E-RIHS ERIC Data Management Policy

Approved by the E-RIHS ERIC General Assembly on 27 May 2025

E-RIHS ERIC Data Management Policy

Approved by the E-RIHS ERIC General Assembly on 27 May 2025

Reference: Pursuant to Articles 9(3) and 24 of the E-RIHS ERIC Statutes

Document ID: E-RIHS_GA13-Data-Management-Policy

TABLE OF CONTENTS

GOAL

As stated in the ERIC Regulation, the E-RIHS ERIC should develop appropriate measures to ensure the optimal use and exploitation of project results. This should cover, in particular,

- the management of knowledge and intellectual property,
- the open access to data produced, both data produced by the ERIC and data contributed by the national nodes (if applicable),
- plans for the use of results (e.g., technology transfer or support to spin-off companies) and dissemination activities (e.g., through educational and/or publishing activities).

Basic principles shall be included in the statutes (Article 10(g) (iii), (iv) and (viii) ERIC Regulation).

The appropriate measure elaborated in this document consists of a high-level data management policy covering the whole E-RIHS research infrastructure (including DIGILAB) to join the step 2 application for the legal European research infrastructure Consortium (ERIC).

CONTEXT AND METHODOLOGY

1. The primary objective of the E-RIHS Data Management Policy is to put into a separate statement a series of principles which conform to the intentions of the statutes around data access and processing conditions.
2. The secondary objective of the E-RIHS Data Management Policy is to demonstrate E-RIHS's commitment to both open science and the fullest protection of the privacy of data subjects, as well as, inter alia, protecting the intellectual property rights of the data owners.
3. Four specific benefits were kept in mind throughout the development process of the plan:
    a. Data users at all levels should benefit from a uniform approach to data access wherever possible.
    b. Metadata users within the E-RIHS ERIC and the E-RIHS National Nodes will benefit from a legally binding statement for re-use, keeping in mind the IPRs of the owners of such data.
    c. Metadata users external to the E-RIHS ERIC and the E-RIHS National Node will also benefit from free access to E-RIHS's rich resource discovery metadata, keeping in mind the IPRs of the owners of such data.
    d. E-RIHS National Nodes will benefit from a unified approach to access, whereby workflows may be able to be shared/repurposed.
4. The concept of this list of principles is to construct a short, relatively generic policy (detailed enough to prevent confusion, but not so explicit as to make it impossible to implement by all the members of the E-RIHS consortium) and some implementation guidelines.
5. The E-RIHS National Nodes will be encouraged by these principles to employ uniform access conditions. E-RIHS ERIC will publish exemplary statements for terms and conditions for both data owner/data service and data service/data user agreements. (for reference : Clarin ERIC Licensing Framework)
6. It shall be expected that all E-RIHS National Nodes in the E-RIHS ERIC will implement this policy. Together with these principles in this data management policy, the E-RIHS ERIC will, for its own data, always adhere to the FAIR principles as laid down in Annex 1, in relation to the data for which the legal person is data owner itself.

7. All principles should come into immediate effect; however, because E-RIHS National Nodes have different levels of maturity and capacities, there is an expectation that all E-RIHS National Nodes will have implemented all these principles within three years of the foundation of the ERIC. Not every eventuality relating to national legislation, local policies and cultural differences can be predicted, therefore some latitude has been written into these principles to allow for minor interpretive differences.

8. This data management policy covers the planned DIGILAB platform as well as all data produced by E-RIHS platforms and activities (as e.g., research activities). No additional data management is needed in general and there should be no access providers with specific additional issues for ARCHLAB, MOLAB and FIXLAB. The references related to DIGILAB as mentioned in the Scientific and Technical Document are summarized in Annex 2.

9. It should be noted that E-RIHS National Nodes will execute other activities than the one related to E-RIHS. The policy will not apply on those activities and resulting data.

E-RIHS DATA MANAGEMENT POLICY PRINCIPLES

Principle 1: The responsibilities of an E-RIHS National Node regarding **access** to any data collection through any of the four access platforms shall be managed by a license/agreement between the data owner and the E-RIHS National Node.

Principle 2: The responsibilities of a user regarding the **use** of any data collection through any of the four access platforms shall be managed by a license/agreement between the E-RIHS National Node and the user.

Principle 3: All data holdings shall be **available to anyone** regardless of status, nation or type of use (except redistribution) unless there are exclusions which prevent it.

Principle 4: All data holdings, documentation and metadata of each E-RIHS National Node shall be available free at the point of access for public research and education.

Principle 5: All data holdings of each E-RIHS National Node shall be identifiable on the public web.

Principle 6: Each data collection shall have its access conditions clearly displayed; in some cases, a tailor- made approach may be beneficial.

Principle 7: Each data collection shall have documentation which allows its use (preferably using open standards to aid intelligibility and interoperability).

Principle 8: Documentation shall be accessible to all and at no cost unless there are known restrictions which prevent this; if so, conditions to allow access should be made based on fair and reasonable conditions.

Principle 9: Resource-discovery metadata in a structured format shall be openly available for any third party to harvest. The metadata should make clear the provenance of the resources.

Principle 10: Resource-discovery metadata shall include a persistent identifier and appropriate and consistent categories (from vocabularies, thesauri, or ontologies) to ensure findability and robust linking.

Principle 11: Access conditions to data shall be fully interoperable to all users as much as possible.

Principle 12: Access conditions shall be applied only taking into account: disclosure risk, intellectual property rights, and reasonable first use period.

Principle 13: E-RIHS National Nodes shall advise data owners on the most appropriate access conditions.

Principle 14: This policy shall be adapted and reviewed by the General Assembly, every five years or more frequently if required, and discussed with the Committee of National Nodes.

IMPLEMENTATION NOTES FOR THE PRINCIPLES

These notes are for guidance, and do not need to be approved. They form a living document which deals with interpretation. With the principles as written we cannot avoid a difference between expectation and actuality, and we cannot avoid local differences of implementation because of cost, local interpretation oflegislation, and differences in terms of funders' opinions.

PRINCIPLE 1

The responsibilities of an E-RIHS National Node regarding access to any data collection through any of the four access platforms shall be managed by a license/agreement between the data owner and the E-RIHS National Node.

For E-RIHS National Nodes to act within the law it is necessary to have a license (or agreement) in place to address the redistribution of data acquired in each case. The license should state the rights of the owner, and the data controller, and it should give the conditions under which the E-RIHS National Node can provide access to such data. These are traditionally known as "Depositor's Licenses" and are legally binding contracts.

There will (inevitably) be some cases where the right's holder/ data controller is unknown. Examples include creators who have died and there is no clarity over the inheritor; creators as organizations which have no clear successor; and creators as organizations which have a clear successor, but that successor is not eligible to manage those rights (e.g., in Estonia, data created during the Soviet regime). In such cases treating these data collections as 'orphan works' will be sensible, and these are to be processed according to the law of the partner country.

As noted, these are traditionally called "Depositor's Licenses". However, with separation of roles, we should distinguish between Data Owners (those who are the rights holders in the data), Data Controllers (who for data where there is a risk of disclosure of personal information are the 'risk managers' of those data) and Data Creators (those who create the data). These three actors are not identical. The license/agreement in this principle should be between the Data Owner (and Data Controller if different) and the E-RIHS National Node (or its legal entity).

PRINCIPLE 2

The responsibilities of a user regarding the use of any data collection through any of the four access platforms shall be managed by a license/agreement between the E-RIHS National Node and the user.

For To manage the license between the E-RIHS National Node and the Data Owner/ Data Controller, an agreement (or license) between the E-RIHS National Node and the data user is necessary. This protects the E-RIHS National Node against any use which the Data Owner might object to.

This agreement may be limited to a set of terms and conditions, but it would be important to ensure that users are agreeing to those terms rather than just having their existence drawn attention to. For example, one E-RIHS National Node could have on their website that users are asked to "please observe" the conditions of use. It is likely that this does not make an agreement. If the wording were to say: "By downloading data from this site, I agree to follow the following terms and conditions…" this would constitute an agreement.

The statement as it stands will also cope with data being accessed through an API.

E-RIHS

During the implementation phase of the data management policy, E-RIHS ERIC will publish recommended Terms and Conditions and the E-RIHS ERIC will use these as part of their negotiation with aspiring members.

Principles 1 and 2

Where E-RIHS National Nodes make data available under an Open license (e.g., creative commons attribution 4.0) then principles may be implemented differently. In the case of a creative commons attribution 4.0 license the agreement is explicitly between the 'data owner' and the 'user'.

PRINCIPLE 3

All data holdings shall be available to anyone regardless of status, nation or type of use (except redistribution) unless there are exclusions which prevent it.

This principle does not provide an exhaustive list of exclusions. However, the key requirements which may prevent data from being made available for re-use include privacy and consent issues, contractual issues, intellectual property requirements (especially with linked data), national security (political science), and trade secrets. There may be others which are not anticipated here.

Privacy requirements explicitly include the appropriate management of consent for data sharing by data subjects. Consent shall be registered.

Legal requirements include both contractual (subject to data owner permission) and statute law (national legislation). Therefore, if consent for commercial use is not given there are privacy requirements which would limit access, etc.

Principle 12 also explicitly deals with different access conditions. We must accept that this principle is idealistic since data owners/data controllers are the final arbiters of access conditions, since it is they, not the E-RIHS National Nodes who are the data owners. Thus, they decide; our obligation to these principles is to help data owners come to the right decision.

"Openness means access on equal terms for the international research community at the lowest possiblecost, preferably at no more than the marginal cost of dissemination. Open access to research data from public funding should be easy, timely, user-friendly, and preferably Internet-based."

PRINCIPLE 4

All data holdings, documentation and metadata of each E-RIHS National Node shall be available free at the point of access for public research and education.

The design of this wording is to allow those E-RIHS National Nodes who already (or may in the future) make a 'handling' or 'special' charge for services which they provide, e.g., copying data to a media, posting it, or maintaining a safe room. The principle for implementation is that access to the data is free, but that if the access method is a value-added service, it can be charged for.

PRINCIPLE 5

All data holdings of each E-RIHS National Node shall be identifiable on the public web.

This means, in essence, that the names (and other key information) of all the data holdings of each E-RIHS National Node should be publicly available. It doesn't mean they should be

accessible. Thus, if E-RIHS National Nodes have some data which is 'preservation only' these should be identifiable. It is of course possible that this principle cannot be fully implemented by all National Nodes since some of the holdings may need to be held confidentially. In these cases, we recommend that National Nodes put some explanatory text on their website which explains non-conformance to this principle.

The issue around older editions/versions or parts of current data collections needs further thought and explanation. It is not the intention of this plan that National Nodes make accessible earlier editions or parts of data collections which are also available.

PRINCIPLE 6

Each data collection shall have its access conditions clearly displayed; in some cases, a tailor-made approach maybe beneficial.

This seems to need no implementation guidance.

PRINCIPLE 7

Each data collection shall have documentation which allows its use (preferably using open standards to aid intelligibility and interoperability).

At this stage the implementation guidance will not provide a minimum level of documentation. However, the informally agreed baseline is that for a member of their 'designated community' the data collection should be independently understandable without recourse to the creator.

In those cases of legacy data where there is minimal documentation, and little hope of providing much without significant work, this rule cannot be applied consistently. Therefore, this applies for all new acquisitions to the E-RIHS National Node, and where the depositor is a known data owner. Exceptions should be allowable in other cases.

PRINCIPLE 8

Documentation shall be accessible to all and at no cost unless there are known restrictions which prevent this; if so, conditions to allow access should be made based on fair and reasonable conditions.

This wording is linked to the wording of Principle 3. There are cases where documentation (and or metadata) is deemed to be a disclosure risk in themselves. However, the key principle is that documentation and metadata should be freely available to all without restriction (except redistribution) regardless of the data access conditions of their related data collection.

PRINCIPLE 9

Resource-discovery metadata in a structured format shall be openly available for any third party to harvest. The metadata should make clear the provenance of the resources.

From an implementation point of view this principle is to mandate the use of a protocol for specific (a minimum set not yet agreed) resource-discovery metadata to be available to anyone.

E-RIHS National Nodes will need to ensure that they have the rights to make any resource-discovery metadata which they use available in this way (cf. Principles 1 and 4).

PRINCIPLE 10

Resource-discovery metadata shall include a persistent identifier and appropriate and consistent categories (from vocabularies, thesauri or ontologies) to ensure findability and robust linking.

This principle is vague to allow for multiple solutions.

The purpose of this statement is not really to apply a technical solution, rather it is part of a strategy to increase the findability of our data holdings.

PRINCIPLE 11

Access conditions to data shall be fully interoperable to all users as much as possible.

This principle is designed to allow for interoperability between E-RIHS National Nodes and to make things simpler for users of the E-RIHS portal and platforms. It is expected to lead to greater harmonization across E-RIHS National Nodes, but it is not designed to force complete harmonization. There are differences of practice across data owners which the National Nodes cannot influence (see Principle 13) but would like to. By interoperability, we mean, at the lowest level, that 'standard' access conditions are interpreted in the same way across E-RIHS National Nodes. So, registration means the user giving basic details, but which details may differ between National Nodes. Each National Node will be transparent concerning its access conditions.

PRINCIPLE 12

Access conditions shall be applied only taking into account: disclosure risk, intellectual property rights, and reasonable first use period.

This is another principle which is not necessarily to be implemented in the same way by each E- RIHS National Node. It is a statement of intent which National Nodes should take into consideration when negotiating for data with data owners. A flow chart could easily show how, in principle, this can be implemented. Each National Node will be transparent concerning its access conditions.

PRINCIPLE 13

E-RIHS National Nodes shall advise data owners on the most appropriate access conditions.

The only advocacy principle here. It relates especially to Principle 12. Several E-RIHS National Nodes are already doing this successfully.

PRINCIPLE 14

This policy shall be adapted and reviewed by the General Assembly, every five years or more frequently ifrequired, and discussed with the Committee of National Nodes.

This principle states that only the General Assembly can initiate or approve the review of this policy. This is to be done in discussion with the Committee of National Nodes (CNN) and the director of the E-RIHS ERIC.

GLOSSARY OF TERMS

ARCHLAB	E-RIHS platform that offers access to specialized knowledge and organized scientific information in datasets largely unpublished from archives of museums, galleries, and research institutions
Data Owner	The term 'Data Owner' is used in this document to define the rightsholder of the data. It may refer to a person or organization.
Data Creator	The 'Data Creator' is the entity who creates the data.
Data Controller	The 'Data Controller' is defined in GDPR as 'the natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data'.
Data collection	The process of obtaining data of any kind, especially through research
Data holdings	All digital objects in a national node (included software, archives, research data). The term FDOs (Fair digital objects) is used by the EOSC
DIGILAB	E-RIHS digital platform that offers virtual access to FAIR scientific data and digital tools concerning tangible heritage, including searchable registries of multidimensional images, analytical data and documentation from large academic as well as research and heritage institutions
Disclosure risk	Any risk related to the disclosure of a resource (including GDPR, IPR, data governance, etc.)
FAIR principles	Guidelines to improve the **F**indability, **A**ccessibility, **I**nteroperability, and **R**euse of digital assets (https://www.go-fair.org/fair-principles/)
FIXLAB	E-RIHS platform that offers access to large-scale and medium- scale facilities, offering a unique expertise to users in the heritage field, for sophisticated scientific investigations on samples or whole objects
Metadata	"Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource. Metadata is often called data about data or information about information." -- National Information Standards Organization http://www.niso.org/publications/press/UnderstandingMetadata.pdf
MOLAB	E-RIHS platform that offers access to an array of advanced mobile analytical instrumentation for non- invasive measurements on valuable or immovable objects, archaeological sites, and historical monuments

E-RIHS

ANNEX 1. USE OF FAIR DATA IN E-RIHS ERIC

INTRODUCTION

This document deals with the way the E-RIHS ERIC will make available its research data as FAIR data.

Unless limited by existing legal restrictions or justified by legitimate interests, all publications and data produced as part of E-RIHS ERIC shall be published/released under an open Creative Commons license, or an agreed equivalent license.

FAIR PRINCIPLES IN E-RIHS ERIC

The FAIR principles are a series of guidelines to help ensure that users can Find, Access, work with (Interoperable) and legally Reuse published research data. Within this DMP, these four main guiding principles have been used to help organize and present how E-RIHS ERIC will manage its data.

MAKING DATA FINDABLE

Making data Findable relates to ensuring that data are described with appropriate metadata, are uniquely identified with open PID and that the PID can be used to discover the data online. E-RIHS ERIC will take the following steps to improve the Findability of the data produced.

- All public E-RIHS ERIC data shall be published with clear agreed standardized metadata to aid discoverability.
- Where relevant, existing, published metadata standards will be followed and their use within the project will be documented.
- When E-RIHS ERIC data cannot be published, due to agreed and documented "legitimate interests", details of, and metadata for, the data will still be published, along with a description of the conditions that restrict its publication.
- All E-RIHS ERIC data will be published with publicly resolvable references or URLs and it is recommended that this will be in the form of a publicly resolvable Persistent Identifier (PID), such as a Digital Object Identifier (DOI).
- Appropriate and consistent categories, keywords and/or terms shall be associated with all published E-RIHS ERIC data to further aid discoverability.
- Details of all published E-RIHS ERIC data and related publications will be aggregated by the E- RIHS ERIC Central Office to form the basis of a registry of exploitable assets. This registry will also be made public.

MAKING DATA OPENLY ACCESSIBLE

Making data Accessible relates to ensuring that data, or at least the metadata defining and describing the data, are retrievable online via standard, documented procedures. FAIR data do not "need" to be open, but their existence does need to be documented and a digital description of them, including any access restrictions do need to be accessible. E-RIHS ERIC will take the following steps to improve the Accessibility of the data produced through activities on the four platforms.

- All E-RIHS ERIC data will be published in a publicly accessible and reliable repository. In absence of an own (or shared national) repository, the E-RIHS National Node can use a dedicated community area on Zenodo to act as a repository for E-RIHS ERIC data.
- Metadata describing all E-RIHS ERIC data, shall be published using open standards whenever practicable.
- Where it is not possible for the actual data to be released, due to agreed and documented "legitimate interests", details of the data and any required metadata shall still be registered in an appropriate repository to enhance accessibility. These registered details should include information describing where the data can be accessed and what the existing restrictions are on access.
- Where data have been lost, destroyed or are inaccessible, the publication of the data details, including any required metadata, shall be maintained to ensure any references to the data will still resolve to a description of the data.
- Repositories to be considered for storing and sharing E-RIHS ERIC data should:
    - Be compliant with EU obligations - this can be verified using the tools provided at: https://re3data.org.
    - Provide access to data and metadata via standardized protocols (e.g. Zenodo provides access via OAI-PMH and REST APIs).
    - Have a clearly stated secure, sustainability plan, providing long term service (e.g., Zenodo's services are currently indicated to be available for at least the next 20 years and is linked to the lifetime of the host laboratory CERN).

MAKING DATA INTEROPERABLE

Making data Interoperable relates to ensuring the appropriate use of common formats and standards and describing or categorizing data with agreed terms which are documented within open controlled vocabularies. E-RIHS ERIC will take the following steps to improve the Interoperability of the data produced in the project.

- Standard and open file formats will be used whenever practicable - for less common formats references and links to relevant documentation will be provided.
- The standards used within a given data set shall be documented as part of the discoverable metadata attached to E-RIHS ERIC data.
- Non-standard or proprietary formats will also be listed along with links to appropriate descriptions of the formats used.
- Where possible, all categories, keywords and/or terms used to describe or define E-RIHS ERIC data shall be selected from, or connected to, existing publicly linkable vocabularies.
- New or non-standard categories, keywords and/or terms required to describe or define E- RIHSERIC data shall be added to existing open vocabularies or published as part of the central E-RIHSERIC vocabulary.
- E-RIHS ERIC shall establish a continuous process to improve the use and understanding of practicable interoperability; this work will be widely disseminated to improve the interoperability of this work and data.
- E-RIHS ERIC shall establish a continuous process to develop and improve interoperability. This work will also be widely disseminated.

MAKING DATA REUSABLE

Making data Reusable relates to ensuring that data are well documented and clearly licensed. E-RIHS ERIC will take the following steps to improve the Reusability of the data produced through activities on the four platforms.

- Within E-RIHS ERIC, where possible all data shall be published/released under an open Creative Commons license, or an agreed equivalent license, preferably CC-0 or CC-BY.
- All data published/released within E-RIHS ERIC shall have a clear right statement attached to it.
- If the actual data are embargoed for an agreed period, this time shall be documented and indicated as part of any registered metadata.
- Any required citation, or acknowledgements, will be clearly defined and documented as metadata.
- Where it is not possible for the actual data to be released, due to agreed and documented "legitimate interests", the data documentation, published with its metadata, will clearly describe any limitations for reuse and indicate, when there is a specific time related limitation, when the data will be available for reuse.

OTHER GENERAL ACCESS RESTRICTIONS

As data are gathered and created within E-RIHS ERIC, some specific access restrictions and limitations relating to existing IPR, or legitimate interests may be identified. Where these restrictions and limitations are shown to relate to multiple datasets or to the whole spectrum of activities, they will be added to future versions of this document.

ANNEX 2. E-RIHS DIGILAB PLATFORM

The principles in this document are applicable on all the E-RIHS access platforms. In this stage the DIGILAB is not yet operational but will be a main driver for implementing the data management policy. Hence it is relevant to repeat the actual references to the DIGILAB in the Scientific and Technical Description (STD).

STD p. 11 E-RIHS DIGILAB

Research facilities concerning the study of heritage by means of Heritage Science digital research data and including digital services, digital research tools, expertise, and resources, offered remotely through online access. E-RIHS DIGILAB has been envisioned to primarily fulfill two main roles: integrate data predominately generated by E-RIHS FIXLAB, MOLAB and ARCHLAB analyzing the assets described above, and provide a set of digital tools for interrogating, processing, analyzing, and interpreting such data, adding new knowledge. Thus, E-RIHS DIGILAB is envisioned as a knowledge creation space, in addition to its functions of curation of scientific data and management of reference collections and libraries (e.g., spectral libraries of pigments). Complementarily, it should provide catalogue information on E-RIHS ARCHLAB, and once its archives are digitized, integrated this within E-RIHS DIGILAB.

STD p. 14 Access to E-RIHS ERIC DIGILAB

Access to E-RIHS ERIC DIGILAB is, as the other E-RIHS ERIC access platforms, not restricted to E-RIHS ERIC Members. Because of its fully digital nature and the associated constraints and opportunities, E-RIHS DIGILAB will have its own access rules. It will nevertheless ensure cohesion between the platforms and will be a key tool in integrating the community.

Within the E-RIHS DIGILAB, which will follow an Open Access policy, metadata about digital resources hosted by E-RIHS data providers will be available under a Creative Commons Open License such as CC-0 or CC-BY. However, the data sets themselves, primarily hosted by E-RIHS DIGILAB-linked repositories, may be subject to more restrictive re-use license agreements, depending on their source, the specific repositories and their data access policies. In these cases, access to data and their re-use limitations may apply for copyright reasons, or for the purpose of data protection, as well as to protect Intellectual Property Rights (IPR) if necessary.

In line with EU recommendations, data made accessible via DIGILAB will be " as open as possible …" and "...as closed as necessary".

DIGILAB will align with EOSC, the European Open Science Cloud regarding its operability.

STD p. 23 3. Access to Research Data

This particularly corresponds to the supply of databases and or digital tools to the E-RIHS DIGILAB. **While new data produced within E-RIHS ERIC will be automatically fed into E-RIHS DIGILAB**, where possible in accordance with the FAIR policy, Partners may hold valuable preexisting datasets that are presently unavailable, and their in-kind value would be agreed on the case-by- case basis. Retrieval, processing, and integration of such data could also be contributed in-kind, in which case the unit costs include person-time, overheads and is calculated per unit of time.

E-RIHS

ANNEX 3. DRAFT IMPLEMENTATION ROADMAP

INTRODUCTION

This data management policy offers a broad framework for its implementation by the E-RIHS National Nodes and the E-RIHS ERIC, and defines a transition period. Nevertheless, there will be a difference in maturity levels with the E-RIHS National Nodes. An action plan with priorities could be envisaged.

Following is a draft implementation plan.

PLAN QUALITIES

- o to allow gradual adoption and evolution, we could identify **maturity levels**.

PRIORITIES

- P1: General Principles and Desiderata (what we are discussing now)
- P2: Registry of Organizations, Persons, Projects
    - o Registry's Services: content browsing, news and notifications services
- P3: Registry of useful HS resources (portal for HS)
    - o Tools, Methodologies, Services, Training Material, etc.
- P4: Registry of Datasets (and or their metadata)
    - o Issues
        - ▪ Suggested schema(s) to describe each of them
        - ▪ Focus on discoverability, provenance, and access rights
        - ▪ Support of (be able to accommodate) various levels of detail and complexity
    - o Registry's Services
        - ▪ Browsing, keyword search, semantic search, structured query answering
        - ▪ Ingestion: bulk updates, harvesting, transformation technology
- P5: Aggregation, linking and integration of the dataset's metadata
    - o Issues
        - ▪ We could use the CIDOC CRM to showcase how datasets can be connected with their context (who, where, when, why, what, etc.) to form a meaningful and coherent semantic network.
    - o Services
        - ▪ Advanced browsing and querying services over integrated metadata
        - ▪ Various services are required to achieve this integration (cleaning, normalization, entity matching, fact checking, enrichments, etc.)
- P6: Hosting of datasets
    - o Storage Space, licenses, costs
- P7: Deep data integration
    - o Aggregate, link and integrate not only the metadata, but also the contents of the datasets (for answering questions that are not currently answerable, for validating/invalidating hypotheses, for fact checking, for deductions, for analytics, for story-telling services, and data-intensive scientific discovery in general)