Artificial intelligence, Data and Robotics ecosystem

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[1] **R**: Report, **DEC:** Websites, patent filling, videos; **DEM:** Demonstrator, pilot, prototype; **OTHER:** Software Tools

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Document summary

The document presents the finding resulting from the Adra-e project activities carried out within the Work Package 2 “Awareness and coordination between European ADR initiatives” and related to the analysis of the status of various ADR research and innovation initiatives, as well as the development of the recommendations regarding potential coordination mechanisms. The data collection was based on desk studies, interviews with experts representing major ADR infrastructure initiatives and survey collecting feedback from the ADR research community.

The document integrates the contributions from the Task 2.1 (ADR Mapping), Task 2.2 (Coordination and mutual awareness mechanism) and Task 2.3 (Foresight Panels).

The document looks across various related infrastructures and provides recommendations regarding potential coordination mechanisms. The authors will make the finding available to ADRA and the EC to be considered for future activities within the ADR European Partnership.

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1. Introduction

Multiple studies confirm that Europe has a task to catch up with its main technological competitors when it comes to ADR research and innovation infrastructure. For instance, the report Precedence Research's Report "GPU as a service market"[2] concludes that North America (mainly USA) accounts for more than 34% of the global GPUaaS market with steady growth at 23% CAGR for 2025-2034. The Asia-Pacific region takes the second place with 29% of the market, but with a better forecast for the growth (ca. 26% CAGR). Europe takes the third place in this race with 24% of the market. Similar examples can be observed in other segments of ADR infrastructure, such as e.g. data infrastructures. The main reasons for this situation are the following:

- Dominant positions of major US technology companies (e.g. Google, Microsoft, NVIDIA, Amazon, etc.) and available investment instruments.
- China, India, and Japan are emerging as major powerhouses in the market. This is mainly due to the rapid expansion of the IT, AI, gaming and telecom industries.
- Growth in Europe is driven by the rising adoption of AI, ML, and cloud computing in industries like automotive, manufacturing, and healthcare. At the same time, the growth is hindered by weaker private investment opportunities and fragmentation.

Without a better use of available resources based on common strategy it would be difficult for Europe to bridge the gap.

2. Mapping of ADR Research and Innovation Infrastructure

The activities on mapping the European activities in the area of ADR Infrastructure benefited significantly from the general mapping of ADR initiatives implemented within WP2, Task 2.1. Additionally, the information was collected using the direct cooperative links of the Adra-e consortium partners. It is necessary to underline that in the 10 past years a significant number of new initiatives have been started on the European level as implementation activities related to major regulatory acts and policies such as e.g., European Data Act, European Data Governance Act, EU AI Act, etc. Below there are summaries of what we consider to be the major related initiatives

2.1 Common European Data Spaces

In the European strategy for Data (2020), the Commission announced common European data spaces in a number of sectors and domains of public interest, while specifying that others could be added at a later stage. In the past years, additional sectoral/ domain-specific common European data spaces have indeed been announced, bringing the current number to a total of 14. There is no one-size-fits-all structure for common European data spaces; each space is organised by participants considering the unique characteristics of the specific sector/domain. Moreover, each data space is based on a specific physical infrastructure. However, there are two key elements that are shared by all: a common European data space brings together relevant *data infrastructures* and *governance frameworks* to facilitate data pooling, access and sharing. Financial support made available by the EC through various projects funded by Horizon Europe and Digital Europe Programmes allowed the establishment of a unified governance framework and the continuous progress in the data infrastructure development.

Within the WP2 Adra-e activities the case of using the European manufacturing data space for ADR technologies implementing Digital Product Passport Directive has been discussed (1st cross-project workshop on 28 June 2024, ECS2025's panel on Manufacturing on 9 April 2025)

[2] **R**: Report, **DEC:** Websites, patent filling, videos; **DEM:** Demonstrator, pilot, prototype; **OTHER:** Software Tools

2.2 AI Factories

The EC has identified the establishment of AI Factories on the basis of EuroHPC Joint Undertaking as a strategic priority, as announced in the 2024 AI Innovation Package. Through 2025-2026, at least 15 AI Factories and several Antennas (associated to AI-optimised supercomputers in existing AI Factories) are expected to be operational, enabling the pan-EU AI ecosystem and promoting growth by prioritising access for AI startups and SMEs. In this context, at least 9 new AI optimised supercomputers will be procured and deployed across the EU. This will more than triple the current EuroHPC AI computing capacity. The efforts in this direction have a goal to compensate for the lower level of private investments into the AI-related computational capacity and propel Europe to the forefront of the AI revolution. The first activities of AI Factories started in 2025 and are on a ramp-up phase.

The Adra-e team organized interviews with specialists representing 2 AI Factories selected in the 1st round of selection:

- Meluxina-AI (Luxembourg), Luxprovide
- BSC AIF (Spain), Barcelona Supercomputer Centre

The interviews demonstrated that the main anticipated challenge related to the implementation of the vision of AI Factories initiative (access to computing power for AI startups and SMEs) is the weak demand for HPC services from the side of this target group. There are several accompanying activities to be designed and implemented in order to lower the access threshold.

2.3 European AI-on-demand Platform

The AI-on-demand platform (AIoD) is a community-driven channel designed to empower European research and innovation in Artificial Intelligence (AI), while promoting the European seal of quality, trustworthiness and explainability.

Open and easily accessible, AIoD facilitates knowledge sharing, research experimentation and development of state-of-the art solutions and technologies related with artificial intelligence. The AIoD platform can be used by the AI community to:

- Share AI-related knowledge, assets, services, or tools.
- Make use of the numerous available resources.
- Learn about the potential and opportunities of ai applications.
- Engage with other peers and experts.

Supported by the EC through 2 consecutive projects, AI4EU (2019-2021) and AI4Europe (2022-2025), the platform is operational. The close links between AioD and ADRA have been established. The latest example of this cooperation is the event "Future-Ready: On-demand solutions with AI, Data and Robotics" (https://adr-association.eu/events/future-ready-demand-solutions-ai-data-and-robotics) jointly organized by ADRA and AIoD platform on February 18-19, 2025. Such activities shall be continued in the future.

2.4 Testing and Experimentation Facilities (TEF)

In order to facilitate the uptake and deployment of ADR technologies across sectors, the EC initiated the creation of several world-class Testing and Experimentation Facilities (TEFs). The joint commitment of the EC (through the Digital Europe Programme) and the Member States mobilises 220 million Euros for that purpose.

These large-scale reference testing and experimentation facilities will offer a combination of physical and virtual facilities, in which technology providers can get support to test their latest AI-based soft-/hardware technologies in real-world environments. This will include support for full integration,

testing and experimentation of latest AI-based technologies to solve issues/improve solutions in a given application sector, including validation and demonstration.

One of the most relevant TEFs (for ADRA) is TEF for Manufacturing, AI-MATTERS. The coordinator of AI-MATTERS, Dr. Valentina Ivanova, CEA, is a member of the Adra-e Joint Task Force and contributed personally to the ECS2025's session on Manufacturing. Her insights and experiences helped to formulate related recommendations.

2.5 European Digital Innovation Hubs

European Digital Innovation Hubs (EDIHs) are one-stop shops supporting companies and public sector organisations to respond to digital challenges and become more competitive. The EC's Digital Europe Programme supports EDIHs together with the Member States.

EDIHs support companies to improve business/production processes, products, or services using digital technologies by:

- Providing access to technical expertise and testing, as well as the possibility to 'test before invest';
- Providing innovation services, such as financing advice, training, and skills development that are central to successful digital transformation;
- Helping companies tackle environmental issues, in particular the use of digital technologies for sustainability and circularity.

EDIHs combine the benefits of a regional presence with the opportunities available to a pan-European network. This regional presence leaves them well-placed to provide the services local companies need, through the local language and innovation ecosystem. The European coverage of the network facilitates the exchange of best practices across hubs in different countries as well as the provision of specialised services across regions when the required skills are not locally available.

Thematically, the majority of EDIHs provide services related to ADR technologies, therefore EDIHs are an important cooperation partner to ADRA. The project Adra-e implemented several activities involving EDIHs, for instance the event for regional ARD ecosystems (predominantly based on EDIHs) was organized within WP4. Moreover, the consultations between DFKI and EDIH Saarland allowed collecting evidence for recommendations' development.

2.6 ESFRI initiatives

European support to large research infrastructures has a long history and well-established community. The European Strategy Forum on Research Infrastructures (ESFRI) plays a key role in policymaking on Research Infrastructures in Europe by developing and maintaining a European roadmap for research infrastructure. ERIs typically include:

- major scientific equipment or sets of instruments;
- collections, archives or scientific data;
- computing systems and communication networks;
- any other research and innovation infrastructure of a unique nature which is open to external users.

Several European Research Infrastructure Consortia (ERICs) are directly relevant to thematic scope of ADRA. For instance, CLARIN ERIC[3] is a digital infrastructure offering data, tools and services to

[3] **PU:** Public**; CO:** Confidential, only for members of the consortium (including the Commission Services)

support research based on language resources, and hence is a critical asset for research in the field of Large AI models especially in the context of European multilingualism.

2.7 European Open Science Cloud

The objective of the European Open Science Cloud (EOSC) is to provide researchers and innovators in Europe with an open and trusted multi-disciplinary environment where they can publish, find and reuse data, tools and services for research and innovation. Through this environment, EOSC aims to mobilise, align, and scale resources across Europe to accelerate open science, higher productivity and increased reproducibility and trust in research.

EOSC should catalyse access for researchers and machines to high-value, machine-actionable research data and other digital objects produced along the research life cycle, such as software and publications. It should enable interoperability of data across and within disciplines, and (re-)use of data by linking them with related tools and services, in line with the 'FAIR' (Findability, Accessibility, Interoperability, Reusability) data principles.

The practical implementation of EOSC is currently taking place in the context of the EOSC European Co-programmed Partnership (the same form as ADR European Partnership) supported on its public side by the Horizon Europe Programme.

2.8 Other ARD infrastructures

The current mapping does not have an exhaustive coverage as its goal is to identify only the most relevant and Europe-wide infrastructure initiatives. At the same time, there are plenty other ADR infrastructure-related initiatives on all levels. The examples of those, which have been contacted and interviewed include RICAIP distributed Industrial Testbed (including Human-Robot Collaboration Lab) comprising 3 nodes in the Czech Republic and Germany and the SmartFactory research environment for experimentation in the field of Industrial AI and Robotics.

3. Study methodology

The development of recommendations related to ADR Research and Innovation Infrastructure has been based on expert opinions collected through several coordinated activities. It included the following:

- direct semi-structured interviews with experts representing ADR R&I infrastructure initiatives;
- discussions in expert groups in the course of cross-project workshops, events organized by the project - like ADRF2024 (4/5 November 2024) and ECS2025 (9 April 2025) and meetings of the Joint Task Force;
- short survey designed to collect the information from a broader research community,
- and the desk study allowing to put the recommendations into the policy context.

The interviews with representatives of ADR R&I Infrastructures have been conducted to collect their opinions about the following topics:

- the existing (or perspective) practices of serving the ADR R&I community (target groups, service portfolio, access procedures and conditions, facilitation, and help, etc.)
- major challenges an infrastructure in question faces in fulfilling its mission
- what can be improved in framework conditions and what kind of additional activities can help the infrastructure in question to improve its offering
- how ADRA and its activities can facilitate strengthening the impact of public investments in ADR infrastructures.

As indicated above, the representatives of the following infrastructure initiatives have been interviewed:

- EuroHPC/AI Factories
- AI-MATTERS (TEF for Manufacturing)
- AI-on-Demand Platform
- EDIHs (5 EDIHs from the Greater Region)
- RICAIP/SmartFactory testbeds (via DFKI)

Additionally, the expert contributing to the activities related to European Data Space for Manufacturing has provided his opinions on the matter.

The survey was designed to be wide-spread and collect the opinions from the R&I community on how researchers and innovators see the status and use of the infrastructures, as well as to solicit their opinions about potential measures to improve the impact of the available European ADR R&I infrastructures on research activities. The questionnaire was anonymous, short to the maximal degree (respond time 1-2 minutes max) and, at the same time, allowing providing qualitative information (like recommendations). The questionnaire can be found in the Appendices.

The questionnaire was distributed using the following community channels (estimated number of recipients – over 1,500 individuals):

- ADRA mailing list and LinkedIn
- AI for Manufacturing Network mailing list
- DFKI internal mailing list
- CAIRNE mailing list

4. Survey results

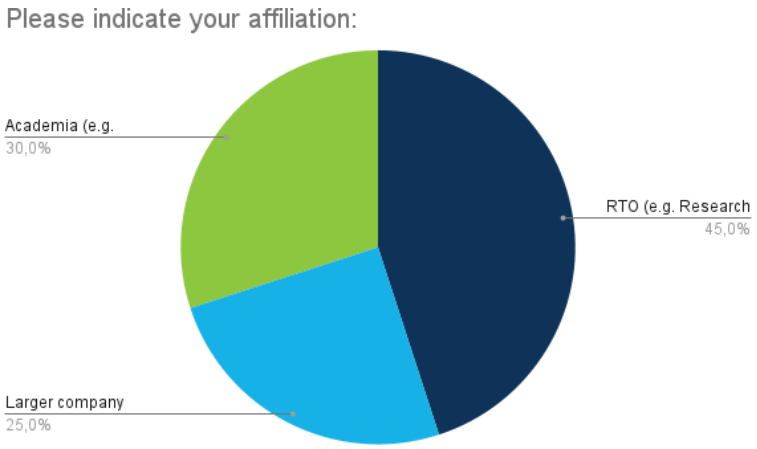

Figure 1 Affiliation of survey participants

Comment: The absence of representatives of e.g. SMEs and NGOs can be explained by the use of the channels mainly focused on traditional RTD performers. Also, it can indicate that only Academia, RTO and large companies see the relevance of EU ADR R&I infrastructures services to their activities.

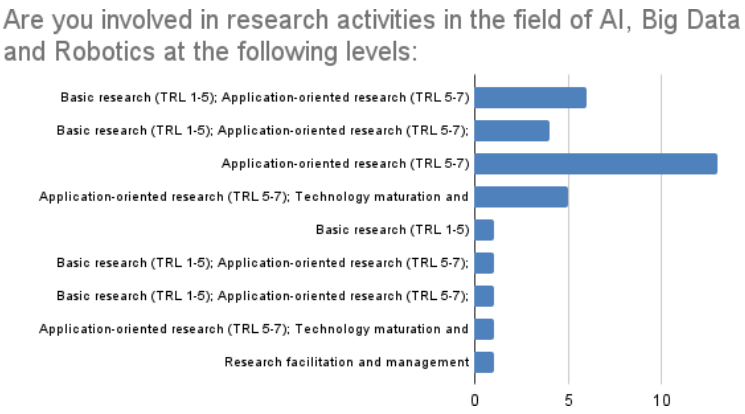

Figure 2 Participants' involvement in ADR research activities by level

Comment: all types of researchers and research facilitators are represented. Dominant focus on application-oriented research is also typical.

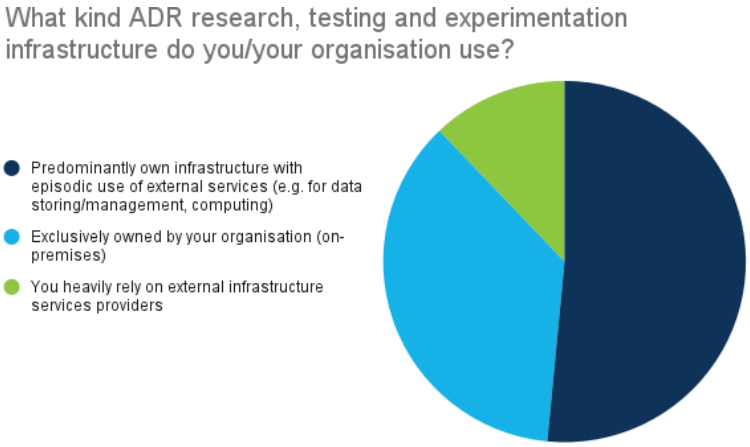

Figure 3 ADR research testing and experimentation infrastructure of survey participants

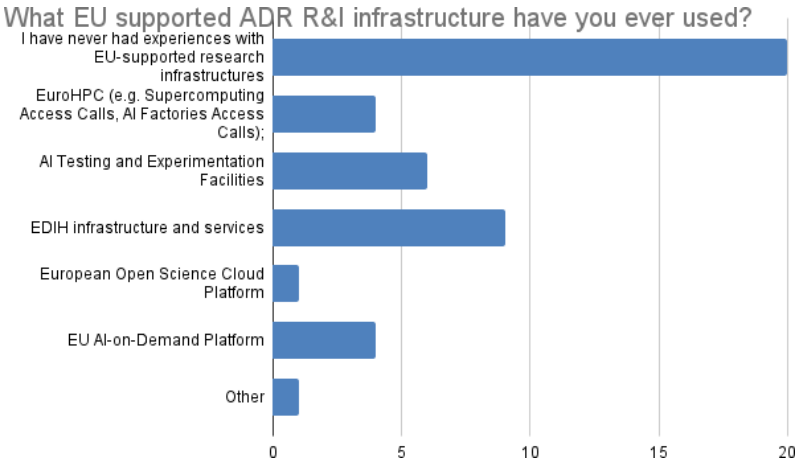

Figure 4 Participants' use of EU supported ADR R&I infrastructure

Comment: The result demonstrates that the majority of respondents do not use services offered by European R&I infrastructures. There are several potential explanations to that fact, starting from that the major initiatives are on a ramp-up phase and that their services are not easy-to-use.

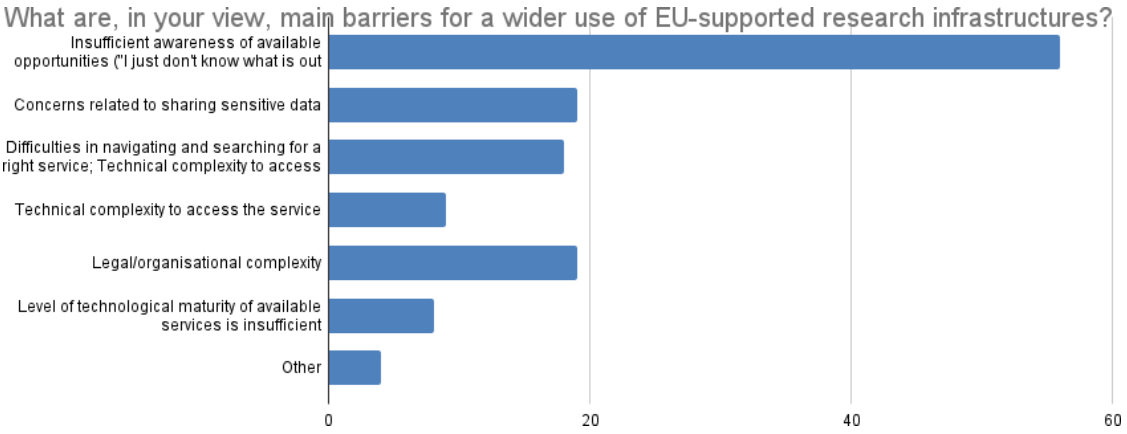

Figure 5 Survey responses to question of main barriers for a wider use of EU-supported research infrastructure

Comment: Clearly, the level of awareness of available infrastructure services offerings is very low, which represents a common problem. Also, the complexity to arrange for a services, as well as data sensitivity concerns, represent major factors contributing to the insufficient use of European ADR infrastructure.

The qualitative recommendations can be grouped as follows:

1. Awareness raising:
    - "Dissemination in RTOs and leading Universities of each country"
    - "Awareness sessions. But not limiting sharing of these sessions to only those on a specific ADR mailing list (or similar). Push it out to the research councils in the various countries and ask them to publicize"
    - "Webinars!"
2. Synergy between infrastructure initiatives and between them and other research activities
    - Organize more clustering events within the funded projects to explain the role of the EU-supported research infrastructures and to enforce projects cooperations related to the topic
    - Improve connection to existing research and technological infrastructures (specifically TEFs and AI Factories)
    - A joint action under the umbrella of AI Continent Action Plan for an harmonization and interoperability of such research infrastructure.
3. Simplification of access procedures and facilitate access
    - Faster and easier access, reduced applications, accelerated reviewing, submission of applications any time
    - Streamline administrative process, clear terms and conditions, sensible pricing (if any)
    - Easy explained pilot cases would demonstrate which services are offered and how to use them in a straightforward way.
    - Start with the basic e.g., what are the problems of the industry and translate those problems on solution oriented program using your infrastructure
    - Promote open-source and interoperable tools, support cross-border experimentation and mobility grants and increase visibility and outreach towards industry
    - Developed for clarification purposes examples of Customer Journeys and Success Stories could help those willing to get access to infrastructures.

5. Recommendations and conclusions

The work presented in this deliverable allows for the following conclusions:

- In order to fully unfold the potential of European investments in various ADR-related R&I infrastructures and to turn them into a powerful catalyst of ADR research advancements, significant efforts have to be undertaken in the directions of raising awareness, improving quality and accessibility of services, and promoting best practice. ADRA in its activities shall pay more attention to ADR infrastructures as a key element to achieve the goals of the Partnership. In this context, it can be recommended to consider setting up a dedicated ADRA Topic Group on Research Infrastructure with the mandate to provide an infrastructure-specific input for the SRIDA maintenance process.
- The topics related to ADR infrastructure should be more visible at the ADRA's community events. The future editions of ADR Forum (Scavanger, Sept. 23-24) and European Convergence Summit (Spring 2026), as well as scientific and cross-project workshops, should include aspects and topics related to infrastructure. ADRA shall consider supporting events directly dedicated to promoting ADR infrastructures and establishing a dialog between infrastructure initiatives and ADR community.
- The synergy effect can be achieved by establishing an infrastructure-related dialog with other relevant European co-programmed Partnerships in order to coordinate and synchronize the efforts in this direction. The most relevant Partnerships for the first step include "Made-in-Europe", EuroHPC and EOSC. The dialogue can take forms of setting up a joint working

group involving representative experts from each field, also organizing joint events and/or cross-participating in other related activities can be considered.

- ADRA can consider discussing and designing (together with the EC and other Partnerships) specific activities funded within Horizon Europe and upcoming Framework Programme aiming at facilitating the access for a broader community to specific infrastructures. This can take a form of dedicated CSAs and/or inclusion into mainstream Calls for proposals priorities related to the use of infrastructures.
- ADRA can and shall play an active role in connecting ADR community and major related infrastructure initiatives. It is important that the community feedback on quality and accessibility of infrastructure services, as well as practical information on how to improve both aspects, are collected and provided to infrastructure initiatives on a regular basis. It can take various forms (surveys, events, working groups, working documents development, etc.), it also can consider setting priorities with regards to the infrastructure tools most relevant and important to ADR research and innovation.
- ADRA can take a lead in developing suggestions for the EC with regards to a better coordination between various EC-supported infrastructure initiatives. Using its direct links to the EC and community-based links to the ADR infrastructure initiatives, the Association can serve as a bridge, a communication channel and facilitator to help in triggering a synergy effect from the side of the EC.

6. Appendices

ADR Research Infrastructure: status and recommendations

The information collected through this questionnaire will be used solely for research purposes and drafting recommendations for the EC. The survey is compliant with the EU regulation (e.g. GDPR)

Please indicate your affiliation:

- Academia (e.g. University)
- RTO (e.g. Research Institute)
- Small and Medium-size Enterprise
- Larger company
- Public Administration
- Non-Governmental Organisation
- Self-employed
- Other

Are you involved in research activities in the field of AI, Big Data and Robotics at the following levels:

- Basic research (TRL 1-5)
- Application-oriented research (TRL 5-7)
- Technology maturation and Transfer (TRL 7-9)
- Research facilitation and management
- Other

What kind ADR research, testing and experimentation infrastructure do you/your organisation use?

- Exclusively owned by your organisation (on-premises)
- Predominantly own infrastructure with episodic use of external services (e.g. for data storing/management, computing)
- You heavily rely on external infrastructure services providers

What EU supported ADR R&I infrastructure have you ever used?

- EuroHPC (e.g. Supercomputing Access Calls, AI Factories Access Calls)
- EU AI-on-Demand Platform
- AI Testing and Experimentation Facilities
- EDIH infrastructure and services
- European Open Science Cloud Platform
- Other
- I have never had experiences with EU-supported research infrastructures

If you picked "Other", please provide details:

What are, in your view, main barriers for a wider use of EU-supported research infrastructures?

- Insufficient awareness of available opportunities ("I just don't know what is out there")
- Level of technological maturity of available services is insufficient
- Difficulties in navigating and searching for a right service
- Technical complexity to access the service
- Legal/organisational complexity
- Concerns related to sharing sensitive data
- Other

If you picked "Other", please provide details. Also, if you want to share your experience - please describe it

Please share with us what, in your view, can be done to improve the accessibility of EU ADR research infrastructures. In more general terms, what would you recommend in order to increase the impact of EU ADR infrastructure on research and innovation in Europe?

We appreciate your feedback!