



IPERION HS

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D 6.1 Data Management Plan for IPERION HS

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Abstract

This Data Management Plan (DMP) documents the agreed data management procedures and protocols used by the project partners to organise, preserve and share data produced during the IPERION HS project. The general aim being to ensure that all the data and processes, produced within IPERION HS, are as open and FAIR as possible, but also as closed as necessary. The document will be updated during the project, as needed, to include further details and developments.

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Abbreviations

Abbreviations	Expansion
API	Application Programming Interface https://en.wikipedia.org/wiki/API
ARCHLAB	Relates to the notion of “Archive Laboratories” http://www.iperionhs.eu/archlab/
CA	IPERION HS - “Consortium Agreement”
CERN	Conseil Européen pour la Recherche Nucléaire - European Council for Nuclear Research - https://home.cern
CNR	Consiglio Nazionale delle Ricerche https://www.cnr.it
CO	IPERION HS - “Coordination Office”
DMP	Data Management Plan
DOI	Digital Object Identifier (https://www.doi.org)
EOSC	European Open Science Cloud https://en.wikipedia.org/wiki/European_Open_Science_Cloud
E-RIHS	European Research Infrastructure for Heritage Science http://www.e-rihs.eu
EU	European Union
FAIR	Findable Accessible Interoperable Reusable https://www.go-fair.org/fair-principles
FIXLAB	Relates to the notion of “Fixed or large scale Laboratories” http://www.iperionhs.eu/fixlab/
GA	IPERION HS - “Grant Agreement”
GDPR	General Data Protection Regulation https://en.wikipedia.org/wiki/General_Data_Protection_Regulation
HS	Heritage Science
INFN	National Institute of Nuclear Physics, Italy https://home.infn.it
IPERION HS	Integrated Platform for the European Research Infrastructure ON Heritage Science - http://www.iperionhs.eu

IPR	Intellectual Property Rights
KIK-IRPA	Koninklijk Instituut voor het Kunstpatrimonium - Royal Institute for Cultural Heritage - http://www.kikirpa.be
MLZ	Heinz Maier-Leibnitz Zentrum https://mlz-garching.de
MOLAB	Relates to the notion of “Mobile Laboratories” http://www.iperionhs.eu/molab/
NCU	Nicolaus Copernicus University https://www.umk.pl
OAI-PMH	Open Archives Initiative Protocol for Metadata Harvesting https://openarchives.org/pmh/
PID	Persistent Identifier
REST	REpresentational State Transfer https://en.wikipedia.org/wiki/Representational_state_transfer
SPK	Stiftung Preußischer Kulturbesitz (SPK, Prussian Cultural Heritage Foundation) https://www.preussischer-kulturbesitz.de
VRE	Virtual Research Environment

Narrative (technical) description

1. Introduction

The IPERION HS “Integrated Platform for the European Research Infrastructure ON Heritage Science” project (GA 871034) integrates a range of national facilities, recognized for their expertise in the study of Heritage Science, to create an open infrastructure of institutions and specialist researchers, engaged in collaborative research and providing services to the wider field of Heritage Science.

IPERION HS aims to make access to data and related services a core part of current and future research within the infrastructure, specifically to support the full development of the European Infrastructure for Heritage Science (E-RIHS)¹.

This IPERION HS Data Management Plan (DMP) provides an outline of the types of data collected, generated and used for and by the IPERION HS project along with guidelines describing how these data will be preserved and published. It is organised in relation to the FAIR Data Principles², adheres to the Horizon 2020 requirements for providing Open Access, is written in line with the subsection 3, particularly article 29, of the GA and will respect the General Data Protection Regulation³ (GDPR) provisions. IPERION HS follows H2020 requirements for open science and open publications⁴ and participates in the European Commission (EC) Pilot on Open Research Data (H2020)⁵ which aims to improve and maximise access to and re-use of research data. IPERION HS also implements the Open Access European Union (EU) strategy⁶, participates in European Open Science Cloud (EOSC)⁷ and contributes to FAIR heritage data.

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

This DMP will evolve during the lifespan of the project, particularly whenever significant changes arise within the management of the consortium and the generation of datasets. Upcoming versions

¹ <http://www.e-rihs.eu/>

² Findable Accessible Interoperable Reusable - <https://www.go-fair.org/fair-principles/>

³ <https://eur-lex.europa.eu/eli/reg/2016/679/oj>

⁴ Benassi, Laura. (2021, January 16). IPERION HS How to do - Open Science: EU rules and tips (Version 1.0). Zenodo. <http://doi.org/10.5281/zenodo.4444799> - <http://www.iperionhs.eu/publications-2/open-access/>

⁵ https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-dissemination_en.htm

⁶ <http://ec.europa.eu/research/openscience/index.cfm?pg=openaccess>

⁷ <https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/5253a1af-ee10-11e8-b690-01aa75ed71a1>

of the DMP are planned to provide more detail and specific examples, particularly in relation to the data management of the transnational accesses⁸ provided by ARCHLAB⁹, FIXLAB¹⁰ and MOLAB¹¹.

2. IPERION HS data

The main class of data, being considered under IPERION HS, will be raw and interpreted data created and or processed, relating to the technical or analytical examination of Heritage works, by the access providers working within IPERION HS and by any other research activities carried out in the framework of the project. However, the notion of “IPERION HS data” also covers a wider range of digital assets, including publications, reports, survey data, documentation, software and more. A full list of IPERION HS data will be generated during the project and appended to the final version of this DMP. All the data created, either new or as a derivative of existing data, by IPERION HS partners, will be considered as Results (Foreground Data) and must be published and made accessible following the guidelines provided¹². However, the meaning and context of this new data will often rely on supporting Background Data. Some of this Background Data, such as the metadata describing and identifying the Heritage works that have been examined, should be considered to be Required Background Data and will also need to be published to ensure that any generated Results (Foreground Data) can be fully usable and exploited.

Intellectual Property Rights (IPR) and data ownership issues are addressed in the GA and this document is intended to only address the aspects related to research “access to” and “use of” IPERION HS Data.

Results (Foreground Data)

‘Results’ means any (tangible or intangible) output of the action such as data, knowledge or information — whatever its form or nature, whether it can be protected or not — that is generated in the action, as well as any rights attached to it, including intellectual property rights.¹³

Within IPERION HS the term “Results (Foreground Data)” can be understood to include all stages of data creation/processing, along with all of the metadata required to identify, validate and potentially re-use the data.

⁸ http://www.iperionhs.eu/wp-content/uploads/2020/10/IPHS-Access-policy_red.pdf

⁹ “ARCHLAB provides access to organized scientific information in largely unpublished datasets from archives of prestigious European museums, galleries and research institutions.”

For more information see: <http://www.iperionhs.eu/archlab/>.

¹⁰ “The goal of FIXLAB is to provide access for the Heritage Science (HS) community to key fixed research facilities and to the associated scientific experience of their staff that develop and maintain sophisticated state-of-the-art instrumentation for advanced diagnostics and archaeometry.”

For more information see: <http://www.iperionhs.eu/fixlab/>

¹¹ “MOLAB (MOBILE LABORATORY) is a world-class distributed infrastructure which consists of key laboratories across 10 European countries providing coherent access, under a unified management structure, to a set of mobile equipment and related competencies, for in-situ non-destructive measurements of artworks, collections, monuments and sites.”

For more information see: <http://www.iperionhs.eu/molab/>

¹² For more information relating to the actual process of making data open see: Benassi, Laura. (2021, January 16). IPERION HS How to do - Open Science: EU rules and tips (Version 1.0). Zenodo.

<http://doi.org/10.5281/zenodo.4459152>

¹³ H2020 Grant Agreement - Article 26.1

Within IPERION HS Results (Foreground Data) can be divided into three main sections:

1. **Published data:** this will include published articles, relating to the project Results, along with all raw and processed data needed to validate the published work. Sufficient documentation and metadata will also be included to ensure that the work can be identified, accessed and re-used. All IPERION HS “Published data” will be released under open access, complete with an appropriate re-use licence and all of the required supporting metadata, at the time of publication or after an agreed embargo of **6 months (12 months for publications in the social sciences and humanities)** if required as part of the open access publications process.
2. **Reports and Documentation:** this will include all non-formally published reports and documentation relating to the work carried out within IPERION HS. Where practicable and appropriate these will be published on the project website and with the [Zenodo Repository](#). This will include all of the completed “**User Reports**”¹⁴ generated as a result of IPERION HS transnational accesses. Where appropriate, these data will be published within **6 months** of the completion of the related work.
3. **Any other data:** created or produced during the work of the project, including all of the “tangible or intangible” assets not included as Published data. The publication of non “published data” is not required by the EU, but it is strongly encouraged by the EU and by the project. Where valuable IPERION HS work has been carried out to generate exploitable data, it is recommended that it will be published and made accessible within **24 months** of production or within **12 months** of the completion of the project.

Please note that as described below, within the section on [Making data FAIR in IPERION HS](#), where the publication of Results (Foreground Data) is limited or restricted by existing IPR or by defined and documented “legitimate interest”, it is still very important to register that the data have been created and do still exist. In this case the metadata defining and describing the Results (Foreground Data), along with details describing the scope and accessibility of said data, needs to be published as an empty data set. If circumstances change in the future, then the data can be added as a new version of the existing empty data set.

It is the responsibility of IPERION HS and its project partners to ensure that all project Results (Foreground Data) are preserved and made accessible, where applicable, for at least 4 years after the end of the project.

Background Data¹⁵

*‘Background’ means any tangible or intangible input — from data to know-how, information or rights — that exists before the GA is signed and that is needed to implement the action or to exploit its results.*¹⁶

Within IPERION HS this simple definition is also extended to include all external related “data” potentially needed by the project, so it will include resources created during the period of the project but outside of and not directly supported by project activities. Therefore, in the context of

¹⁴ <http://www.iperionhs.eu/after-access/>

¹⁵ For more information see: <http://www.iprhelppdesk.eu/news/how-define-and-manage-background-horizon-2020>

¹⁶ Taken from the H2020 AGA – Annotated Model Grant Agreement, Version 5.2, 26 June 2019, page 232: https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf

IPERION HS this can represent a wide range of tangible and intangible assets held by project researchers, access providers and project users. The key issues prior to the commencement of any defined research or access activity is to **identify** what Background Data are required for the work and ensure that appropriate **access rights** are available.

Background Data are covered by existing IPR and licence restrictions, as indicated in the GA Subsection2, particularly Article 24, and may not always be in a format that facilitates efficient re-use. As part of the preparation for any defined piece of IPERION HS research or access provision, specifically ARCHLAB accesses, it is important to clearly identify what Background Data may be required and what access rights or licence limitations may be in place and to ensure that any Required Background Data will be available and licenced for future use in relation to the Results (Foreground Data) created during any IPERION HS activity.

Required Background Data

Required Background Data is defined as the minimal amount of information/knowledge required to ensure that any Results (Foreground Data) produced within IPERION HS can be understood, put in context and re-used. The level of detail required here will vary depending on the nature and scope of the work being carried out, but these data will need to be at least made available under an open licence for academic research. A fuller list of examples will be developed during the project but initially the best example relates to the:

- Key metadata required to identify and find any objects/works of art examined or studied within IPERION HS activities or related to samples examined or studied within IPERION HS activities. These metadata can be descriptive, facilitating resource discovery but could, depending on the specific dataset, also relate to technical metadata of related materials, equipment or measurements.
- An image, of sufficient size¹⁷, to clearly illustrate any objects/works of art/sample examined or studied within IPERION HS activities, if one is not created during the IPERION HS activities.
- Inventory, short summary, access detail and/or references for any documentation, reports, publications, databases or archives referenced or used within the work.
- Inventory, short summary and access detail for any Background datasets referenced or used within the work. It is recommended, where possible, and if they have not been already published, that these datasets are also published in an appropriate, open data repository or similar institutional system to facilitate further research activities, subject to existing licencing and IPR restrictions.

Project Management data

As part of the general running of the IPERION HS project and the ongoing tracking of project activities and milestones and deliverables, project management data will be produced, collected and archived, by the project Coordination Office (CO) and various project partners. Project management data will include, but will not be limited to, all of the supporting documents created during the project, for example project meeting minutes and agendas, internal and external reports,

¹⁷ The specific dimensions here will be further discussed as new versions of this DMP are created, but at this time sufficient size is indicated as big enough to be printed in a report at half page width or height at reasonable quality, approximately 150 DPI. This equates to an image resized to fit within the bounding box of 600x800px.

project financial documents, the Grant Agreement (GA) and Consortium Agreement (CA) contracts (along with any amendment files), deliverables and other exploitable research outputs, presentations, project media files (templates, logos, etc.) and other related documents.

In order to manage and develop all of these documents in a shared location, open to all of the project participants, IPERION HS has set up a dedicated virtual research environment (VRE) on the D4Science data infrastructure¹⁸. This VRE is a closed working environment and provides shared file management, storage and preservation along with a discussion forum.

- https://services.d4science.org/group/iperion_hs

All public versions of completed documents, reports, recommendations, procedures, etc. will also be published via the selected [project repository](#) and/or on the public project website¹⁹. Public project deliverables will also be made available via the standard EU Cordis platform²⁰.

All completed private documents, reports, recommendations, procedures, etc. will be managed by the CO and stored within the project's D4Science data infrastructure. The development of a public registry of all closed data/documents, including key metadata describing the data/documents - responsible person, summary, key words, reason for privacy, IPR holder, etc. will be explored within the project.

The IPERION HS project management data will be maintained during the project for at least 4 years beyond the life of the project by representatives of the Consiglio Nazionale delle Ricerche (CNR). The process of migrating ownership or stewardship of these data to the future E-RIHS will be examined during the project.

Public Project Website

The IPERION HS project website (<http://iperionhs.eu>) is hosted by the Italian National Institute of Nuclear Physics (INFN) and will be maintained as described for other project management data. The namespace **iperionhs.eu** is managed by the IPERION HS CO, is owned by CNR and will also be maintained as described for other project management data.

The process of migrating ownership or stewardship of the website and its contents to the future E-RIHS will be examined during the project.

User Data

During the process of the life of the project IPERION HS will gather a range of personal data, related to project access applications, exploitations and disseminations activities, and general correspondence. These data will be stored and used in accordance with gathered consent and the General Data Protection Regulation (GDPR) legislation, for the life or the project. The storage and use of these data, required beyond the duration of the project, will require separate written agreement.

¹⁸ <https://www.d4science.org/>

¹⁹ <http://www.iperionhs.eu/>

²⁰ <https://cordis.europa.eu/>

A detailed description of how these data are gathered and managed has been included in the IPERION HS “Privacy policy & cookies” document, which will be made available via the IPERION HS public website.

Some user data, specifically related to completed IPERION HS accesses, will be published, as part of the access agreement, within dedicated access reports.

Dissemination, training, presentations and other data

Presentations

All public IPERION HS presentations will be published via the selected [project repository](#) and/or on the public project website²¹. Where possible this will include links to online presentations or video files of the actual presentation. Defining a consistent approach to categorising or keywording presentation data will be explored during the course of the project. All private or restricted presentations will be managed along with other closed project management data. A list or registry of presentations given in relation to IPERION HS will be managed by the IPERION HS CO.

Training Material

New training or educational material created as part of the IPERION HS project will be managed following the procedures for other project data and published under open access where possible, limited or restricted by existing IPR or by defined and documented “legitimate interest”. The use and management of existing training material will be subject to specific Background data agreements or existing licenses. A list or registry of training resources used within IPERION HS will be managed by the IPERION HS CO.

Social Media

A range of social media accounts have been established to support and expand the activities of IPERION HS, the data hosted and housed on these platforms is generally managed by the individual respective platforms.

- **Facebook:** <https://www.facebook.com/iperion.heritagescience/> - Used for general dissemination and social engagement. The account is maintained by the IPERION HS CO and the data are managed by the Facebook platform²².
- **Twitter:** https://twitter.com/iperion_hs - Used for general dissemination activities and connecting with related projects and researchers. The account is maintained by the IPERION HS CO and the data are managed by the Twitter platform²³.
- **YouTube:** https://www.youtube.com/playlist?list=PL9cfK7AHGZ9FkfqanEe0krtm4M_iCJ0yU - IPERION HS YouTube playlist is used to publish and share short videos created in relation to IPERION HS. The account is maintained by the IPERION HS CO and the data are managed by the YouTube platform²⁴.

²¹ <http://www.iperionhs.eu/>

²² <https://www.facebook.com/about/privacy>

²³ <https://twitter.com/en/tos>

²⁴ <https://www.youtube.com/t/terms>

- **LinkedIn:** <https://www.linkedin.com/company/iperion-hs/> - This dedicated group has been setup to act as an IPERION HS user forum. The account is maintained by the IPERION HS CO and the data are managed by the LinkedIn platform²⁵.

These accounts will be maintained by project staff for at least 1 year after the end of the project. Beyond this point, to ensure the preservation of disseminated data and communications via project social media sites, where practicable, all social media accounts will be migrated to join those representing E-RIHS.

Short videos

In addition to publishing videos on YouTube, any pre-publication, internal demo or restricted videos will be stored on private project data infrastructure on D4Science. Any details and documentation relating to these videos will be stored with them and managed alongside all of the other project management data. Where possible and appropriate these additional videos will also be published on YouTube or as part of the project website, as the project develops.

Data Repositories

To simplify the process of the publishing project data in an open access repository, the IPERION HS project has set up a specific community site on the Zenodo infrastructure.

- <https://zenodo.org/communities/871034/>

All public project data can be deposited with Zenodo following the instructions they provide. To improve discoverability standardised keyword or subject terms will be examined during the IPERION HS project. Alternative data repositories, including institutional repositories, can also be used as long as they are compliant with EU obligations. For more details and tools to help with this process see the IPERION HS Open Access report²⁶.

Also, all additional data repositories used to host IPERION HS data will need to be registered with the IPERION HS CO.

3. Making data FAIR in IPERION HS

The FAIR principles²⁷ are a series of guiding ideas to help ensure that users can Find, Access, work with (Interoperable) and legally Reuse published research data. Within this DMP, the four main guiding principles have been used to help organise and present how IPERION HS will manage its data in the project. The statements gathered in this section have been generated in response to the questions posed in the [IPERION HS Researcher DMP Template](#). Further, more granular procedures may be required for some specific project activities and tasks, these will be identified during the life of the project and added or linked to future versions of this DMP under the appropriate [sections below](#).

²⁵ <https://www.linkedin.com/legal/user-agreement>

²⁶ Benassi, Laura. (2021, January 16). IPERION HS How to do - Open Science: EU rules and tips (Version 1.0). Zenodo. <http://doi.org/10.5281/zenodo.4459152>

²⁷ <https://www.go-fair.org/fair-principles/>

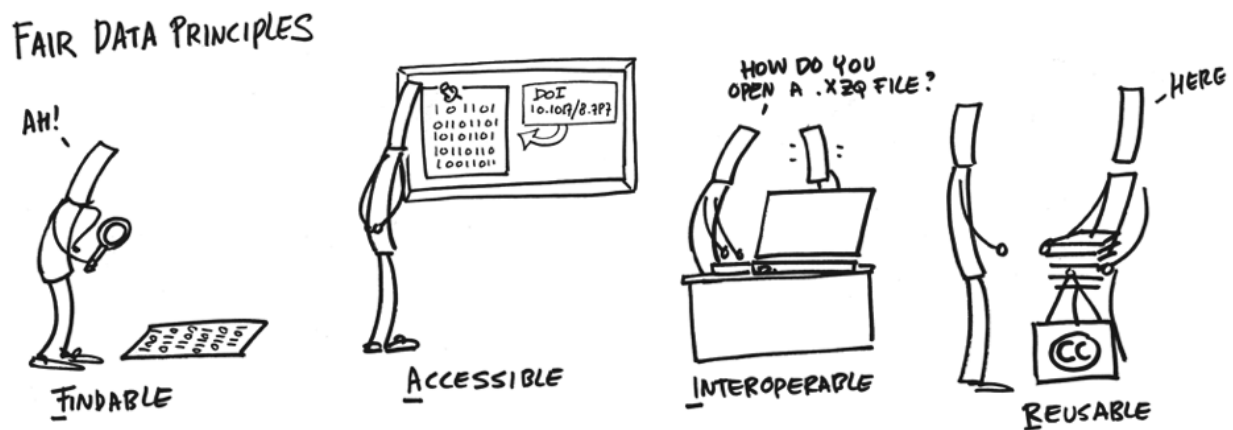


Figure 1: FAIR Data Principles: Image taken from book.fosteropenscience.eu

As recommended by the EU for H2020 projects, the following points are intended to ensure that all IPERION HS data can be:

“As Open as Possible, As Closed as Necessary”²⁸.

Making data Findable

Making data **Findable** relates to ensuring that data are described with appropriate metadata, is uniquely identified with open PIDs and that the PID can be used to discover the data online. IPERION HS will take the following steps to improve the Findability of the data produced in the project.

- All public IPERION HS data shall be published with clear agreed standardised metadata to aid discoverability. If required more detailed metadata descriptions will be developed within the project.
- Where relevant, existing, published metadata standards will be followed and their use within the project will be documented.
- When IPERION HS 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 IPERION HS 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)²⁹, such as a Digital Object Identifier (DOI).
- Appropriate and consistent categories, keywords and/or terms shall be associated with all published IPERION HS data to further aid discoverability.
- Details of all published IPERION HS data and related publications will be aggregated by the IPERION HS CO to form the basis of a registry of exploitable assets. This registry will also be made public.



Figure 2: [Findable](#)

²⁸ https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/data-management_en.htm

²⁹ https://en.wikipedia.org/wiki/Persistent_identifier

Making data openly accessible

Making data **Accessible** relates to ensuring that data, or at least the metadata defining and describing the data, is retrievable online via standard, documented procedures. FAIR data does not “need” to be open, but its existence does need to be documented and a digital description of it, including any access restrictions do need to be accessible. IPERION HS will take the following steps to improve the Accessibility of the data produced in the project.

- All IPERION HS data will be published in a publicly accessible and reliable repository³⁰. As noted, IPERION HS has set up a dedicated community area on Zenodo³¹ to act as a default repository for IPERION HS data.
- Metadata describing all IPERION HS data, including any Required Background 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 has been lost, destroyed or is 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.
- When the recommend repository, Zenodo, is not used, selected alternatives should also:
 - Be compliant with EU obligations - this can be verified using the tools provided at: <https://re3data.org>.
 - Provide access to data and metadata via standardised protocols - for example Zenodo provides access via [OAI-PMH](#) and [REST APIs](#)³².
 - Have a clearly stated secure, sustainability plan, providing long term service - for example 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 CERN³³.

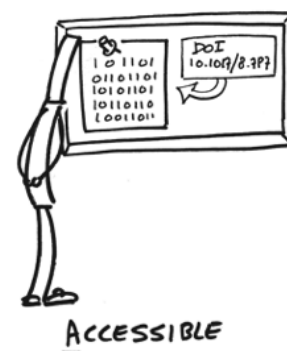


Figure 3: [Accessible](#)

Making data interoperable

Making data **Interoperable** relates to ensuring the appropriate use of common formats and standards, and describing or categorising data with agreed terms which are documented within open controlled vocabularies. IPERION HS will take the following steps to improve the Interoperability of the data produced in the project.

³⁰ The <https://re3data.org> tool can be used to find alternative repositories that are compliant with the EU obligations.

³¹ <https://zenodo.org/communities/871034/>

³² <https://about.zenodo.org/principles/>

³³ <https://home.cern/>

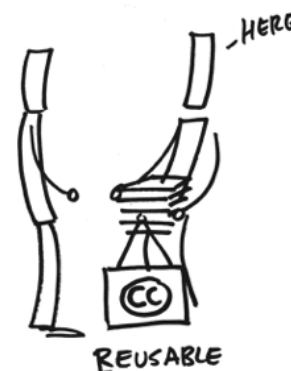
- Standard and open file formats will be used whenever practicable - for less common formats references and links to relevant documentation will be provided.
- The standards used within a given data set shall be documented as part of the discoverable metadata attached to IPERION HS data.
- Non-standard 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 IPERION HS 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 IPERION HS shall be added to existing open vocabularies or published as part of the IPERION HS project vocabulary.
- IPERION HS includes a dedicated networking task to improve the projects use and understanding of practicable interoperability, this work will be widely disseminated to improve the interoperability of our work and data.
- IPERION HS has set up a dedicated working group to develop and improve interoperability during the project, this work of this group will also be widely disseminated.

Figure 4: [Interoperable](#)

Making data reusable

Making data Reusable relates to ensuring that data are well documented and clearly licenced. IPERION HS will take the following steps to improve the Reusability of the data produced in the project.

- Within IPERION HS, where possible all data shall be published/released under an open Creative Commons licence³⁴, or an agreed equivalent licence, preferably [CC-0](#) or [CC-BY](#).
- All data published/released within IPERION HS shall have a clear right statement³⁵ attached to it.
- If the actual data are embargoed for an agreed period of time, this time shall be documented and indicated as part of any registered metadata.
- Any required citation or acknowledgements statements 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.

Figure 5: [Reusable](#)

Other General Access Restriction

As data are gathered and created within IPERION HS 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 project as a whole, they will be added to future versions of this document.

³⁴ <https://creativecommons.org/share-your-work/>

³⁵ <https://rightsstatements.org/>

4. Additional data management requirements in IPERION HS

Specific embargoes, caveats and additional complications identified across the project LABs or as part of other specific IPERION HS tasks will be detailed within this section as they are identified throughout the project.

IPERION HS access LABs

IPERION HS offers Transnational Access (TNA) to a wide range of high-level scientific instruments, methodologies, data and tools for advancing knowledge and innovation in the field of Heritage Science³⁶. During the project each Access has the potential to generate a wide variety of data from raw data to finished publications. The management of all of the actual IPERION data will generally follow the steps outlined in this document, but it is expected that some types of Access or even specific Accesses made need to outline exceptions or even additional DM steps. Additional details will be added to this section as the project develops as required.

As indicated before, User Reports³⁷ created at the end of each Access will be published by the project within the chosen project data repository. A standard description of the metadata required to describe each Access type will be explored during the project.

ARCHLAB³⁸

What additional DM issues are there for ARCHLAB in general and are there any access providers with specific additional issues. Including links to any existing institutional documentation?

DM issues specifically related to ARCHLAB accesses will be explored with IPERION HS Task 2.4 ARCHLAB “Data Management”, led by KIK-IRPA³⁹. Work in this area is expected to include but may not be limited to issues of exploiting Background data, integrating archive DMPs and IPR issues, and recommendations of how new data created by IPERION HS Users after a given Access can be linked back to IPERION HS. Further details will be added to or referenced in future versions of this DMP.

FIXLAB⁴⁰

What additional DM issues are there for FIXLAB in general and are there any access providers with specific additional issues. Including links to any existing institutional documentation?

DM issues specifically related to FIXLAB accesses will be explored with IPERION HS Task 3.4 FIXLAB “Data Management”, led by SPK/MLZ⁴¹. Work in this area is expected to include but may not be limited to issues of dealing with larger amounts of data, sample descriptions and integrating with existing DMPs used by larger scale research facilities. Further details will be added to or referenced in future versions of this DMP.

³⁶ <http://www.iperionhs.eu/catalogue-of-services/>

³⁷ <http://www.iperionhs.eu/after-access/>

³⁸ <http://www.iperionhs.eu/archlab/>

³⁹ Koninklijk Instituut voor het Kunstpatrimonium - Royal Institute for Cultural Heritage - <http://www.kikirpa.be>

⁴⁰ <http://www.iperionhs.eu/fixlab/>

⁴¹ Stiftung Preußischer Kulturbesitz (SPK, Prussian Cultural Heritage Foundation) - <https://www.preussischer-kulturbesitz.de> / Heinz Maier-Leibnitz Zentrum - <https://mlz-garching.de>

MOLAB⁴²

What additional DM issues are there for MOLAB in general and are there any access providers with specific additional issues. Including links to any existing service documentation?

DM issues specifically related to MOLAB accesses will be explored with IPERION HS Task 4.4 MOLAB “Data Management”, led by NCU⁴³. Work in this area is expected to include but may not be limited to issues of managing data in a mobile environment, integrating data from different techniques and issues of storing and presenting the captured data. Further details will be added to or referenced in future versions of this DMP.

DIGILAB Working Group

Within IPERION HS a new working group has been established to explore issues relating to the development of a new Access LAB - DIGILAB. It is intended that DIGILAB will offer a range of digital services and expertise and represent the organisation of the digital infrastructure for E-RIHS⁴⁴. Any future outcomes from this group, which directly relate to DM within IPERION HS, will be added to or referenced in future versions of this DMP.

Additional research or task specific procedures

Individual DM details for each of the IPERION HS research and networking workpackages or tasks will not be included in this first version of the DMP. However, as the work within the project progresses details of any workpackage or task related DM exceptions will be added to this section and explored within the project as required.

⁴² <http://www.iperionhs.eu/molab/>

⁴³ Nicolaus Copernicus University - <https://www.umk.pl>

⁴⁴ <http://www.e-rihs.eu/access/>

References

- European Research Infrastructure for Heritage Science: <http://www.e-rihs.eu>
- The FAIR Principles - Findable Accessible Interoperable Reusable - <https://www.go-fair.org/fair-principles>
- General Data Protection Regulation (GDPR) - <https://eur-lex.europa.eu/eli/reg/2016/679/oj>
- Benassi, Laura. (2021, January 16). IPERION HS How to do - Open Science: EU rules and tips (Version 1.0). Zenodo. <http://doi.org/10.5281/zenodo.4444799> - <http://www.iperionhs.eu/publications-2/open-access/>
- H2020 Open access & Data management: https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-dissemination_en.htm
- EU support for open access - <http://ec.europa.eu/research/openscience/index.cfm?pg=openaccess>
- Final report and recommendations of the Commission 2nd High Level Expert Group on the European Open Science Cloud (EOSC), 2018 - <https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/5253a1af-ee10-11e8-b690-01aa75ed71a1>
- IPERION HS Access Policy - http://www.iperionhs.eu/wp-content/uploads/2020/10/IPHS-Access-policy_red.pdf
- H2020 How to define and Manage Background - <http://www.iprhelppdesk.eu/news/how-define-and-manage-background-horizon-2020>
- Annotated Model Grant Agreement, Version 5.2, 26 June 2019 - https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf

Annex

Example of an IPERION HS Researcher DMP Template

This template is a direct derivative of the “DMP Researcher Template for Archaeological Datasets”⁴⁵ created within the H2020 Parthenos project⁴⁶.

Creating a DMP for a given project can be quite a complex process. This template, an edited version of the Parthenos DMP Template, has been created to act as a possible starting point for the creation of DMPs for transnational access “projects” within IPERION HS. By answering the, generally multiple-choice, questions a user can define and document the main issues of how they plan to manage their data. This template is still relatively long and the need for a simplified version, for regular use in smaller projects will be considered during IPERION HS.

DMP Researcher Template for IPERION HS

Email address*	
Name and Surname	
Your research domain *	
Affiliation	
Role	
DMP version	
Date Created	
Date Last Updated	
Updated By	

Mandatory questions are marked with an asterisk *.

⁴⁵ <http://www.parthenos-project.eu/wp-content/uploads/2019/10/DMP-Researcher-Template-for-Archaeological-Datasets.pdf>

⁴⁶ <https://www.parthenos-project.eu/>

Data Summary

State the purpose of the data collection/creation *

Please, include a brief description of the reason for collecting/creating data explaining the relation to the objectives of the project.

Specify the types and formats of data collected/created *

If they are listed, you can select type and format from the documents suggested by the Data Archiving and Networked Services (KNAW-DANS) (<http://tiny.cc/xg9lcz>), for less common formats please include a link to further details.

State the size of the data to be archived (GB) [expected / actual]*

Express the value in Gigabytes.

Specify the granularity of the data to be archived, indicating the scale and the type(s)*

Scale

- Single items (i.e. one page of a manuscript, one examination report, publication...)
- Datasets (a set of documented, structured data records, consisting of fields carrying data values)
- Collections (an aggregation of resources, a collection may include e.g. a textual document, a set of images, one or more datasets and other collections)
- Corpora

Type

- General text documents
- Interpreted/Summarized results
- Raw data
- Processed data
- Image(s)
- 3D Models
- Other Media files

- Other

If other, please specify.

Specify the origin of the data (Institution, Project, Author, Date, Technique, Instrumentation, etc.)*

What sort of data is it? *

- Newly created data
- Reused data
- Newly created content based on reused data

- Aggregated data (Working from multiple combined datasets)
- Other

If other, please specify.

How will data be collected?

You can select all applicable fields from the list(s) or add a new entry(s) in the field "Other".

Access Type

- ARCHLAB
- FIXLAB
- MOLAB
- Other:

Subject Matter

- Artwork(s)
- Monument(s)
- Sample(s)
- Archaeological site(s)
- Research Object(s) (Mock Ups, Reference Objects, etc)
- Archival Material (Documents, Books, etc)
- Image Resource(s)
- Data Resource(s) (Analytical Data)
- General Digital Resource(s) (Databases, Repositories, etc)
- Other:

Expected Data Outcomes

- Raw Analytical Dataset(s)
- Processed Analytical Dataset(s)
- Digital Images(s)
- 3D Model(s)
- Report(s)
- Publication(s)
- Other:

Analytical/Technical Investigations

- 2D/3D analysis
- Multi/hyper spectral imaging/mapping
- Point analysis
- Remote sensing

- Ageing techniques
- Biological analysis
- Conservation techniques and preparation methods
- Dating
- Environmental parameters measurements
- Imaging (multiscale and multispectral)
- Ion Beam analysis techniques
- Mass Spectrometries

- Microscopies
- Molecular analysis
- Molecular spectroscopies
- Neutron techniques
- Optical spectroscopies
- Physical characterization
- Thermal characterization
- X-ray techniques

- Conservation Archive(s)
- Scientific Archive(a)
- Art Historical Archive(s)
- Library(s)

- Other:

If other, please specify.

Specify if existing metadata is being reused *

- Yes
- Yes, remapped to another schema
- Yes, reprocessed with a different algorithm
- I don't know
- No
- Other:

If other, please specify.

Outline the data utility: to whom will it be useful? *

Specify whether the data produced and/or used in the project is usable by third parties, in particular, after the end of the project. If the reuse of some data are restricted, explain why

Describe any constraints concerning ethics and privacy

- If third parties are involved in the project, consent forms from informants and test subjects are documented, and the documentation is electronically archived
- If you are collecting personal data, you must have informed consent for storing, processing or publishing the data
- Not applicable
- Other:

If other, please specify.

FAIR DATA

Making data Findable, including provisions for metadata

Do you provide metadata for data discoverability? *

- Yes
- No
- I don't know
- Other:

If other, please specify.

Specify standards used for metadata creation *

You can select from the list or add a new entry in the field "Other". You can search for additional discipline-specific standards and associate tools browsing the Research Data Alliance Metadata Standard.⁴⁷

- CIDOC CRM
- DC - Dublin Core
- LIDO
- PARTHENOS Entities
- ARIADNE model (AO-Cat)
- CARARE
- EDM - Europeana Data Model
- DCAT
- Not available
- Other:

If other, please specify.

National standards - List any national standard used for metadata creation

Ad hoc metadata/proprietary schemas

Outline the method used to ensure that there is appropriate metadata available to ensure the understanding and reuse of data over time

You can select from the list or add a new entry in the field "Other"

- Minimum set of metadata created
- Metadata is associated to each digital object
- Use of metadata standards
- Set up of quality assurance committee for metadata
- Not available
- Other:

If other, please specify.

⁴⁷The RDA Metadata Standards Catalog: <https://rdamsc.bath.ac.uk/>

Specify if metadata are updated once the data are archived *

- Yes, automatically
- Yes, manually
- I don't know
- No
- Other:

If other, please specify.

Do you assign a unique identifier to your data/resources? *

- Yes - Public resolvable PIDs⁴⁸
- Yes - Internal
- No
- I don't know
- Other:

If other or public PIDs, please specify.

Outline the approach towards search keywords/categories/terms *

Indicate what search keywords/categories/terms will be provided and associated to all copies of your data to make the data findable.

Do you follow file naming conventions? *⁴⁹

- Yes
- No
- I don't know
- Other:

If other, please specify.

If yes, please, list below the naming conventions that should be followed during the project.

Do you have any approach for clear versioning? *

- Yes
- No
- I don't know
- Other:

If other, please specify.

⁴⁸ https://en.wikipedia.org/wiki/Persistent_identifier

⁴⁹ File naming best practices <http://tiny.cc/op8lcz>

Which methodologies are used to make data findable? *

- Common metadata-based discovery
- Ontology-based discovery
- Content-based discovery (e.g. text, images, etc.)
- Other:

If other, please specify.

What technologies are used to make data findable?

- Data Repository
- Digital library
- Registry/Catalogue
- Linked Open Data
- Digital Asset Management
- Content Management System
- Web-GIS
- Other:

If other, please specify.

Describe how data resources are retrieved from your selected data repository or data presentation system.***Global access mechanism**

- Landing web page
- Harvest with OAI-PMH protocol
- Other:

If other, please specify.

Ad hoc services

- Web service
- Federated Content Search API (FCS)
- Actionable APIs
- Other:

If other, please specify.

Will all of the new data generated during your research be published in some form of public repository?*

- Yes
- No

If no, please summarize details of the data and why it will not be published? (Details of any restrictions are requested below).

Specify if the metadata for any non-public resources can be made publicly available

- Yes
- I don't know
- No
- Other:

If other, please specify.

Making data openly accessible**Specify which data will be made openly available ***

Describe the data made openly available. If there are any restrictions on public accessibility, describe the nature of the restrictions (time embargoes, no access at all, restrictions to a certain group of users, sensitive data, etc.) and how access will be provided (by contact person, etc.). Are there well described conditions for access (i.e. a machine readable license)?

Specify how the data will be made available *

- Project website
- University repository
- Domain-specific database
- Repository of Archival Institution
- Other:

If other, please specify.

Specify which processes are used to make the data accessible*

- Linked Open Data
- SPARQL access point
- Standard Visualizer (e.g. browser, Acrobat Reader, Image Viewer)
- Local Visualizer
- Download
- GIS software
- Other:

If other, please specify.

Please indicate the link to access documentation or open source code of the software needed to access the data (if available).

Specify where the data and associated metadata, code, and documentation will be deposited *

(If you have not selected a data repository, an IPERION HS repository has been setup on Zenodo, <https://zenodo.org/communities/871034/>, or alternatively you can select an appropriate repository from this registry of research data repositories <https://re3data.org>)

- Digital Library
- University repository
- Repository of Archival Institution
- Domain-specific database
- Research Data Repository
- Other:

If other, please specify.

Please provide a link to your specific chosen research data repositories or data storage and presentation solution and details of their service?*

Link:

If you are not using Zenodo please specify if the repository⁵⁰ you will submit your data to is accredited/has a data management policy document*

- Yes
- No
- I don't know
- Other:

If other, please specify.

If yes, please provide further details or a link to where the details are already described.

Making data interoperable

Assess the interoperability of your data *

Specify what standards you will use to facilitate interoperability. You can select from the list below or add a new entry in the field "Other".

- RDF
- OWL
- DAML+OIL
- JSON LD
- XML
- KML
- GML
- GeoJSON
- CSV
- Other:

If other, please specify.

If it is not possible or practicable for open standard file formats to be used please describe the formats used, including links to appropriate documentation.

⁵⁰ Repositories compliant with EU obligations can be identified using: re3data.org

Standard Metadata Schema and Ontologies

Please provide details of any standard metadata schema and/or ontologies that are being used to improve the interoperability of your data.

Data vocabularies

Specify the data vocabularies you will follow to facilitate interoperability

- Wikidata <https://www.wikidata.org/>
- Art and Architecture Thesaurus (AAT) <http://www.getty.edu/research/tools/vocabularies/aat/>
- PeriodO <http://perio.do/en/>
- Pleiades <https://pleiades.stoa.org/>
- Other:

If other, please specify.

Specialist domain vocabularies

National vocabularies

Ad hoc/proprietary vocabularies

Specify whether you will be using standard vocabularies for all data types present in your dataset, to allow interdisciplinary interoperability?

- Yes
- No
- I don't know

If not, will you provide mapping to standard vocabularies?

- Yes
- No
- I don't know
- Other:

If other, please specify.

Increase data reuse

Specify how the data will be licensed to permit the widest reuse possible *

(If different licenses are required for different parts of the project data, please provide details; raw data, processed data, interpreted results, etc.)

Creative Common Licenses

Please select an appropriate Creative Commons license for your data, “CC0 (no copyright)”, “CC-BY (attribution)”, are preferred: <https://creativecommons.org/share-your-work>

Rights Statements for cultural heritage institutions or aggregation platforms

Please select an appropriate rights statements for your data, “In Copyright”, “Education Use Permitted”, etc: <https://rightsstatements.org/page/1.0/>

If another is used, please specify.

Tick all that apply

- Open data policy
- Public Domain Mark
- Not available
- Other:

If other, please specify.

Specify when the data will be made available for reuse *

- Reuse is subordinated to legitimate interests of rights holders and protection of confidentiality and personal information
- Embargo date can only be handled when the technical framework allows it
- Date individually set with repository
- No specific date
- Other:

If other, please specify

When will the data be released (after any required embargo):

If applicable, specify why a data embargo is needed:

Specify if the data produced⁵¹ and or used in the project is usable by third parties after the end of the project *

- Yes
- No
- I don't know

⁵¹ This is particularly relevant to any work that makes use of existing Background data, which is not currently on open access.

If the reuse of some data is restricted, explain why:

Specify the length of time for which the data will remain reusable *

- 5 years
- 10 years
- >10 years
- Other:

If other, please specify.

Do you request a specific format be used for reuse citations?

(For how to cite data you can consult <http://tiny.cc/mf9lcz>)

- Yes
- No
- I don't know
- Other:

If other or yes, please provide details.

Are there any further details relating to your data reuse rights documented?

- Yes
- No
- Other:

If other or yes, please specify.

Describe which information you gather on any additional rights holders relating to data created/used in your project to make sure that nobody is left out

- The rights owner is recorded in the metadata form
- Documentation is gathered from their holders
- Permissions are gathered from their holders
- Agreement with each content provider
- The data creator is responsible for recording any rights
- If rights are held by third parties, the creator is responsible for ensuring permissions are given, or content removed
- Support standards for data citation
- Provide proper attribution and credit information in an external metadata record where a dataset is implemented by different individual contributors
- Not available
- Other:

If other, please specify.

Describe the data quality assurance processes *

- Set up of scientific and technical committee
- Use of tools for automatic checks
- Data conform to format specification
- Consistency verified with data models and standards
- Manual/visual verification
- Not available
- Other:

If other, please specify.

Specify if defined criteria ensuring relevance and understandability of the data for users are available

- Yes
- No
- I don't know
- Other:

If other, please specify.

If yes, you can select from the list or add a new entry in the field "Other"

- Minimal set of metadata created
- Collection level metadata required
- Panel of specialists for Quality Assurance
- Formats, standards and certification models recognized by the scholarly community
- Documented details linked to the data
- Described in linked publication
- Not available
- Other:

If other, please specify.

How do you ensure the availability of sufficient information (technical data and metadata) for end users to enable them to make reliable quality related evaluations?

- Staff with specialized education or training
- Detailed metadata
- Special training course to use specialized infrastructure
- Quality Assurance working groups
- Domain experts collaborate with technical partners to ensure precise mappings from content providers schemas to project ontology
- Not available
- Other:

If other, please specify.

Allocation of resources

Estimate the costs for making your data FAIR *

Please indicate the estimation of the total cost for the whole research life cycle (including also cost for archiving and long term preservation) - if a free service, such as Zenodo is being used please indicate this.

Cost covered by hosting institution

Specify which is the "unit" of archiving

- Price per megabyte
- Price per digital object
- Price per number of backups
- Price per authorized user
- Price per file
- Not available
- Other:

If other, please specify.

Describe how you intend to cover these costs *

- Cost covered by the project
- Cost covered by hosting institution
- Collaboration with other projects
- Other:

If other, please specify.

Clearly identify responsibilities for data management in your project *

Please, list the responsible actors/partners for every data life cycle activity.

Describe costs of long term preservation

You can get help in calculating Research Data Management (RDM) cost with the Guide available at <http://tiny.cc/ob4lcz>

Indicate the potential value of long term preservation

You can select from the list or add a new entry in the field "Other"

- Data is potentially important for reuse by a larger community
- Data contributes to improve an open access publication

- Data was produced with a process that is difficult to repeat
- Data was produced is related to a specific point in time and is impossible to repeat
- Data need to be archived because the funder requires it
- Other:

If other, please specify.

Data Security

This section concerns data recovery as well as secure storage and transfer of sensitive data.

Address data recovery as well as secure storage and transfer of sensitive data *

Specify if your organization has tools to control the risks associated with receiving, managing, processing and ingesting digital collection content

- Yes
- No
- Other:

If other, please specify.

If yes, you can select from the list or add a new entry in the field "Other"

- Checking/syntactic parsing of data structures
- Mechanisms to secure the reception and storage of exact copies of the original files (ingestion phase)
- Tools for generating metadata and for automatic validation of the XML
- Virus scanner for scanning file uploads
- Technology vulnerability scan
- SLA with the data storage provider
- Procedure for file fixity checking
- DRAMBORA Risk Assessment
- Declaration of Confidentiality for employees
- Bespoke Content Management System (CMS) with Object Management System (OMS) extension
- Not available
- Other:

If other, please specify.

Specify if you have policies regarding the storage of intermediate results and temporary files

- Yes
- No
- I don't know
- Other:

If other, please specify.

If yes, you can select from the list or add a new entry in the field "Other"

- Policies on IPR
- Licenses policy
- Not available
- Other:

If other, please specify.

Specify if your system uses automated backup processes, and/or if an automated monitoring process for storage is available

- Yes
- No
- Other:

If other, please specify.

If yes, you can select from the list or add a new entry in the field "Other"

- Institutional back up process
- External back up process
- Personal back up process
- Global backup mechanism
- Other:

If other, please specify.

Describe how the system supports preservation

- Using preferred data formats
- Assigning Persistent Identifiers (like DOI and URN) to a dataset
- Preserving all datastreams in the original format as distinct files
- Performing quality checks on submitted metadata
- Preserving data and metadata via migration
- Not available
- Other:

If other, please specify.

What tools does your system use to provide access to users?

- Provided by external data repository (such as Zenodo)
- Invenio (<https://invenio-software.org/products/rdm/>)
- Dataverse (<https://dataverse.org/>)
- FEDORA (<https://duraspace.org/fedora/>)
- DSpace (<https://wiki.lyrasis.org/display/DSPACE>)
- Locally developed system
- Other:

If other, please specify.

Describe the digital asset management system functionality used

- Management of data creation
- Metadata repository
- Image repository
- Registry of metadata preservation
- Not available
- Other:

If other, please specify.

*Ethical aspects***Outline how your project ensures compliance with disciplinary and ethical norms**

- Anonymising data where necessary
- Privacy constraints and applicable ethical norms
- Data accompanied by informed consent statements
- Privacy policies
- National laws
- Not available
- Other:

If other, please specify.

*Other***Refer to other national/funder/sectorial/departmental procedures for data management being used***

- My institution has a Research Data Management Protocol
- Horizon 2020 guidelines
- Digital Curation Center Data Management Plan
- Arts and Humanities Research Council
- UK Data Archive
- Not applicable
- Not available
- Other:

If other, please specify.