IMPLEMENTATION PHASE

E-RIHS IP

European Research Infrastructure for Heritage Science

Implementation Phase

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D.3.4 Draft of the E-RIHS Quality System Implementation Plan

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Abstract

The quality manual with Key Performance Indicators, designed during the preparatory phase of E-RIHS PP is the foundation to the **quality system implementation plan** which has been **re-drafted** to focus on updating necessary procedures and processes for the quality assessment of prospective new partners and services, for the quality auditing of existing E-RIHS partners and services as well as for parties seeking endorsement or support by E-RIHS.

Adjustments presented herein regard the tailored set of E-RIHS KPIs acting upon the recommendations of the Commission HLEG of June 2020 to ensure for the effective quality monitoring of activities against reasoned targets for E-RIHS ERIC.

With a view towards operations, the responsibility for quality management has been assigned chiefly at national node level with coordination by and delivery to the central hub. This is subject to change and further clarification over the course and development of the E-RIHS IP project and beyond.

This deliverable furthermore provides the necessary indications towards defining the overall strategy of how each quality element drafted during E-RIHS PP is to be rendered operational with a dedicated timeframe of E-RIHS partners willing to undergo and test the quality assessment procedures outlined herein during this implementation phase.

This live document is under continuous evolution with attention to the progression of overlapping parallel tasks.

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Abstract (for dissemination)	The deliverable describes an updated draft E-RIHS quality and KPI monitoring system for the assessment of prospective new partners and services, for the quality audit of existing E-RIHS partners and services and procedures for endorsement. A timeline for testing procedures is indicated herein.
Keywords	E-RIHS: Heritage Science; Quality System; Quality Manual; KPI.

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Abbreviations

Abbreviations	Expansion
BSD	Berkeley Software Distribution
CC-NC license	Creative Commons – Non-Commercial license
CC0	CC0 1.0 Universal (Creative Commons deed with no-copyright dedication)
DIGILAB	E-RIHS digital platform offering 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.
DIN	Deutsches Institut für Normung (German Standardization Institute).
DMP	Data Management Plan.
DSA	Data Seal of Approval (a self-assessment process for digital archives, aimed at archives that hold data).
EOSC	European Open Science Cloud.
ERIC	European Research Infrastructure Consortium.
E-RIHS	European Research Infrastructure for Heritage Science.
EU	European Union
FAIR	Data which meet standards of Findability, Accessibility, Interoperability, and Reusability.
GPL	General Public Licence
IEC	International Electrotechnical Commission.
ISO	International Organization for Standardization.
KER	Key Evaluator Ratings (average of scores attributed by a team of evaluators appointed by the E-RIHS management on a scale of 1 – poor - to 10 – excellent - corresponding to a quantification of subjective appraisals of the quality level of the feature examined).
KPI	Key Performance Indicators (values that may be objectively measured allowing an unbiased appraisal of operational effectiveness).
NC	Non-Commercial
OAI-PMH	Open Archives Initiative - Protocol for Metadata Harvesting
RG	Research Group (any individualized group of researchers and technical support active in the context of E-RIHS).

Narrative (technical) description

For a continued coherency, this deliverable is constituted by the **updated** E-RIHS PP quality manual and KPIs. The original proposed structure is momentarily maintained constituted by a main document, the "E-RIHS Quality Policy" outlining the pertinent principles of quality management within E-RIHS and five annexes which refer to specific procedures for quality assurance:
1. *Assessment Procedures with Indicators*;
2. *Evaluation of data provision services and datasets for DIGILAB*;
3. *KPIs for the self-assessment and periodic assessment of partners*;
4. *E-RIHS Quality Manual guidance document*; and
5. *E-RIHS policy on Ethics.*

The work of Task 3.4 in E-RIHS IP is to "implement" the quality system and make it ready to use once E-RIHS ERIC has entered its operational phase. This will be executed through testing the viability of procedures for quality assessment as tentatively indicated in Table 1 below. The final "E-RIHS Quality Policy" will be submitted for approval to the GA (Art. 7.3 of E-RIHS Statutes).
This task also foresees a flexible fit for purpose set of E-RIHS KPIs and KERs to ensure effective quality monitoring of all E-RIHS services and activities.

Table 1: Timeline for E-RIHS IP quality system testing phase

E-RIHS Quality system testing phase		
QUALITY PROCEDURE	APPLIED TO	TIMELINE
AUDIT of E-RIHS partners and their services	Existing FIXLAB; MOLAB and ARCHLAB services (2 service providers each) that will integrate E-RIHS, now being offered through the European project IPERION HS	June-December 2023
Assessment of new E-RIHS services from partners National nodes	E-RIHS.it and atleast 1 more partner will undergo assessment for addition of new services	Autumn 2023
Assessment of prospective new partners- "candidates" and their services National nodes	E-RIHS.it and atleast 1 more partner will undergo assessment for addition of new partner and services (FIXLAB)	Spring 2024
Grant endorsement by E-RIHS, or support to external organizations, services, projects and proposals	Case by case basis	Open

Introduction

"E-RIHS Quality Policy"

E-RIHS, the European Research Infrastructure for Heritage Science is a distributed infrastructure integrating national facilities of recognized excellence. E-RIHS connects researchers in arts, humanities, science and engineering and fosters a transdisciplinary culture of exchange and cooperation.

The facilities within E-RIHS are _partners_ and through them the partnership offers access to a wide range of high-level scientific instruments, data and specialized knowledge for advancing science and technologies in the field of heritage science.

Quality is one of the pillars of E-RIHS and to ensure its high level throughout the partnership, quality criteria must be met by all organizations and research groups that may state a connection with E-RIHS.

This document describes the step-by-step procedures for the quality audit of existing E-RIHS partners and their services and the quality assessment of prospective new partners and their services. It also outlines the process to grant external organizations, services, projects and proposals the endorsement or support by E-RIHS. Quality assessment procedures involve: the evaluation of the candidate's internal processes, its scientific excellence and quality of its services towards eventual suitability for E-RIHS. In accordance with the E-RIHS statutes (art.2.2a), E-RIHS ERIC shall coordinate the community of National Nodes including the establishment and monitoring of quality management procedures for the National Nodes and the partner facilities. Thus, it is accepted that the indicated assessment procedures be provided by the central coordination yet upheld at the national node level with periodic reporting to the central hub.

Quality assessment features

On a general note, "quality" here is understood as an evaluation from the specific E-RIHS perspective as a degree to which distinct criteria are set and maintained within the research infrastructure. Given the varied nature of the services to which the quality assessment will apply, the procedures presented herein require flexibility. Such flexibility is to be given by a rating on personal judgements by specialists in the relevant fields. Guidelines constructed from the contents of annexes 1 and 2 will be used to support both the evaluated and the evaluator. However it must be noted that the procedure must not be considered as a bureaucratic compliance verification exercise but rather as a collaborative process between all parties involved.

Quality assessment is a procedure required to ALL services offered by E-RIHS at a stated level of excellence. It addresses both partners, with simplified periodic reviews, and external institutions, candidates to become new partners or establishing collaboration with E-RIHS. It may also be used to evaluate services such as educational or diffusion initiatives from organizations other than partners, seeking an endorsement by E-RIHS. The procedure for the approval of e.g. new educational activities managed by E-RIHS partners follows instead the scheme used for new services.

The E-RIHS procedure for quality assessment includes a *meta-study*, i.e. based on publicly available sources; the *analysis of* the submitted declarations and *documentation*; *on-site visits* and *interviews as necessary*. The procedure starts on the initiative of a partner contacting its National Node and proposing new services, or of a prospective new partner ("candidate") contacting E-RIHS Central Hub and being referred to its National Node. Regarding periodic partner reviews, assessment is carried out at national level according to Central Hub coordination and timeframe.

Table 2: Application of quality assessment procedures according to institution type and subject

Assessment Procedure	Partners	Candidate new partners	External institutions
Overall quality assessment	Periodic review: simplified procedure	Admission: full procedure	Not applicable
New services offered	Simplified procedure	Full procedure, jointly with admission procedure	Endorsement: independent assessment
Feedback on services rendered	Continued assessment at National Node (data provided to central hub annually or on request)	The means for monitoring feedback should be in place on acceptance into E-RIHS	For all services endorsed by E-RIHS as a condition for future endorsements

The quality assessment procedure

The procedure for assessing the quality of institutions and of the services they provide through E-RIHS is carried out in several steps. Guidelines for each step and, where applicable, the indicators chosen for continuing appraisal will be published and made available to all institutions undertaking the procedure. The complete procedure steps are the following:

STEP 1)

> *Ex-ante quality assessment of internal procedures and processes*

> This step aims at evaluating the existence and correctness of the candidate's internal processes, including governance, management and administration. This step may be skipped or simplified if the institution is accredited / certified by a standard such as ISO 17025 [01] or ISO 9001 [02]. Verification of financial viability is also part of this step; it may be omitted for public institutions. The assessment is carried out under the responsibility of the quality representative/s at the national node.

STEP 2)

Evaluation of the services offered.

This step concerns the services provided, or to be provided, through E-RIHS by the candidate. It examines the importance of such services for the aims of E-RIHS, their adhesion to E-RIHS core values and ethical principles and the expected/actual demand by the research community. The evaluation is carried out by the national node quality representative/s.

STEP 3)

Peer review of scientific excellence of the institution and its services

The peer review is performed by the E-RIHS Scientific and Ethics Advisory board members (SEAB) or advisory committee external to the candidate, the national node quality representative/s and the coordinator of the National Node as ex-officio members (in accordance with E-RIHS STD, section 5.1, "Assessment will be performed by domain experts, members of the E-RIHS ERIC Advisory Board). It follows current academic good practices for scientific reviews.

STEP 4)

Overall assessment of the quality evaluation results and recommendation for decision

This step is carried out by quality representative/s at the national node combining the outcomes of the previous steps and assessing their results. It produces a report and a recommendation to the E-RIHS Committee of National Nodes (CNN) in accordance with E-RIHS Statutes, Art. 20.3 The E-RIHS Committee of National Nodes shall have the task to… (f) prepare annually the offer of services.

STEP 5)

Final decision by E-RIHS
The final decision lies with the E-RIHS CNN. Such decision also considers any views communicated by the coordinator of the E-RIHS National Node. It may overrule the report produced in step 4, with an appropriate justification. A final confidential evaluation report will be prepared and transmitted to the candidate.
The decision may be one of the following:
a) *Approved;*
a) *Rejected*, with justification;
b) *Approved with recommendations*: this is the case where minor issues are noted, but they are expected to be amended in the short term; the final report will indicate a plan for corrections. Final approval is then subject to the verification of successful compliance to such plan.

c) *Pending*: in this case E-RIHS sees a potential for the candidate but major issues prevent the immediate approval of the candidature. The final report will sketch out a roadmap to acceptance and will indicate, when appropriate, tutor organizations chosen within the partnership to accompany and guide the candidate to achieve full compliance. Final approval is subject to a new quality assessment of the institution/service concerned.

Probation

New partners and new services are subject to a period of probation of at least 12 months during which the activities under E-RIHS are accompanied by the quality indicators, KPIs where applicable. Following the period of probation, the national node quality representative/s produce a report to the Committee on National Nodes (CNN) recommending the positive conclusion or an extension of the probation for a further period or reporting a negative result. The (CNN) proposes on the outcome of the process to the E-RIHS central hub.

Assessment of institutions and services

The above process applies in part or totally to the various assessment cases, as detailed below.

i. *Inclusion of a new partner*

The process of the acceptance of a new partner includes all the above steps 1) to 5), applying step 2) to all the services offered. It also includes an evaluation of the in-kind contribution resulting from the services offered by the new partner.

ii. *Periodic partner quality assessment*

The quality assessment of partners is mainly based on their past activity within E-RIHS. It follows a simplified procedure, skipping step 1) and evaluating steps 2) and 3) based on the periodic reports submitted by the partner. Thus, it is mainly carried out on existing documentation, but may include also on-site visits and interviews as required. An exclusion proposal may only be motivated by serious partner defaults and is subject to the exclusion procedures set by the Governance Rules.

iii. *New services offered by partners*

The quality assessment of new services and the evaluation of their in-kind contribution are carried out skipping step 1) and evaluating only 2) and 3) as concerns the new service(s).

Table 3: Quality control features for each activity assessed.

Activity subject to Q&A control	Quality control features	
	Partner	**Non-partner**
Inclusion as new partner	Not applicable	All the steps 1) to 5) + minimum one year probation
Periodic quality assessment	Step 1) skipped; 2) and 3) mainly evaluated on periodic reporting.	Not applicable
New service	Step 1) skipped; steps 2) and 3) evaluated only as regards the new service. Minimum one-year probation.	Not applicable, it is part of the global evaluation for inclusion as new partner by the National Node
External service assessment	Not applicable	1) skipped for public bodies 3) concerns only involved people
Project/proposal support	Not available; same as for non partners for proposal support.	One-stage assessment of candidate's documentation

Allocation of resources and costs related to quality assessment

Human resources are allocated within those available and following general E-RIHS regulations. The central hub quality manager evaluates the related costs sustained by E-RIHS (e.g. for staff time, for travel costs and eventual payments to external members etc.) Special cases such as courses, summer schools etc. organized by institutions other than E-RIHS partners may be exempt but subject to special conditions (e.g. provision of special registration conditions to E-RIHS partners).

Other cases

Cases not wholly included in the categories listed above or unforeseen circumstances are to be addressed by the QBoard using as a basis the principles and procedures set by this document with the necessary adaptations.

Approval and Revision

The Quality System will be effective after ratification by the General Assembly of E-RIHS. It is revised each year in time to present proposed alterations to the General Assembly meeting to which the yearly Plan of Activities is submitted.
The annual KPI results should be considered, and any proposed alterations dully justified [03] and presented at the same time.

END Main Document V.03 (May 25, 2023)

Appendixes to E-RIHS Quality Policy

Appendix 01. Assessment Procedures with indicators (vs 2023/05/25)

Appendix 02. Evaluation of data provision services and datasets for DIGILAB (vs 2023/05/25)

Appendix 03. KPIs for the self-assessment and periodic assessment of partners (vs. 2023/05/25)

Appendix 04. E-RIHS quality manual guidance document (vs. 2023/05/25)

Appendix 05. E-RIHS policy on Ethics (vs. 2023/05/25)

1.1. Appendix 01- Assessment Procedures with indicators

Introduction

This appendix includes a list of indicators for the different steps of the quality assessment procedure as described in the dedicated E-RIHS Quality Policy document. The indicators (Key Evaluator Ratings or KER) are the average of scores attributed by the team of evaluators appointed by the E-RIHS management on a scale of 1 (poor) to 10 (excellent) corresponding to a quantification of subjective appraisals of the quality level of the feature examined. Questions that may be simply replied "yes" should be scored with "10"; while "no" scores "0".

Key Performance Indicators (KPI) instead, are values that may be objectively measured allowing an unbiased appraisal of operational effectiveness and will be used mostly for the purpose of self-assessment and periodic evaluation of accepted partners.

Often a prospective partnership or affiliation to E-RIHS will interest just a part of an organization, such as a division or a research group. In such cases most of the matters addressed will apply only to the means involved. However, subjects of relevance for the future relations with E-RIHS, such as the decision chain, financial viability, and technical or administrative management, must be assessed up to the apex of the organization.

The assessment is aimed to apply to both partner and affiliate candidates, and in the first case to those offering access to E-RIHS services. Some of the sections are only applicable to some of the cases above and should be omitted elsewise. In particular all questions related to services rendered through E-RIHS are to be omitted when assessing candidates to affiliation.

The assessment of data-related services for virtual access is dealt with separately in Appendix 02.

1. Assessment of internal procedures and processes (step 1)

1.1. Decision-making and administrative procedures and policies

- Is the decision-making chain clearly defined up to the apex?
- Are responsibilities pertaining to work under E-RIHS specified?
- Is there an accounting system in place, providing detailed information on costs and suitable to extract data relevant for in-kind contribution assessment?
- Are administrative procedures well-defined and applicable to the proposed services?
- Are the above aspects formally described in internal documents such as a manual of procedures?

1.2. Internal policies and their compliance with EU strategies

- Is there a digital data policy for the documentation of heritage science data (when applicable)?

- Is there in force a data openness policy such as the EU Open Data Strategy?
- Was the EU Open Access to Scientific Publication Strategy implemented?
- Does the institution implement a policy concerning work safety and health of personnel?

- Does the institution adhere to EU policies concerning employees:
  - o   health and safety at work?
  - o   equal opportunities for women and men?
  - o   protection against discrimination based on sex, race, religion, age, disability and sexual orientation? o informing and consulting employees?

1.3. Sustainability and financial viability

- Has the organization sufficient financial support to guarantee its continuity in the foreseeable future?
- Does it support the activities under E-RIHS ensuring its sustainability in the medium-long term (5 years minimum)?

2. Evaluation of services offered (step 2)

2.1. Access to technical means

2.1.1. Facilities and equipment

Overall conditions

- Is the facility infrastructure suitable for the proposed services?
- Are measurements, calibrations and similar activities done according to written documents such as international standards or procedures to the same purpose when standards are not available?
- Is the equipment itself appropriate for the activities foreseen?

NOTE. This question refers solely to the type of equipment and not the specific condition of the hardware e.g. to its metrological maintenance.

- Is there a regular metrological / maintenance scheme in place, with appropriate allocation of resources?
- Has the access provider (i.e. department or division in charge of the service) a previous good scientific / technical record in Heritage Science in the last five years?
- Is there a suitable spot in the premises for users to sit, use a computer and do work related with the service? (not applicable for MOLAB services)

Assessment of equipment involved in the service(s) (if applicable):

- Are there instruments valuable for research within E-RIHS but not yet available through its network?

NOTE. If applicable, please write down what they are and how they may be used.

Are there instruments already available through E-RIHS but with innovative, unique or very sought-for features? Or applications? Or expertise?

NOTE. If applicable, please write down what these features are.

- What is the fitness for purpose of the equipment involved in the service?
  In particular:
  o Has the uncertainty of measurements been reckoned? If not, then how appropriate are:
    - the instrumental resolution?
    - its repeatability?
    - its stated accuracy?
  o Which is the status of limitative conditions? (e.g. what are the detection limits and which conditions, such as the matrix, may affect the results?)

Assessment of computing resources:

- Are computing resources appropriate to research needs in terms of storage and processing power, compared to the amount and nature of produced data?
- Is there an in-house technical support for the computing infrastructure?
- Are there appropriate safety features to check the danger of contamination with viruses or malware in general?
- Is there a policy for the backing-up of data in a way ensuring its preservation in the case of foreseen risks?
- Can the organization access international (and eventually national) research and educational networks through its broadband internet connection? (not applicable for MOLAB)

2.1.2 Personnel

- Is there a central contact point (a person indicated both as overall responsible for the activities under the E-RIHS brand and for the liaison with E-RIHS)?

NOTE. If not, please state what is the local solution for these two functions and add any relevant comments you may have.

- Is the person responsible for the activities under the E-RIHS brand experienced for the role?
- Is the available staff trained, experienced and competent to conduct (or to assist users in) offered research activity, e.g. choosing the correct analytical/computational method; taking into account its limitations; assessing and critically evaluating the results; and drawing the correct conclusions? in accordance with proposed research questions

NOTE 1. It is not required that the personnel ascribed to work under E-RIHS has knowledge of e.g. all the materials/matrices they may have to analyse, but they should then be aware of their own limitations and know where within the partnership they may find the necessary capabilities.

NOTE 2. This is a crucial point that may require a detailed assessment and written account of the conditions together with eventual suggestions for a limitation of the scope of use of the means available and / or improvement (e.g., training within the partnership).

NOTE 3: the competency of the personnel must be confirmed by relevant publications in peer-review journals.

2.1.3. Service quality and relevance

- Does the service adhere to E-RIHS core values and ethical principles?
- Does the service represent overall an added value for E-RIHS?

  The assessment must consider, among others, the following aspects:

  o the research fields in which the group is specialized and its applications; or the research techniques / methods (through publications and demonstrated experience);
  o the interest for the E-RIHS users' community taking into account the balance between demand of the service from the community vs. offer within the partnership;
  o available resources (instruments and techniques and / or data). Note: these may often constitute a larger pool than those instruments offered in-kind for external access under E-RIHS.

- Are equipment characteristics appropriately documented and operating instructions available?
- When instruments are offered for external access under E-RIHS, are the characteristics available to users in English?
- Is a data management policy implemented?
- If yes, is there a data management plan compliant with the E-RIHS standards?
- Is a support service available for non-expert users?
- Based on experience of the evaluators and on the views of the local personnel what is the expected % of demand for the services offered, against the volume offered?

NOTE. After a trial period this indicator will become a KPI.

2.1.4. Access selection

• Is the proposed selection method for users under E-RIHS compliant with E-RIHS regulations?

2.1.5. Feedback from users

- Is there a feedback system in place?

NOTE. An E-RIHS-compliant feedback indicator will become a KPI.

- If the answer is negative, is the applicant ready to implement one immediately?
- If the answer is positive, what is your impression of the results having in view the standard E-RIHS criterion that on a 1 to 5 scale, at least 80% of users should rate satisfaction ≥ 4)?

NOTE. Please write down your impression on the causes for the feedback results and whether actions are taken following negative feedback.

2.2. Virtual Access (data-related services)

This subject is specifically dealt with in Appendix 02 to the E-RIHS Quality Policy.

3. Peer review of the candidate / partner (step 3)

3.1. Research

Given the fields of scientific expertise offered as services within E-RIHS, how do you assess the curricula of the researchers to address subjects in each of the individualized fields?

NOTE. Please score one KER for each field.

- On the same basis and assessing the results published and given any interviews made, how do you rate the level of scientific quality of the research group in each of the individualized fields?

NOTE: the scientific review committee should browse every publication or, if their number is considered too high, a subset made of the most recently produced.

- In the previous five years how many publications (full papers or extended abstracts published in any means following a peer review) did the group produce overall (in all fields of stated expertise)?

NOTE. This indicator will become a KPI.

- In the previous five years what was the average number of publications as above per researcher x year?

3.2. Organization & participation in dissemination events in fields within the scope of work with E-RIHS

• What activity did the research group have during the previous five years as pertains to the organization, collaboration, lecturing or attendance of dissemination events?

NOTE. If applicable a KPI will be used in the future to assess feedback from participants of events organized or co-organized by the research group.

3.3. Organisation & participation in education events within the scope of the work with ERIHS

• What activity did the research group have during the previous five years as pertains to the organization, participation, lecturing or attendance of education events?

NOTE. If applicable a KPI will be used in the future to assess feedback from participants.

END Appendix 01- (V.03 May 26, 2023)

1.2. Appendix 02- Evaluation of data provision services and datasets for DIGILAB

Introduction

This appendix describes how to evaluate and eventually accept or reject: a) the provision of datasets to be registered in the DIGILAB Registry (henceforth, *data provision services*) and b) the inclusion of data processing tools (henceforth, *tool services*) in the DIGILAB portfolio. For both, the *provider* is either a partner or an external institution. The steps and general procedures follow the specifications in the main document (E-RIHS Quality Policy).

For datasets, publicly available ones may also be considered, e.g. data published in an Open Data framework. For tool services, software tools in the public domain, provided as Open Source, freely available, and commercial ones, may also be considered. In both cases there is no provider, but a responsible institution must be identified, nonetheless.

Virtual access differs from physical access, as it has in practice no limitation on the number of users accessing the service. Access can also be repeated as necessary, consuming data and using data services with no limitation or cost increase beyond the ones for storage and management. Furthermore, digital services have their own specific requirements about quality and use, summarized below with the related indicators. In any case, offering access to datasets or tool services implies an indirect endorsement by E-RIHS, so they should be carefully verified before being incorporated in the E-RHIS virtual access offer.

Defining quality criteria as soon as possible is of paramount importance to start (and test) the operations of DIGILAB, as this is in practice a brand-new facility offered to the research community.

1. Assessment of data or service provider (step 1)

This part is identical to the institution assessment used for general services. In the case of a recurring or regular provision of different data/services this step may be omitted.

If there is no provider, it must be however specified who oversees maintaining, updating, and curating the data or supporting the service, and how these activities are planned to be carried out. The assessment will be applied to such a substitute provider.

2. Evaluation of services offered (step 2)

The procedure is like the general one outlined for all services, only differing because there is no Access selection subsection, and the Service quality and relevance subsection are replaced by the following.

2.1. Tool services

This kind of services consists in the on-line provision of tools, for example image processing or visualization tools, to process existing datasets made available through DIGILAB or datasets provided by the user for processing.

Service quality and relevance

General features

Is the service innovative and useful for E-RIHS purposes?

- Does service use require registration?
- Are there general conditions/restrictions to use the service (e.g. a CC-NC license)?
- Is the service use restricted to a particular category of users (e.g. registered professionals)?
- Is the service software provided under an open licensing scheme (e.g. BSD, GPL, etc.)?
- Is the service suitable to work in a cloud environment such as the EOSC?
- Does the service apply/use/require data standards?

Service management and documentation

- Are the service and its software well documented?
- Is such documentation available to users?
- Are on-line help and user manual available to users?
- Is result interpretation clearly explained, when necessary?

User support

- Is a support service available for non-expert users?
- Are bug reporting and commenting by users implemented?

Maintenance and sustainability

- Is there a maintenance plan for the service?
- Is there a sustainability plan for the service?

Data management

- Can results obtained using the tool be saved and incorporated in the DIGILAB repository, made available for later use, or stored for re-use by other researchers?
- Is a data management policy implemented for the results obtained using the tool, including a Data Management Plan compliant with the E-RIHS standards?

2.2. Data provision service

This case consists in the provision of external datasets to E-RIHS (i.e. generated outside of E-RIHS activities) for incorporation in DIGILAB; for example, this may include the provision of digital reference collections, results of analyses, reports of conservation work, and so on. The incorporation in DIGILAB may be *actual*, through the transfer of such datasets to a DIGILAB-controlled repository, managed by E-RIHS; or *virtual*, by enabling access through DIGILAB to data stored with the data provider. The assessment consists in the evaluation of the following aspects. Service quality and relevance

(Only for datasets stored with the data provider)

- Is the repository appropriately curated?
- Does the repository comply with standard repository trustworthiness conditions (e.g. DSA, ISO 16363 [A02.01], DIN 31644 [A02.02])?
- Is a long-term preservation plan existing and appropriate?

(Only for datasets deposited at the E-RIHS repository)

- Which is the data ingestion mechanism?
- Is it compliant with established standards (e.g. OAI-PMH)?
- Which are the frequency and the mechanism planned for updates (if applicable)?

(For all datasets, both those managed by the data provider and those deposited with ERIHS)

- Are the data relevant for E-RIHS?
- Are there plans for regular data update and curation?
- Is a Data Management Plan required for data deposit by creators?
- Is such Data Management Plan compliant with E-RIHS requirements?
- Is the contributed dataset well documented as concerns data trustworthiness (e.g. who produced the data, for which purpose, in which conditions, using which protocol, and so on)?
- Are such provenance metadata provided in the DMP or in another document?
- Does access to data require registration?
- Are there general conditions for/restrictions to data re-use (e.g. a CC-NC license)?
- Is data access and re-use restricted to a particular category of users (e.g. registered professionals)?
- Are data provided under an open licensing scheme (e.g. CC0, BSD, GPL, etc.)?
- Does the dataset use/require data standards?

3. Peer review of the provider (step 3)

Assessing and evaluating this aspect has in general less importance than in the general case. Interesting data and useful services may be provided, for example, by heritage management institutions with little scientific activity, by researchers operating in different domains or by software research unrelated to cultural heritage. So, this aspect in the main document on the quality policy will be considered as informative only.

END Appendix 02- (V.03 Brenda DohertyMay 26, 2023)

1.3. Appendix 03- KPIs for the self-assessment and periodic assessment of partners

Introduction

Adhering to the ESFRI Working Group on the monitoring of research infrastructures performance and based tightly to experiences gathered in former European projects by the E-RIHS consortium, the monitoring of access provision, education, and training, are implemented through a set of flexible Key Performance Indicators (KPIs) [03].

Key Performance Indicators (KPI) are values that may be objectively measured allowing an unbiased appraisal of operational effectiveness. This appendix includes a list of KPIs to be used as for the self-assessment of all services provided and of the productivity of research and support to research at the National Node level to be reported annually to the central hub. Non-compliance with targets should induce partners to review their internal procedures, introduce corrections and generally aim at improving their performance towards users and the Partnership in general. KPIs will also be considered (albeit not singly) for the purpose of periodic assessments of E-RIHS. It is fully expected that the base set of KPIs which follow, that have been tested for the duration of IPERION HS along with many other not included below, be supplemented where necessary as the infrastructure commences in its operations and once it stabilizes. Specifically, it is foreseen the additional ESFRI categories to be integrated into E-RIHS ERIC such as: provision of scientific advice. Policy related activities; optimizing management- Revenues; Facilitating economic activities-income from commercial activities.

1. **Access Key Performance Indicators (KPI$_{ACC}$)**

ENABLING SCIENTIFIC EXCELLENCE (ESFRI category)

Applies to all access services, i.e access to facilities by number of user proposals for access against available slots for access. For data services, number of downloads. In principle reference periods of 1 year will be used but initially a longer period (2-3 years) may be set by the quality manager to allow for the setting of a steady state and the correction of initial problems.

1.1. KPI$_{ACC}$ 1. Access demand

Measure: (Access demanded / Available access). 100%

Objective: Verify that there is demand for each service offered and that promotion of access is sufficient to attract a high inflow of interested researchers.

Target: KPI > 100% at the end of any reference period.

1.2. KPI$_{ACC}$ 2. Access provision

Measure: (Accesses provided / Accesses planned). 100%.

Objective: Verify the effective carrying out of access.

Target: KPI > 40% at midterm of any reference period.

1.3. KPI$_{ACC}$ 3. Access provision

Measure: Number of Users served

Objective: Indicator to measure the size of the community served

Target: KPI > 40% expected at midterm of any reference period.

Detailed methodology may report sub-groups- discipline and origin of users.

1.3. KPI$_{ACC}$ 4. Access quality

Measure: (Users rating satisfaction in top two categories / All users). 100%

Objective: Appraise the quality of the service from the perspective of users Target: KPI >

80% after an initial probation period of 12 months.

NOTE. Based on the multi category standard E-RIHS feedback slip.

1.4.   KPI$_{ACC}$ 4. Data Use

Optimising data use (ESFRI category)

Track extent to which the data that the RI produces and/or makes available is regarded as useful by people who could be in the same scientific domain, in other scientific domains or even by the general public. It thus provides some indicator of the wider significance of the data.

Measure: Number of publicly available data sets used externally annually

Objective: number of data sets that are subsequently accessed by data users after an initial probation period of 12 months.

2. Research Key Performance Indicators (KPI$_{RS}$)

ENABLING SCIENTIFIC EXCELLENCE (ESFRI category)

2.1. KPI$_{RS}$ 1. Scientific impact

Measure: Number of publications (papers in journals or conference books of proceedings) mentioning E-RIHS.

Objective: Verify the impact of E-RIHS in the Heritage Science research landscape.

Target: not specified.

Nb. This indicator is not suitable for very young RIs. A period of 4 to 5 years after publication is needed to have enough citation data.

3.   Event Key Performance Indicators (KPI$_{EV}$)

OUTREACH TO THE PUBLIC (ESFRI category)

Applies to all engagements achieved by direct contact (events, visitors, guided tours, summer schools, events for industry) organized under the E-RIHS brand.

2.1. KPI$_{EV}$ 1. Event quality

Measure: (Participants rating satisfaction in top two categories / All participants). 100%.

Objective: Appraise the quality of the event and its organisation from the perspective of participants.

Target: KPI > 70%.

NOTE. Based on the multi category standard E-RIHS feedback slip.

4.   Communication Key Performance Indicators (KPI$_{AD}$)

OUTREACH TO THE PUBLIC (ESFRI category)

4.1. KPI$_C$ 1 Social media insight

Measure: Traking Engagement rate in social media and tracking downloads via website

Objective: RI presence and engagement via web and social media activities

Target: Reaching increasing trends

NOTE. Details collected biannually from the national hubs individual websites and passed to HQ. Data collected from main E-RIHS ERIC website.

5. Management Key Performance Indicators (KPI$_{AD}$)

5.1. KPI$_M$ 1 Extent of resources made available to users

Measure: Annual number of access units allocated to services

Objective: The total available time allocated to users or number of data entries/ data sets/

items/ respondents/ services.

NOTE. Each node can be considered a dataset, to be passed to the central hub annually.

5.2. KPI$_M$ 2 Internal reporting efficiency

Measure: Eventual delay of reports to be delivered to the Central Hub Unit: weeks.

Objective: Verify the timely communication of essential data for the working of the ERIC.

Target: KPI = 0.

NOTE. Documents to which this KPI is applicable will be precisely defined and should be the same for all partners akin.

 END Appendix 03 (V.03 (May 26, 2023)

1.4.   Appendix 04- E-RIHS Quality Manual guidance document

Introduction

Quality is one of the pillars of E-RIHS and to ensure its high level throughout the network, quality criteria must be met by all organizations and research groups that may state a connection with the E-RIHS brand. However, as a general note, "quality" must be understood throughout the E-RIHS network as a standard of excellence established by the ERIC with a view to ensure: i) the will and the means to satisfy the users of its services; ii) comparability between its partners, in particular in what respects technical procedures and their results; iii) register and archive of all preliminary steps, metrological conditions and results related with any service rendered, allowing its inclusion in a digital database or replication in any other laboratory.

This document describes the minimum content for a quality manual to be prepared and maintained by all members of the Partnership. The quality manual aims at being an in-house reference consultation document as brief and non-bureaucratic as possible. An updated copy, printed in paper, is archived at a location known and easily accessible to every person within the research group (RG) directly involved in E-RIHS operations.

The manual will also be made available on request to users and evaluators of the services and may in general be diffused to give confidence in the work done and its results. Partners are free to increase the contents or alter their disposition as they consider fit for its purpose.

In all cases, the manual does not need duplicate the contents of any other manual applicable to the service. Therefore, the manual as prescribed may be simplified or even skipped if the institution is accredited or certified for the service rendered by a standard such as ISO 17025 or ISO 9001 and already holds a quality or procedures manual where the full information may be found [01, 02].

1. Contents of the E-RIHS quality manual - generic sections

1.1. Presentation

Present the E-RIHS partner (RG and legal organization in which it is integrated, if applicable). Include the scope of its activity and the historical background to give an idea of how old the research group is and how it has evolved to the present situation.

1.2. Compromise with quality

Declaration of the person representing the research group (RG) on his views on the meaning of *quality* in the framework of the participation in E-RIHS, and compromise in the name of all the group to aim at improvement and to abide by standards of excellence: i) when doing research; ii) when doing services for users; iii) in the dealings within the partnership.

NOTE. Within the E-RIHS network, *excellence* must be understood as quality well above the normal perception of a satisfactory level together with the purpose to go beyond the expectations of both clients and users.

1.3- Compromise with Ethics

E-RIHS is actively concerned with its responsibilities towards Society, its workers and collaborators, its standing in the world of science and its compromise with the Future. Ethical principles should be diffused and strictly applied by the RG.

This section includes a signed declaration by each member of the RG directly involved in research or the production of measurement results with the following text.

"I understand that E-RIHS is humanist in nature, aimed to study and preserve Culture within the scope of Heritage Science. It has written policies and applies strict criteria of respect for human rights, respect for the environment and focus on sustainability, compromise towards the free availability of the results of research and is bound by a code of good research practice.

Scientists and technical staff participate actively, with clarity of purpose and good intentions, on the creation and development of knowledge following the lines of the scientific method. Such activities within E-RIHS are developed in freedom but in a professional, responsible, and collaborative manner.

I have read the E-RIHS document containing the guidelines of its ethical principles and derived procedures, and I am aware of the location of a copy which I may consult at any time."

NOTE. The *E-RIHS Ethical Guidelines* are Appendix 05 to the Quality Policy and an up-to-date copy of the document should be available for consultation in an archive known to all or annexed to the manual, and all the personnel should receive a digital copy for own reference. **1.4**. Structure and governance

Indicate the structure of the RG, its insertion in the organization where it belongs and the line of access to the person or board with the power to decide and bind the organization contractually. Include an organizational scheme depicting the position of the RG in the structure of the whole organization.

Indicate the name of the person who coordinates and answers for the RG. This person dates and signs the compromise with quality (section 1.2) and all pages of the quality manual. Indicate the name of the deputy who replaces the coordinator when absent.

1.5. Updates

The quality manual is up to date at any moment. Whenever any information must be altered, the page or pages affected are replaced. If the alteration allows the text to be replaced may be cut with a straight line and a new text written near it so that both are clearly readable. The RG coordinator dates and signs all such alterations, as well as any new or additional pages included in the manual.

2. Contents of the E-RIHS quality manual - personnel

List all personnel in the RG, including technical support and grant holders. Researchers and other specialists whose knowledge is made available should have updated full curricula available through the Net. If necessary, the location (URL and, if needed, public key for access) should be included.

Any other personnel assisting access users should also have curricula available, as before or available at the installations.

3. Contents of the E-RIHS quality manual - premises

Include a plant of the premises allocated to work under the E-RIHS brand with the location of individual equipment used in access services and any physical archives related to the work performed.

Whenever spaces have to be conditioned as a requirement for the service performed, indicate the thermo-hygrometric conditions maintained in the locals.

Note: Services are firstly judged by the appearance of installations accessible to the users. Locals do not necessarily have to be tidy whenever creative work is being performed, but all premises accessible to users should be maintained clean, business-oriented, with safety fixtures at hand, and all standards, instructions and accessories needed should be methodically stored, to be easily accessible in known locations. Any containers should be clearly marked as to contents and date of validity, if applicable.

4. Contents of the E-RIHS quality manual – equipment and measurements

Include a list of all relevant measuring or testing equipment used in the framework of services supplied under E-RIHS. Minor accessories or subsidiary measuring equipment such as calipers, or scales used solely for indicative purposes, do not need be listed.

Each piece of such equipment must have associated documentation, usually physically archived in the same room or digitally available through an internal network, including:

- characteristics relevant for the use given to it;

- instructions on its operation and associated metrological procedures written in a language known to operators;

- register of calibrations or other metrological operations (if applicable) giving assurance of the rastreability and control of the uncertainty of results.

Whenever complex preparations of samples are needed, or calibration with reference materials acquired externally or standards prepared in-house, such operations should also be included in the archive and made available to users at their request.

5- Contents of the E-RIHS quality manual – register and archive

All relevant operations during any service to users under the E-RIHS brand should be covered by a register of dates, installations visited, persons present or contacted, operations or consultations and any other information needed for future reference. In particular, all measurements must be backed by sufficient information to allow an investigation of the causes of any anomaly and the eventual replication of all the experimental procedure (including any specific calibrations) in a different laboratory.

All digital or physical archived data must have a back-up made not more than a week after the original register. The back-up must be stored at a different physical or digital location to be preserved when for any fortuitous reason the original is lost.

This section of the quality manual should include information about the specific policies on data registers, its preservation and posterior availability under the FAIR principles of data management.

6- Contents of the E-RIHS quality manual – evaluation of hazards and risk control

This section should include an identification of hazards and a listing of risks. For each risk that may be controlled, the section will also indicate the countermeasures taken. Whenever the likelihood of a risk or the outcome of an occurrence may be reduced through information, the document will state how users are instructed on the avoidance of hazards and on how to address risks should they materialize.

The document will also include a list of passive or active protection fixtures and countermeasures available and the contents will have in view, not only external users, but also all personnel involved.

END Appendix 04- (V.03 May 26, 2023)

1.5.   Appendix 05- E-RIHS POLICY ON ETHICS

Introduction

E-RIHS is Humanist in nature and aimed to study and preserve Culture within the scope of Heritage Science. Ethics within the E-RIHS Partnership is understood as a set of principles by which all those working under its brand are bound to abide. Those principles, listed in the following sections, are consequent through procedures followed in all operations.

Principles

1. Respect for persons

Researchers and other professionals should maintain the highest moral standards irrespective of the difficulties and limitations that at any moment might be raised. They should have concern for others and in general treat them as they would normally want to be treated in likewise conditions.

Whatever their own personal opinions, professionals should behave without prejudice against others, treating them likewise irrespective of gender, nationality, ethnicity, religion, age, sexual orientation, gender expression, presence of disabilities, educational background, professional origin or other personal attributes or aspects through which diversity manifests itself.

People with reduced autonomy should be cared for, to ensure that the eventual influence of their condition in their participation to the work is minimized.

Tutelage of students or apprentices is to be regarded as a trust. Wherever possible, recognised intermediaries should be used so that those under formation have always two different contact points, e. g. one tutor and one supervisor. This should be strictly adhered to whenever young people under the age of consent are involved.

Students and apprentices should be given as much autonomy of decision in research as possible and treated with the same consideration due to colleagues, respectfully and without exploitation, having only in view the promotion of their learning and professional development in safety and without undue constraints.

Researchers should treat colleagues throughout the partnership respectfully and as equals, and through cooperative actions diffuse knowledge by both teaching and learning. They should share ideas openly whenever confidentiality of procedures or results is not at stake and give credit for the contributions of others. Before any teamwork is started, the researchers involved must agree on and comply with practices for data ownership and sharing, authorship, publication, peer review (if applicable) and cooperation in general.

2. Respect for heritage values

The importance of tangible cultural heritage depends on a belief system that attributes significance and relative weight to an asset, be it a cathedral or a ring. A scientist will not put in cause in any manner an established system of values unless grounded on largely unquestionable research results. Whenever research results contradict, in a relevant manner, values upon which the importance of a heritage asset rests (e. g. by strongly suggesting a different, eventually more recent, chronology) those results must at least be reassessed and eventually the whole instrumental process repeated, possibly after a new sampling and by a different team using an alternate technology, before the results are published or made public in any manner. The owner or entity responsible for the asset will be informed in detail of the conclusions and their ground before any dissemination is made.

Any sampling of a tangible heritage asset will decrease its value, even if negligibly. Therefore, it must be carefully considered on a basis of potential gain versus potential harm. Sample sizes must be adequate given the asset sampled and the purpose: as small as possible but not so small that they may end up being unfit.

When sampling a physical asset researchers will first seek consent from the owner or the entity responsible for its conservation. On seeking authorization, they will inform on the objective, number and size of samples needed, and method of sampling. They will also establish an agreement on the ultimate destination of the test items and any remainders.

In all cases, the owner, or the entity responsible for the conservation will be offered the possibility to witness the sampling procedure and thenceforward be considered primary stakeholders of the research, be informed of the results before any dissemination and, if not co-authors, their participation will be acknowledged in publications using the results.

Samples of heritage assets, test items obtained thereof, and remainders are themselves heritage assets with associated values and must be treated as such, in particular caring that all information related to the sampling is obtained and kept traceable to each sample.

If applicable, scientists should aim at the preservation of test items and remainders associated with the information pertaining to the sampling and instrumental procedures applied, towards their future availability for further research without the need to re-sample.

3. Beneficence (Do Good)

The definition of beneficence is linked with outcomes that are beneficial to others and to the society at large. This principle states that research should aim at some positive outcome that will advance knowledge and our understanding of phenomena under the rule of science, towards a positive purpose such as the enhancement of some of the values of cultural heritage.

Results should be shared with the research community and the public at large through diffusion media and integration in accessible databases.

Beneficence is also connected with doing no harm: professionals should comply with safety policies and procedures and improve them, when possible, to safeguard from undue risk students, apprentices, all other team members and themselves. They should respect and protect life and the environment avoiding any aggression and following the highest health and safety standards, including the disposal of waste and waste products having in view, not only immediate consequences, but also possible risks in the long run.

Scientists must be aware of their role in the sequence going from academic research, pre-practice research and practical implementation. Conclusions made under one context may be misleading and ultimately detrimental, sometimes grievously, when applied in a specific situation. Therefore, researchers should not suggest or propose practical application with insufficient data validation and lack of practical demonstration.

4. Fairness

All activities and their outcomes are to be developed or handled in a fair way, transparent to all participants. Peer reviews of applications, performance or proposed publications should be conducted in a righteous manner. Whenever possible, there must be clear rules known to those being assessed and all notes should be clearly explained and justified. There should be an established system of appeal involving a third party. Registers of all consequential remarks and decisions should be maintained and made available to those deciding on any claims or appeals.

Authorship of papers and similar diffusion media should be based simultaneously on: i) substantial contributions to the conception of the research; or the acquisition and interpretation of data for the work; and ii) drafting the texts or revising them critically; and iii) approval of the version to be published in a way that makes the person fully accountable for the contents. Unless there is a clear preliminary understanding otherwise, only those meeting the three criteria should be deemed as authors or co-authors; all those not meeting the criteria but having nevertheless significant

contributions should be acknowledged. The order of author names has a meaning that varies with the field but should follow clear rules known previously to all in writing and agreed between all team members. IPERION-HS recommends to all researchers within its partnership to be generous with students and apprentices giving them, whenever fair, a position as authors that will enhance the development of their careers.

By default, and as known to all and agreed between the team, a measure of confidentiality on processes and outcomes must be established before publication. Subsequent results must necessarily refer the original publication or acknowledge the sources of the research lines being pursued.

5. Quality

Quality in all its forms should always be one of the pillars of scientific research. Within Ethics, IPERION-HS researchers and other professionals should strive to remain informed and apply the most recent advances in their field. They should share ideas and information, use instruments of known accuracy, keep complete laboratory registers, maintain professional moderation in their conduct and publications, and give due credit to the contributions of others.

Conflicts of interest and scientific misconduct, such as bold or biased conclusions based on insufficient data, fabrication, or plagiarism, are incompatible with ethical principles. Experimental procedures should be fully reproducible and the disclosure of results in scientific media should always include all information needed to replicate the experiments or measurements to a reasonably uncertainty level. Public comments on scientific matters should be made with care and accuracy. Questionable conclusions should be presented as hypotheses and premature or exaggerated statements should be absolutely avoided.

Research is a quest for new knowledge, with critical and systematic verification and peer review. Honesty, openness, a systematic approach and documentation are fundamental preconditions for achieving this goal [A05.01].

Other sources consulted: [A05.02; A05.03; A05.04; A05.05]

END Appendix 05- (V.03 May 26, 2023)

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