

Selection **Criteria** for the identification of ELIXIR Recommended Interoperability Resources

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What is an RIR?

The selection of RIRs aims to make non-binding *suggestions* (*i.e.*, it is not mandatory that members of ELIXIR are required to use them) of interoperability services that can aid the FAIRification activities both forward (prospectively streamlining standardised process workflow and tooling), and backward (retrospectively curation of existing data). The benefits of becoming an RIR include increased visibility of the service within ELIXIR, a notable status of service maturity and functionality that is fit-for-purpose, and a recognition of recommended externally-reviewed service as part of the ELIXIR Interoperability Platform that is highlighted when the Platform is referenced by an international policy strategy (e.g., [the European Research Council Open research Data Management Plans](#)). The selection of RIRs provides exposure and promotion of a matured service as a good practice encouraged for adoption by the scientific community internally, and externally to ELIXIR.

- The ELIXIR Interoperability Platform has established a service selection process to identify 'ELIXIR Recommended Interoperability Resources' (RIRs) that facilitate downstream interoperability across data, tools, and compute infrastructures.
- RIR status indicates maturity of the RIR for its stated purpose. We encourage the RIRs to continue to engage within ELIXIR via the Interoperability Platform.
- The selection criteria were based on four considerations: facilitation to scientific discovery, quality of resource, community support & community impact, and resource legal framework & governance.

The Recommended Interoperability Resources highlight the important task of *Interoperability* functionality of the resource. The resource must facilitate the FAIRification activities that aids user to *process* their data content with metadata that

- 1) use a formal, accessible, shared, and broadly applicable language for knowledge representation
- 2) use vocabularies that follow the FAIR principles
- 3) include qualified references to other data or metadata

In addition, the resource must demonstrate the plan for long-term sustainability and the usage and support by the community to be considered an RIR. The resource may be specific to data types (*i.e.*, resource is exploited on a specific scientific biological question), or independent of data types (*i.e.*, resources provides the means to FAIRify data regardless to the context of specific scientific question of interest). The ELIXIR RIRs

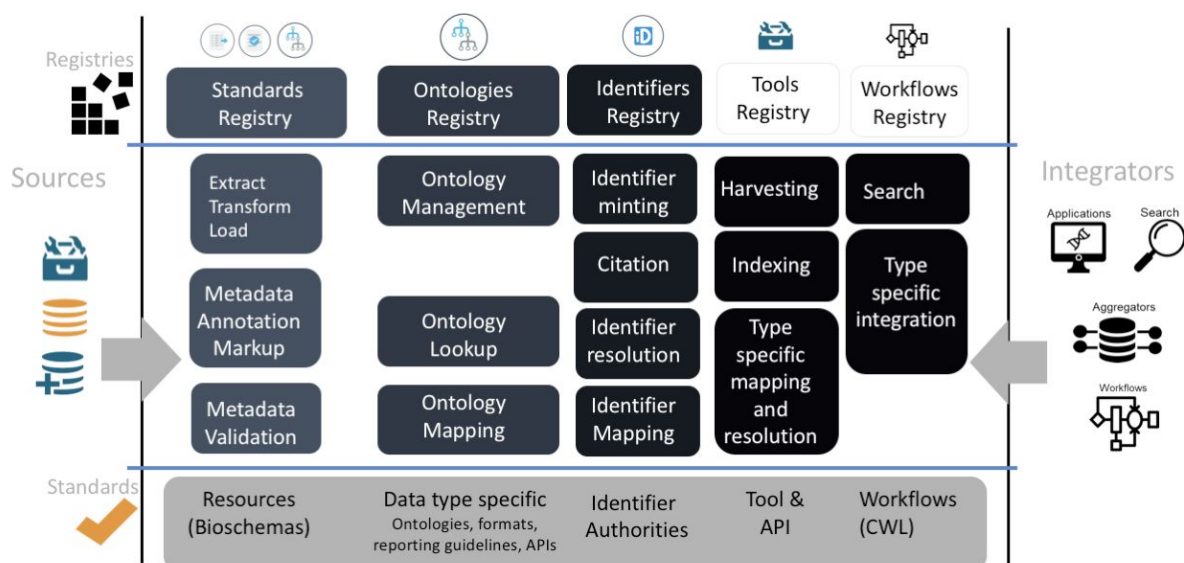
focus on the process of FAIRification (e.g., metadata validation, ontology mapping, identifiers linking) and do not function to measure the FAIRness of the content - RIRs are not intended to be a data resource/repository (*i.e.*, RIRs are judged by the quality of the service and process maturity, and not the data quality or content maturity).

The Selection Criteria

The ELIXIR Interoperability Platform (EIP) has identified a set of criteria that are relevant for selecting ELIXIR Recommended Interoperability Resources. These criteria should be viewed as guidance for a minimum set of requirements. For instance, **it is unlikely that a resource would fulfil all of these criteria, but it is required that the resource needs to fulfill the minimum requirement** as denoted. For a resource to be considered for the selection, the resource:

- Must be an ELIXIR Service (*i.e.*, is part of an existing ELIXIR Node's Service Delivery Plan, or is ELIXIR commissioned work), or is in the official process/commitment of becoming one. (*required*)
- Must have evidence that it primarily performs an interoperability function, and is operational. (*required*)
- Should fit into, or be forecast to fit into, the [tasks to support the EIP Service Reference Framework](#) for data interoperability or other activities relevant to ELIXIR mission.

Interoperability Service Reference Framework



The criteria listed below are aligned with the emerging [FAIR metrics](#) framework and [FAIR data maturity model](#), and divided into the following four categories: Resource facilitation, Community, Quality, and Legal.

1. Resource facilitation to scientific research

Non-redundancy of the resource

- If there are other relevant resources, what metrics differentiate this resource from others in the same space?
- What impact does the resource have on the scientific community? How is the resource used to assist the research life cycle?

Comprehensiveness of the resource

- What is the QA/QC plan to ensure the completeness and accuracy /or/ effectiveness and responsiveness of the resource to the scientific questions of interest (*i.e.*, is the service fit for purpose?)
- If the resource is instantiable into a workflow, does the resource provide a standardised (meta)data management and/or implementation? For example, how would the resource be adopted or integrated into a workflow?
- If the resource requires additional bespoke scripting to be integrated into analyses, are there explicit and sufficient instructions and documentation on the additional technical requirements/local installation necessary for users to perform the task?

Inter-organisational collaboration of the resource

- Who, if any, outside the resource host collaborates in the operational development of the resource?
- Is the resource supported and/or adopted by a recognised community? This may be measured by, for example, geographical diversity in sources of submission, user requests, external collaborators, international diversity of delivery partners, resource operators and/or funders.

2. Community

Documented evidence of community impact (e.g., publication citations, API calls, projects using the resource, etc.)

- Who are the resource's users, and from which communities?
- How is the resource usage tracked/recorded?
- How is the resource being used/integrated in the user's scientific research? What are the user's dependencies on the resource?

Established community outreach/support strategy:

- List of resource support publication(s)/user documentation(s) associated with the resource
- How does the resource engage with the user community e.g., organise a community workshop to disseminate the resource ?
- Is there a record of resource improvement plan (e.g., internal review) to incorporate user feedback to better serve the community?
- Other equal-opportunity research support (e.g., accessibility for users with disabilities) (where applicable).

3. Quality of resource

Operational quality

- Technical performance: Average percentage uptime/month during the last 12 months, response time of the resource. In other scenarios where up/down time is not applicable, alternative metrics may include interval of update/release, trackable response to user's request/question time.
- Accessibility: what are resource retrieval mechanisms? Does the resource provide web-based user interface, application programmable interface (API), containers, and/or other channels? Support of ELIXIR-AAI platform (where/when applicable)
- Content quality: if relevant, what is the process for populating the resource growing the content and the data served? (e.g., manual curation, data harmonisation, or automated processing)

Maintenance quality

- Is there a maintenance SOP or plan, reflecting sustainability and scalability?
- Does it align with [guidelines for sustainable software development](#)?

Support quality

- Is there an assigned contact or helpdesk, or a named and current contact on the relevant web site (e.g. help@resource.org)?
- What is the method to collect user feedback? What is the timeframe of the resource's active response to feedback?
- Are tutorial/training documentation/materials available? In what formats? Are they linked and indexed on [the ELIXIR's Training Portal \(TeSS\)](#)?

4. Legal framework, funding, and governance

Legal framework

- What are the resource's license/terms of use? Some examples of conformant licenses for data can be found [here](#), and for software [here](#).
- Can the license facilitate [Open Science](#)?
- If applicable, is there a publicly available privacy policy in which use and security around personal data are described? E.g. [The EU General Data Protection Regulation \(GDPR\)](#)
- If applicable, is there an ELSI policy in place to comply with relevant international standards and best practice? (see the [ELIXIR ELSI Policy](#)).

Funding & sustainability plan

- List of funding sources supporting the resource
- Sustainability plan of the resource operation over the next five years OR demonstrating a critical impact on the community where maintenance of the resource is crucial, and strategically supported by a maintenance scheme. This may include a list of current in-progress proposals, or is evidenced by the success of continuous funding for the resource, as standalone or as part of research activities, in the past.



Governance

- Should have a QA/QC plan that guarantees similar quality governance to that of ELIXIR (which entails, for instance, having a Scientific Advisory Board). The resource may ensure monitoring and quality assurance of the resource by:
 - a. Having a plan to establish an annual review process (*e.g.*, a Scientific Advisory Board).
 - b. Having demonstrable quality assurance mechanisms in place
 - c. Having an established resource life-cycle management plans
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