approach can enhance resource efficiency by enabling automated early-stage evaluations. **The process can scale to accommodate a high volume of applications** while reserving intensive resources for the most advanced solutions.

Importantly, the **gates in the model** (Figure 6) **serve as both entry and exit points** for the sandbox. Each gate has specific built-in selection criteria (based on TRL and/or other relevant criteria for each stage) and may receive solutions from earlier phases or directly from external sources such as the AI Factory, EDIHs, and TEFs. This open structure allows the process to operate as a modular and flexible system, working seamlessly in collaboration with other actors in the EU AI Innovation Ecosystem. We believe this flexibility is essential because AI solutions may require AIRS support at different points in their development lifecycle, and the nature of validation activities may vary significantly.

Since each AI solution is evaluated in a manner tailored to its current development phase and specific validation needs, it enables solutions to enter the sandbox at the most relevant stage. This ensures resources are used efficiently and prevents efforts from being wasted on outdated or mismatched cases. This approach would establish clear eligibility criteria for entry, facilitate integration with the building blocks of the AI innovation ecosystem, and offer greater legal certainty for market entry. Consequently, this structured and phased approach aims to streamline the implementation of AIRS across the EU by providing a coordinated and resource-efficient pathway for NCAs to fulfill their obligations under the AI Act.

Subsequent EUSAiR reports will fully illustrate how the concept of Stage-Gate model can be practically implemented in the Sandbox-phase scheme recalled in Figure 4 above.

4. Operational Challenges and Recommendations

The EU AI Innovation Ecosystem does not have the full capacity to provide one specific AIRS service: “ensuring compliance with both European and national regulations, alongside the engagement of Data Protection Authorities (DPAs) and other NCAs”. In light of this gap, NCAs are invited to adhere to the recommendations outlined in EUSAiR’s report on preliminary findings on key regulatory issues, focusing on enhancing their expertise through upskilling, reskilling, or hiring: such reports will be published by the end of September 2025.

Our analysis of the geographical distribution of the EU AI Ecosystem has revealed a strategic gap, particularly highlighted in the TEF nodes. These nodes represent key stakeholders that provide the most pertinent services to AIRS framework with built-in expertise that should inform their creation and operations. Although AI Factories are not present in all EU MSs, EuroHPCs can be made available as an infrastructure for development and testing in combination of TEFs services, when relevant.

To address the disparities in geographical distribution concerning AI infrastructure, MSs, particularly those that do not currently **host or join existing** AI Factories or TEF nodes, are strongly encouraged to initiate the development of these essential infrastructures as opportunities arise under the AI Continent Action Plan.

Furthermore, MSs have the opportunity to **leverage the extensive expertise available within the EU AI Ecosystem**. This collaboration can serve as a valuable foundation for NCAs to enhance the internal provision of AIRS services. By tapping into this knowledge base, MSs can more effectively strategize and choose to either implement part of the services internally or engage in creating the needed external ecosystem (e.g. TEF). SMEs often face challenges in navigating complex regulatory environments

Funded by the European Union

independently MS of their origin. Regulatory sandboxes can help by connecting them with financiers and funding sources, reducing regulatory uncertainty, and providing valuable information about regulatory risks and requirements.

ANNEX
EU AI Innovation Ecosystem Mapping

The EU's dual approach to AI fosters innovation while safeguarding user rights and ensuring fair competition. The European Union (EU) supports a range of strategic infrastructures and services to accelerate digital transformation, trustworthy AI deployment, and AI innovation across sectors. Each initiative below is part of the EU AI Innovation Ecosystem and provides a unique value proposition in terms of services, sectoral focus, technologies, and target users.

EUSAiR identified primary and secondary stakeholders within the EU AI Innovation Ecosystem relevant for AIRS in Deliverable 6.2: Collaboration and Dialogue Strategy. For the purpose of this report, we focus on the potential role that a number of these initiatives (EDIHs, TEFs, AI Factories, EuroHPC, AI-on-Demand Platform and Data Spaces) could play in AIRS, based on 5 parameters:

- strategic function
- core services
- sectoral focus
- technological orientation
- target clients and access
- geographical distribution

• European Digital Innovation Hubs (EDIHs)

Strategic Function

EDIHs function as regional and thematic entry points for digital transformation, offering tailored services to SMEs, public authorities, and other organizations. They combine technological expertise with business support to accelerate digital uptake, especially in under-digitized regions and sectors (Europa, 2025d).

Within the AI Act, EDIHs are envisaged as key enablers for the effective functioning of AI Regulatory Sandboxes. Article 58 identifies EDIHs as strategic actors supporting prospective providers, especially SMEs and start-ups, participating in sandboxes. In this context, the AI Act proposes that these providers should be directed to relevant pre-deployment services, including guidance on the implementation of the regulation, assistance with standardization documents and certification, and access to testing and experimentation facilities. EDIHs and Centres of Excellence are also expected to provide broader value-adding services to support the development and deployment of compliant AI systems, specifically for SMEs. Recital 145 further emphasises the importance of EDIHs in mitigating risks to the AI Act's implementation that may arise from a lack of market knowledge and expertise. This is reflected in Recital 68 which highlights EDIHs should have access to high-quality datasets relevant to their activities to enable the development and assessment of high-risk AI systems.

Core Services

- "Test-before-invest" environments
- Digital maturity assessments
- Innovation and sustainability consulting
- Training and upskilling
- Access to finance and ecosystem networks (e.g. Enterprise Europe Network

Sectoral Focus

Multi-sectoral, with application across diverse domains including aeronautics, automotive, and energy.

Technological Orientation

EDIHs are primarily focused on digital technologies, with upcoming emphasis on AI.

Target Clients and Access

EDIHs are open to all organisations, with a focus on SMEs and public sector bodies. Services are co-financed or subsidized through EU funding schemes, as well as national funding, ensuring broad accessibility.

Geographical Distribution

We identified 153 EDIHs and 57 Seal of Excellence hubs with a strong focus on AI. From our desk research, each EU Member State hosts at least one AI-focused EDIH, as illustrated in the accompanying map below. EDIHs are well distributed across the EU enabling higher accessibility to their services for AI Providers in the continent. Notably, AI-focused EDIHs are also present in non-EU member state countries such as Turkey, Albania, and Serbia, through their participation as Associated Countries under the Digital Europe Programme.

Funding Overview

The EDIH network is funded through a combination of EU and member-state financing. Under the Digital Europe Programme, the Commission provides 50% of funding for each EDIH whilst the other 50% is covered by the relevant MS, region or private sources (Europa, 2025c). This funding structure is consistent across MS however there are intendent variances in the sources of local support with some EDIHs acquiring national ministry funds, regional or other industry support. The Digital Europe Programme has committed a budget of around €700 million for the period of 2021-2027 to the EDIH network (part of DIGITAL's €7.5 billion budget) which is allocated to support 150+ hubs across Europe (Gov.ie, 2023).

Each EDIH's grant funding lasts from 3-7 years (ERRIN, 2025). EDIHs are not expected to achieve commercial sustainability after the end of their funding however, the capacities built up during the funding period are expected to remain available in some form to SMEs and public sectors (ibid). After 3 years under the DIGITAL programme, operating EDIHs are encouraged to submit a new proposal for a new grant (Europa, 2025c). Importantly, those candidate hubs that were ranked highly but were unable to procure EU funding received a *Seal of Excellence* (Europa, 2025d). These are to be solely funded by MS or regions however, they are considered to be part of the larger EDIH network (ibid).

EDIHs operate through a not-for-profit principle, as their core mission is to provide accessible services to SMEs and public sector actors typically through free-of-charge offerings or significantly subsidised rates (Europa, 2025c). Practically, EDIHs can decide their pricing strategy in a way that will best support SMEs and public administrations in their area of expertise however, any profit revenue that is generated is expected to be reinvested in the EDIH (ibid). While larger companies are not the primary target of EDIHs, they may still access services on a paid basis, and mid-cap companies may be eligible for discounted rates (ibid).

Capacity Overview

The goal behind the EDIH initiative is the establishing of at least one EDIH in each MS. As of writing, there are currently 460 EDIHs demonstrating a capacity across regional and expertise domains (Europa, 2025d). Each Member State's EDIH(s) may have specific domain expertise and strengths, indicating a potentially higher capacity in those areas.

The capacity of EDIHs is mostly measured in terms of their human expertise consisting of specialist staff and network rather than infrastructure (as is the case with AI Factories and TEFs).

In 2023, the EDIH Network successfully completed over 3,450 Digital Maturity Assessments for SMEs and public administrations (AI Magister, 2024). A report also revealed the network delivered over 18,000 services and engaged more than 200,000 participants via 5,000+ events since 2023 (Europa, 2025h). In addition, since 2023, EDIHs have organised 37 training sessions reaching over 2,550 participants (AI Magister, 2024). Importantly, EDIHs employ a coordination mechanism to ensure that SMEs or public administrations can access the most suitable EDIH if it is not available within their geographic context (Europa, 2025c).

Potential for AIRS

We view EDIHs as a core part of the initial stages of the AIRS pipeline (see Chapter 3), particularly due to their strong networking capacity. In addition, their specialisation in conducting Digital Maturity Assessments with an ability to deliver associated services indicates EDIHs possess the necessary competencies to support AI Regulatory Sandboxes especially at the pre-participation and early participation phases of AIRS (see Chapter 3)

As such, EDIHs can play a 'triaging', funnelling and referral role, assessing the suitability, including the technical and legal readiness of an AI system for entering an AIRS, or guiding AI providers to other actors within the EU AI ecosystem that might be better equipped to meet the specific needs of an AI provider. EDIHs could also potentially assist AI providers with preparations for an AIRS process, such as the formulation of regulatory challenges the AI provider wants to test in an AIRS.

Looking Forward

The European Digital Innovation Hubs Network 2025 call, launched under the EDIH 2.0 initiative, aims to consolidate the EDIH network while strengthening its focus on AI. While EDIH 2.0 is not exclusively about AI, hubs are expected to improve their AI expertise and collaborate more closely with AI innovation ecosystems to better address client needs. Existing hubs from EDIH 1.0 must reapply with enhanced AI capabilities and as a result we signal the extant mapping may be subject to change in 2026. Under this call, EDIHs are also expected to offer complementary services alongside other ecosystem actors to ensure coordinated client support. We envision this will help consolidate the EU AI ecosystem and reinforce the development of EU-wide AI Regulatory Sandboxes in a coordination fashion.

Funded by the European Union

Figure 2: Distribution of EDIHs with a focus on AI across EU member states (Europa, n.d)

EUSAiR is planning to collect feedback from EDIHs through a survey to be disseminated by the end of July. Hence, these insights are based on preliminary desk research.

• EuroHPC Joint Undertaking

Strategic Function

The European High Performance Computing Joint Undertaking (EuroHPC JU) is a public-private initiative to position the EU as a global leader in supercomputing and quantum computing. It seeks to provide world-class infrastructure and foster innovation in computation-intensive sectors and applications. They are joint undertakings of EU member states (and associated countries) that participate in EuroHPC, the European Commission and private partners (with limited voting rights), which together form the Governing Body. The European Commission holds voting rights equivalent to the combined contribution (i.e. funding). Of all member and associated states.

Core Services

- Access to top-tier supercomputing facilities
- Support for R&D in HPC and quantum computing

- Cross-border cooperation among EU member states
- Calls for proposals targeting HPC-based research and industrial innovation

Sectoral Focus

Multi-sectoral, depending on project calls. Potential applications span: Climate modelling, Genomics, Advanced manufacturing, Artificial Intelligence, among others.

Technological Orientation

High-Performance Computing (HPC) and Quantum Computing focus on technologies demanding large-scale compute resources. Various expert groups and scientific advisory panels of representatives from academia, industry and research institutions provide technical guidance on supercomputing strategies, technology roadmaps (e.g quantum computing) and EuroHPC JU research priorities.

Target Clients and Access

Access varies by project call, with eligibility for: Academic research institutions, SMEs and large enterprises, public sector users, and innovation consortia across the EU and associated states. The decisions are taken by the EuroHPC JU Governing Board.

Funding overview

EuroHPC JU undertakes a public-private partnership funded through a combination of sources including EU programmes such as the Digital Europe Programme and Horizon Europe, matched by financial contributions from participating countries (Europa, 2025b). In addition, private members including technology companies and supercomputing vendors contribute up to € 900 million in cash or in the form of in-kind support such as technologies, software, expertise (ibid). This multi-source funding structure means there is both EU-wide and national ownership as every MS (32 countries including EU members and associates) has an incentive in EuroHPC.

EuroHPC undertakes a non-profit scientific infrastructure with usage of supercomputers and quantum computers being granted through merit-based calls rather than commercial service. For example, academic research use is provided without fees through a peer-review allocation process (European Commission, 2025:3). There is the possibility for industry access, with SMEs benefiting from EuroHPC “Industrial Access” which offer free or subsidized supercomputing time for innovation purposes (LUMI, 2025). The EuroHPC usage policies also emphasise open science whereby those benefiting from compute time are expected to publish and disseminate their results (Europa, 2025b).

Capacity overview

As of 2025, EuroHPC has deployed eight supercomputers across Finland, Italy, Spain, and petascale systems in Slovenia, Luxembourg, Bulgaria Czechia and Portugal (Europa, 2025b). The first EU exascale system, "JUPITER," in Germany is under procurement and is expected to come online in 2025 (ibid). To further expand capacity and geographic coverage, EuroHPC has also selected 5 new hosting sites (in Germany, Greece, Hungary, Ireland, and Poland) for the next generation of supercomputers (ibid). The specific capacity in terms of usage distribution could be determined by the MS specific arrangements as those countries that host or co-finance a system will have a specific arrangement in terms of hosting and access shares while another portion is offered at the European level for cross-border access (ibid).

• AI Factories

Strategic Function

AI Factories serve as centralized infrastructures for AI model development, offering advanced computing resources and a suite of services that facilitate the training, testing, deployment, and ongoing maintenance of general-purpose and application-specific AI systems.

Core Services

- AI-optimized compute and storage infrastructure
- Developing, training and fine-tuning of models
- AI sandbox environments
- Documentation and developer support
- AI testing, validation, and compliance assistance
- In-house management of software environments and data resources

Sectoral Focus

Multi-sectoral, with application across diverse domains including health, environment, manufacturing, public services, and research.

Technological Orientation

Accepting all types of AI technologies.

Target Clients and Access

Access is open to a broad spectrum of actors:

- Startups and SMEs (often free or subsidized)
- Public entities (often free or subsidized)
- Research institutions (often free or subsidized)

- Larger enterprises (custom pricing based on usage and service level)

Geographical Distribution

As part of the EuroHPC JU, 19 supercomputing and quantum computers have been established across **14 EU member states**, with hosting sites in Bulgaria, Czechia, Finland, France, Germany, Greece, Italy, Luxembourg, the Netherlands, Poland, Portugal, Slovenia, Spain, and Sweden. As such, whilst the EuroHPC JU has procured these supercomputers, each supercomputer is operated by the supercomputer centres (known as Hosting Entities) across the EU (EuroHPC JU, n.d).

The first AI Factories selection, comprising seven facilities across 15 member states and two EuroHPC participating states, includes:

- Spain's BSC AIF at the Barcelona Supercomputing Centre
- Italy's IT4LIA at CINECA
- Finland's LUMI AIF at CSC Kajaani
- Luxembourg's Meluxina-AI at LuxProvide Bissen
- Sweden's MIMER at the University of Linköping
- Germany's HammerHAI at the University of Stuttgart
- Greece's Pharos at GRNET Athens

The second selection includes 6 AI Factories:

- AIF Austria (Austria)
- JAIF (Germany)
- PIAST AIF (Poland)
- BRAIN++ (Bulgaria)
- AIF2 (France)
- SLAIF (Slovenia)

The map below showcases the geographic distribution of AI Factories alongside EuroHPC facilities throughout the EU, highlighting **10 EU member states that have not yet established an affiliation with an AI Factory** but do host a EuroHPC facility: Ireland, Lithuania, Latvia, Croatia, Hungary, Slovakia, Cyprus, Belgium, Netherlands, and Malta.

The AI Continent Plan stipulates the full operation of **15 AI Factories by 2026**, each with a set of sectoral focus, and a network of **advanced antennas**. These facilities will be integrated with powerful supercomputers and cutting-edge data and training hubs, offering seamless remote access to AI-optimized computing through the strategically placed antennas (European Commission, 2025b).

Furthermore, the **AI Continent Plan** announced five incoming **Gigafactories**, each equipped with over a million advanced processors dedicated to the development and training of sophisticated AI models. These compute-heavy centres will focus on transformative sectors, including healthcare, biotechnology, industry, robotics, and scientific research. By federating with EuroHPC, comprehensive ecosystem-wide integration will be ensured, along with creating a collaborative environment that fuels innovation and accelerating progress across multiple disciplines (European Commission, 2025b).

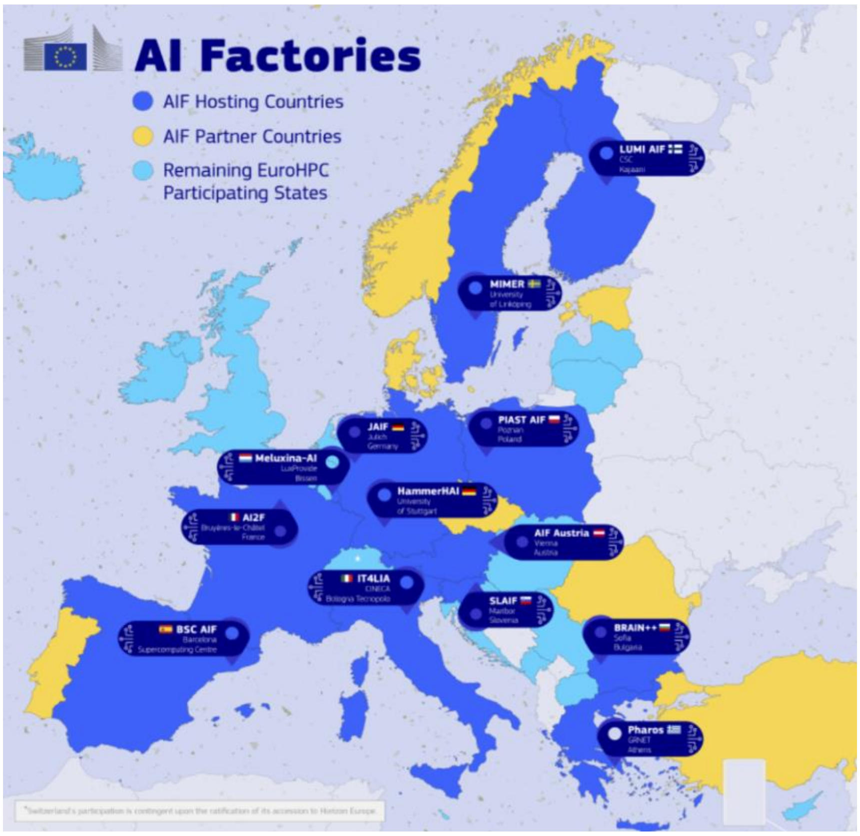


Figure 3:The Geographical Distribution of AI Factories (Europa, 2025a)

Funding Overview

For insights into the funding and capacity streams of AI Factories, we drew from our desk research, as well as our interviews with Luxembourg, Italian, Finnish, and Spanish, Austrian and Swedish AI Factories.

The AI Factory initiative follows a public co-investment model with approximately €1.5 billion in initial funding (Europa, 2024). Half of this sum is contributed through the Digital Europe Programme and Horizon Europe, while the remaining funding comes from the national governments of the host countries. The funding is primarily channelled through the EuroHPC Joint Undertaking, enabling the procurement of AI-optimized supercomputers and associated support services. The AI Factory initiative operates under a timeline of three years, operationalised by the EU's 2024 AI Innovation Package and the latest AI Continent Action Plan (Europa, 2025e).

Given the early stage of AI Factories, especially those established during the second wave of funding, such as the ones in Austria, Bulgaria, France, Germany, Poland, and Slovenia, it was challenging to obtain concrete information pertaining their long-term funding plans, capacity, and service offerings as these elements are still in the process of being defined.

However, we found AI Factories are primarily structured as research and innovation infrastructures rather than more commercial organisations. Their primary function is to deliver high-quality subsidized computing resources to researchers, SMEs, and public-sector entities. To allow access to these key user groups, operational costs are covered by the EU and national co-funding (ibid). In practice, academic and public-sector AI research and development actors are eligible for cost-free usage of computing resources when projects are funded under Horizon Europe or Digital Europe (Lumi, 2025). Meanwhile, resource allocation for SMEs can be managed through EuroHPC calls (European Commission, 2025). Large commercial users are to be charged for access and usage of computational resources (ibid). As such, we see how the financial model of AI Factories is centred around maintaining operational expenses rather than explicitly generative profit revenue.

Whilst we found this information from our desk research, our interviews with AI Factory representatives revealed some nuances. For example, our interview with LuxAIF revealed that while SMEs are considered a priority group for access, they are not the sole focus. LuxAIF claims that larger organisations should be equally able to access LuxAIF's resources, particularly because large organisations can have smaller internal AI teams that function similarly to AI startups. As such, when asked whether services would be free for SMEs and public sector actors, LuxAIF representatives clarified that the funding model is still under development. While there is a strong intention to offer free access, particularly for SMEs, this has not yet been confirmed.

Capacity Overview

Due to the nascency of AI Factories, our capacity assessment was based on the technical specifications of the underlying supercomputers, supporting infrastructure and institutional stakeholders involved. This approach was based on the logic that the services and capacities of each AI Factory will ultimately be shaped by their consortium members, deployed infrastructure, and sectoral priorities of the host MS. While the EU AI Action Plan outlines common capacity goals across various domains, we anticipate the actual service offerings to vary significantly in practice depending on each AIF's practical capacities.

Key Sectors	AT	BG	DE	EL	ES	FI	FR	IT	LU	PL	SE	SI
Health & Life Sciences	●		●	●	●	●	●	●		●	●	●
Technology & Digital		●		●	●	●	●	●	●	●	●	●
Environment & Sustainability		●	●	●	●		●	●	●	●	●	●
Education & Culture	●	●	●	●	●		●	●			●	●
Manufacturing & Engineering	●	●	●			●	●				●	●
Finance & Business	●		●		●		●	●	●		●	
Agriculture & Food	●				●		●	●			●	●
Cybersecurity & Dual use							●	●	●			
Space & Aerospace		●					●		●	●		
Public Sector	●		●		●					●		

Figure 7: AIF Specialisations under the AI Continent Action Plan (Europa, 2025e)

AIF Interviews Findings

EUSAiR held interviews with a number of AIFs to gather additional information on their capacities, service offerings and priority sectors. Interviews with additional AIFs are planned.

Luxembourg AIF

The capacity of the Luxembourg AI Factory is based around the MeluXina supercomputer, a widely used high-performance computing resources for startups and SMEs in Europe (Luxembourg AI Factory, n.d). The Luxembourg AI Factory is coordinated by LuxProvide who act as the operator of MeluXina (ibid). They will host and operate a newly procured AI-optimised version of the supercomputer, MeluXina-AI, expected to become operational in 2025 (ibid). During our interview, the Luxembourg AI Factory representatives outlined how MeluXina-AI will be able to accommodate a wide range of AI applications, and any limitations are more likely to arise from sectoral priorities and the available expertise at the national level.

The capacity of the Luxembourg AI Factory is additionally shaped by a consortium of national institutions and stakeholders. LuxProvide, a private entity originally established to support industry, is responsible for infrastructure operations, while Luxinnovation, the national innovation agency, coordinates service delivery (ibid).

Our interview revealed details about **key consortium members and their associated roles**. For example, members include the Luxembourg Institute of Science and Technology (LIST), the University of Luxembourg, and the Luxembourg National Data Service (LNDS), a governmental entity that facilitates access to public-sector data for secondary use. The wider ecosystem includes associated partners such as Clarence and Deep, which provide cloud services, as well as government departments covering education, cyber security, and digital skills. The current consortium structure is seen as sufficiently comprehensive to provide most services in-house, reducing the need for outsourcing.

The Interview further revealed that the Luxembourg AIF is focused on supporting startups and SMEs **in four priority sectors: finance, space, cybersecurity, and the green economy**. However, this sectoral focus is not exclusive. For instance, if a company from manufacturing or healthcare were to approach the Luxembourg AIF, they may be served locally if the needs are primarily computational. Representatives emphasised that where more specialised sectoral support was required, users could be redirected to other AI Factories in the European network.

In terms of **service offerings**, although many details are under development, plans include providing access to computing infrastructure, support for data management, vocational training through a Digital Learning Hub, and the development of an AI sandbox for experimentation and compliance testing in collaboration with LIST.

In this way, the Luxembourg AIF is envisioned as a **one-stop shop for AI development and support which is open to all sectors**, with service feasibility and alignment determined on a case-by-case basis. However, representatives outlined that while they were open to coordination with other AIFs, formal mechanisms for inter-factory collaboration have yet to be established even though there is interest in knowledge exchange, joint testing, and shared funding initiatives.

Italy AIF

The Italian AI Factory, also known as IT4LIA, is centred around the EuroHPC Leonardo supercomputer at CINECA (National Cybersecurity Agency, 2024). This computing capacity is envisioned to expand as IT4LIA is in the process of integrating an additional AI-optimised supercomputer at the Bologna Tecnopolo, an emerging hub for supercomputing, AI, big data, and quantum technologies (ibid). This new infrastructure will be approximately four times more powerful than current standard HPC systems for general applications and up to 40 times more powerful for AI workloads, achieving over 40 exaflops in mixed-precision performance (Quantum Zeitgeist, 2025). As such, these advancements are envisioned to enhance Italy’s ability to support large-scale AI model training and experimentation.

The sectoral capacity of IT4LIA is tied to the composition and expertise of its consortium. Indeed, the **prioritised sectors of agrifood, cybersecurity, earth sciences, climate, and manufacturing** are supported by domain experts from specialised national institutions ((National Cybersecurity Agency, 2024). For example, agrifood services are being developed in collaboration with the Agri-Food TEF, while the Italian National Cybersecurity Agency contributes to cyber-related capacities (ibid). The Italian Foundation for AI in Industry and the national weather agency provide sectoral leadership in manufacturing and environmental modelling respectively (ibid). These collaborations enable the capacity for vertically integrated services that combine access to computing resources with tailored sector-specific support.

Funded by
the European Union

Service offerings at IT4LIA will **include workload optimisation, AI model quality and safety testing, compliance-by-design support, as well as training and capacity-building initiatives such as hackathons, internships, and in-person consultations**. **A pathway-to-national-sandbox service is planned,** which is meant to synergize with the Italian AIRS. The Italian AIF is conceived to minimise external outsourcing by opting for either in-house provision or structured cooperation with EU-wide competence centres and national programmes to address any service gaps. For example, IT4LIA benefits from its integration into the Emilia-Romagna innovation ecosystem, located at the Tecnopolo Manifattura, part of a wider network of twelve Technopoles distributed across more than twenty sites in the region (Emilia-Romagna, 2024). These facilities, in conjunction with the High Technology Network and the Clust-ER associations, allows IT4LIA to offer not only high-level AI services but also to act as a gateway for interregional collaboration (ibid).

Finland AIF

CSC operates the LUMI supercomputer, a pre-exascale system serving as the backbone of their AI Factory infrastructure (LUMI, n.d.a). It will progressively be supplemented and then partially replaced by LUMI-AI, a dedicated AI supercomputing environment (ibid). LUMI-AI is designed with next-generation GPUs to meet the increasing demands of AI workloads, and it will be complemented by LUMI-IQ, for quantum-AI integration (ibid).

The AI Factory is supported by a consortium of six partners (ibid). Our interview with the representatives revealed the consortium and technical capacities enabled a range of services including **computing infrastructure, AI model training and inference, help desk support, training, documentation, software environment maintenance, and access to high-value datasets**. There was a specific focus on the Datasets-as-a-Service to enhance access and enable the use of high-value datasets such as the European Open Web Index produced by OpenWebSearch.eu project, spatial data, and speech data (LUMI, n.d.b). Sector-specific capacity was focused on manufacturing, healthcare, life sciences, and communication technologies, while broader research areas include climate science, digital twins, material science, and language technologies (ibid).

Spain AIF

The BSC Spanish AI Factory's technical capacities are determined by the MareNostrum 5 supercomputer, which is being enhanced with state-of-the-art hardware and software to support AI development (Ajuntament de Barcelona, 2024). Our interview with BSC'S representatives revealed this upgraded infrastructure will focus particularly on generative AI model training, development, and validation, underpinned by access to a substantial data repository. The supercomputer's application scope spans domains such as **pharmaceuticals, biotechnology, climate science, and agriculture** (ibid).

The consortium leverages the Spanish Supercomputing Network (RES), comprising 14 computing centres across Spain (BSC, 2025). This distributed structure reflects BSC's capacity to serve a wide range of national priorities and offer a significant amount of compute. Through its Portuguese partnership, the BSC Factory also includes a dedicated interface in Portugal which is staffed to support SMEs in leveraging supercomputing for AI applications.

Our interview with BSC representatives outlined they had a strong capacity for generative-AI applications. They outlined that, due to the popularity of this paradigm, it is likely most services will be delivered in-house. However, BSC is exploring selective outsourcing to certified third-party providers where necessary. Services are being designed for sectors including **public administration, health, pharma and biotech, finance and legal, agriculture and climate, public sector, energy, and communication and media**. These are intended to be accessible for a broad set of users, including public sector bodies, SMEs, and startups. However, the specific capacity subsidised access for these actors was still in development.

Sweden AIF

The Swedish AIF, also known as MIMER, has a technical capacity determined by the Berzelius supercomputer, a mid-range system optimised for AI workloads (RISE, 2025). Berzelius offers secure, cloud-style access and is tailored to manage large volumes of training data, making it particularly suitable for large-scale applications (ibid).

MIMER is operated by the National Academic Infrastructure for Supercomputing in Sweden), with Linköping University serving as the host institution in partnership with RISE Research Institutes of Sweden (ibid). Our interview with the representatives of MIMER outlined how their envisioned goal of the AIF was to **provide services towards the development of AI models. Their vision is for the AIF to serve as a hub where models are developed with built-in compliance from the outset**. To achieve this, MIMER will seek to develop the capacity to offer services and testing infrastructure to ensure that models developed within the AIF are built with regulatory compliance embedded from the outset.

Due to the nascency of this AIF, representatives explained that its full range of service offerings is still being defined. While the AIF aims to be open to all potential AI use cases, they highlighted that existing partnerships currently support capacity in several **priority sectors: life sciences, medicine, materials science, autonomous systems, and gaming**. Additionally, they outlined how their capacity was intended for **all technology types**. Yet, they also envisioned that applicability will be guided by user demand, and that most use-cases will likely revolve around generative AI tools.

Austria AIF

Similarly to Sweden's AIF, the Austrian AIF is in its early stages of development, forming part of the second wave of AIF grant approvals under the EU. As such, representatives emphasised that its structure and service offerings are still being defined. The Austrian AIF will use a new AI-optimized supercomputer, building on the capabilities of the existing Vienna Scientific Cluster (Austrian Institute of Techology, 2025). This high-performance infrastructure will have the capacity to **support the training of complex AI models** and facilitate their deployment across a wide range of applications. Access to this infrastructure is intended to be open to researchers, start-ups, industry actors, and public administration.

The aim is to have enough capacity to lay the foundations for a wider Austrian AI hub that extends the impact of the AIF beyond its technical remit. To this end, it is intended that the AIF will have the capacity to offer community and ecosystem development, operational support for accessing AI infrastructure from pilot to production stages, innovation assistance through proof-of-concept and consultancy services, and comprehensive training programs.

Representatives from the AIF indicated that **flexibility and adaptability would be key** principles underlying the service offerings. They noted this would be especially important due to the fast pace of AI innovation, meaning there would be a need to extend services to accommodate emerging critical applications, particularly in sectors such as public administration and healthcare. To this end, there is a planned legislated consultation with Austrian stakeholders to ensure the prospective service offerings are responsive to national and sectoral needs.

In terms of technological focus, the Austrian AIF representatives underscored how they wish to establish an extended capacity towards **all AI-related technologies**. There are additional discussions ongoing to determine how permissive or restrictive the eligibility criteria should be in terms of accommodating different technology readiness levels, with market dynamics likely to influence the final approach.

Germany AIF

The German AI Factory known as HammerHAI is centred around the new Hunter supercomputer which is designed to support large scale simulation, AI model development and data analytics (University of Stuttgart, 2025). The technical capacity of this computing infrastructure lends itself well to tackling challenges in areas such as **engineering, biomedical research, materials science, and weather and climate modelling** (ibid).

The HammerHAI AIF leverages the capacity of a wide German AI ecosystem led by the High-Performance Computing Center Stuttgart which will oversee HammerHAI's operations and contribute computational resources, storage infrastructure, software environments, access models, and security protocols (ibid). HLRS's role in European HPC networks including EuroCC 2, CASTIEL 2, and FFplus will ensure that HammerHAI will benefit from close integration with regional and national AI capacities (HLRS, 2024). In addition, the Leibniz Supercomputing Centre plays a core role in HammerHAI because it brings significant capabilities in user training, maintenance and provisioning of the AI Factory's software environment, and development of trustworthy AI tools (ibid). As the main IT service provider for Munich's universities and Bavaria's research institutions, the Leibniz Supercomputing Centre will help ensure HammerHAI offers high-level support for researchers and developers (ibid).

In terms of service capacities, HammerHAI intends to provide **end-to-end support across the whole AI lifecycle from model development and training to deployment**. To this end, HammerHAI will provide access to workflow templates, shared datasets, and pre-trained models, dedicated user support (HPC Wire, 2024). The capacity for professional education and training programs within the consortium will mean both researchers and application developers are equipped to maximise benefits from the AI technologies. HammerHAI specialists will also assist users transitioning from cloud environments to high-performance computing platforms (ibid).

Greece AIF

Pharos is the Greek AI Factory, and it will leverage the upcoming DAEDALUS EuroHPC supercomputer specifically optimized for AI workloads (HPC Wire, 2024). This infrastructure will provide the capacity to support the development and training of large-scale AI models including generative and multimodal systems such as language models.

The consortium provides Pharos with a wide-spread capacity due to its broad and interdisciplinary members. Key national contributors include the National Center for Research and Technology Development, Aristotle University of Thessaloniki, the National and Kapodistrian University of Athens, the Foundation for Research and Technology-Hellas and HDIKA S.A., a digital governance agency, among others (Athena, 2024). Specifically, the DAEDALUS supercomputer will be managed and operated by GRNET S.A., Greece's National Infrastructures for Research and Technology organization, under the Ministry of Digital Governance (ibid). GRNET provides high-performance computing, networking, cloud services, and e-infrastructure to educational and public sector institutions, and it will ensure robust operational capacity for Pharos. A strength of Pharos AIF lies in the development of Greece's first Large Language Model which will serve as a foundation for future language technologies and cultural applications (EKT, 2024).

These consortium members and technical infrastructure will provide the capacity for expertise spanning **health, language, culture, energy, climate, and sustainability** which are core domains where Pharos aims to deliver AI solutions aligned with both national priorities and EU strategic goals (ibid). Pharos offers end-to-end user support services such **upskilling, dataset provision, AI model training, and business innovation guidance** (ibid).

AIF potential for AIRS

AI Factories offer the foundational infrastructure and service capacities that would be highly relevant for the operationalisation of AIRS in terms of support for the technical development of AI systems. AIFs could provide services for testing, evaluation, sector-specific application and compliance-related assessments.

While many AIFS are in nascent stages of exploration, development or implementation, we believe they offer ample potential in providing the necessary infrastructure to align with AIRS requirements related to development, testing and evaluation. The important capacities arise from AIFs' combination of high-performance computing resources and access to expert knowledge through diverse consortia.

Importantly, the course of our interviews revealed that several AIFs would be willing to refer potential clients to other AIFs better suited to meet their specific needs. This demonstrates a willingness to cooperate EU-wide, that AIRS could leverage to triage and route activities to the most competent AIF. This capacity for coordination is valuable to ensure AIRS services are efficiently covered across Member States. For AI Providers' a catalogue and single point of coordination of AIF specialization and terms of access to the services would be beneficial.

AIFs appear to be under no or little pressure to become commercially independent. However, the funding model for free of charge AIF participation for SMEs remains unclear. Moreover, here is no standard pricing or access policy across AIFs which could provide future logistical challenges. We recommend maturing both the capacity and funding models, especially following the implementation of the AI Continent Action Plan.

Overall, we presently find large variability in the AIF landscape. Some AIFS can provide AI-optimised infrastructure and computing resources, with MSs such as Spain, Sweden and Italy being particularly well suited to support development of large-scale or generative AI models. Meanwhile, other AIFs, such as Greece, Finland and Germany focus more on sector-specific services. As such, for AIRS, this variability underscores the need for strategic identification and matchmaking between the potential AIRS use cases and capacities of certain AIFS. For example, testing of legally complex use cases will require access to AIFS with specialised domain expertise, either through their consortium or through their outsourced services. Similarly, alignment by sector will be important. For example, to ensure AIRS are strategically aligned in terms of sectors, we see the potential for fruitful collaboration between Italy and Spain for agricultural applications, and with Greece or Germany for healthcare-related applications.

- ## Testing and Experimentation Facilities (TEFs)

Strategic Function

TEFs are large-scale environments dedicated to testing, validating, and demonstrating advanced AI systems, both software and hardware, in real or close-to-real conditions. They are central to de-risking AI deployment and aligning with regulatory frameworks such as the AI Act.

Core Services

- Integration and validation of AI systems
- Physical and virtual testbeds
- Compliance testing and AI Act alignment
- Demonstration and real-world experimentation
- Progress tracking via structured models (e.g., “graduation” schemes)

Sectoral Focus

Sector-specific, with current TEFs covering:

- Agrifood (agrifoodTEF)
- Healthcare (TEF-Health)
- Manufacturing (AI-MATTERS)
- Smart cities and communities (Citcom.AI)

Technological Orientation

Focused on AI technologies, including AI-driven robotics, embedded AI systems, and edge computing, among others.

Target Clients and Access

Open to all types of organisations. Costing is market-based but may be subsidized for SMEs depending on the TEF node, services accessed, and available funding.

Geographical distribution

The geographical distribution of TEF nodes is notably limited compared to AI Factories and EuroHPC facilities. The table below outlines the locations of each TEF node, subtracted from the website of each TEF, highlighting that a significant number of EU Member States do not host a TEF node.

	Agrifood TEF	Citcom.ai	AI Matters	TEFHealth
EU MSs with TEF Nodes	Austria Belgium Denmark France Italy Spain Sweden Poland the Netherlands	Denmark Finland Sweden Belgium Netherlands France Luxembourg Spain Italy Poland	Denmark Netherlands Germany Czechia France Spain Italy Greece	Germany France Sweden Slovakia Portugal Belgium Italy Finland Czechia

EU MSs with no TEF Nodes	Bulgaria Croatia Cyprus Czechia Estonia Finland Germany Greece Hungary Ireland Latvia Lithuania Luxembourg Malta Portugal Romania Slovakia Slovenia	Austria Bulgaria Croatia Cyprus Czechia Estonia Germany Greece Hungary Ireland Latvia Lithuania Malta Portugal Romania Slovakia Slovenia	Austria Belgium Bulgaria Croatia Cyprus Estonia Finland Hungary Ireland Latvia Lithuania Luxembourg Malta Poland Portugal Romania Slovakia Slovenia Sweden	Austria Bulgaria Croatia Cyprus Denmark Estonia Greece Hungary Ireland Latvia Lithuania Luxembourg Malta Netherlands Poland Romania Slovenia Spain

Table 1: Geographical Distribution of TEF Nodes across the EU MSs

Funding Overview

Desk research revealed the funding model for TEFs is based on a co-investment structure jointly financed by the European Union and participating Member States (Europa, 2025g). The EU, through the Digital Europe Programme, covers up to 50% of each TEF's total costs (Europa, 2023). The remaining costs are financed by the participating Member States and regions, with each Member State hosting parts of a TEF (nodes, satellite, testing facility, etc) contributing funds (ibid). These national contributions may be financial or in-kind including staff time, use of infrastructure, equipment, hardware, or the use of national or regional budgets (ibid). Each TEF node must provide evidence of national co-funding for the remaining 50% of project costs (ibid). This is typically demonstrated through a letter of commitment from a competent national or regional authority (ibid). The TEF network also allows for the inclusion of associated nodes or satellites that do not receive direct funding (ibid). These can be part of the TEF network but must operate without EU financial support (ibid).

The EU co-funding period started in 2023 and lasts a total of 5 years (Europa, 2025g). This time-limited co-funding model was designed to encourage national investment in TEFs by giving Member States a direct stake in the development of these testing infrastructures (ibid). The underlying goal is to foster long-term commitment motivating Member States to support the establishment of TEFs but also to sustain them over the 5-year period by supporting, identifying and developing new revenue streams (ibid). To this end, as part of the application process, all TEF proposals had to include a credible and sustainable business plan outlining how the facility will continue operating after EU funding ends. (Europa, 2023).

Today 4 TEFs are operational, and the implementation of their financial sustainability strategies is underway, as demonstrated by their service offerings. Functioning as service providers, TEFs offer external users, such as SMEs and large companies, the opportunity to test technologies under near-market conditions. In doing so, they generate revenue by charging for services based on market rates under the same pricing structure for all customers. Interviews revealed that service fees across TEFs can range from €1,000 to €150,000 depending on the scope and complexity of services requested.

Under the pricing structure, SMEs can afford TEF services if eligible funding is available to reduce or fully cover the costs. AgrifoodTEF representatives claimed funding to reduce service fees for SMEs is available under EU state aid rules, up to €300,000 per SME. However, interviews with the other TEF representatives revealed differences in how SME funding occurs in practice. For example, TEF Health, Citcom.AI, and AI-MATTERS noted the actual cost to SMEs depends on which node delivers the service and how much national funding is available to support it. As such, since the final price for SMEs varies based on available co-funding and the value of the service, funding may reduce fees for SMEs but are rarely eliminated.

Funding models also differ in scope for different TEFs based on differing national coordination schemes, consortium partners and governmental collaborations. For example, interviews with TEF-Health revealed an advanced level of collaboration with Germany’s Ministry of Economy and Ministry of Health to establish innovation sandboxes in the healthcare sector. These sandboxes may eventually be operated by TEF-Health as formal institution, including permanent budget allocations. Meanwhile, the interview with a different TEF revealed budgetary constraints and are exploration of ways to leverage the EDIH framework to align national resources with EU-level funding.

AgrifoodTEF stood out from other TEFs because it claimed to directly manage funding applications on behalf of eligible SME clients. However, representatives also emphasized that awareness of the opportunity to access state aid within TEFs remains low, which indicates a need for greater awareness-raising to ensure SMEs can take advantage of available support.

Specific insights from CitCom.AI and AI-MATTERS were more limited. However, the overall takeaway from our interviews is that SME access to reduced-cost or free TEF services largely depends on the configuration of each TEF and the commitment of individual Member States to subsidize services for their SMEs.

Capacity Overview

Interviews revealed that each TEF's capacity is dependent on its organizational configuration and coordination among its partners. However, we found some common factors that serve as indicators of TEFs' capacities to deliver a broad range of AI services, including: the distributed nature of TEFs and their associated nodes across multiple countries, diverse testing environments, the availability of physical and virtual infrastructure, along with qualified personnel to support real-world experimentation, and the ability to offer customizable, long-term services tailored to the specific needs of clients.

First, the capacity of a given TEF is shaped by its sector-specific nodes and facilities distributed across multiple countries. The distributed structure of each TEF allows for a breadth of capacity in terms of the large range of AI solutions that can be tested in real-world environments and across varying conditions. For example, AgrifoodTEF connects experimental farms and food labs in different climates, allowing for agricultural AI to be tested across multiple soil types and seasons (AgrifoodTEF, n.d). CitCom.AI provide access to urban districts and living labs in 10 countries, which is important for the testing of smart city technologies and AI solutions (CitCom.AI, n.d).

The depth of TEF capacities is strengthened by a wide range of available resources. Their physical and virtual infrastructure includes advanced technologies such as robots, autonomous systems, IoT networks, edge computing platforms, digital twins, and simulation environments. Additionally, TEFs employ skilled experts, including PhD-level researchers and technical specialists to execute and evaluate the services. These resources are a core strength of TEFs, allowing them to tailor services to the specific needs of each client. Moreover, they enable TEFs to provide ongoing support for long-term engagements, with some projects extending up to six months, as revealed in our interviews.

TEFs potential for AIRS

The insights gathered from our desk research and interviews have implications for the potential integration of TEF services within the framework of AIRS offerings. While TEFs have the technical and organisational capacity to offer the kinds of services included in the AIRS pipeline, financial limitations remain a key barrier in providing these services for SMEs. For example, TEF-Health and CitCom.AI indicated a willingness to provide their services as part of an AIRS however they emphasised that doing so without dedicated funding would not be viable. AI-MATTERS and Citcom.AI both claimed offering services for free would undermine the financial stability of their business models. This is especially because, once the period of EU-funding ends, TEFs are reliant on service revenues, national co-funding, or alternative funding mechanisms.

In summary, as TEFs approach the end of their EU funding period, there is variation in revenue streams and the extent of national support across different TEFs, reflecting differences in their scope, structure, and sectoral focus. While their capacity to deliver real-world AI testing, specialized services, and sustained client engagement is strong, ensuring long-term financial sustainability is a core challenge highlighted by all TEFs.

- ## AI on Demand Platform

Strategic Function

The AI-on-Demand Platform (AIoDP) offers a wide range of services, with its most valuable feature being the platform itself. It serves as a collaborative space for the AI community, enabling engagement with peers and experts, sharing opportunities, applications, and knowledge, and accessing AI-related assets and tools (AI4Europe, n.d).

Core Services

- Experimentation Services: exploring, testing, and creating with shared AI tools on the platform
    - e.g. Create Experiment Run with RAIL
- Enabling collaboration with other teams
- Accessing existing datasets, AI tools and services, use cases, scientific publications, funding opportunities, training resources, and upcoming AI-related events.

Sectoral Focus

Sector-agnostic; enabling access to a large selection of tools and use cases from diverse sectors.

Technological Orientation

Focused on all AI technologies.

Target Clients and Access

Open to all types of organisations, including researchers, SMEs, tech providers, students, EU-funded projects, Digital Innovation Hubs, and public institutions.

• Data Spaces

Strategic Function

Data Spaces are designed as sector-specific data ecosystems that enable secure, sovereign, and interoperable data sharing among stakeholders. They establish a governance and trust framework for data exchange in compliance with EU regulations, particularly in relation to data protection, competition law, and ethical use (Data Spaces Support Centre, 2024).

Core Services

- Data governance frameworks
- Interoperability standards
- Facilitation of data trading and sharing
- Legal and compliance support

Sectoral Focus

High sectoral granularity, with targeted ecosystems in: Agriculture, Energy, Health, Manufacturing, Mobility, Public Administration, Cultural Heritage, Tourism, Media, and Research and Innovation, among others.

Technological Orientation

Data Spaces are technology-agnostic, enabling data use and sharing irrespective of the technology stack or domain-specific tools.

Target Clients and Access

Inclusive participation for both public and private actors. From desk research of few Data Spaces, access is membership-based, with annual contributions ranging from approximately €1,000 (standard members) to €5,000 (steering board members), ensuring sustainability while maintaining openness (Data Space 4.0, n.d).

Geographical Distribution

Data Spaces are designed to cater to the unique requirements of specific sectors. To facilitate their effective implementation, stakeholders from various EU member states collaborate within dedicated Data Space consortia. Currently 144 Data Spaces are strategically distributed across all EU MSs, as shown in the table below.

Funded by the European Union

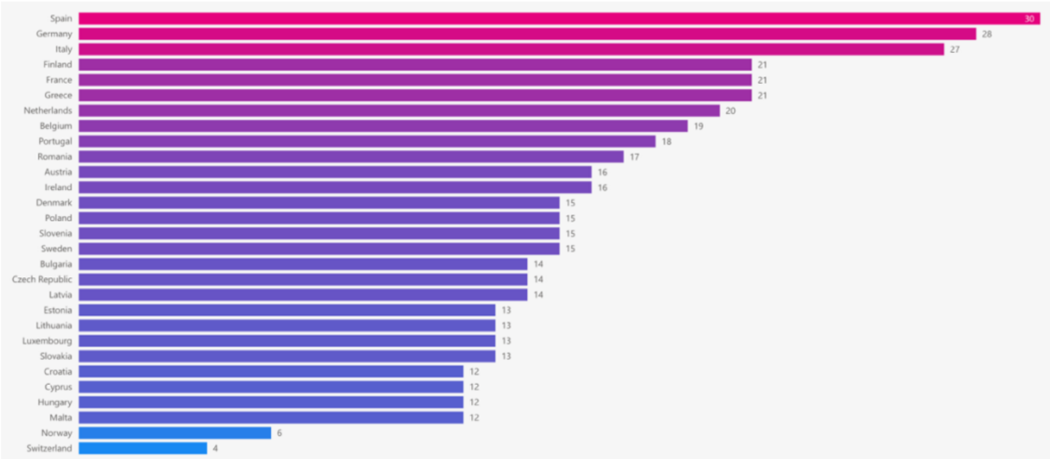


*Figure 4: Geographics Distribution of Data Spaces (*The Data Spaces Radar, n.d)

It should be noted however, that only 31 Data Spaces spread over 22 MS are currently operational, as shown in the table below, while the others are currently still in exploratory, preparatory or implementation phases.

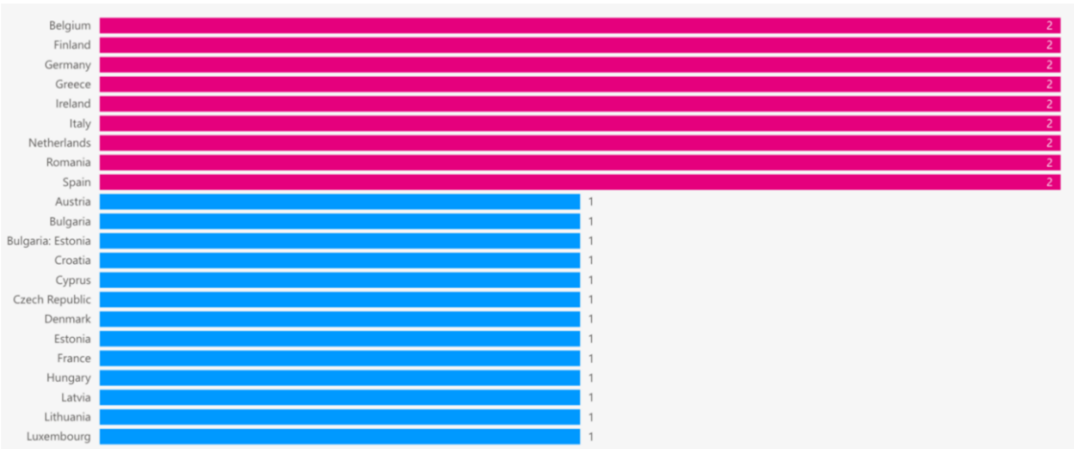


*Figure 5: Operational Data Spaces at July 1st, 2025 (*The Data Spaces Radar, n.d)

Funding Overview

Data Spaces are funded through grants via the Digital Europe Programme (for building and deploying the operational Data Space platforms) and Horizon Europe (for research and innovation to develop the technologies, standards, and governance for Data Spaces) (Rossi, 2021). Each specific Data Space has received EU funding, complemented with in-kind support from industry stakeholders who participate either through data or infrastructure.

Data Spaces do not operate under a typical commercial or revenue model. Rather than running as a free-of-charge service, they enable data exchange with no customer fee.

Indeed, participation in common Data Spaces is voluntary and open to all eligible companies (Europa, 2025f). Rather than commercialising the Data Space, the value proposition lies in the companies monetising their data themselves, and that sustainability will come from participant's contributions (ibid).

Capacity Overview

Data Spaces are federated data ecosystems with the EU developing over 14 common spaces covering domains such as energy, mobility, tourism, finance, etc (ibid). In this way, the capacity of a Data Space can be measured in terms of the data volume and the number of participants. Whilst Data Spaces are pan-European, their uptake differs per Member States. Some industry-specific Data Spaces could have a greater national data representation due to certain Member States prioritising those sectors as part of their national strategies.

EUSAiR is planning an interview with the Data Spaces Support Center to identify potential synergies with AIRS.

• Upcoming Initiatives under the AI Continent Plan

The AI Continent Plan outlines the establishment of five Gigafactories, each designed to house over a million advanced processors dedicated to the development and training of sophisticated AI models. These facilities will concentrate on transformative sectors such as healthcare, biotechnology, manufacturing, robotics, and scientific research. By collaborating with EuroHPC, the initiative will ensure comprehensive ecosystem integration, fostering a collaborative environment that accelerates innovation and progress across multiple disciplines (Europa, 2025e).

Moreover, the plan anticipates the operational launch of 15 AI Factories by 2026, each with a specific sectoral focus and equipped with a network of advanced antennas. These facilities will be intricately linked with high-performance supercomputers and cutting-edge data and training hubs, enabling seamless remote access to AI-optimized computational resources via strategically positioned antennas (ibid).

The AI Continent Plan also calls for the establishment of new TEFs in 2026 to enhance sector-specific testing capabilities (ibid). EDIHs will also undergo transformation starting December 2025, evolving into dynamic AI Experience Centres. These centres will become critical hubs for sector-specific AI adoption and support, facilitating innovative solutions and fostering collaboration. This synergy with AI Factories and Gigafactories will drive significant technological advancements across industries (ibid).

Furthermore, the AI Continent Plan includes the development of Data Labs as part of the AI Factories network, intended to connect AI providers with Data Spaces and national datasets. These Data Labs will federate data from various AI Factories that focus on the same sectors, ensuring better resource utilization and collaboration (ibid). Data Spaces will be tailored to address the specific requirements of each sector effectively.

- ### Establishing Communication Channels Across the Ecosystem

The first EUSAiR Co-creation Workshop featured a breakout session titled "*Connecting the Dots: Building Bridges Across Europe's AI Ecosystem*." This session brought together representatives from TEFs, EDIHs, AI Factories, NCAs, and a variety of other stakeholders. The focus was on identifying strategies for better coordination and sustained communication across the EU AI Innovation Ecosystem. Such coordination is paramount if NCAs choose to instrumentalise the existing EU AI Innovation Ecosystem in establishing an operational AIRS

A key question that emerged from this dialogue is whether a bottom-up or top-down approach would be more effective as a sustainable communication framework for stakeholders engaged within the EU AI Innovation Ecosystem.

At this stage, the EU AI Innovation Ecosystem stakeholders expressed the absence of a centralized channel of communication where, for example, TEFs could communicate with AI Factories. This lack of a centralized communication system is hindering the streamlining of services leading to repetitive work, operational inefficiencies, and unnecessary resource strains. To mitigate this challenge, stakeholders proposed diverse streams potentially enabling a swift coordination and substituting the current unmaintainable and unscalable, bilateral relationships.

Top-down Communication Channel

The optimal approach for stakeholders is participation in a centralized communication channel established by the EC. The EC maintains a direct relationship with the EU AI Ecosystem, where stakeholders primarily consist of EU projects managed by its various divisions. This established connection facilitates streamlined access to pertinent contact points, given the existing partnerships between the EC and the coordinators of key initiatives such as TEFs, AI Factories, EuroHPC, Data Spaces, EDIHs, and the AI on Demand platform, among others.

To effectively manage centralized communication across projects, one proposed approach is the establishment of a Coordination and Support Action (CSA) for each initiative. This would facilitate regular meetings and coordination among stakeholders within the same categories. For example, TEFs have a CoordinaTEF entity that oversees all four TEF categories within the EU. In addition, EDIHs have a Digital Transformation Accelerator (DTA) that offers centralised support action for the EDIH network. In contrast, a similar structure is not currently in place for AI Factories.

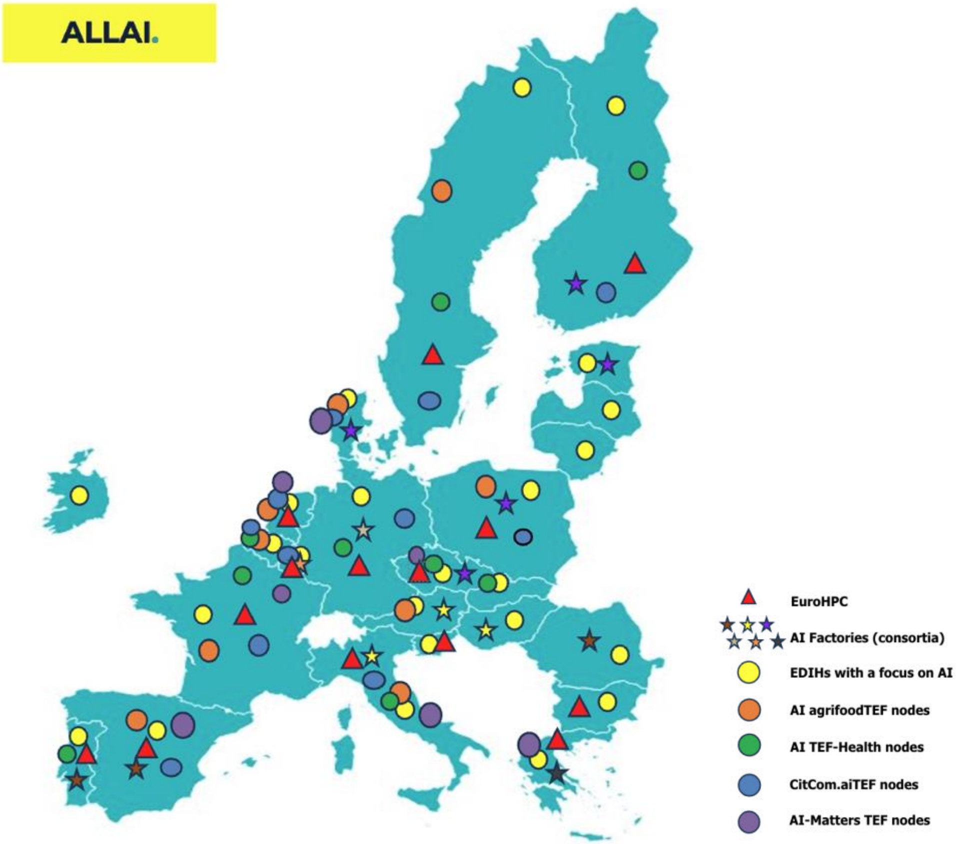
Additionally, a complementary top-down communication framework could be initiated at the national level. During the breakout session, it was proposed that each EU member state undertakes a mapping of their national AI ecosystem. This would address the challenge that authorities lack full awareness of the resources and expertise available locally, which could be leveraged for AI Regulatory Sandbox activities and beyond. Such mapping should include the identification of key contact points and the creation of mechanisms for ongoing reporting and information exchange among stakeholders, thereby fostering a more cohesive and well-informed AI landscape within each Member State.

Bottom-up Communication Channel

Stakeholders also highlighted the role for bottom-up initiatives. It was recommended that each stakeholder category first establishes communication channels with their counterparts, if such channels are not already in place, before expanding outreach to other stakeholder groups. Once each category designates a coordinator at the EU level, these coordinators can focus on fostering connections with homologues in other categories to create sustainable engagement.

This objective aligns closely with the mandates of the various stakeholders within the EU AI Innovation Ecosystem, particularly as many have a Working Package (WP) dedicated to identifying synergies within the existing ecosystem and facilitating interconnections. Nevertheless, we recommend the EU to launch several Coordination and Support Actions, to drive such coordination process.

The map presented below delineates the geographical distribution of AI Factories, EuroHPC facilities, EDIHs with a focus on AI, and TEFs across the EU. This distribution highlights a robust coverage at the EU level but requires further analysis to comprehensively study the feasibility of cross-regional AIRS.



Funded by the European Union

References

AgrifoodTEF (n.d) “Catalogue of Services”. https://agrifoodtef.eu/catalogue-of-services

AI Magister (20 May 2024) “EDIH Network: a year of impactful digital transformation”. https://aimagister.it/2024/05/20/edih-network-a-year-of-impactful-digital-transformation/

AI4Europe (n.d) “AI on Demand”. https://www.ai4europe.eu/

Ajuntament de Barcelona (12 December 2024) “The BSC will host one of seven European AI factories to drive its development in the business ecosystem”. https://www.barcelona.cat/internationalwelcome/en/news/the-bsc-will-host-one-of-seven-european-ai-factories-to-drive-its-development-in-the-business-ecosystem-1464124

Athena (12 December 2024) “One of the first seven AI Factories in the EU to be established in Greece - “Pharos” places Greece on the Artificial Intelligence Map”. https://www.athenarc.gr/en/news/one-first-seven-ai-factories-eu-be-established-greece-pharos-places-greece-artificial

Austrian Institute of Technology (13 March 2025) “AI Factory Austria (AI:AT) strengthens national AI ecosystem”. https://presse.ait.ac.at/news-ai-factory-austria-aiat-strengthens-national-ai-ecosystem?id=214556&menueid=34057&l=english

BSC (6 February 2025) “BSC presents the first quantum computer in Spain developed with 100% European technology”. https://www.bsc.es/news/bsc-news/bsc-presents-the-first-quantum-computer-spain-developed-100-european-technology

CitCom.AI (n.d) “Services”. https://citcomtef.eu/services

Data Space 4.0 (n.d) “Join us, Become part of the Digital Factory Alliance”. https://digitalfactoryalliance.eu/join-us/

Data Spaces Support Centre (11 October 2024) “Intermediaries and Operators”. https://dssc.eu/space/bv15e/766065352/Intermediaries+and+Operators

Data Spaces Radar (n.d). “Chart View”. https://app.powerbi.com/view?r=eyJrIjoiMjEwZTg1Y2QtNDkxNS00ODA1LTgyYzAtMzkzOTQ0ZmUzMWUzliwidCI6ImIzNDZkNjM0LWFjZmItNDJjNy1iZDQ0LWYxNTU3ZWU4OWIxYiJ9&pageName=ReportSectiond652f7271af77096228a

EKT (19 December 2024) “The Greek "Pharos" is among the first seven Artificial Intelligence Factories established in Europe”. https://www.ekt.gr/en/news/30578

Emilia-Romagna (13 December 2024) “IT4LIA AI Factory project of Bologna Technopole selected to create one of the 7 AI factories in Europe”. https://internationaltalents.art-er.it/news/it4lia-ai-factory-project-bologna-technopole-selected-create-one-7-ai-factories-europe

ERRIN (16 June 2025) “European Digital Innovation Hubs in Digital Europe Programme”.https://errin.eu/documents/european-digital-innovation-hubs-digital-europe-programme#:~:text=This%20document%20provides%20initial%20ideas,covering%20all%20regions%20of%20Europe

EU Neighbours East (31 January 2025) “New European Digital Innovation Hubs set up in Ukraine”. https://euneighbourseast.eu/news/latest-news/new-european-digital-innovation-hubs-set-up-in-ukraine/#:~:text=New%20European%20Digital%20Innovation%20Hubs,Ukraine%2C%20Western%20Balkans%20and%20T%C3%BCrkiye

Europa (3 June 2025a) “AI Factories”. https://digital-strategy.ec.europa.eu/en/policies/ai-factories

Europa (5 May 2025b) “The European High Performance Computing Joint Undertaking”. https://digital-strategy.ec.europa.eu/en/policies/high-performance-computing-joint-undertaking#:~:text=with%20the%20Union%E2%80%99s%20common%20European,spaces%20and%20secure%20cloud%20infrastructures

Europa (06 March 2025c) “FAQ: European Digital Innovation Hubs”. https://european-digital-innovation-hubs.ec.europa.eu/faq/faq-european-digital-innovation-hubs#:~:text=As%20settled%20in%20the%20call,therefore%20not%20to%20be%20taxed

Europa (09 April 2025d). “European Digital Innovation Hubs”. https://digital-strategy.ec.europa.eu/en/policies/edihs#:~:text=gaps%20in%20the%20Network%20which,the%20European%20calls%20for%20proposals

Europa (09 April 2025e) “The AI Continent Action Plan”. https://ec.europa.eu/newsroom/dae/redirection/document/114523

Europa (23 May 2025f) “Common European Data Spaces”. https://digital-strategy.ec.europa.eu/en/policies/data-spaces#:~:text=,consumer%20protection%2C%20and%20competition%20law

Europa (21 May 2025g) “Sectorial AI Testing and Experimentation Facilities under the Digital Europe Programme”. https://digital-strategy.ec.europa.eu/en/policies/testing-and-experimentation-facilities#:~:text=Together%20with%20Member%20States%2C%20the,world%20environments

Europa (16 April 2025h) “New report shows EDIHs are accelerating digital transformation across Europe”. https://european-digital-innovation-hubs.ec.europa.eu/news/new-report-shows-edihs-are-accelerating-digital-transformation-across-europe

Europa (10 December 2024) “Seven consortia selected to establish AI factories which will boost AI innovation in the EU”. https://digital-strategy.ec.europa.eu/en/news/seven-consortia-selected-establish-ai-factories-which-will-boost-ai-innovation-eu

Europa (22 June 2023) “Testing and Experimentation Facilities (TEFs): Questions and answers”. https://digital-strategy.ec.europa.eu/en/faqs/testing-and-experimentation-facilities-tefs-questions-and-answers#:~:text=The%20edge%20AI%20TEF%20aims%2C,technologies%2C%20such%20as%20neuromorphic%20computing

Europa (13 May 2022) “AI Watch: Revisiting Technology Readiness Levels for Relevant Artificial Intelligence Technologies.” https://ai-watch.ec.europa.eu/publications/ai-watch-revisiting-technology-readiness-levels-relevant-artificial-intelligence-technologies_en

Europa (2021). “Testing and Experimentation Facilities (TEFs): Questions and Answers | Shaping Europe’s Digital Future.” https://digital-strategy.ec.europa.eu/en/faqs/testing-and-experimentation-facilities-tefs-questions-and-answers

Europa, (n.d) “EDIH catalogue”. https://european-digital-innovation-hubs.ec.europa.eu/edih-catalogue

EuroHPC JU (n.d) “Homepage”. https://eurohpc-ju.europa.eu/index_en

European Commission (2022) “AI Watch: Revisiting Technology Readiness Levels for relevant Artificial Intelligence technologies”. https://publications.jrc.ec.europa.eu/repository/bitstream/JRC129399/JRC129399_01.pdf

European Commission (09 April 2025) “Access Policy for the allocation of the Union’s share of access time of the EuroHPC Joint Undertaking Supercomputers and AI Factories”. https://eurohpc-ju.europa.eu/document/download/a473e939-1131-4a75-bf0b-4d8659d6bce0_en?filename=EuroHPC%20JU%20-%20Access%20Policy_April2025.pdf#:~:text=EuroHPC%20allocations%20are%20project,applications%2C%20for%20demanding%20model%20training

Frydlinger, David, Oliver Hart, and Kate Vitasek. (2019). “A New Approach to Contracts”. Harvard Business Review. https://hbr.org/2019/09/a-new-approach-to-contracts

Government of Ireland (24 February 2023). “Minister Coveney announces the establishment of two of Ireland’s new European Digital Innovation Hubs”. https://www.gov.ie/en/department-of-enterprise-tourism-and-employment/press-releases/minister-coveney-announces-the-establishment-of-two-of-irelands-new-european-digital-innovation-hubs/#:~:text=In%20total%2C%20the%20European%20Union,established%20in%20the%20coming%20weeks.

HLRS (10 December 2024), “E HammerHAI to Create an AI Factory for Science and Industry”.https://www.hlrs.de/news/detail/hammerhai-to-create-an-ai-factory-for-science-and-industry-1

HPC WIRE (10 December 2024), “EuroHPC Reveals Hosting Sites for Europe’s Initial AI Factories”. https://www.hpcwire.com/off-the-wire/eurohpc-reveals-hosting-sites-for-europes-initial-ai-factories/

Heikkilä, J., Lagstedt, A., Heikura, S., Kaakkurivaara, E., Dardykina, A., & Teilhard de Chardin, A. (2025). From Simple Sandbox Process to Regulatory Sandbox Framework: Serving the Dual Objectives of AI Regulation. In A. Pucihar, M. Kljajić Borštnar, S. Blatnik, M. Marolt, R. W. H. Bons, K. Smit, & M. Glowatz (Eds.), & (Ed.), 38th Bled eConference: Empowering Transformation: Shaping Digital Futures for All: Conference Proceedings (pp. 643-660). Univerzitetna založba Univerze v Mariboru. https://press.um.si/index.php/ump/catalog/book/947/chapter/625

Kimmo Rossi, European Commission, CNECT.G.1 (2021) “Funding for Data Spaces”. https://mydata.org/wp-content/uploads/2021/12/Data-Spaces-funding-opportunities_KimmoRossi.pdf#:~:text=level%20%E2%80%93%20data%20spaces%20are,Mobility%20Green%20Deal%20Energy%20Skills

LUMI (n.d.a), “LUMI AI Factory”. https://www.lumi-supercomputer.eu/lumi-ai-factory/

LUMI (n.d.b), “In Focus”. https://lumi-supercomputer.eu/lumi-ai-factory-launch/

LUMI (10 April 2025) “EuroHPC JU access calls for AI Factories”. https://www.lumi-supercomputer.eu/access-calls-for-ai-factories/

Luxembourg AI Factory (n.d) “LUXEMBOURG SELECTED TO HOST ONE OF EUROPE'S FIRST AI FACTORIES”, https://www.aifactory.lu/

National Cybersecurity Agency (10 December 2024) “IT4LIA, Italy will host one of the first AI Factories”. https://www.acn.gov.it/portale/en/w/it4lia-ai-factory-protagonisti-dell-intelligenza-artificiale-in-europa

Quantum Zeitgeist, (14 May 2025) “EuroHPC Announces AI-Optimized Upgrade for Leonardo Supercomputer to Enhance High-Performance Computing Capabilities” https://quantumzeitgeist.com/eurohpc-announces-ai-optimized-upgrade-for-leonardo-supercomputer-to-enhance-high-performance-computing-capabilities/

Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act)

RISE (09 April 2025) “MIMER: Sweden’s AI Factory Powers Up – Supercomputing Race to Tomorrow’s AI Solutions”. https://www.ri.se/en/mimer-swedens-ai-factory-powers-up-supercomputing-race-to-tomorrows-ai-solutions

University of Stuttgart (17 January 2025) “High-Performance Computing: Stuttgart's 'Hunter' supercomputer goes into operation”. https://www.uni-stuttgart.de/en/university/news/all/High-Performance-Computing-Stuttgarts-Hunter-supercomputer-goes-into-operation/

EUSAiR
BRIDGING INNOVATION AND COMPLIANCE IN AI

Consortium

Funded by the European Union

Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.
Grant Agreement number 101195535.