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1 Executive Summary

ARIADNEplus objectives

As a follow up on the initial ARIADNE project, the overall objective of ARIADNEplus is to serve archaeological researchers and data management communities by proceeding to improve data sharing and the (re)use of data resources, which are dispersed through Europe and often difficult to discover and access as different silos (institutional, national or disciplinary) still exist.

Building on the achievements of the initial ARIADNE and PARTHENOS project

The outcomes of the initial ARIADNE project, as well as the recently finished PARTHENOS project (good practices, policies & guidelines, tools), are taken into consideration and serve as a starting point for ARIADNEplus Work Package 3.

The following deliverables from the first ARIADNE project are an important source and example for the extension of the guidelines and good practices.

ARIADNE D3.3 Report on Data Sharing Policies, which examines data access and sharing practices within the consortium in light of Open Access, the licensing options available and the issues arising from this evolving movement¹.

ARIADNE D4.6 Final Report on Good Practices, which is focussed on the dissemination of project outcomes and to inform and create a wider community of good practice².

The PARTHENOS project focussed on the humanities as a whole, therefore included archaeologists, and delivered the first concept of a generic Data Management Plan (DMP) for the humanities that will now be transformed by ARIADNEplus to a DMP directed towards archaeologists. The Policy Wizard and the Guidelines on FAIR data management are also being used as a starting point for ARIADNEplus.

PARTHENOS D3.2 Report on Guidelines for Common Policies Implementation presented a series of recommendations and guidelines about which policies to apply during and after research or infrastructure work³.

Policies and Good Practices for FAIR Archaeological Data Management

This report, “Policies and Good Practices for FAIR Data Management”, is the first deliverable of Work Package 3. It describes the activities carried out by the different partners during the first year of the ARIADNEplus project, as well as the results achieved through the work package. The following partners are involved: DANS-KNAW, PIN, UoY-ADS, CNR, CONICET, BUP, NIAM-BAS, AMZ, ARUP, AU, UH, CNRS, INRAP, RGK, ATHENA-RC, PP, HNM, FI, IAA, MIBACT-ICCU, NARA, DGPC, SND and ASU.

¹ <http://legacy.ariadne-infrastructure.eu/resources-2/deliverables/d3-3-report-on-data-sharing-policies/>

² <http://legacy.ariadne-infrastructure.eu/resources-2/deliverables/d4-6-final-report-on-good-practices/>

³ PARTHENOS D3.2 Guidelines for Common Policies Implementation [10.5281/zenodo.2575434](https://zenodo.org/record/105281)

The objectives of Work Package 3 Policies and Good Practices for FAIR Data Management are to:

- Support the creation of FAIR data in the archaeological sector
- Define and spread guidelines to good practices in archaeological data management
- Adapt standard quality criteria for datasets and data to the archaeological case, and support their implementation among users.

The deliverable describes the results obtained in all WP3 Tasks, including the tools, protocols and templates developed by the project in the first reporting period (Months 1-18).

Chapter 2 describes how to define and spread guidelines to good practices in archaeological data management. Commonly developed and widely applicable guides will ensure that archaeological data will be FAIR and available in the long-term.

Chapter 3 presents an overview of the activities to develop and implement a portfolio of tools to support users in their work with archaeological data, like a flexible Data Management Plan (DMP) template and a Domain Data Protocol for Archaeology, a Policy Wizard and a communication platform for information exchange about preferred formats.

Chapter 4 shows the importance of sharing experiences from partners with already certified repositories to partners willing to set up an archaeological data repository. Providing guidelines and support on repository creation and management is the focus of activity here.

Chapter 5 describes what partners willing to certify their repository need to be provided with: the explanation of and training on accreditation requirements when applied to repositories of archaeological data with a perspective on international initiatives, e.g. access restrictions for security and privacy reasons. Achieving a Trustworthy Data Repository status, and making and keeping data FAIR is a joint journey.

Chapter 6 highlights the application of the FAIR principles to archaeological data, taking into account different regulations throughout Europe and the potential sensitivities and IPR-related issues. The aim is to work towards solutions that harmonize the diverse approaches adopted.

Chapter 7 describes training activities on FAIR Data Management.

2 Good practices in archaeological data management

Task 3.1 builds on the work of the first phase of the ARIADNE project under WP4 *Good Practices and Dissemination*, and specifically on Task 4.5 *Good Practices* and Task 4.6 *Guides to Good Practice*. UoY-ADS leads the task, with SND, MIBACT-ICCU, and DGPC. The work within ARIADNE and now ARIADNEplus is inspired by the successful series published by the Archaeology Data Service (ADS) in the UK in collaboration with Digital Antiquity in the United States⁴. It concerns the preparation and publication of a series of guides aimed at non-IT-specialist archaeological researchers, explaining how to organise different aspects of archaeological activity and documentation to ensure the long-term sustainability and re-use of archaeological data, thereby making the best use of the ARIADNEplus Infrastructure. The guides are structured using a wiki format and include common data formats (text, spreadsheets, sound, video) as well as more discipline-dependent formats including GIS, geophysics, 3D photogrammetry and laser scanning.

During the first phase of ARIADNE, areas of contribution to the Guides were previously identified through a survey of *Good Practices* (Task 4.5) and reported in D4.4 (*Initial Report on Good Practices*). The survey involved the identification, assessment and definition of good practices in archaeological research activities, potentially affecting the use of the ARIADNE research infrastructure, including:

- Survey of current good practices related to the use of existing infrastructures
- Assessment, adaptation and customization of such practices
- Guidance on applications, including examples
- Reference information

Within these areas, particular themes were explored, including:

- GIS, archaeological prospection and related datasets
- Scientific data organisation and related datasets
- Applications of visualisation technologies in archaeology and related datasets
- Semantics and metadata

D4.4 described and assessed the nature of good practice in use by the content-providing ARIADNE partners, and listed potential areas of contribution to the Guides to Good Practice by these partners⁵.

The survey of the ARIADNE content providing partners highlighted a diverse range of guidance and Good Practice. Such Good Practice typically took the form of guidance documents, reflecting the partner's areas of expertise and function, and ranged from:

- Broad guidelines on data and report structures and the structure of national databases
- Guidelines and recommendations for excavation and fieldwork
- Guidelines for specific survey (e.g. lidar) or data set types (e.g. 3D or dating techniques)

D4.4 identified five broad themes that formed the basis for the work on the Guides to Good Practice:

- The alignment with, and referencing of, existing Good Practice documents
- The creation of case studies illustrating the application of Good Practice documents to specific data sets for which no good practice currently exists

⁴ <https://guides.archaeologydataservice.ac.uk/g2gpwiki/>

⁵ <http://legacy.ariadne-infrastructure.eu/resources-2/deliverables/d4-4-initial-report-on-good-practices/>

- The referencing and incorporation of guidelines through the ArchaeoLandscapes and 3D-ICONS projects into existing guidelines and the illustration of these guidelines through relevant case studies
- The revision, creation or enhancement of guidelines for 3D datasets
- The creation of guidelines for data from scientific dating and analysis, specifically dendrochronological datasets.

The initial survey of ARIADNE partner organisations highlighted the existence of a variety of guidance and Good Practice documents across the sector. These documents reflected a broad range of expertise and function, while also highlighting a number of specific themes, which have formed the objectives for work to be carried out under Task 4.6 *Guides to Good Practice*⁶

These objectives produced a number of new and much-needed guidelines, which incorporated one or more of the areas identified for contribution. The new guides and case studies successfully incorporated existing material and guidelines from a wide range of sources, ranging from outputs of other collaborative projects and organisation-specific guidelines produced by project partners such as DAI and DANS-KNAW. Additionally, case studies were used both within individual guides and as stand-alone contributions, to successfully illustrate the application of data selection, archiving, and documentation procedures to real-world datasets. When viewed together, the outputs of D4.4 and 4.6 highlighted that, while language, procedure, and the archaeology itself may vary widely between countries and institutions; the data that arises from archaeological investigations and projects, irrespective of geography, share common elements that allow guides for good practice to be commonly developed and widely applicable.

The work carried out within ARIADNE on the Guides provided a solid foundation, and in the interim period between ARIADNE and ARIADNEplus, partners continued to update their best practice expertise in Open Science, Data Citation, Academic Reward for Data Curation and Quality Accreditation of Repositories. This has been expanded by the advent of the FAIR Principles, which sets out guidance on how data should be made Findable, Accessible, Interoperable and Reusable. DANS in particular worked to develop resources around the FAIR principles within the PARTHENOS project allowing ARIADNEplus to incorporate these important new principles into Good Practice work right away⁷.

In addition, the understanding of current trends and needs in Good Practice has been augmented by the findings published in the ARIADNEplus D2.1 *Initial Report on Community Needs*⁸. This deliverable reported Task 2.2 *Reviewing the Community Needs and the Market* as part of WP2 *Extending and Supporting the ARIADNE Community*, and provided information on recent EU research and e-infrastructure strategies, including Open Science, FAIR data, and the European Open Science Cloud. It presented the results of the ARIADNEplus user needs survey, including comparison with the ARIADNE 2013 survey. In 2019 the user needs survey was focused on more advanced data search and access, and new or enhanced services for researchers and data managers, along with future needs. It also took into account the creation of the European Open Science Cloud (EOSC), Open Science, and FAIR, but it is worth expanding upon the major changes in opinion that have occurred. The respondents to the 2019 survey found the most critical barriers to sharing their research data to be the same, but with regard to good practice around data management, the number of respondents who were concerned about the work effort necessary to provide data and metadata in required formats fell from

⁶ <http://legacy.ariadne-infrastructure.eu/resources-2/deliverables/d4-6-final-report-on-good-practices/>

⁷ http://www.PARTHENOS-project.eu/portal/policies_guidelines

⁸ https://ariadne-infrastructure.eu/wp-content/uploads/2019/11/ARIADNEplus_D2.1_Initial-Report-on-Community-Needs-1.pdf

80% to 74%. This is still far too high, but shows a general trend in the right direction, and that ARIADNEplus still has a key role to play in good practice guidance.

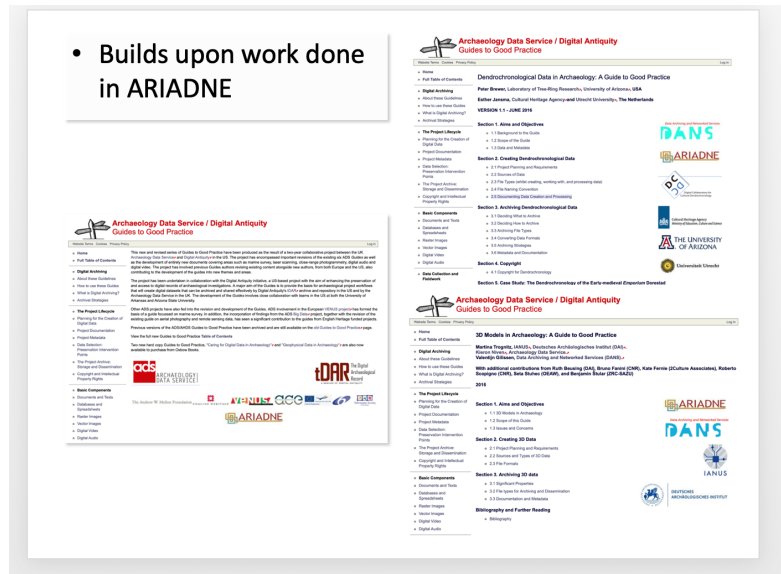


Figure 1 ADS Guides to Good Practices web page

In 2018 and 2019, Science Europe, the European association representing the interests of major public research performing and research funding organisations, published two documents with great relevance for Task 3.1 on good practices in archaeological data management. The Science Europe work was a response to the growing tendency among research organisations and funders to ask researchers to create Data Management Plans for their work and proposals. A lack of standardisation in research data management (RDM) requirements means that these can be time-consuming to create and difficult to compare and evaluate. The Guidance Document “Presenting a Framework for Discipline-specific Research Data Management” of 2018 proposed the creation of domain-specific protocols to be used as standardised templates for RDM, reducing the administrative burden on both researchers and research organisations, as well as funders⁹.

In 2019 the “Practical Guide to the International Alignment of Research Data Management” was prepared by experts from Science Europe Member Organisations¹⁰ This guide aims to align RDM requirements across various research and funding organisations. The Science Europe core requirements have in the meantime been accepted by a growing number of research (funding) organisations, and will also be the starting point for Data Management Plans (DMPs) in the Horizon Europe programme. Work is in progress to develop protocols for various domains on the basis of these documents. Section 3 describes how we will incorporate a Domain Data Protocol for archaeology that is compliant with the Core DMP requirements proposed by Science Europe in the ARIADNEplus template for research data management.

⁹<http://www.scienceeurope.org/our-resources/implementing-research-data-management-policies-across-europe/>

¹⁰<http://www.scienceeurope.org/our-resources/practical-guide-to-the-international-alignment-of-research-data-management/>

3 ARIADNEplus policy support tools

Task 3.2 will implement a portfolio of tools created to support users in their work with archaeological data. DANS-KNAW leads the task, supported by PIN, MIBACT-ICCU, DGPC and other partners as required.

The ARIADNEplus Data Management Plan (DMP) template builds on the work done in the PARTHENOS project¹¹, which produced a DMP template that was extensively tested by the archaeological community.¹² To gather the specifications it builds upon, representatives of the PARTHENOS archaeological communities, represented by the ARIADNE community, were asked to describe their daily data management procedures in detail, through a questionnaire that was structured according to the various phases of the data life cycle. The survey was subsequently extended to other experts of the domain, providing a comprehensive framework of the standards and best practices for creating, storing, and sharing data used by the archaeological community.

As part of task 3.2 ARIADNEplus will improve this DMP template for the archaeological community to comply with the requirements of funding institutions and to provide archaeological researchers the right tool to document their research process. PIN is the partner responsible for the development of such a template and of the online tool, with the support of DANS-KNAW. The aim of ARIADNEplus is to create a template, which focuses mainly on the needs of the archaeologists, and to provide full indications on the compilation for all the questions addressed and suggested answers, by integrating what is already available, thus facilitating the work of the users. Each question included in the template is accompanied by a set of guiding statements, and relevant responses are provided to assist users in completing their DMP with an online tool. Besides including information required by the EU Commission as well as by major funding agencies and other relevant institutions, it incorporates the disciplinary information necessary to support researchers and data managers in the competition of the template.

The ARIADNEplus template will make sure that the harmonized core requirements formulated by Science Europe will be included, and aims to incorporate the domain protocol-idea by proposing norms for good practices in data management that can be generally accepted by the archaeological community.

¹¹ <https://www.parthenos-project.eu>

¹² S. D. Giorgio and P. Ronzino, "PARTHENOS Data Management Plan template for Open Research in Archaeology," 2018 3rd Digital Heritage International Congress (DigitalHERITAGE) held jointly with 2018 24th International Conference on Virtual Systems & Multimedia (VSMM 2018), San Francisco, CA, USA, 2018, pp. 1-4.

Builds on work done by Science Europe on Data Management Requirements & Domain Protocols

CORE REQUIREMENTS FOR DATA MANAGEMENT PLANS

When developing solid data management plans, researchers are required to deal with the following topics and answer the following questions:

1. **Data description and collection or re-use of existing data**
 - a. How will new data be collected or produced and/or how will existing data be re-used?
 - b. What data (for example the kinds, formats, and volumes) will be collected or produced?
2. **Documentation and data quality**
 - a. What metadata and documentation (for example the methodology of data collection and way of organizing data) will accompany data?
 - b. What data quality control measures will be used?
3. **Storage and backup during the research process**
 - a. How will data and metadata be stored and backed up during the research process?
 - b. How will data security and protection of sensitive data be taken care of during the research?
4. **Legal and ethical requirements, codes of conduct**
 - a. If personal data are processed, how will compliance with legislation on personal data and/or data security be ensured?
 - b. How will other legal issues, such as intellectual property rights and ownership, be managed? What legislation is applicable?
 - c. How will possible ethical issues be taken into account, and codes of conduct followed?

Archaeological Domain Data Protocol

- to be formulated by archaeological community
- to be endorsed by research funders
- principle: comply or explain
- reduces need for individual data management plans
- simplifies evaluation of DMPs by funders

BANS Data Archiving and Networked Services

<https://www.scienceeurope.org/policy/policy-areas/research-data/>

Figure 2 Archaeological Domain Data Protocol

Based on the Open Science initiative and the FAIR principles, the template addresses researchers in the archaeological domain and it is tailored to the community needs, including standards and tools commonly used in their daily practices. Beside compliance with the H2020 template, the ARIADNE DMP template indeed adds useful support in the compilation of the document thanks to the guidelines and cross-references created along with the other project resources. It satisfies the needs of research organizations that manage institutional repositories, with a section specifically tailored for them, and of researchers, as they are both data producers and data users, each having a specific perspective on data quality and FAIRness issues. Furthermore, the ARIADNE DMP is aimed at researchers and institutions that still don't have any written policy on how to write a clear document that explains what data they will create, how it will be managed and what their plans are for data sharing and preservation.

With its structure and the suggested answers, the DMP helps researchers think about what to do with their research data, how to collect and to keep track of it, thus helping to identify the support, standards and services needed. Furthermore, it is a useful instrument to plan for short- and long-term storage, and to prepare data for re-use by acknowledging the sources and intellectual contributions according to legal terms and conditions that may include limited privileged use.

An example of suggested answers, which are based on archaeological procedures and practices, is shown in figure 3, where the question "How will data be collected" suggests answers that refer to the specific practices of archaeologists.

1.7 How will data be collected?

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

Archaeological excavation

Archival research

Other

Archaeological prospections

Field Survey

Remote Sensing

Other

Analytical Investigations

Inorganic Materials Study

Dating (Bio-archaeology, Ancient DNA, Dendrochronology, C14)

Other

Figure 3 Example of suggested answers provided by the DMP template

The ARIADNE DMP template is compliant with the guidelines on FAIR Data Management published by the EC to ensure that research data is publicly available, to help Horizon 2020 beneficiaries in making their research data findable, accessible, interoperable and reusable, with the main objective of increasing the scientific quality of the funded projects and to foster their replicability. The ARIADNE DMP template is organized following the same structure of the Horizon 2020 Guidelines, and includes a set of questions organized into the following sections:

1. Data Summary
2. FAIR Data
3. Allocation of resources
4. Data Security
5. Ethical aspects
6. Other

By answering the questions included therein, researchers will provide, among other things, information on:

- Data set description: with detailed information on the scientific focus and technical approach.
- Standards and metadata: users can select among several protocols and standards adopted by the archaeological community, or may describe the proprietary schema used to structure their data, so that other scientists can make an assessment and reproduce the dataset.
- Name and persistent identifier for the data sets: guarantees using repositories that will provide a unique and persistent identification (an identifier) for their data sets and a stable resolvable link where their datasets can be directly accessed.
- Curation and preservation methodology: providing information on the standards that will be used to ensure the integrity of their data sets and the period during which they will be maintained, as well as how they will be preserved and kept accessible in the longer term. If available, users can provide a reference to the public data depository in which their data will be deposited.
- Data sharing methodology: providing information on how their data sets can be accessed, including the type of license under which they can be accessed and re-used, and information on any restrictions that may apply. Users can specify and justify the timing of data sharing, for example, as soon as possible after the data collection, or at the end of the project. In the

section for making data reusable, a researcher can find out more about Open access policies that promote the research data sharing and practical suggestions for managing IPR issues.

All the sections above include questions aimed at the researchers, while section 4 on “Data Security” mostly addresses data managers and repository managers as it concerns details on data recovery as well as secure storage and transfer of sensitive data, information of which a researcher is not necessarily informed.

As anticipated, the added value of the ARIADNE DMP template compared to other existing templates, stands in the guidelines provided in support of the questions and the suggested answers based on the standards and operative workflows adopted in archaeology. This way, users may have a better understanding of the processes and methodologies used, as well as consider possible alternatives to their research approach.

The need for support in the compilation of a DMP was strongly expressed by a group of experts that responded to a survey carried out by the Research Data Management team of the OpenAIRE project and the FAIR Data Expert Group¹³ to collect feedback for the evaluation of the Horizon2020 approach to DMPs in order to identify gaps and collect suggestions for improvement. This need has been further confirmed by the extended community of ARIADNEplus and by the archaeologists and experts of the archaeological domain that are part of the SEADDA community, to which we submitted the DMP template and the tool, asking for their comments and validation.

Cross-references with the resources available under the “training hub” section of the ARIADNEplus website are currently being implemented, to create links that support researchers and institutions in developing a DMP adopting standards and procedures that are shared among the different groups representing the different disciplines of the archaeological domain.

Currently the template includes the PARTHENOS Guidelines on how to make data FAIR¹⁴ and guidance drafted in collaboration with the OpenAIRE project. The collaboration between ARIADNEplus and OpenAIRE has been recently established through joint activities carried out by the team responsible for the development of the ARIADNE DMP tool and the OpenAIRE group involved in the development of the ARGOS tool. It is a mutual collaboration from which both communities will benefit and concerns the improvement of the DMP templates, and that of the tools. As concerns the DMP templates, both are compliant with the H2020. Their content has been mapped to each other to identify possible gaps and to join forces in the implementation of guidelines useful for filling the templates with the right information, besides referencing the resources already published by both projects (See Annex 1).

Figure 4 shows a typical example of a question, which provides a guideline explaining to the user what is required, as well as a list of suggested answers. In this specific case the question is to specify the standard used for metadata creation. Besides choosing the standard provided in the list, the user is free to complete the question by indicating other standards not specified in the list or referring to national or proprietary standards used in the metadata creation.

¹³ M. Grootveld, E. Leenarts, S. Jones, E. Hermans, and E. Fankhauser, OpenAIRE and FAIR Data Expert Group survey about Horizon 2020 template for Data Management Plans (Version 1.0.0), 2018 [Data set]. Zenodo. <http://doi.org/10.5281/zenodo.1120245>

¹⁴ https://www.PARTHENOS-project.eu/portal/policies_guidelines

2.1.2 Specify standards used for metadata creation *

To enable the discovery of content, describe research data as consistently and completely as possible. Include enough information for the data to be accessed and understood later on. If possible, use an existing metadata schema which fits the type of data object or dataset you are describing (source PARTHENOS FAIR Guidelines).

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

You can search for discipline-specific standards and associate tools browsing the Research Data Alliance Metadata Standard Catalogue here: rd-alliance.github.io/metadata-directory/

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

If other, please specify

National standards

List any national standard used for metadata creation

Ad hoc metadata/proprietary schemas

Figure 4 DMP tool screenshot, showing a typical question with guidance and suggested answers

To facilitate the compilation of the ARIADNEplus Data Management Plan template, an ad hoc application has been developed by PIN, the design of which has taken into consideration both the practical needs of researchers, and the current technological evolution that digital documents are undergoing. Temporarily stored on PIN's server, the tool will be embedded into the ARIADNE portal

together with the services developed by the project¹⁵. It will also be an instance of the VRE on D4Science developed by CNR to provide researchers with the means of creating their own DMP.

The interface made available online has been designed to facilitate the compilation of the DMP through the use of intuitive and user-friendly solutions. The questions that the researcher is invited to answer are divided into successive pages, enriched by a common progress bar that presents itself as the main reference point for the user. The overall view of the various parts that make up the model guides the user step by step, indicating approximately the time required to conclude them. Each page groups similar thematic questions, divided into mandatory and optional, enriched by informative pop-ups to help the user fill them in. If some of the points deemed mandatory for submitting the DMP have not been completed, their number will be displayed in red in the progress bar. At the end of the compilation procedure it will be possible to download the information it contains in PDF format and in JSON. The JSON file is essential within the application, as it offers the user the opportunity to save a version of his/her work. In fact, the compilation of the questionnaire can be interrupted at any time by downloading the JSON file containing the current data. This file can be reloaded within the online interface to continue and finish the job. If instead the compilation of the questionnaire is definitive, the data contained in the file will constitute a version of the DMP useful for any subsequent revisions or updates.

Our goal is to obtain a machine-actionable DMP, whose information can be automatically processed and understood by computers, and which are at the same time interoperable, editable and shareable within the community of stakeholders. The design of future application developments is aimed at making the data contained within the DMPs shareable and interoperable between those research communities that will adopt common solutions to facilitate cooperation between their systems. Making documents interoperable means making sure that the information they contain can be exchanged between different systems in a complete and reliable way. For this it is necessary to consider both the syntactic and the semantic aspects of the data. Computers can process and manage most of the information syntactically, if it is encoded in standard formats such as XML or JSON, but they are unable to interpret and "understand" it if it is not modelled using controlled vocabularies and standards. The DMPs that can be generated with the current version of the tool already meet the requirements for syntactic interoperability, thanks to the encoding in JSON format.

The machine actionable version of the ARIADNE DMP template is currently under definition as it relies on the mapping to the AO-CAT model, the CIDOC CRM extension developed for the interoperability of the datasets integrated by ARIADNEplus. This will offer researchers the opportunity to benefit from sharing information.

As anticipated, to extend the benefits of using the ARIADNEplus DMP tool, the group responsible for this activity, is collaborating with a team from the OpenAIRE project, with the aim to integrate the ARIADNEplus DMP template into the ARGOS tool¹⁶. ARGOS is an open extensible service that simplifies the management, validation, monitoring and maintenance of DMPs. It allows researchers, managers, supervisors, etc. to create actionable DMPs that may be freely exchanged among infrastructures for carrying out specific aspects of the data management process in accordance with the intentions and commitment of data owners. The ARIADNEplus DMP template is currently being tested and later on will be embedded into the ARGOS environment. This will guarantee greater visibility and to be reached by a larger community. A mapping of the ARIADNEplus DMP template with the RDA DMP Common

¹⁵ <https://vast-lab.org/dmp/ariadneplus/form/>

¹⁶ <https://www.openaire.eu/argos/>

Standard for machine-actionable Data Management Plans is underway to allow integration into the ARGOS environment. On the other side, ARIADNEplus is contributing to the ARGOS multidisciplinary aspect by sharing standards, vocabularies and other information specific to the archaeological domain.

To guarantee a coherent dissemination of these valuable tools, webinars and training workshops will be organized, and are already included in the project communication plan for the next period (M19-36), with the aim to raise awareness on open research in archaeology and in the digital humanities sector.

Further DMP activities that ARIADNEplus aims to finalize by the end of the project, include the translation of the DMP template into different languages to provide national versions to those countries that have not yet implemented their own template, e.g. Italian, Spanish, Greek, etc. Other activities include the creation of links between the DMP guidelines and other resources made available within ARIADNEplus and already available online on the project website. In particular, links to the contents of the training hub will be made to help those who are not familiar with the data management process and who can thus know in an interdisciplinary way, how data should be collected, processed, stored and shared with other researchers.

Another tool ARIADNEplus plans to further develop is the Policy Wizard, which summarizes and explains the main principles of archaeological data management and their implementation. This online service¹⁷ aims to help archaeologists discover which data policy applies best to their particular data.

This task will build on the work done in PARTHENOS, which defined the different concepts of policy, guidelines and best practice, their objectives and target audience. An inventory of existing policies from different infrastructures in the Social Science and Humanities was created to be able to extract a list of shared policies. The Policy Wizard shows a range of policies suggesting how data should be collected, processed, stored, and shared with other researchers. Some of these policies operate on a country level, because they depend on national regulations, while others are based on EU regulations and operate at a European level.

The Policy Wizard has been designed with a user-friendly interface that displays the information on the selected policies and allows cross-filtering of data from different disciplines. Users start with selecting their area of interest, followed by the topics that they wish to find policies for. End-users can use this tool to access the information about the policies that best adapt to their use case. All available data are ordered by the FAIR principles. This model is interoperable with training modules and works on standards like the SSK toolkit¹⁸ which documents the major standards in the archaeological domain, as well as authority files such as thesauri, reference collections, gazetteers etc. Data Curation of the matrix information is managed and updated via a Google Drive excel sheet and the Wizard uses REST APIs to communicate with other web services. The Wizard is currently available via the PARTHENOS Portal and can be installed as a stand-alone widget. Thus, the wizard can be made available on the ARIADNEplus website for interested cultural heritage and archaeological researchers¹⁹.

There is a huge potential for international collaboration on the topic of common guidelines on preferred formats. Preferred formats are file formats that will offer the best long-term guarantees in terms of usability, accessibility and sustainability. Partners like ADS, SND and DANS-KNAW, have a lot

¹⁷ <https://www.PARTHENOS-project.eu/portal/wizard>

¹⁸ <https://www.PARTHENOS-project.eu/portal/ssk-2>

¹⁹ PARTHENOS D3.2 Guidelines for Common Policies Implementation 10.5281/zenodo.2575434

of expertise on preferred formats and produce guidelines for their own communities. The work within ARIADNEplus to deliver policy support continued by doing research work and focused on new recommendations about preferred formats. DANS-KNAW started by creating an overview on the DANS website which is regularly updated²⁰.

This way depositors are recommended to try as much as possible to deposit data in preferred formats, which are frequently used, have open specifications and are independent of specific software, developers or vendors.

DANS created a communication platform for information exchange about preferred formats via a GitHub environment that is still in its conceptual phase. This model can help to exchange new insights between experts and users in an international context. The content of the policy wizard can be filled by extracting common guidelines from this communication platform, thus helping to promote them in different research communities. This idea was presented during the FAIR Data Management workshop (described below in task 3.6) organised for the ARIADNEplus partners with the aim not only to receive feedback, but also to start an international collaboration process. The network of ARIADNEplus archaeological partners, together with the network of SEADDA, with its members from archaeological institutions and museums, can participate by adding new policies to the existing list incorporated in the Policy Wizard. The Policy Wizard offers search by topic. When a policy is not yet listed in the Policy Wizard, it can be added through a simple interface that feeds the information about the new policy directly into the Policy Wizard backend. Not only formal policies can be shared, but also best practices.

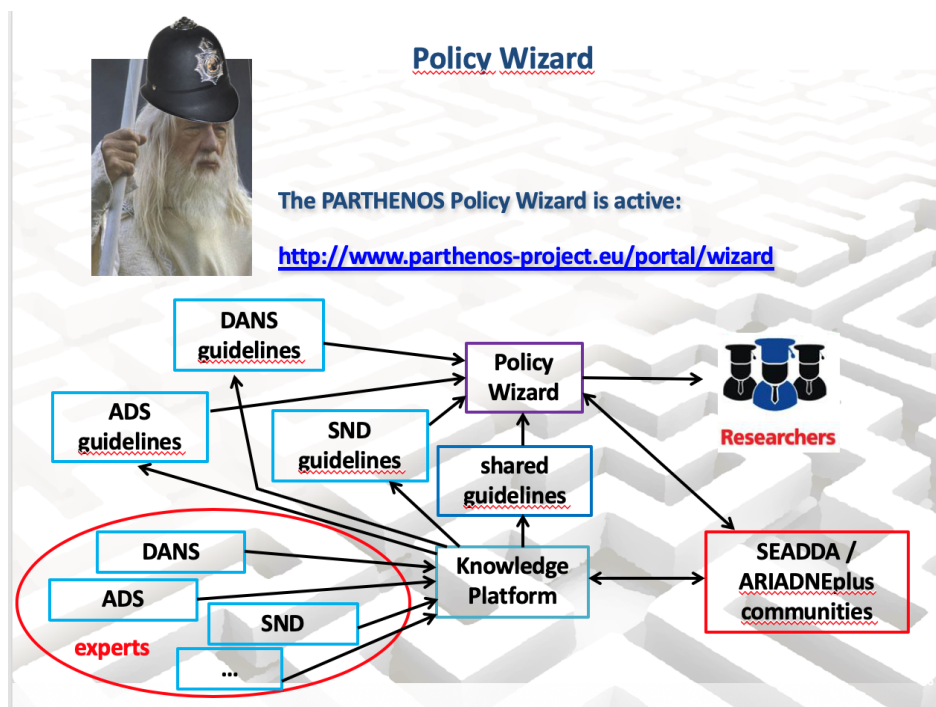


Figure 5 Policy Wizard workflow

²⁰ <https://dans.knaw.nl/en/about/services/easy/information-about-depositing-data/before-depositing/file-formats>.

4 Providing guidelines and support on repository creation and management

Task 3.3 provides guidelines and supports partners willing to set up an archaeological data repository. UoY-ADS leads the task, with SND and CNR-ISTI (NEMIS-Infra). Other partners will advise on national/local opportunities.

The stewardship model for the first phase of ARIADNE was an online aggregation infrastructure, bringing together resource discovery metadata, allowing users to access locally held resources in the different regions and countries represented by the ARIADNE partners and associate partners. Projects combining the archaeology and computer science domains are often tasked with showing technological innovation, while less appreciation is placed on the unique intersection afforded by the collaboration between the two fields. For ARIADNE, the technological innovation was challenging, but the collaborative innovation was equally so. Setting aside the differences of opinion that naturally arise from working through an untried process, most challenges arose when trying to accommodate the diverse workflows in use by archaeologists. Europe has different schools of practice that vary from country to country, and different legal and social traditions with regard to the divisions between academic, development-led, and community archaeology. Archives and repositories are typically based in one country, but for ARIADNE, partners had to cooperate to make their data interoperable in new ways and across national borders. As the project progressed, there was increasing discussion about the variability in capacity among the data-providing archaeological partners, which was found to be greater than was initially understood.

All data-providing partners encountered challenges in how best to map and organise their metadata in order for it to be incorporated and made discoverable within the ARIADNE portal, but some partners encountered greater barriers than others. These included lack of technical capacity in preparing their data; lack of background in data stewardship; and lack of an appropriate, persistent repository to house their data. Despite initial frustrations, several partners came to see this as an opportunity, using the collaboration within ARIADNE as a form of leverage to improve their existing organisational practices or to create better infrastructures for their data. New resources were created or improved using the funding and shared expertise within the network, not only helping partners participate in ARIADNE, but also leaving their institutions, regions, or countries with more complete or accessible resources internally. One of the best examples is the Hungarian National Museum, which used ARIADNE partnership and access to its collaborative community not only as an opportunity to prepare digital archaeological resources for resource discovery within the aggregation infrastructure, but also as impetus to create their own online research infrastructure, disseminating their archaeological data online via their own institution for the first time²¹.

Two of the ARIADNE partners saw lack of equity as an issue that needed to be fully articulated within the partnership and beyond. As part of the ARIADNE session for the Italian Semester of Presidency of the European Union International Conference on Research Infrastructures and e-Infrastructures for Cultural Heritage, Benjamin Štular from the Institute for Archaeology, ZRC SAZU (Research Centre of the Slovenian Academy of Sciences and Arts) and Anthony Corns from the Discovery Programme in Ireland presented a paper titled “Impressions from the ARIADNE Community.” They described the lack of equity they saw across the ARIADNE partnership with regard to access to a persistent and appropriate archive or repository for their digital data in their home countries, and stated that there were countries that were “haves” and “have-nots” within Europe. For example, the UK, the Netherlands, and Sweden were “haves,” whereas most European countries, including the countries

²¹ <https://archeodatabase.hnm.hu>

they represented, Ireland and Slovenia, were “have-nots.” For the “haves,” at least some percentage of digital archaeological research data in their country was being saved for future use and reuse, but for the “have-nots,” potentially all could be lost. It was determined that data management workshops in partner countries would be a useful way to begin to address the issue of equity within the partnership. The Archaeology Data Service and 2Culture Associates, offered to run in-country data management workshops for partners who wished to host them.

The participants cited the following primary reasons for attending: pressure on researchers from institutions to deposit data in a persistent repository, and from funders to deposit data for open access dissemination; lack of guidance on what constitutes compliance for data deposit; funders willing to cover costs of data management and deposit, but lack of guidance for depositors in data management planning; and lack of an appropriate archive or persistent repository able to accommodate archaeological data. Equally important were the presentations given by the local ARIADNE partners, who carefully researched and presented the current archaeology data stewardship landscape within their respective countries for the first time. Attendees included archaeologists and technical staff directly involved with data handling, alongside governmental and institutional stakeholders who would be a necessary part of any future solution. Attendees also took the opportunity to speak with each other about how to approach these changes in practice, which were a source of uncertainty for those working in isolation. They also felt positively about learning that there was a larger best-practice community with which they could engage.

In both Austria and Slovenia, work towards greater stewardship of archaeological data moved forward. In Austria, researchers from the Austrian Academy of Sciences and the University of Innsbruck worked together to create a case study, building a stewardship exemplar for a specific project. In Slovenia, there was experimentation with the creation of a database to form the basis of an archive within ZRC SAZU and the Centre for Preventive Archaeology at the National Heritage Office (CPA ZVKD) began developing a registry of field- and desk-based assessments. ARIADNE partners also used what was learned at the workshops to inform a survey to better understand the stewardship landscape for archaeological data in Europe, and were able to collate and analyse responses from over 20 countries. The online availability of unpublished fieldwork reports, excavation registers, and sites and monuments registers were surveyed, with the conclusion that their availability was very rare, and confirming the suspicion that lack of equity was even more widespread than was previously known.

The ARIADNE partnership generally, and the in-country data management workshops specifically, made clear that there must be variability in stewardship models. Equity would not be built through a single proscriptive solution. The ways archaeological work was funded and undertaken, and which stakeholders should be taking responsibility for stewardship varied greatly between countries and even regions. In addition, those who wanted to take action could find themselves isolated and, in many instances, junior voices in the discussions about new models for working practice, making collaboration and the formation of a community of practice even more important. Equity Initiatives after ARIADNE based on the positive response to the data management workshops and the information returned by the survey, ARIADNE partners determined that the creation of persistent archives and repositories able to accommodate archaeological data was urgent, and that the timing was opportune. Before the first phase of ARIADNE came to a successful close in 2017, plans were already in place to move forward with funding proposals to create a broad collaborative network, including colleagues in North America and other countries outside of Europe²².

²² Holly Wright & Julian D. Richards (2018) Reflections on Collaborative Archaeology and Large-Scale Online Research Infrastructures, *Journal of Field Archaeology*, 43:sup1, S60-S67, DOI: [10.1080/00934690.2018.1511960](https://doi.org/10.1080/00934690.2018.1511960)

This resulted in securing successful funding for the COST Action Saving European Archaeology from the Digital Dark Age (SEADDA), which is now running concurrently with ARIADNEplus, allowing an increased focus on data stewardship and expansion of international participation. SEADDA²³ currently has participants from 34 countries, including all countries represented by ARIADNEplus partners. It is useful to think of the work ARIADNEplus and the ARIADNE Portal as developing the current state-of-the-art for implementation of the FAIR principles, whereas SEADDA is concerned with the long-term trajectory of the data itself. It is focussed on the capacity-building necessary for organisations, regions and countries to expand their participation in ARIADNEplus in a more equitable way through collaborative stewardship.

When Task 3.3 was first created, it was set to take the form of draft guidance to be produced towards the middle of the project (with a revised version planned for delivery at the end) linked to TNA from WP9, but as SEADDA was funded concurrently with ARIADNEplus, this has been transformed into deeper work and collaboration across four different working groups (WG), and the ability of ARIADNEplus partners to participate in SEADDA Short Term Scientific Missions for more intensive work. These WGs include:

WG1: Stewardship of Archaeological Data

Objective: To bring together members with varying levels of experience to share their successes and challenges around the stewardship of archaeological data to create a sub-network. Practical and ethical considerations will be explored including encouragements and resistances to sharing data and making it openly accessible within archaeology, and who is legally required to fund the short and long-term costs of preservation. This Working Group will be the starting point for those new to the main aim of SEADDA and who wish to begin or progress dialogue in their region, country.

Tasks:

- Survey of state-of-the-art for preservation and dissemination within Europe
- Develop a European network of contacts, and determine which are well placed to host data management and stewardship workshops within their countries
- Organise an exploratory workshop on stewardship to define format and content most useful for data management and stewardship workshops, and a discussion workshop to synthesise
- The findings of the survey and create resources that can be used to inform key decision-makers for with regard to stewardship, e.g. position papers
- Create an open access publication on the current state-of-the-art of the stewardship of archaeological data in Europe

WG2: Planning for Archiving

Objective: To identify the practical and technical issues surrounding the creation of an appropriate repository for archaeological data. This will range from understanding hardware and software options for those wishing to initiate a repository in their country, management structures, and the training of archivists. It will identify existing best practice, changing future needs, and pragmatic technical and structural solutions.

Tasks:

- Survey of current hardware and software options for archiving archaeological data
- Organise exploratory workshop on practical issues around repository creation
- Organise discussion workshop on repository implementation
- Create practical materials for workshops organised by WG1

²³ <http://seadda.eu>

- Create open access publication on experiences of new and emerging archives

WG3: Preservation and Dissemination Best Practice

Objective: To understand current international best practice with regard to archiving and dissemination, and implementation by existing repositories. It will include best practice using the Open Archival Information System (OAIS) model, the FAIR Principles, and other international standards, along with repository accreditation, cost modelling, and issues surrounding the myriad forms of data generated and used within archaeology. It will also bring together archaeological digital archivists together in a formalised network for the first time to share current practice, and survey future trends to understand the changing archaeological and digital landscapes (domain and technology watch).

Tasks:

- Survey of current practice within existing archives
- Create sub-network of digital archivists within archaeology
- Review of current international best practice guidance, providing expansion and improvement where needed
- Organise exploratory workshop on current best practice within existing archives
- Organise discussion workshop on future challenges and trends in the archaeological and digital domains
- Create open access publication on current best practice and future challenges within archaeological data archives

WG4: Use and Re-use of Archaeological Data

Objective: To understand how to optimise archives and interfaces to maximise the use and re-use of archaeological data, and explore how archaeological archives can better respond to user needs, and ways to document and understand both quantitative and qualitative re-use. This will include exploring barriers to re-use, such as intellectual property rights and licencing, but also design of underlying data structures and their interfaces. It will focus on initiatives like the FAIR Principles and technologies that improve and optimise searching, issues around how data is created, organised and disseminated, different options for interface design, and developing best practice around qualitative re-use.

Tasks:

- Survey of archive search interfaces and underlying structures and technologies
- Survey of qualitative analysis procedures and technologies to better understand re-use and barriers to re-use
- Organise an exploratory workshop on current challenges around the use and re-use of archaeological data
- Organise a discussion workshop on optimising archaeological data for re-use
- Create an open access publication on the state-of-the-art of re-use of archaeological data, and future challenges

The exploratory workshops have all taken place within the last 12 months, and ARIADNEplus partners worked to set the agenda for SEADDA at all levels of best practice, for long-term management of their archaeological data.

5 Providing guidelines and support on repository quality control

Task 3.4 will provide guidelines and support partners willing to accredit their repository and their data according to the most important accreditation systems presently leading to CoreTrustSeal, as well as to other systems in use in different EU countries. It will attentively follow the evolution of policies on the matter and provide indications from the archaeological research perspective to international initiatives in the field, for example concerning restriction of access for security and privacy reasons, issues related to language use (multilinguality), or, on the other hand, the implication and an explanation of accreditation requirements when applied to repositories of archaeological data.

DANS-KNAW leads the task, with the support of UoY-ADS, MIBACT-ICCU, DGPC, and SND.

DSA Principles (for data repositories)	FAIR Principles (for data sets)
data can be found on the internet	Findable
data are accessible	Accessible
data are in a usable format	Interoperable
data are reliable	Reusable
data can be referred to	(citable)

Figure 6 FAIR data assessment

This task gives support to partners willing to accredit and certify their repository. Giving guidelines with an archaeological perspective on international initiatives, e.g. access restrictions for security and privacy reasons, as well as an explanation of and training on accreditation requirements especially applied to repositories of archaeological data are requested.

One session of the workshop on FAIR data management described in task 3.6 was dedicated to focus on the process of how to get your repository certified. However, due to the COVID-19 safety restrictions on organizing meetings, this interactive part of the program in a hands-on setting had to be cancelled last minute. The following preparations for this workshop will form the basis and will be part of activities in this task later on in the project:

The Swedish National Data Service (SND), as well as the Archaeological Data Service (ADS/UK) and MIBACT-ICCU from Italy were invited to share their experiences with the procedures as well as the lessons learned and advantages that the CTS certification has brought them. These presentations are a motivating example for other partners willing to make their first steps into accreditation. After a general introduction on data repositories and an introduction to the CoreTrustSeal²⁴ the aim is to focus on the following requirements:

²⁴ <https://www.coretrustseal.org/wp-content/uploads/2017/01/20180629-CTS-Extended-Guidance-v1.1.pdf>

- R4: The repository ensures, to the extent possible, that data are created, curated, accessed and used in compliance with disciplinary and ethical norms.
- R5: The repository has adequate funding and sufficient numbers of qualified staff managed through a clear system of governance to effectively carry out the mission.
- R7: The repository guarantees the integrity and authenticity of the data.
- R8: The repository accepts data and metadata based on defined criteria to ensure relevance and understandability for data users.
- R10: The repository assumes responsibility for long-term preservation and manages this function in a planned and documented way.
- R15: The repository functions on well-supported operating systems and other core infrastructural software, and is using hardware and software technologies appropriate to the services it provides to its Designated Community.

Achieving a Trustworthy Data Repository status and making and keeping data FAIR is a joint journey. DANS-KNAW is project coordinator of the FAIRsFAIR project, aiming to perform long-term stewardship and curation so data remains FAIR over time. It is FAIRsFAIR's ambition to support the governing bodies of the European Open Science Cloud (EOSC) in setting up FAIR aligned Rules of Participation for the FAIR-principles. At a recent FAIRsFAIR webinar, in which ARIADNEplus Work Package 3 participated, the involved community expressed that, although it will take an investment of time and money, a formal certification process for FAIR-enabling repositories offers an objective modality for assessment and helps to build and share community roadmaps.

ARIADNEplus started at the kick-off event to exchange knowledge and experiences by combining a series of presentations on important best practice issues with presentations on information on FAIR data management tailored to data supporters in the broadest sense and departing from the lifecycle of scientific research data. The survey held within ARIADNEplus showed that 67.3% of the respondents (both researchers and data managers) found it would be very helpful to receive training to help apply open and FAIR data principles in archaeology²⁵.

Therefore, Work Package 3 started to work on further dissemination of the "Guidelines to FAIRify data management and make data reusable" (Fig.7).

²⁵ <https://ariadne-infrastructure.eu/key-results-of-the-community-needs-survey/>

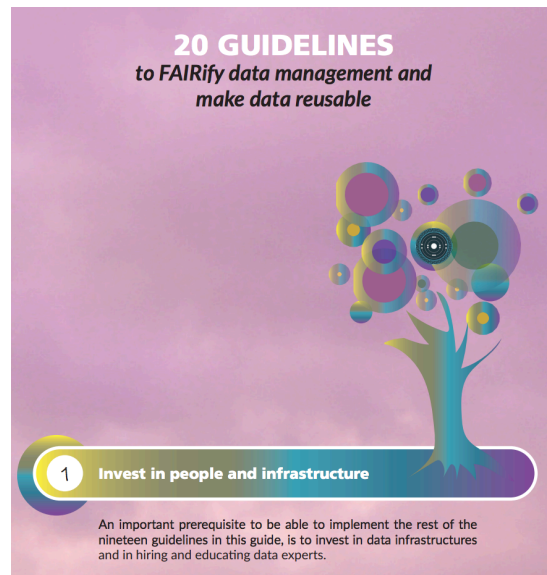


Figure 7 Guidelines to make data FAIR

This compact guide offers a series of guidelines to make research data as reusable as possible based upon the FAIR principles. The guidelines were developed within the PARTHENOS project and the recommendations are for data producers and data users on the one hand and for data archivists on the other. Twenty core recommendations were extracted from different research data management policies. Within ARIADNEplus, new translations of the “Guidelines to FAIRify data management and make data reusable” are now being created in Turkish, Czech and Portuguese, in addition to the already available English, Italian, French, Hungarian and Greek versions. This is done as a joint ARIADNEplus and SEADDA effort as communities related to partners from both networks are target users. More translations in other languages will follow as it proves to be an excellent way to help communities make a start with the FAIR enabling journey.

6 Managing FAIRness of archaeological data and IPR

Task 3.5 is led by MiBACT-ICCU and will assess the impact of European and National regulations on data policies in archaeology, with the aim to make archaeological data compliant with FAIR principles. The archaeological data treatment related to IPR issues are complex both for the multiplicity of contents that can be produced and for the presence of the different actors involved. In pursuing this objective, the task analyses the different restrictions imposed by legal regimes and the way archaeologists respond to them, how they are interpreted and how they influence behaviour. Moreover it identifies good practices specifically in relation to the legal protection of personal data, the protection of intellectual property rights and the use of licences or waivers to indicate the terms of re-use.

The FAIR principles need to be combined with a statement that research data should be Open, unless there is a good reason for restricting access or reuse. In recent European Commission formulations, the maxim 'as open as possible, as closed as necessary' has been introduced, which is a helpful articulation of the principles at play.

The intellectual ownership of the archaeological data and the documents that represent them will be identified, also clarifying the fundamental difference between the so-called economic rights (the right of possible economic exploitation, which in this field is limited, but also the right to disseminate, copy, etc.) and moral rights (the right of the person who is considered the author of the resource to be cited as such. Moral rights are not transferable in the European Civil law, but this aspect can be detailed in the survey to define exactly the policies adopted in each Member State, represented by the partners.

The "destiny" of the archaeological documentation should be defined and declared upstream, i.e. the way in which it should be collected and shared with the public. The data creator should know how his work will be disseminated in the future and, if possible, choose the licenses. A minimal set of data should be defined and licensed open by default, and the dataset creator should be properly informed of this. From an operational point of view, the application of FAIR principles to archaeological data requires first of all the distinction between the two main phases for which it is necessary to outline workflows and guidelines: the excavation/research phase and the phase following the conclusion of field activities, concerning data archiving, data storage and access/reuse.

In order to balance the freedom of research, the guarantee of knowledge sharing and the need to protect archaeological goods, the modalities governing access to data and documents should be carefully established in relation to:

- the provision of open access to a minimum level of information, with the adoption of open licences for reuse, including for commercial purposes (possibly with specific licences allowing at least commercial uses such as professional archaeology)
- progressive levels of insight and thus access to detailed data for researchers and professionals, plausibly subject to accreditation;
- limited access to topographic data for vulnerable assets in terms of protection (e.g. wrecks and underwater sites), through visibility dependent on scale;
- possibility for the creator of the resource to publish the results of the study first, granting if necessary a period of embargo on the dissemination of sensitive data limited to the study phase (max 5 years, and in any case not on minimum data that must be disseminated immediately).

We will identify examples of circumstances or data types that, in the field of archaeology, might qualify as good reasons not to make the data publicly available, or where data can be available through restricted access to registered users, for example, due to:

- location information or other unique data that may place vulnerable sites at risk;

- data containing personal information on human subjects;
- where there are specific legal restrictions to certain sensitive data and the laws provide standard means for researchers to apply for access;
- where the data (or software) were purchased and access is available to others through the same process. For example, if a commercial software package or data set is used, the researchers can indicate where others can obtain similar access.

The survey on policies on data management in archaeology, which will be conducted next October, will first analyse two key aspects:

- who and how to archive the documentation deriving from archaeological investigations
- who and how to access the documentation

The survey will take into consideration different contexts in which data are produced (research academy or commercial environment) and will investigate the main issues related to IPR:

- data created as a result of archaeological research;
- research data produced by institutional activities by national or regional agencies and ministries in charge of heritage. For example, data created by excavation activities (sometimes by the collaboration between research centres and such agencies);
- data produced by private institutions or individuals, who are the owners or the managers of the asset. For example, data that is produced to comply with national legislation before applying to or carrying out work, whether to preserve the asset or in advance of development potentially impacting on CH assets. These obligations cover archaeological monuments and areas of archaeological interest;
- finally, data produced by third parties relevant for risk management: examples are geophysics data, which are highly relevant for the evaluation of heritage risks.

These datasets are regulated under different regimes. The data may be subject to access restrictions deriving from security, privacy, IPR or other reasons.

The survey will identify legal barriers of the accessibility and reusability of research archaeological data due to IPR, also taking into consideration the implications that the European Copyright Directive has had on the archaeological field.

For data produced by public bodies, we will analyse possible impacts at the National level of the PSI EU directive and the recent update Directive 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector. The recent directive introduces the concept of High-value Datasets and broad thematic areas. For now, regulation of Cultural Heritage data is covered by the general rules. The elements gathered by the ARIADNEplus survey could contribute to further discussion between restrictive approaches and more the open ones, which characterized the application of the PSI directive in the CH domain in past years. By gathering information through the survey, this task will investigate restrictive approaches and the more open ones, and the new exceptions that are opening up the possibilities that digital technologies and research infrastructures offer to research, education and heritage preservation and dissemination, taking into account online and cross-border uses of copyright-protected material. Based on the survey's results, this task will provide recommendation on finding policies that guarantee openness of archaeological data at the highest possible level, with the objective of promoting the FAIR principles beyond their original scope, research data, while remaining compliant with all the applicable regulations. Restrictions to access for legitimate interests are not excluded by FAIR, so the ARIADNEplus policy will promote Findability and Interoperability in view of Re-use, recommending best practices for Access that encourage the removal of unnecessary restrictions, which may vary from country to country. The proposed solutions will be integrated to FAIR data tools and metrics of GO FAIR and FAIRsFAIR.

7 Training on FAIR Data Management

Task 3.6 is led by DANS-KNAW and will organize a workshop on FAIR data management in years 2, and 4. Training sessions will be short and intense spanning three days with an additional visit to a relevant innovative Dutch research or data facility. A workspace will be provided; access to several online demonstrator facilities and conventional Internet access is included. Training material will be made digitally available and trainees can bring their own data. Several trainers, from DANS-KNAW and allied organizations, will be involved in the offered services.

The DANS team originally organized a three-day event for mid-March that combined a series of presentations on important best practice issues for FAIR Data Management, with a visit to the National Museum of Antiquities and the Bibliotheca Thysiana (in Leiden), as well as workshops on 'FAIR data management' and 'Trust Concepts and Standards'. The event was envisioned as a combined ARIADNEplus and SEADDA meeting, to give participants the opportunity to interact across both networks. SEADDA is the COST-action Saving European Archaeology from the Digital Dark Age and involves the following type of members: archaeologists, researchers and people working at museums and governmental institutions from the cultural heritage sector.

However, due to the COVID-19 safety restrictions on organizing meetings in The Netherlands, the face-to-face event had to be restructured as a one-day virtual meeting, which consisted of a series of lectures in the morning and a SEADDA WG3 meeting in the afternoon of March 17th. Unfortunately, the hands-on part of the workshops on FAIR Data Management and Trust Concepts and Standards had to be cancelled because of their interactive nature. However, presentations and discussions to share best practices on these topics were held.

The virtual session took place on Tuesday, March 17th using GoToMeeting and, despite the unfortunate circumstances, was a great success. A total of 42 participants joined the sessions, although not all of them were there for the entire meeting.

The FAIR Data Management workshop programme consisted of three one-hour lectures as follows:

1. Herbert Van de Sompel kicked the meeting off with his lecture on *An Institutional Perspective to Rescue Scholarly Orphans*. In the Scholarly Orphans project, funded by the Andrew W. Mellon Foundation, the team looked into archiving artefacts (presentations, code, data, etc.) that researchers deposit in various web platforms (GitHub, Slideshare, Zenodo, personal websites, etc.), but that go unnoticed by their institutions.
2. The second speaker, Valentijn Gilissen, gave a presentation entitled *Preferred Formats = Pre-FAIRed formats*, where he explained the reasoning behind DANS's preferred formats policy and demonstrated how such a policy contributes to producing FAIR data. In short, DANS considers that the file formats best suited for long-time preservation and accessibility are file formats which are commonly used, have open specifications, and are independent of specific software, developers or suppliers.
3. Last but not least, Stijn Heeren presented the Portable Antiquities of the Netherlands (PAN) project in his lecture *Archaeological small finds from field to file: Citizen science approach and data structure of the PAN-project*²⁶. Stijn emphasized the role of private finders contributing to the project. In addition, he discussed the PAN portal and the data model

²⁶ <https://ariadne-infrastructure.eu/ariadneplus-seadda-meetings-on-fair-data-management/>

behind the description of the findings in detail, and how this approach leads to publishing data that is FAIR.

The topics discussed were archiving research artefacts like presentations, code and data, followed by a discussion about preferred formats policies, but also the topic of citizen science and FAIR data, Guidelines to FAIRify Data Management, Testing of Data Management Plan tool and other dissemination activities were discussed. Several interesting views and needs came up at the FAIR Data Management event, which are worth looking into. Participants expressed the need for new policies on data migrations (bulk migration) and metadata harmonization. Interesting discussions were held about policies to discard data and the importance of European data integration using controlled vocabularies and data mappings. As described in task 3.2, a knowledge platform on preferred formats is being set up, a place where different partners with different insights can share their thoughts in a structured, more official way.

The presentations, along with session notes, will also be made available on the Training Hub of ARIADNEplus, which provides training resources for archaeological researchers and practitioners. A number of key topics are covered through online resources, training workshops and webcasts. In addition, links are provided to external sources that may be of interest.

8 Conclusions

The teams working on the different tasks of Work Package 3 Policies and Good Practices for FAIR Data Management got off to a flying start in setting up good practices, guidelines, policy support tools, and in dissemination and training activities on FAIR Data Management in Trustworthy Data Repositories keeping in mind national and international regulations. Building on the work previously done within ARIADNE and PARTHENOS, as explained above, has allowed to re-use previous results and avoided starting from scratch.

By responding with a flexible attitude towards the restrictions caused by COVID-19, the team was able to continue all activities in all tasks. An example is the already mentioned event on FAIR Data Management and Trust Concepts and Standards planned in March, which was rapidly turned into a virtual event, showing the effectiveness of this approach.

Annex 1 ARIADNEplus DMP template



Data Management Plan Template for Researchers in Archaeology
v.2.0

DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
Administrative information	<i>Email address*</i>		
	<i>Name and Surname*</i>		
	<i>Affiliation*</i>		
	<i>Role*</i>		
	<i>DMP version*</i>		



Data Management Plan Template for Researchers in Archaeology
v.2.0

DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
Data summary	State the purpose of the data collection/creation*	<p>Please, include a brief description of the reason for collecting/creating data explaining the relation to the objectives of the project.</p> <p>Data collection is usually at the beginning stages of research data management lifecycles to set the background of what is needed (data generation), what is already there (data reuse) and how to best use it to fulfil the project's objectives (why). Here you may add information about the scope and objectives of your data collection process.</p> <p>You may find a comparison of different data management lifecycles here: Plale, Beth & Kouper, Inna. (2017). The Centrality of Data: Data Lifecycle and Data Pipelines. 10.1016/B978-0-12-809715-1.00004-3. (Source: ARGOS)</p>	Free text answer



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DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
	<p><i>Specify the types and formats of data collected/created*</i></p>	<p><i>All data files held in a data repository should be in an open, international, standardised file format to ensure long-term interoperability in terms of usability, accessibility and sustainability. From the start of your research project think about future-proof file formats. Use preferred formats which are recommended by the data repository and are independent of specific software, developers or vendors.</i></p> <p><i>By using standardised file formats that are widely used in your community, reusability is increased. Use current popular file formats next to archival formats to share your data, e.g. Excel (xlsx) and CSV or ESRI Shapefiles next to MID/MIF files. (source PARTHENOS FAIR Guidelines)</i></p> <p><i>You can select type and format from the documents suggested by Archaeology Data Service (ADS) (http://tiny.cc/wo9lcz), or by the Data Archiving and Networked Services (KNAW-DANS) (http://tiny.cc/xq9lcz)</i></p>	<p><i>Free text answer</i></p>



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DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
	Specify if existing metadata is being reused*	<p>Learn more on how to reuse research (meta)data: https://www.openaire.eu/can-i-reuse-someone-else-research-data (source: ARGOS)</p> <p>Please select only one option</p>	<p><input type="radio"/> Yes</p> <p><input type="radio"/> Yes, remapped to another schema</p> <p><input type="radio"/> No</p> <p><input type="radio"/> I don't know</p> <p><input type="radio"/> Other</p> <p>If other, please specify</p>
	Specify the origin of the data*	<p>Data collection may contain both primary and secondary data depending on the source where they have been derived from.</p> <p>Primary data is data that have been collected for the first time and have not undergone through data processing and/or analysis, yet.</p> <p>Secondary data is data that have been cleaned up, analysed and shared by others (published or unpublished) and they are those that are being typically reused (source: ARGOS).</p>	Free text answer
	State the expected size of the data to be archived (GB)*	Express the value in Gigabytes	Free text answer



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DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
	Outline the data utility: to whom will it be useful?*	<p>Data generated or reused in the project can be useful for a number of stakeholders and third parties. Think about the target audience of your research, but also about possible third parties who could further exploit this data even after the project ends (source: ARGOS).</p> <p>If the reuse of some data is restricted, explain why.</p>	Free text answer
	Specify the granularity of the data to be archived	<p>Please describe the level of detail of your data within the data structure.</p> <p>You can select from the list or add a new entry in the field "Other".</p>	<p><input type="checkbox"/> Single items (i.e. one page of a manuscript, one excavation report...)</p> <p><input type="checkbox"/> Datasets (a set of homogeneously structured data records, consisting of fields carrying data values)</p> <p><input type="checkbox"/> 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)</p> <p><input type="checkbox"/> Corpora</p> <p><input type="checkbox"/> Raw data</p> <p><input type="checkbox"/> Other</p> <p>If other, please specify</p>



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DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
	<p><i>What sort of data is it</i></p>	<p><i>You can select from the list or add a new entry in the field "Other".</i></p>	<p> <input type="checkbox"/> <i>Newly created data</i> <input type="checkbox"/> <i>Reused data</i> <input type="checkbox"/> <i>Newly created content based on reused data</i> <input type="checkbox"/> <i>Other</i> </p> <p><i>If other, please specify</i></p>



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DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
	<i>How will data be collected</i>	<p><i>Due to the nature of archaeology, archaeological methods for data collection vary and tend to focus more on quantitative data, lab work, field surveys and scientific analysis.</i></p> <p><i>You can select from the list or add a new entry in the field "Other".</i></p>	<p><input type="checkbox"/> <i>Archaeological excavation</i></p> <p><input type="checkbox"/> <i>Archival research</i></p> <p><input type="checkbox"/> <i>Other</i></p> <p><i>If other, please specify</i></p> <p><i>Archaeological prospections</i></p> <p><input type="checkbox"/> <i>Field Survey</i></p> <p><input type="checkbox"/> <i>Remote Sensing</i></p> <p><input type="checkbox"/> <i>Other</i></p> <p><i>If other, please specify</i></p> <p><i>Analytical Investigations</i></p> <p><input type="checkbox"/> <i>Inorganic Materials Study</i></p> <p><input type="checkbox"/> <i>Dating (Bio-archaeology, Ancient DNA, Dendrochronology, C14)</i></p> <p><input type="checkbox"/> <i>Other</i></p> <p><i>If other, please specify</i></p>



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	Describe any constraints concerning ethics and privacy	You can select from the list or add a new entry in the field "Other".	<input type="checkbox"/> If third parties are involved in the project, consent forms from informants and test subjects are documented, and the documentation is electronically archived <input type="checkbox"/> If you are collecting personal data, you must have informed consent for storing, processing or publishing the data <input type="checkbox"/> Not applicable <input type="checkbox"/> Other If other, please specify
2. FAIR Data 2.1. Making data findable, including provisions for metadata	Do you provide metadata for data discoverability*	Metadata is essential in making data findable, especially the metadata which is used for citing and describing data. A metadata schema is a list of standardised elements to capture information about a resource, e.g. a title, an identifier, a creator name, or a date. Using existing metadata schemas will ensure that international standards for data exchange are met (source PARTHENOS FAIR Guidelines). Please select only one option	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> I don't know <input type="radio"/> Other If other, please specify



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	<p>Do you assign a unique identifier to your data/resources?*</p>	<p>Locating data is a necessary condition for any other step from access to reuse. To be findable, any data object and dataset should be uniquely and persistently identifiable over time with a persistent identifier (PID). A PID continues to work even if the web address of a resource changes. PIDs can take different forms, such as a Handle, DOI, PURL, or URN (source PARTHENOS FAIR Guidelines).</p> <p>PIDs can be assigned to research outputs including publications, data and software/code. PIDs can also be assigned to researchers, samples, organisations and projects. A PID may be connected to a metadata record describing an item rather than the item itself.</p> <p>PIDs are usually provided by data repositories and other deposit platforms. Re3data includes tags to show which platforms that it indexes assign PIDs to their content (source: ARGOS).</p> <p>Please select only one option</p>	<p>o Yes o No o I don't know o Other</p> <p>If other, please specify</p>



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	Do you follow naming conventions?*	<p>Following a precise and consistent naming convention - a generally agreed scheme to name data files - makes it significantly easier for future generations of researchers to retrieve, access and understand data objects and datasets. Consult the policies and best practices for your research discipline or domain to find the most suitable naming convention (source PARTHENOS FAIR Guidelines). File naming best practices can be found at http://tiny.cc/op8lcz</p> <p>Please select only one option</p>	<p>o Yes o No o I don't know o Other If other, please specify</p> <p>If yes, please, list below the naming conventions that should be followed during the project</p>
	Outline the approach towards search keywords*	Indicate what search keywords will be provided to make data findable	Free text answer
	Do you have any approach for clear versioning?*	<p>Research data which were collected should be identical to the research data which are accessed later on. To ensure data authenticity, checks for data integrity should be performed.</p> <p>Implement a method for version control. The guarantee that every change in a revised version of a dataset is correctly documented, is of integral importance for the authenticity of each dataset (source PARTHENOS FAIR Guidelines).</p>	<p>o Yes o No o I don't know o Other If other, please specify</p>



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	<p>Specify standards used for metadata creation*</p>	<p>To enable the discovery of content, describe research data as consistently and completely as possible. Include enough information for the data to be accessed and understood later on. If possible, use an existing metadata schema which fits the type of data object or dataset you are describing (source PARTHENOS FAIR Guidelines).</p> <p>You can search for discipline-specific standards and associate tools browsing the Research Data Alliance Metadata Standard Catalogue here:</p> <p>http://rd-alliance.github.io/metadata-directory/</p> <p>You can select from the list or add a new entry in the field "Other".</p>	<p><input type="checkbox"/> PARTHENOS Entities</p> <p><input type="checkbox"/> ARIADNE model (AO-Cat)</p> <p><input type="checkbox"/> CARARE</p> <p><input type="checkbox"/> CIDOC CRM</p> <p><input type="checkbox"/> DC - Dublin Core</p> <p><input type="checkbox"/> EDM - Europeana Data Model</p> <p><input type="checkbox"/> LIDO</p> <p><input type="checkbox"/> DCAT</p> <p><input type="checkbox"/> Not available</p> <p><input type="checkbox"/> Other</p> <p>If other, please specify</p> <p>National standards List any national standard used for metadata creation</p> <p>Ad hoc metadata/proprietary schemas</p>



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	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".	<input type="checkbox"/> Minimum set of metadata created <input type="checkbox"/> Metadata is associated to each digital object <input type="checkbox"/> Use of metadata standards <input type="checkbox"/> Set up of quality assurance committee for metadata <input type="checkbox"/> Not available <input type="checkbox"/> Other If other, please specify
	Specify if metadata are updated once the data are archived	Please select only one option	<input type="radio"/> Yes, automatically <input type="radio"/> Yes, manually <input type="radio"/> I don't know <input type="radio"/> No <input type="radio"/> Other If other, please specify



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	Describe how resources are retrieved from your repository	<p>Using a data standard backed up by a strong community, increases the possibility to share, reuse and combine data collections. Check with the repository where you want to deposit your data what data standards they use. Structure your data collection in this format from the start of your research project (source PARTHENOS FAIR Guidelines).</p> <p>You can select from the list or add a new entry in the field "Other".</p>	<p>Global access mechanism</p> <p><input type="checkbox"/> Landing web page</p> <p><input type="checkbox"/> Harvest with OAI-PMH protocol</p> <p><input type="checkbox"/> Other</p> <p>If other, please specify</p> <p>Ad hoc services</p> <p><input type="checkbox"/> Web service</p> <p><input type="checkbox"/> Federated Content Search API (FCS)</p> <p><input type="checkbox"/> Actionable APIs</p> <p><input type="checkbox"/> Other</p> <p>If other, please specify</p>
	Specify if metadata of non-public resources can be made publicly available	Please select only one option	<p><input type="radio"/> Yes</p> <p><input type="radio"/> No</p> <p><input type="radio"/> I don't know</p> <p><input type="radio"/> Other</p> <p>If other, please specify</p>



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	<i>Which methodologies are used to make data findable?</i>	<i>You can select from the list or add a new entry in the field "Other".</i>	<input type="checkbox"/> <i>Common metadata-based discovery</i> <input type="checkbox"/> <i>Ontology-based discovery</i> <input type="checkbox"/> <i>Content-based discovery (e.g. text, images, etc.)</i> <input type="checkbox"/> <i>Other</i> <i>If other, please specify</i>
	<i>What technologies are used to make data findable?</i>	<i>You can select from the list or add a new entry in the field "Other".</i>	<input type="checkbox"/> <i>Digital library</i> <input type="checkbox"/> <i>Registry/Catalogue</i> <input type="checkbox"/> <i>Linked Open Data</i> <input type="checkbox"/> <i>Digital Asset Management</i> <input type="checkbox"/> <i>Content Management System</i> <input type="checkbox"/> <i>Web-GIS</i> <input type="checkbox"/> <i>Other</i> <i>If other, please specify</i>



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DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
2.2 Making data openly accessible	Specify which data will be made openly available*	<p>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)?</p> <p>When choosing an access option, consider legal requirements, discipline-specific policies and ethics protocols when applicable. Choose Open Access when possible. When you collect personal data, ask yourself whether it contains any information which might lead to participants' identities being disclosed, what participants consented to and which measures you have taken to protect your data. If your data cannot be published in Open Access, the metadata should be, allowing data discovery (source PARTHENOS FAIR Guidelines).</p>	Free text answer
	Specify how the data will be made available*	You can select from the list or add a new entry in the field "Other".	<input type="checkbox"/> Project website <input type="checkbox"/> University repository <input type="checkbox"/> Domain-specific database <input type="checkbox"/> Repository of Archival Institution <input type="checkbox"/> Other If other, please specify



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	Specify what tools are needed to access the data*	You can select from the list or add a new entry in the field "Other".	<input type="checkbox"/> Linked Open Data <input type="checkbox"/> SPARQL access point <input type="checkbox"/> Standard Visualizer (e.g. browser, Acrobat Reader, Image Viewer) <input type="checkbox"/> Local Visualizer <input type="checkbox"/> Download <input type="checkbox"/> GIS software <input type="checkbox"/> Other If other, please specify
2.3. 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"	<input type="checkbox"/> RDF <input type="checkbox"/> OWL <input type="checkbox"/> DAML+OIL <input type="checkbox"/> JSON LD <input type="checkbox"/> XML <input type="checkbox"/> KML <input type="checkbox"/> GML <input type="checkbox"/> GeoJSON <input type="checkbox"/> CSV <input type="checkbox"/> Other If other, please specify Data vocabularies



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			<p>Specify the data vocabularies you will follow to facilitate interoperability</p> <p><input type="checkbox"/> <u>Art and Architecture Thesaurus (AAT)</u></p> <p><input type="checkbox"/> <u>PeriodO</u></p> <p><input type="checkbox"/> <u>Pleiades</u></p> <p><input type="checkbox"/> Other</p> <p>If other, please specify</p> <p>National vocabularies</p> <p>Ad hoc/proprietary vocabularies</p>
	<p>Specify whether you will be using standard vocabularies for all data types present in your dataset, to allow interdisciplinary interoperability*</p>	<p>The description of metadata elements should follow community guidelines that use open, well defined and well known vocabularies. Such vocabularies describe the exact meaning of the concepts and qualities that the data represent. Use vocabularies relevant to your field, and enrich and structure your research output accordingly from the start of your research project (source PARTHENOS FAIR Guidelines).</p> <p>Please select only one option</p>	<p><input type="radio"/> Yes</p> <p><input type="radio"/> No</p> <p><input type="radio"/> I don't know</p> <p><input type="radio"/> Other</p> <p>If other, please specify</p>



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DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
2.4. Increase data re-use (through clarifying licences)	Specify how the data will be licensed to permit the widest reuse possible*	<p>To permit the widest reuse possible of (meta)data, it should be clear who the (meta)data rights holder is and what license applies.</p> <p>Make sure you know who the (meta)data rights holder is before publishing your research data (source PARTHENOS FAIR Guidelines).</p> <p>You can select from the list or add a new entry in the field "Other".</p>	<p>Creative Common Licenses</p> <ul style="list-style-type: none"> <input type="checkbox"/> CC0 (no copyright) <input type="checkbox"/> CC-BY (attribution) <input type="checkbox"/> CC-BY-SA (attribution and share alike) <input type="checkbox"/> CC BY-ND (attribution and no derivative) <input type="checkbox"/> CC BY-NC (attribution and no commercial) <input type="checkbox"/> CC BY-NC-SA (attribution, no commercial and share alike) <input type="checkbox"/> CC BY-NC-ND (attribution, no commercial and no derivative) <p>Rights Statements for cultural heritage institutions or aggregation platforms</p> <ul style="list-style-type: none"> <input type="checkbox"/> <u>IN COPYRIGHT</u> <input type="checkbox"/> <u>IN COPYRIGHT-EU ORPHAN WORK</u> <input type="checkbox"/> <u>IN COPYRIGHT-EDUCATIONAL USE PERMITTED</u> <input type="checkbox"/> <u>IN COPYRIGHT-NON-COMMERCIAL USE PERMITTED</u> <input type="checkbox"/> <u>IN COPYRIGHT-RIGHTSHOLDER(S) UNLOCATABLE OR UNIDENTIFIABLE</u>



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DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
			<p><input type="checkbox"/> <u>NO COPYRIGHT-CONTRACTUAL RESTRICTIONS</u></p> <p><input type="checkbox"/> <u>NO COPYRIGHT-NON-COMMERCIAL USE ONLY</u></p> <p><input type="checkbox"/> <u>NO COPYRIGHT-OTHER KNOWN LEGAL RESTRICTIONS</u></p> <p><input type="checkbox"/> <u>NO COPYRIGHT-UNITED STATES</u></p> <p><input type="checkbox"/> <u>COPYRIGHT NOT EVALUATED</u></p> <p><input type="checkbox"/> <u>COPYRIGHT UNDETERMINED</u></p> <p><input type="checkbox"/> <u>NO KNOWN COPYRIGHT</u></p> <p><input type="checkbox"/> Other If other, please specify</p> <p>Tick all that apply</p> <p><input type="checkbox"/> Open data policy</p> <p><input type="checkbox"/> Public Domain Mark</p> <p><input type="checkbox"/> Not available</p> <p><input type="checkbox"/> Other If other, please specify</p>



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DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
	<p>Specify when the data will be made available for reuse*</p>	<p>Clearly state why and for what period a data embargo is needed (if any).</p> <p>Make the (meta)data openly available as soon as possible (source PARTHENOS FAIR Guidelines).</p>	<p><input type="checkbox"/> Reuse is subordinated to legitimate interests of rights holders and protection of confidentiality and personal information</p> <p><input type="checkbox"/> Embargo date can only be handled when the technical framework allows it</p> <p><input type="checkbox"/> Date individually set with repository</p> <p><input type="checkbox"/> No specific date</p> <p><input type="checkbox"/> Other</p> <p><i>If other, please specify</i></p> <p><i>If applicable, specify why and for what period a data embargo is needed</i></p>
	<p>Specify whether the data produced and or used in the project is usable by third parties after the end of the project*</p> <p><i>If the reuse of some data is restricted, explain why</i></p>	<p>You can select from the list or add a new entry in the field "Other".</p>	<p><input type="radio"/> Yes</p> <p><input type="radio"/> No</p> <p><input type="radio"/> I don't know</p> <p><input type="radio"/> Other</p> <p><i>If other, please specify</i></p>



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DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
	<p><i>Describe the (meta)data quality assurance processes*</i></p>	<p><i>To boost (meta)data quality and, therefore, interoperability, establish (automatic) processes that clean up, derive and enrich (meta)data. Establish procedures to minimise the risk of mistakes in collecting data.</i></p> <p><i>E.g. choose a date from a calendar instead of filling it in by hand (source PARTHENOS FAIR Guidelines).</i></p> <p><i>You can select from the list or add a new entry in the field "Other".</i></p>	<ul style="list-style-type: none"> <input type="checkbox"/> <i>Set up of scientific and technical committee</i> <input type="checkbox"/> <i>Use of tools for automatic checks</i> <input type="checkbox"/> <i>Data conform to format specification</i> <input type="checkbox"/> <i>Consistency verified with data models and standards</i> <input type="checkbox"/> <i>Not available</i> <input type="checkbox"/> <i>Other</i> <p><i>If other, please specify</i></p>



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DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
	Specify if defined criteria ensuring relevance and understandability of the data for users are available	You can select from the list or add a new entry in the field "Other".	<ul style="list-style-type: none"> <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> I don't know <input type="radio"/> Other <p>If other, please specify</p> <p>If yes, you can select from the list or add a new entry in the field "Other"</p> <ul style="list-style-type: none"> <input type="checkbox"/> Minimal set of metadata created <input type="checkbox"/> Collection level metadata required <input type="checkbox"/> Panel of specialists for Quality Assurance <input type="checkbox"/> Formats, standards and certification models recognized by the scholarly community <input type="checkbox"/> Not available <input type="checkbox"/> Other <p>If other, please specify</p>
	Specify the length of time for which the data will remain reusable*	You can select from the list or add a new entry in the field "Other".	<ul style="list-style-type: none"> <input type="checkbox"/> 5 years <input type="checkbox"/> 10 years <input type="checkbox"/> Other <p>If other, please specify</p>



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	<p><i>Do you request how data should be cited when reused?</i></p>	<p><i>If research data have a persistent identifier and are cited in accordance with community standards, the corresponding data objects or datasets are more easily found. Get acquainted with data citation guidelines that are specific to your field or discipline and cite research data accordingly (source PARTHENOS FAIR Guidelines).</i></p> <p><i>Please select only one option</i></p> <p><i>For how to cite data you can consult http://tiny.cc/mf9lcz</i></p>	<p><i>o Yes</i> <i>o No</i> <i>o I don't know</i> <i>o Other</i></p> <p><i>If other, please specify</i></p>
	<p><i>Are the rights related to the data documented?</i></p>	<p><i>Please select only one option</i></p>	<p><i>o Yes</i> <i>o No</i> <i>o I don't know</i> <i>o Other</i></p> <p><i>If other, please specify</i></p>



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	<p><i>Describe which information you gather on the rights holder to make sure that nobody is left out</i></p>	<p><i>You can select from the list or add a new entry in the field "Other".</i></p>	<ul style="list-style-type: none"> <input type="checkbox"/> <i>The rights owner is recorded in the metadata form</i> <input type="checkbox"/> <i>Documentation is gathered from their holders</i> <input type="checkbox"/> <i>Permissions are gathered from their holders</i> <input type="checkbox"/> <i>Agreement with each content provider</i> <input type="checkbox"/> <i>The data creator is responsible for recording any rights</i> <input type="checkbox"/> <i>If rights are held by third parties, the creator is responsible for ensuring permissions are given, or content removed</i> <input type="checkbox"/> <i>Support standards for data citation</i> <input type="checkbox"/> <i>Provide proper attribution and credit information in an external metadata record where a dataset is implemented by different individual contributors</i> <input type="checkbox"/> <i>Not available</i> <input type="checkbox"/> <i>Other</i> <p><i>If other, please specify</i></p>



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DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
	<p>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?</p>	<p>You can select from the list or add a new entry in the field "Other".</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Staff with specialized education or training <input type="checkbox"/> Detailed metadata <input type="checkbox"/> Special training course to use specialized infrastructure <input type="checkbox"/> Quality Assurance working groups <input type="checkbox"/> Domain experts collaborate with technical partners to ensure precise mappings from content providers schemas to project ontology <input type="checkbox"/> Not available <input type="checkbox"/> Other <p><i>If other, please specify</i></p>
<p>3. Allocation of resources</p>	<p>Estimate the costs for making your data FAIR*</p>	<p>Please indicate the estimation of the total cost for the whole research life cycle (including also cost for archiving and long term preservation). https://www.openaire.eu/how-to-comply-to-h2020-mandates-rdm-costs</p>	<p>Free text answer</p>



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DMP component	Data Management Plan Template ARIADNEplus	Guidelines	Discipline - specific answers
	<p><i>Cost covered by hosting institution</i> <i>Describe how you intend to cover these costs</i></p>	<p><i>Specify which is the "unit" of archiving.</i></p> <p><i>You can select from the list or add a new entry in the field "Other".</i></p>	<p><i>Price per megabyte</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> <i>Price per digital object</i> <input type="checkbox"/> <i>Price per number of backups</i> <input type="checkbox"/> <i>Price per authorized user</i> <input type="checkbox"/> <i>Price per file</i> <input type="checkbox"/> <i>Not available</i> <input type="checkbox"/> <i>Other</i> <p><i>If other, please specify</i></p> <p><i>Describe how you intend to cover these costs</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> <i>Cost covered by the project</i> <input type="checkbox"/> <i>Cost covered by hosting institution</i> <input type="checkbox"/> <i>Collaboration with other projects</i> <input type="checkbox"/> <i>Other</i> <p><i>If other, please specify</i></p>
	<p><i>Clearly identify responsibilities for data management in your project*</i></p>	<p><i>Outline the roles and responsibilities for all activities e.g. data capture, metadata production, data quality, storage and backup, data archiving & data sharing. Consider who will be responsible for ensuring relevant policies will be respected. Individuals should be named where possible (source: DCC). Please, list the responsible actors/partners for every data life cycle activity</i></p>	<p><i>Free text answer</i></p>



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	<i>Describe costs of long term preservation*</i>	<i>You can get help in calculating Research Data Management (RDM) cost with the Guide available at http://tiny.cc/ob4lcz</i>	<i>Free text answer</i>
	<i>Indicate the potential value of long term preservation</i>	<p><i>Consider how the data may be reused e.g. to validate your research findings, conduct new studies, or for teaching. Decide which data to keep and for how long. This could be based on any obligations to retain certain data, the potential re-use value, what is economically viable to keep, and any additional effort required to prepare the data for data sharing and preservation. Remember to consider any additional effort required to prepare the data for sharing and preservation, such as changing file formats (source: DCC).</i></p> <p><i>You can select from the list or add a new entry in the field "Other".</i></p>	<p><input type="checkbox"/> <i>Data is potentially important for reuse by a larger community</i></p> <p><input type="checkbox"/> <i>Data contributes to improve an open access publication</i></p> <p><input type="checkbox"/> <i>Data was produced with a process that is difficult to repeat</i></p> <p><input type="checkbox"/> <i>Data need to be archived because the funder requires it</i></p> <p><input type="checkbox"/> <i>Other</i></p> <p><i>If other, please specify</i></p>
4. Data security	<i>Is the data safely stored in certified repositories for long term preservation and curation?*</i>	<p><i>Consider how datasets that have long-term value will be preserved and curated beyond the lifetime of the grant. If you do not propose to use an established/certified repository, the data management plan should demonstrate that resources and systems will be in place to enable the data to be curated effectively beyond the lifetime of the grant. Please select only one option</i></p>	<p><input type="radio"/> <i>Yes</i></p> <p><input type="radio"/> <i>No</i></p> <p><input type="radio"/> <i>I don't know</i></p> <p><input type="radio"/> <i>Other</i></p> <p><i>If other, please specify</i></p>



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4. Data security	<i>Is the data safely stored in certified repositories for long term preservation and curation?*</i>	<i>Please select only one option</i>	<ul style="list-style-type: none"> <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> I don't know <input type="radio"/> Other <p><i>If other, please specify</i></p>
<i>For data managers</i>	<i>Specify if your organization has tools to control the risks associated with receiving, managing, processing and ingesting digital collection content</i>	<i>You can select from the list or add a new entry in the field "Other".</i>	<ul style="list-style-type: none"> <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> I don't know <input type="radio"/> Other <p><i>If yes, you can select from the list or add a new entry in the field "Other"</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> <i>Checking/syntactic parsing of data structures</i> <input type="checkbox"/> <i>Mechanisms to secure the reception and storage of exact copies of the original files (ingestion phase)</i> <input type="checkbox"/> <i>Tools for generating metadata and for automatic validation of the XML</i> <input type="checkbox"/> <i>Virus scanner for scanning file uploads</i> <input type="checkbox"/> <i>Technology vulnerability scan</i> <input type="checkbox"/> <i>SLA with the data storage provider</i> <input type="checkbox"/> <i>Procedure for file fixity checking</i>



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			<input type="checkbox"/> DRAMBORA Risk Assessment <input type="checkbox"/> Declaration of Confidentiality for employees <input type="checkbox"/> Bespoke Content Management System (CMS) with Object Management System (OMS) extension <input type="checkbox"/> Not available <input type="checkbox"/> Other <i>If other, please specify</i>
For data managers	Specify if you have policies regarding the storage of intermediate results and temporary files	You can select from the list or add a new entry in the field "Other".	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> I don't know <input type="radio"/> Other <i>If yes, you can select from the list or add a new entry in the field "Other"</i> <input type="checkbox"/> Policies on IPR <input type="checkbox"/> Licenses policy <input type="checkbox"/> Not available <input type="checkbox"/> Other <i>If other, please specify</i>



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For data managers	Specify if your system uses automated backup processes, and/or if an automated monitoring process for storage is available	You can select from the list or add a new entry in the field "Other".	<p>o Yes o No o I don't know o Other</p> <p>If yes, you can select from the list or add a new entry in the field "Other"</p> <p><input type="checkbox"/> Institutional back up process <input type="checkbox"/> External back up process <input type="checkbox"/> Personal back up process <input type="checkbox"/> Global backup mechanism <input type="checkbox"/> Other</p> <p>If other, please specify</p>



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<i>For data managers</i>	<i>Describe how the system supports preservation</i>	<i>You can select from the list or add a new entry in the field "Other".</i>	<input type="checkbox"/> <i>Using preferred data formats</i> <input type="checkbox"/> <i>Assigning Persistent Identifiers (like DOI and URN) to a dataset</i> <input type="checkbox"/> <i>Preserving all data streams in the original format as distinct files</i> <input type="checkbox"/> <i>Performing quality checks on submitted metadata</i> <input type="checkbox"/> <i>Preserving data and metadata via migration</i> <input type="checkbox"/> <i>Not available</i> <input type="checkbox"/> <i>Other</i> <i>If other, please specify</i>
<i>For data managers</i>	<i>What tools does your system use to provide access to users?</i>	<i>You can select from the list or add a new entry in the field "Other".</i>	<input type="checkbox"/> <i>FEDORA</i> <input type="checkbox"/> <i>DSpace</i> <input type="checkbox"/> <i>Locally developed system</i> <input type="checkbox"/> <i>Other</i> <i>If other, please specify</i>



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<i>For data managers</i>	<i>Describe the digital asset management system used</i>	<i>You can select from the list or add a new entry in the field "Other".</i>	<input type="checkbox"/> <i>Management of data creation</i> <input type="checkbox"/> <i>Metadata repository</i> <input type="checkbox"/> <i>Image repository</i> <input type="checkbox"/> <i>Registry of metadata preservation</i> <input type="checkbox"/> <i>Not available</i> <input type="checkbox"/> <i>Other</i> <i>If other, please specify</i>
5. Ethical aspects	<i>Outline how your project ensures compliance with disciplinary and ethical norms</i>	<i>Ethical issues affect how you store data, who can see/use it and how long it is kept. Managing ethical concerns may include: anonymisation of data; referral to departmental or institutional ethics committees; and formal consent agreements. You should show that you are aware of any issues and have planned accordingly. If you are carrying out research involving human participants, you must also ensure that consent is requested to allow data to be shared and re-used (source: DCC).</i> <i>You can select from the list or add a new entry in the field "Other".</i>	<input type="checkbox"/> <i>Anonymising data where necessary</i> <input type="checkbox"/> <i>Privacy constraints and applicable ethical norms</i> <input type="checkbox"/> <i>Data accompanied by informed consent statements</i> <input type="checkbox"/> <i>Privacy policies</i> <input type="checkbox"/> <i>National laws</i> <input type="checkbox"/> <i>Not available</i> <input type="checkbox"/> <i>Other</i> <i>If other, please specify</i>



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6. Other	Refer to other national/funder/sectorial/departmental procedures for data management that you are using*	You can select from the list or add a new entry in the field "Other".	<input type="checkbox"/> My institution has a Research Data Management Protocol <input type="checkbox"/> Horizon 2020 guidelines <input type="checkbox"/> Digital Curation Center Data Management Plan <input type="checkbox"/> Arts and Humanities Research Council <input type="checkbox"/> UK Data Archive <input type="checkbox"/> Not available <input type="checkbox"/> Other If other, please specify