



## D12.4: Initial Infrastructure Testing Report

### Authors:

Anthony Corns  
Louise Kennedy  
Evie Monaghan

The Discovery Programme



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Authors:

Anthony Corns

Louise Kennedy

Evie Monaghan

The Discovery Programme

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**Acronyms and abbreviations**

API	Application Programming Interface
ACDM	ARIADNE Catalogue Data Model
REST API	Representational State Transfer Application Programming Interface

## 1 Executive Summary

This document is a deliverable (D12.4 Initial Infrastructure Testing Report) of the ARIADNE project (“Advanced Research Infrastructure for Archaeological Dataset Networking in Europe”), which is funded under the European Community’s Seventh Framework Programme. It presents results of the work carried out in Task 12.4 Testing.

The tasks of WP12 *Implementing Interoperability* aim to specify use requirements and design for the ARIADNE infrastructure and to implement and test that design. Task 12.4 is comprised of testing the integrated infrastructure built in Task 12.3 *Implementing Integration*, based on the requirements and design specified in Task 12.1 *Use Requirements* and 12.2 *Infrastructure Design*. This document augments the synthesis of requirements and design given in D12.2 with the infrastructure implemented in D12.3 and tests the implementation against the requirements specified. Each requirement is outlined with the infrastructural tools and/or services designed to meet it and a brief overview of the implementation documented in 12.3. Recommendations are made based on this analysis. The general use requirements are addressed in the first instance, followed by more specific requirements addressing integration activities.

The initial infrastructure implementation has met many of the requirements specified. Some aspects not yet visible will require further testing in Task 12.6 *Final Testing Report*. Some clarification of use requirements for the Preview Service may be necessary: D12.2 designs a service that previews search results, as described above and illustrated in the prototype portal, as a list, on a map and timeline (D12.2, 24) but which can also preview individual records. D12.3 has implemented a Preview Service through which researchers can preview their own datasets in a number of formats, which seems to be more closely aligned with the Registry (17).

The Support Portal, which includes documentation and user guidance, needed to be approached holistically in order to provide clear and coherent guidance to a variety of users at different points of interaction with the infrastructure. Documentation is required for each major component of the infrastructure. The Registry input tool provides the necessary functionality to enable depositing of metadata. The user experience of the Registry could be improved and more closely guided with changes in design. A table of recommendations for the infrastructure is included at the end of this document.

## 2 Objectives

The objectives of work package 12 are:

- To adapt infrastructures provided to ARIADNE for integration.
- To design and set up the necessary tools (crosswalks, mappings) and resources for interoperability.
- To set up the internal (APIs) and external (human) interfaces to access the integrated resource.

Work Package 12 is comprised of the following tasks:

- 12.1 Use requirements
- 12.2 Design and Specifications
- 12.3 Implementing Integration
- 12.4 Testing

Task 12.4 is comprised of testing the integrated infrastructure built in Task 12.3 *Implementing Integration*, and based on the requirements and design specified in Task 12.1 *Use Requirements* and 12.2 *Infrastructure Design*. The implementation is examined in light of the requirements and design documented in deliverables 12.1 and 12.2. Infrastructural elements with user interfaces were tested for this task.

This deliverable reports on the results of Task 12.4. It comprises a comparison of the use requirements with the service design and implementation, with recommendations. As the first point for data integration, ARIADNE's Registry was tested. Documented in D12.2, the Registry is a key element of the interoperability framework and drives resource discovery within the public-facing ARIADNE portal.

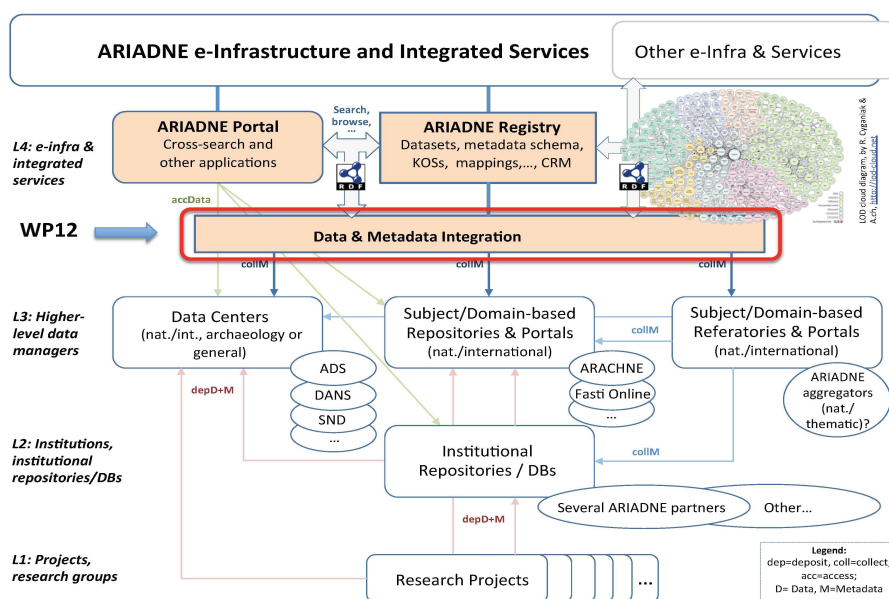


Figure 1: Conceptual framework with outlining of WP 12 role by Achille Felicetti, D12.1, p7.

### 3 Use Requirements, Service Design and Implementation

The work of WP12 has been to specify use requirements for the ARIADNE infrastructure (noting the extensive work of WP2 on user needs and WP3 on the Registry), and design and implement a specification for that infrastructure based on the use requirements.

Use requirements specified in D12.1 focused on three areas: datasets, metadata standards, schemas and vocabularies and access and sharing policies. The use requirements reflect the data available in the archaeological sector, and priorities for the integration activities for different types of data. Use requirements for the infrastructure have both practical and policy implications, both of which must be reflected in the implementation as appropriate (D12.1, 4, 5).

The design specification focused on an integration strategy which addressed metadata integration and data integration, and in the first instance, enabled cross-search of resources through What, Where, When and Resource Type facets. Consistency and quality are key requirements for content added to the ARIADNE infrastructure (D12.2, 16, 17).

The initial infrastructure implementation addressed the core services, with further implementation and testing to follow in WP12. Key components of the architecture described in 12.3 are an RDF store, an Elasticsearch index and the Registry service (together, the Data Access Layer of the integration architecture, D12.2, Fig. 2, 10), and the MORE aggregation service which also contains validation, quality and enrichment services (D12.3, 7).

D12.2 Infrastructure Design provided a table of conformance, reproduced in Table 1 below (D12.2, 12), with the use requirements specified in D12.1. This document aims to augment that synthesis with the infrastructure implemented in D12.3 and test the implementation against the requirements specified. Each requirement is outlined with the infrastructural tools and/or services designed to meet it and a brief overview of the implementation documented in D12.3. Recommendations are made based on this analysis. The general use requirements are addressed in the first instance, followed by more specific requirements addressing integration activities.



Requirements	Data Access Layer	Integration & Interoperability	Deposit Service	Metadata Enrichment	Vocabulary Management	Quality Service	Preservation Service	Digital Assets Management	ARIADNE Portal	Preview Service	Resource Discovery
Data Transparency	•								•	••	
Data Accessibility	•	••	•••						•	•	•
Metadata Quality	•	•		•		•••					
Data Quality	•					•••					
International Dimension	•	••			••				•	••	
Cross & border period search	•	••							•	•	•
Cross & border subject search	•	••							•	•	•
Map driven searching or visualisation	•								••	•••	
Bibliographic metadata from grey literature	•								•	•	•
Integration and interoperability from scientific databases		•••	•								•
Integration of particular kinds of artefact data		•••									
Dataset assessment required						•••					

Table 1: Conformance of the ARIADNE Infrastructure to User requirements (D12.2, 12) with number of dots indicating the degree of relevance, i.e. • low, •• medium, ••• high.

## 3.1 General Requirements

### 3.1.1 Data Transparency

**Requirement:** From D2.1 First Report on User’s Needs, the requirement centres on resolving fragmentation of the archaeological record to provide “a good overview (D12.1, p13)” of the archaeological data in existence and available online.

**Design:** D12.2 designs three services to meet this need: the Data Access Layer, the ARIADNE Portal and the Preview Service (D12.2, p12). The Data Access Layer provides a REST API to return, edit, add and delete records in the ARIADNE Catalogue. The authentication required to perform these tasks is provided through the ARIADNE Catalogue, using API keys for the machine interface and user/password challenge on the human interface (D12.2, p34). The Preview service enables previews of search results and individual records as a list, on a map or timeline or using a combination of map, timeline and other criteria (D12.2, p24).

**Implementation:** The Data Access Layer documented in D12.3 (Section 5 Data Access and Management Services, p18) is composed of the Registry, an RDF triplestore and Elasticsearch indexing service. The design meets the requirement by providing input tools for data resources, which in turn reflect the requirements of the ACDM, and a suite of tools which should facilitate dynamic (integrated) resource discovery.

The ARIADNE Portal is the user interface for access to data resources, and its design is crucial to user perception of need fulfilment. What, Where and When browsing as outlined in the portal mock-ups presented in D12.3 answer the need for dynamic overview simply and clearly (p38-40).

With regard to the preview service, D12.3 states “through the data access management services, researchers can preview their datasets in different formats, such as RDF, JSON or XML” (D12.3, p18).

**Recommendation:** Resolve the use of language around the terms ‘Registry’ and ‘Catalogue’ in any support documentation and user interfaces [R31]. D12.3 refers to the Registry as “is a single point where all ARIADNE resources are stored and made available.” (D12.3, p20). *ARIADNE Catalogue: Entering Data Resources* refers to the Catalogue as the store (p3) and the Registry as the input tool for metadata records (p3).

The implementation of the ACDM by users inputting metadata within this tool is crucial to meeting the needs around a transparent overview of existing available data. Effective support and guidance is required (see Support Portal and Documentation, p32). The needs around metadata quality are also relevant as incorrect, incomplete or poor quality metadata will obstruct trust in, and usefulness of, the overview.

In the prototype ARIADNE Portal, the Preview Service makes available previews of search results in map and timeline views: the user can explore a map or timeline, refine those according to their interest and a

preview of the results for that refinement is produced on the fly. Similar map and timeline based previews are available alongside a list of search results on the search results landing page within the prototype portal. Further comments on visual overviews relevant to this requirement can be found using? map driven searching or visualization (3.2.3, p15).

Some clarification of the use requirements for the Preview Service may be necessary: D12.2 designs a service that previews search results, as described above and illustrated in the prototype portal, as a list, on a map and timeline (D12.2, p24) but which can also preview individual records [R32]. D12.3 documents implementation of a Preview Service through which researchers can preview their own datasets in a number of formats, which seems to be more closely aligned with the Registry (p17). Within the Registry, while documents or objects can be attached to resources, it is unclear whether these can be made available to generate previews of the resource. D2.2 (p108) and D13.1 (30-32) both refer to the high priority given to this feature for quickly assessing relevance by users.

### 3.1.2 Data Accessibility

**Requirement:** Datasets should be available in an uncomplicated way, costs have been and are a barrier to access, data is 'dark' (D12.1, p?).

**Design:** D12.2 designs six services to meet the user requirements around data accessibility. These are the Data Access Layer, Integration and interoperability service, Deposit service, the ARIADNE Portal, the Preview Service and Resource Discovery.

The Data Access Layer, the ARIADNE Portal and the Preview Service are discussed in 3.1.1 above.

The Integration and Interoperability service is designed to integrate elements of the ARIADNE Catalogue, "and develops the tools and components to enable the integration of archaeological resources." (D12.2, p26). It is informed by the integration strategy outlined in D12.2, which outlines metadata integration using the three resource types specified in the ACDM, two properties for thematic description, faceted cross-search and vocabulary mapping. Data integration will be implemented on a phased basis, from identifying datasets with potential for useful integration through to demonstration.

The Deposit service is designed to allow users to deposit metadata which conforms to the ACDM schema and includes validation (mandatory requirements, integrity checks); as such it also references the Quality service.

The Resource Discovery Service enables access to data through searches on the Catalogue based on various criteria including the subject, geographical and temporal facets specified in the user requirements.

**Implementation:** The Deposit Service, realized as a manual input web tool in the Registry, has been tested, see Section 4 ARIADNE Registry, p17.

Early stages of user interface implementation of the Resource Discovery Service are documented in D12.3 (35-42).

#### **Recommendation:**

Appropriate, targeted guidance for the user in the use of the Registry to add data resources is required [R33]. The tool itself is easy to navigate and use. Some of the structures expected by the ACDM are not intuitive and should be explained clearly, briefly and simply to the user. More detailed comments on testing of the Registry are at Section 4 ARIADNE Registry (p17).

The use requirements and design have mainly focused on the end-user or researcher user's needs and experience with the infrastructure. The project's ability to address fragmentation of the archaeological record is greatly influenced by the experience of the depositor user and their satisfaction with the tools, services and representation of their content. The Support Portal and documentation are key aspects of this relationship and are further discussed in Section 6 *Support Portal and Documentation* below (p32).

Cost issues need to be addressed at the policy level; as mentioned in D2.1, a business and sustainability model is required (13) [R34].

### **3.1.3 Metadata Quality**

**Requirement:** ARIADNE should demonstrate good practice, raise awareness about metadata and usefulness and standards for interoperability. D12.1 specified metadata mapping tools, metadata input and description tools and a SKOSifier tool. Appropriate metadata standards can also address requirements in the areas of data transparency and accessibility and the international dimension.

**Design:** D12.2 uses four services to meet this requirement, the Data Access and Integration and interoperability layers, the Metadata Enrichment service and the Quality service. The Deposit service discussed in 3.1.2 above is relevant to the input and description of metadata.

5.4 Catalogue Record Quality Service of Functional requirements (D12.2) specifies checks on completeness and correctness of metadata as functions of the aggregation service. In addition, metadata in native repositories should be evaluated through endpoints described in ariadne:distribution, which entity should include information on metadata formats and schemas.

5.8 Catalogue Record Enhancement specifies relationship mining and automatic linking with thesauri and vocabularies.

The ARIADNE Data Catalogue Model specification, and the communication of it through the ARIADNE tools and services is central to the metadata quality requirements in the areas of raising awareness, demonstrating good practice and the usefulness of standards for interoperability.

The tool to SKOSify vocabularies is designed within the Vocabulary Directory Management service.

**Implementation:** D12.3 documents the implementation of the MORE aggregator, which is a key service for the Integration and Interoperability service and the Metadata Enrichment and Quality services.

The Quality service is implemented within MORE and measures completeness, correctness and consistency of the metadata values against parameters for ACDM, returning graphed values to signify quality.

The Validation service implemented in MORE is also key to metadata quality. Validation against the ACDM XSD takes place automatically within MORE during ingest. The datasets are normalised, link checks are performed where URLs are present and schematron rule validation is also carried out.

The enrichment services use vocabulary matching, geo-location and other micro-services to tailor the enhancement of catalogue records according to the needs of the user and/or data resource. The micro-services can be used within MORE or directly.

Enrichment services are focused around four areas: subject, space, time and other.

Thematic or subject enrichment is serviced by both manual and automatic tools within MORE. Access to a wide variety of vocabularies is provided within the tool, which should reduce barriers to use and integrate subject enhancement into the deposit/ingest workflow. Enrichment with DBPedia URIs is also available within the tool.

Vocabulary management tools and services are discussed under 3.1.5 below, International Dimension (13).

Task 12.3 did not implement any services which answer the design specification around mining of relationships.

**Recommendation:** The quality services are crucial to developing trust in the (usefulness of the) infrastructure. D12.3 does not specify whether specific parameters for quality (beyond mandatory elements) can be used as gateways for deposit and/or ingest. Guidance for users on the nature of the errors thrown during the deposit and ingest process would be helpful [R35].

Subject enrichment with terms from SKOSified vocabularies answers the need for ARIADNE to demonstrate best practice, providing a means to demonstrate the benefits of Linked Data for archaeology in future.

**Portal:** Subject browsing ('What') has been implemented in the prototype portal with a word cloud. The most popular subject terms are largest in the display, the least popular the smallest. The smallest terms are difficult to read. The word cloud gives a good visual overview of the subjects currently covered in the prototype portal, with direct links to lists of resources tagged with any term displayed in the cloud. It may be useful to also display a word cloud of the 'derived subject' facet or Getty AAT terms, either as a filter or a second word cloud in the 'What' browsing area [R36].

### 3.1.4 Data Quality

**Requirement:** Balance data quality and quantity

**Design:** D12.2 designed two services to answer data quality needs, the Data Access Layer and the Quality service.

**Implementation:** D12.3 implements metadata quality services rather than data quality.

**Recommendation:** As perspectives on which datasets constitute data and which metadata can be subjective or fluid, depending on use, the project should communicate clearly to users its approach to data and metadata, if possible [R37]. For example, data added as metadata for a single data resource can become part of a dataset for research which synthesizes or analyses aspects of archaeology broadly. This may need to be defined independently for different types or categories of data.

### 3.1.5 International Dimension

**Requirement:** From D2.1, D12.1 highlighted the desire among users for easy access to international data and the relatively high level of dissatisfaction among users with current access. D12.2 specified work on metadata schemas and vocabularies to meet the needs around availability (and integration) of international data resources.

**Design:** D12.2 designs five services to meet the needs around International Dimension: the Data Access layer, the Integration and Interoperability Service, Vocabulary Management, the ARIADNE portal and the Preview service.

**Implementation:** Though not documented in D12.3 the ACDM schema will be crucial to meeting user needs for international data and integration of metadata across borders within the ARIADNE portal. The Vocabulary Management Service, which is described and implemented in the subject area of the Metadata Enrichment Service within the MORE aggregator, provides access to 27 relevant vocabularies to enable subject enrichment, which should enhance user experience of cross border subject search with the ARIADNE Portal (continuing work on extensions of the CIDOC CRM in WP 14 is essential to developing availability and integration across international datasets). The Vocabulary Directory is also available through a REST API. The Vocabulary Matching Tool designed by the Hypermedia Research Group at the University of South Wales will also be available as a service through the ARIADNE infrastructure.

**Recommendation:** Given the European aims of ARIADNE, the source vocabularies available through the Vocabulary matching tool could be expanded to allow broader mapping to AAT [R38]. Guidance documentation on how to prepare vocabularies for inclusion in the tool and for mapping would be required [R39]. This work could be targeted at data centres, institutional repositories and data managers and made available on a semi-public basis or to ARIADNE participants only. Multilingual thesauri are addressed in WP13.



## 3.2 Specific Requirements

User acceptance of portal features will be reported in WP13, so are therefore described here for completeness, but were not subject to the same level of evaluation. Recommendations have been made however, in several instances where it was recognised that improvements were needed.

### 3.2.1 Cross border period search

**Requirement:** D12.1 specified cross border period search for sites and monuments data, intervention data and fieldwork data. The feasibility of integration of scientific data for cross border period search “must be established case by case according to content type” (p5).

**Design:** D12.2 designed five services to meet the needs of cross and border period search: the Data Access layer, the Integration and Interoperability Service, the ARIADNE Portal and the Preview and Resource Discovery services.

**Implementation:** D12.3 describes the PeriodO project, a gazetteer of period assertions, which will provide a SKOSified collection of period names. The period gazetteer will be implemented as a metadata enrichment service in MORE, and should enable cross border period discovery through the Resource Discovery layer.

**Portal:** In the ARIADNE prototype portal, users can use the ‘Period’ facet to filter their search results based on the temporal terms supplied with the content. Within MORE, users may create collections of temporal mappings for use with their content. They must supply the source period’s label, beginning and end dates and a term to search for.

**Recommendation:** The targets of this search are not visible within the enrichment service currently. Documentation is required for this enrichment service [R40].

### 3.2.2 Cross border subject search

**Requirement:** D12.1 required a cross-border subject search for sites and monuments, intervention and fieldwork data. The feasibility of integration of scientific data for cross border subject search “must be established case by case according to content type” (p5).

**Design:** D12.2 designed five services to meet the needs of cross border subject search, the Data Access layer, the Integration and Interoperability service, the ARIADNE Portal and the Preview and Resource Discovery services.

**Implementation:** As discussed in 3.1.5 International Dimension above, D12.3 implements subject micro-services for metadata enrichment. Integration of data will be implemented on a phased basis.



**Portal:** Subject terms for content provision have been mapped to the spine of the Getty AAT to enable searching across resources. This enables the inclusion of both the content provider's own subject terms and the equivalent terms from Getty AAT, which appear as 'Native Subject' and 'Derived Subject' facets in the search results view in the prototype portal. Cross border searching of subjects from metadata are also be available in the Portal through a 'What' browsing interface.

### 3.2.3 Map driven searching or visualisation

**Requirement:** D12.1 specified map driven searching or visualisation of data for sites and monuments, intervention and fieldwork databases. The feasibility of including burial and scientific datasets in these tools must be examined on a case-by-case basis (12.1, p5).

**Design:** D12.2 specifies three services for this requirement: the Data Access layer, the ARIADNE Portal and the Preview service. The Data Access layer pulls results from the catalogue to present in the previewing service as search results or individual records. Presentation on a map is only one method of display offered within the preview service.

**Implementation:** D12.3 presented mock-ups of map browsing and searching capabilities implemented in the Portal.

**Portal:** Map driven searching is available through the 'Where' browsing feature of the prototype ARIADNE portal. Any resources which have spatial information are included in this view. Users can refine a spatial area and return a list of results which reference that area. The map-based 'Where' search facet can be used alongside this list to provide further refinements.

### 3.2.4 Bibliographic metadata from grey literature

**Requirement:** Integrate bibliographic metadata from grey literature.

**Design:** D12.2 designed four services to meet the requirement to make metadata from grey literature more accessible, the Data Access layer, the ARIADNE Portal, the Preview Service and the Resource Discovery Service. As such, there are no services designed only for this requirement, the infrastructure should meet it through the services devised also for other requirements.

**Implementation:** As the design did not specify specific services for this requirement only, D12.3 does not refer to it directly.

**Portal:** The prototype portal demonstrates the integration of bibliographic metadata from grey literature through the Archaeology Data Service's Grey Literature Library.

### 3.2.5 Integration and interoperability from scientific datasets

**Requirement:** Integration of scientific datasets is a specified requirement for data in D12.1. Analyses in similar areas of study may share similar structures, which would aid integration (D12.2, p23).

**Design:** D12.2 designed three services to meet this requirement: the Integration and Interoperability service, the Deposit Service and the Resource Discovery service.

**Implementation:** “The Deposit service allows registered users to deposit metadata following the ACDM schema.” (D12.2, p25). The deposit service is currently implemented in the Registry.

**Recommendation:** It is not clear from D12.1 or D12.2 what kind of integration and interoperability is sought [R41]. Thus D12.3 does not mention Integration and interoperability from scientific datasets. Metadata integration is the first step towards meeting this requirement. Data integration is addressed in WP16.

### 3.2.6 Integration of particular kinds of artefact data

**Requirement:** D12.1 requires the integration of particular kinds of artefact data, including data on burials. Artefact data on stone tools and ceramics may be most amenable to integration.

**Design:** D12.2 designed one service to meet this need, the Integration and Interoperability service.

**Implementation:** The MORE Aggregator.

**Recommendation:** The aggregator serves the search capabilities requested in the user requirements by transforming all metadata records to ACDM and pushing them to an RDF store, which enables indexed search. Data integration is not implemented in D12.3; according to the data integration strategy outlined in D12.2, the preparation phase focuses on “access functionality” (p18) and presenting which datasets are good candidates for integration. Integration is planned for the third phase and is addressed in WP16.

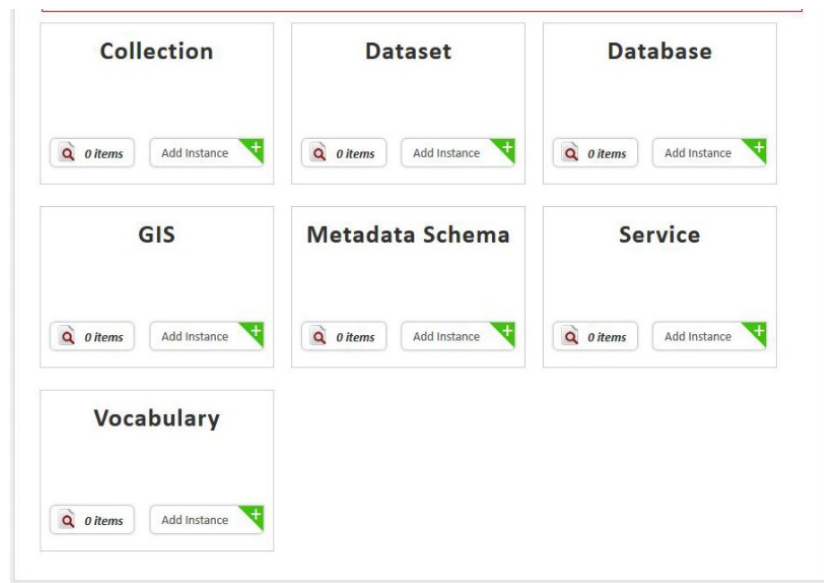
## 4 ARIADNE Registry

### 4.1.1 Sign up and login

The registration and login at the [Registry homepage](#) is a very simple and fast process; a minimum of information was required and confirmation emails were received quickly. While the low barrier to access is user-friendly, it raises questions around managing inputs and quality. An offer of training or guidance on first login (for example with a walkthrough video, or high visibility for the support portal) might be helpful to introduce new users to the standards and quality expected, though the aggregation services will also filter out low quality inputs.

Following login, the registry homepage is simple, but it may benefit from a clearer visual structure. Seven of the available resource types are not visible on this page, including the mandatory **foaf:agent**. Key data resource classes could be grouped together, and language resources grouped separately, reflecting the resource types listed in D12.2 (16). A basic visualisation may help the user to better understand the relationships between data resources and language resources, and illustrate which language resources are mandatory or recommended for particular data resources.

Short descriptions of each resource type would reduce any ambiguity and guide the user quickly to the appropriate class of resource. The users' first experience of the tool may also be improved by adding a notification that an agent is mandatory before adding any other resource.



*Figure 2: Registry homepage on login.*

#### **Recommendations [R1-4]:**

- Include the addition of an instance of foaf:agent as part of the registration process, or as part of navigation during first addition of a data resource.
- Include page navigation or pop-up which directs users to guidance for content provision on first one to five logins.
- One sentence descriptions of each data resource where the user chooses which resource class is suitable for his/her content.
- Include a basic visualisation of the relationships between data resources and language resources within user guidance, including highlighting of mandatory language classes for data resources.

### 4.1.2 Adding resources

Testing was carried out with a collection of digital assets comprised of textual metadata, 3D models, video and images. The collection-level metadata was exported to an xml file structured according to the CARARE metadata schema. The assets are available online and the metadata contains a URL link to a representation of each asset. Following consultation with the ACDM specification, the file was added as a dataset.

Many of the field names within the web forms have small pop-ups explaining the purpose of the field or the expected content. The user comes to expect these while navigating through the site but they are missing for some elements.

The URL for the online versions of the data referred to in the metadata set was added as an Ariadne:Distribution associated with the dataset, though it does not include an OAI-PMH repository or an RSS feed and is not strictly a web service.

#### Recommendation [R5]:

- Expand the use of pop-up element descriptions to all elements in the input forms.

Figure 3: Registry Dataset input form.

### 4.1.3 Add Dataset

Some questions were raised by the web form for dataset and are applicable to other resources. These include:

- Temporal, subject and others: additional elements can be added but not removed, though extra elements added in error are removed when the page is refreshed on save.
- The drop down on dct:publisher is dauntingly large and does not always display on first click. Exposing the full list of agents to all users presents the possibility that items can be incorrectly attributed, intentionally or unintentionally. An auto-complete may be helpful: it may not be immediately clear to users that typing will bring them to matches in the existing list. Some guidance, policy or control on the recording of names in foaf:agent may be helpful to the transparency and accessibility of the system.
- If the user has not added an agent on first login, this step must be completed before adding information to dct:publisher, creator and owner. If the agent step is completed while adding a resource, the user must wait for the system to update before the agent is available to other relevant fields. Information in other fields of the web form was lost as the system logged the user out to complete the update. The agent was available to all fields on the next login.
- In the dcat:keyword and dct:subject fields, users may be confused by the presence of two different fields for what appear to be very similar purposes. The Registry FAQ provides guidance on the application of the different access fields; similar guidance for subject elements may be helpful.

#### Recommendations [R6-9]:

- Implement an auto-complete function on the dct:publisher element as an alternative to exposing the full list of agents to all users.
- Standardise the recording and display of personal and organisational names within the Registry.
- Eliminate the potential to circumvent adding an agent before adding metadata on a data resource.
- Expand guidance on the use of elements currently available in the Registry to include guidance on the use of the different fields which relate to subjects.

#### 4.1.4 Adding temporal information to a resource

There were some unexpected behaviours when adding temporal information to a given resource. Figure 4 below shows temporal information added to the appropriate input form. Figure 5 shows the display of that information after clicking the Save button on the input form. A similar error occurred with another resource which had a smaller specific date range. There is no error message to indicate to the user that inappropriate values have been entered, or that required values are missing.

Period name: -

From Period:

	Year	Month	Day
BC	3000	0	0

Until Period:

	Year	Month	Day
AD	1699	0	0

Save Close

Figure 4: Inputting temporal information.

dct:temporal 3000 until 3000

Figure 5: Temporal information from Figure 4 after saving.

\*:dbms Microsoft Access

dct:description

dct:issued 2004

dct:modified 2007

:originalId EXCAVATION (2007 version)

dct:identifier N/A

dcat:keyword artefacts

\*dct:language en

dct:temporal 401 until 401

Figure 6: A second error on temporal information.

**Recommendations [R10-11]:**

- Indicate mandatory elements in the input form for temporal information.
- Provide a fail warning for inappropriate or missing values.

**4.1.5 Adding Data Format to a Dataset**

As the test dataset was comprised of metadata structured according to CARARE, the Associations area of the web form presented some questions. The CARARE schema was associated with the record through :hasRecordStructure by adding CARARE as a Data Format resource. However, the schema could also have been added as a Metadata Schema.

**Recommendation [R12]:**

- Include appropriate examples of the use of the Associations area in the different resource classes in user guidance.

**Data Format**

\*Title:

dct:description

:characterSet

:XSD

\*:expressedIn

---

**Associations**

:usesVocabulary

:hasAttachedObject

*Figure 7: Registry Data Format input form.*

### 4.1.6 Add Vocabulary

Testing the addition of a vocabulary to the Catalogue raised the following issues:

**:status:** This is currently a free text field, a drop down might be helpful. It is not clear to the user whether the expected information is related to the publication status (i.e. a public or project vocabulary), whether the vocabulary is actively maintained or updated, in draft or some other value.

The ACDM suggests some of these elements are strongly recommended: it may be useful to highlight strongly recommended elements to the user in addition to the mandatory elements.

It is also unclear what values are expected in :hasVersion. The Registry does not provide a pop-out to supply the values documented for this class in the ACDM v2.6.

The screenshot shows the 'Vocabulary' input form in the ARIADNE metadata registry. The form includes the following fields and controls:

- \*dct:title**: A text input field.
- dct:identifier**: A text input field containing 'N/A'.
- dct:description**: A text area for description.
- \*:status**: A text input field.
- \*dct:language**: A dropdown menu showing 'ar' and a plus icon for more options.
- :hasConcept**: A text input field with a plus icon.
- :hasVersion**: A text input field with a plus icon.
- :usedby**: A dropdown menu with a minus sign and a plus icon.
- dct:creator**: A dropdown menu with a minus sign and a plus icon.
- dct:publisher**: A dropdown menu with a minus sign and a plus icon.
- foaf:homepage**: A text input field.
- Buttons**: A green 'Manage Concepts for this Vocabulary' button, and 'Save' and 'Delete' buttons at the bottom right.

Figure 8: Registry Vocabulary input form.

#### Recommendation [R13]:

- Update the :hasVersion element to include a pop-out which reflects the values expected in the ACDM v2.6.



### 4.1.7 Add Mapping

Source and target fields are mandatory and use drop-down lists: schemas must be added as Metadata Schema resources before adding a mapping. Any schema added to the Catalogue is available in these drop-down lists in the Registry.

Figure 9: Adding a mapping between metadata schemas.

#### Recommendation [R14]:

- Consider navigational changes which reflect the required workflow of adding metadata schemas before adding a mapping.

### 4.1.8 Add Distribution

A Distribution was added for the 3D Icons Ireland project. There are only three mandatory fields, dct:title, dct:issued and dct:modified. There was no value for dct:modified but the resource added without indicating an error. A web address was added to Dcat:accessURL and the organisation name to dct:publisher.

#### Recommendation [R16]:

- Highlight in user guidance that the Distribution class is mandatory.
- Introduce a fail warning or completeness indicator where mandatory elements are missing.

### 4.1.9 Add Metadata Schema

The test schema was MARCXML. The web form for MetadataSchema comprises many fields, and though not many are mandatory, when adding a mapping this may be a deterrent for users: they must repeat these steps twice before turning to the relevant task. The ‘manage mappings for this schema’ button on the Metadata Schema can be used, but both source and target schemas must be present.

Figure 10: Registry Metadata Schema input form.

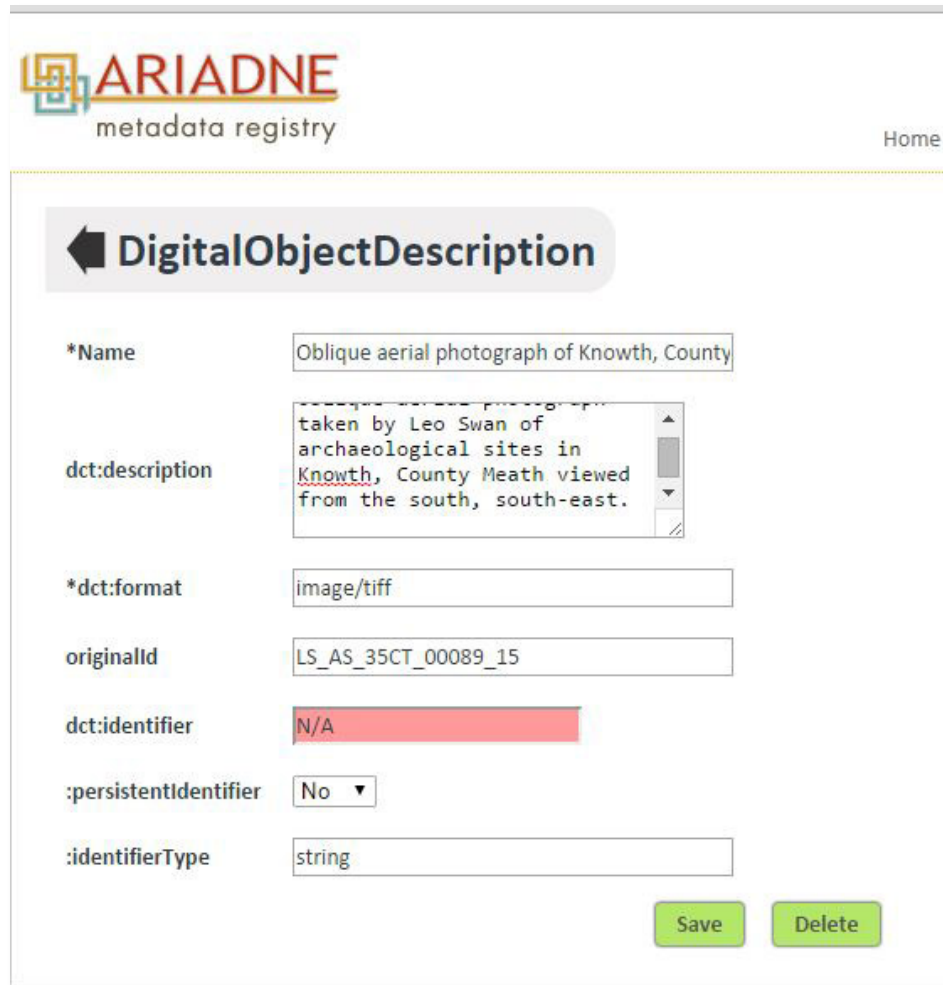
#### Recommendation [R14]:

- See Add Mapping (25) above.

### 4.1.10 Add Digital Object Description

For the element `dct:format`, the pop-up specifies the use of IANA MIME types, which some users may not be familiar with and possibly should be explained. The ACDM V5.5 specifies an auto-complete for this field, which will be helpful when implemented.

Within :identifierType, the pop-up suggests DOI and NBN as values. A drop down list may be more appropriate if the design requires specific values (this is not specified in the ACDM).



The screenshot shows the 'DigitalObjectDescription' form in the ARIADNE metadata registry. The form includes the following fields and values:

- \*Name:** Oblique aerial photograph of Knowth, County
- dct:description:** taken by Leo Swan of archaeological sites in Knowth, County Meath viewed from the south, south-east.
- \*dct:format:** image/tiff
- originalId:** LS\_AS\_35CT\_00089\_15
- dct:identifier:** N/A (highlighted in red)
- :persistentIdentifier:** No (dropdown menu)
- :identifierType:** string

At the bottom right of the form are two green buttons: 'Save' and 'Delete'.

Figure 11: Adding a DigitalObjectDescription to the Registry.

#### Recommendations [R17-18]:

- Implement an auto-complete operation with values from IANA's MIME Media Types for dct:format.
- Implement a drop-down on :identifierType with acceptable values for this element.

#### 4.1.11 Add Service

Example 1: Online Web resource [Mapping Death](#), database service of inhumations and cremations.

Mapping Death, according to the ACDM latest version and the Data Resources User Guide, should be added as a Service for Humans. Because the Registry does not reflect this aspect of the ACDM it's not possible to specify this class when adding the resource to the Registry.

Example 1: Online Web resource [WODAN](#) database service of palaeo-environmental scientific data.

Similarly, WODAN should be added as an Institutional Service as it requires a login to access its data. It is not possible to specify this in the Registry.

According to the guidance, these services, which are built on databases should be added as single entries in the Registry, and displayed as such in the portal. In the case of Mapping Death, it is possible to provide spatial metadata and unique landing pages which represent entries in the database. As TextualDocument is the only ACDM class, which provides for item level descriptions, these cannot currently be provided to the catalogue.

#### Recommendations [R19]:

- Allow users to specify which of the ACDM Service types (described in ACDM v2.6) their Service data resource represents.

#### 4.1.12 Add Licence

A Creative Commons 4.0 licence was added to the Registry. The name field is the only mandatory one. Distribution is the only resource to which the Licence class becomes available when added. While the portal may require Licence as a class, it may be frustrating for the Registry user that Licence cannot be added from within the Distribution web form as, for example, with foaf:agent in Collection.

#### Recommendation [R20]:

- Enable the addition of an instance of the Licence class from within the Distribution class, through a pop-out or otherwise.


#### 4.1.13 Add GIS

The WMS GetCapabilities operation for Ireland's sites and monuments inventory was added from Ireland's government Open Data portal. As with other classes of resource in the Registry, there is not enough guidance in the input form for users on how each element, or even the mandatory elements should be filled: pop-ups are present for some of them, and these could be used more effectively.

The shapefile for the GIS was later added to the Registry entry. It is very easy to add a resource without any attached documentation or landing pages, resulting in a very scanty entry in the portal. Validation services need to address the inclusion of mandatory and recommended elements, and some immediate feedback to the user on compliance with the requirements of the ACDM in relation to the class they are working in is expected, given the level of specificity in the ACDM.

**Recommendations [R21-22]:**

- Include an example value in the element guidance pop-ups or link to guidance on the input form page.
- Include fail warnings or completeness indicator for mandatory and/or strongly recommended elements.



*dcterms:title	National Monuments Service - Arch	acdm:publisher	National Monuments : ▾ ↗ +
acdm:systemName		acdm:contributor	- ▾ ↗ +
dc:description	This dataset contains the digitised locations of the records of the Archaeological Survey of Ireland	acdm:creator	National Monuments : ▾ ↗ +
dcterms:issued	1/1/2016	acdm:owner	National Monuments : ▾ ↗ +
dcterms:modified	3/2011	acdm:legalResponsible	National Monuments : ▾ ↗ +
acdm:originalId		acdm:scientificResponsible	National Monuments : ▾ ↗ +
dcterms:identifier	N/A	acdm:technicalResponsible	Paul Walsh ▾ ↗ +
dc:keyword		*acdm:archaeologicalResourceType	Sites and monuments ▾ +
*dc:language	en ▾ +	acdm:nativeSubject	▾ +
acdm:temporal	All ▾ +	acdm:nativeSubject	▾ +
*acdm:spatial	Ireland ▾ +	acdm:hasAttachedDocuments	Choose file No file chosen
dcterms:accrualPeriodicity	continual		
dc:landingPage	http://webservices.npws.ie/ai		
dc:contactPoint			

---

acdm:accessPolicy	
dcterms:accessRights	
dc:rights	CC-BY 4.0
dcterms:extent	
dcterms:audience	

Figure 12: Adding a GIS to the Registry.

#### 4.1.14 Add Collection

Leo Swan Aerial Archaeological Photography Collection and Discovery Programme Image Collection were added as Collections.

From a depositor perspective, it's difficult to determine what is expected in this resource. The Data Resources user guide specifies that only textual documents should be added as items in collections, and associated with the parent collection (description of) using dct:isPartOf. Within the Registry, the landing page for the collection as a whole is included. For this content it is also possible to provide landing pages for all of the individual images in the collection, with the potential to include thumbnails.

**ARIADNE**  
metadata registry

Home Objects Settings Help Logout

**Collection**

*dcterms:title	Leo Swan Aerial Photography	acdm:publisher	The Discovery Progr: ▾
dc:description	The Leo Swan collection of aerial photography is a unique source in Irish archaeology. It comprises over six thousand images	acdm:contributor	The Discovery Progr: ▾
dcterms:issued	2016	acdm:creator	Leo Swan ▾
dcterms:modified	2015	acdm:owner	National Museum of I ▾
acdm:originalId	LS_AS	acdm:legalResponsible	National Museum of I ▾
dcterms:identifier	dat:245376	acdm:scientificResponsible	National Museum of I ▾
dc:keyword	aerial photography	acdm:technicalResponsible	The Discovery Progr: ▾
*dc:language	en ▾	*acdm:archaeologicalResourceType	Artefact databases or ▾
acdm:temporal	901 until 1600	acdm:nativeSubject	
acdm:spatial	Ireland	acdm:hasAttachedDocuments	Choose File No file chosen
dcterms:accrualPeriodicity	complete		
dc:landingPage	https://lswanaerial.loccloud/		
dc:contactPoint			
acdm:accessPolicy			
dcterms:accessRights	http://creativecommons.org		
dc:rights			
dcterms:extent	6194 jpegs		
dcterms:audience			

Figure 13: Adding a Collection to the Registry.

**Recommendations [R23-24]:**

- Indicate to users where objects which can be used to generate thumbnails for items within the collection should be provided.
- Include a descriptive pop-up for the :hasAttachedDocuments element.

**4.1.15 Other Registry features****Excel/XML Ingest**

Currently there is no user interface within the Registry for uploading Excel or xml files and nothing on the pages where the templates are provided to indicate to users that a file upload service is available within MORE. From the Registry users can only see the web form and the API. In this case it is crucial that users are well informed about the workflow available for content provision, either from notes with the templates or through the Support Portal.

**Recommendations [25-26]:**

- Expand notes on this resources to explain to users that file upload is available within MORE.
- Consider a content provision workflow diagram which shows the path through the different parts of the infrastructure.

**Excel template record**

The ACDM Excel template was tested with a collection of archaeological grey literature reports with associated metadata in an existing Excel spreadsheet. As the reports are not available on the web, the metadata is added as a dataset. Each row in the spreadsheet contains the metadata record for one report. As the report metadata is marked up in Dublin Core, following the ARIADNE template document is relatively straightforward. Some users may require guidance or support to map from existing metadata in other standards to the template. Expanding the examples available for the different resource classes would facilitate this.

**Recommendations [27]:**

- Include further worked examples of the use of the template for different resource classes.

**Resource classes on the Registry homepage**

There are a number of resource classes that are not visible on the interface on logging in to the Registry. The resource classes that are available in Registry, from the homepage or from the 'Objects' drop down, do not reflect the current content of the ACDM. The 'Objects' drop-down could also be renamed to reflect the descriptions of resource classes in the ACDM: data resources, language resources, services.



**Recommendations [28-29]:**

- Rename the 'Objects' drop-down to reflect the language of the ACDM.
- Ensure no data resources classes are hidden from the user by the visual structure of the Registry interface.

**User management**

Consideration should be given to management of user accounts in the Registry. It is currently possible for several staff members of one organisation to register, login and add resources to the Registry, without any visibility or oversight of that content at the organisational level. Thus it is possible, for example, for a single organisation to be added in foaf:agent multiple times by different users. There are several classes of resource where this duplication may occur. It is unclear whether this duplication is resolved within the Registry or Catalogue. Implementing an organisational account which has oversight and role assignment for member users is a further opportunity for quality control.

**Recommendation [R30]:**

- Consider implementing organisational level user accounts in the Registry.

**4.2 Conclusions and Recommendations**

The relationship between user guidance, the ACDM and the Registry should be strong. Currently, the guidance, while reflecting the ACDM well and describing useful workflows, serves to confuse, as the structures within the Registry do not reflect the content of either *ARIADNE Catalogue: Entering Data* Resources or the latest version of the ACDM Specification. For some classes there are a large number of input fields, and the form may benefit from more visual prioritisation of the mandatory and strongly recommended elements. This is particularly relevant for elements which provide access to the resources through URLs: within the Registry interface, it is not obvious that Distribution is a required class.

Pop-ups associated with individual elements are useful, but could be optimised to provide more helpful guidance to users, perhaps with links to expanded guidance and examples. Working within the Registry can be a frustrating experience, with varying feedback to the user on whether their entries will comply with the standard required and validate against the ACDM. Some warnings are provided and in other cases the user is unable to save the record. A preview of how the record/ entry will look in the ARIADNE Portal may provide some encouragement to providers to improve the quality or quantity of metadata they provide for a particular resource.

As the Registry is the first point of contact for content provision for ARIADNE, its design should closely reflect content provision workflow.

Recommendations for the ARIADNE Registry		
<b>R1</b>	4.1.1	Include the addition of an instance of foaf:agent as part of the registration process, or as part of navigation during first addition of a data resource.
<b>R2</b>	4.1.1	Include page navigation or pop-up which directs users to guidance for content provision on first one to five logins.
<b>R3</b>	4.1.1	One sentence descriptions of each data resource where the user chooses which resource class is suitable for his/her content.
<b>R4</b>	4.1.1	Include a basic visualisation of the relationships between data resources and language resources within user guidance, including highlighting of mandatory language classes for data resources
<b>R5</b>	4.1.2	Expand the use of pop-up element descriptions to all elements in the input forms.
<b>R6</b>	4.1.3	Implement an auto-complete function on the dct:publisher element as an alternative to exposing the full list of agents to all users.
<b>R7</b>	4.1.3	Standardise the recording and display of personal and organisational names within the Registry.
<b>R8</b>	4.1.3	Eliminate the potential to circumvent adding an agent before adding metadata on a data resource.
<b>R9</b>	4.1.3	Expand guidance on the use of elements currently available in the Registry to include guidance on the use of the different fields which relate to subjects.
<b>R10</b>	4.1.4	Indicate mandatory elements in the input form for temporal information.
<b>R11</b>	4.1.4	Provide a fail warning for inappropriate or missing values.
<b>R12</b>	4.1.5	Include appropriate examples of the use of the Associations area in the different resource classes in user guidance.
<b>R13</b>	4.1.6	Update the :hasVersion element to include a pop-out which reflects the values expected in the ACDM v2.6.
<b>R14</b>	4.1.7	Consider navigational changes which reflect the required workflow of adding metadata schemas before adding a mapping.

<b>R15</b>	4.1.8	Highlight in user guidance that the Distribution class is mandatory.
<b>R16</b>	4.1.8	Introduce a fail warning or completeness indicator where mandatory elements are missing.
<b>R17</b>	4.1.10	Implement an auto-complete operation with values from IANA's MIME Media Types for dct:format.
<b>R18</b>	4.1.10	Implement a drop-down on :identifierType with acceptable values for this element.
<b>R19</b>	4.1.11	Allow users to specify which of the ACDM Service types (described in ACDM v2.6) their Service data resource represents.
<b>R20</b>	4.1.12	Enable the addition of an instance of the Licence class from within the Distribution class, through a pop-out or otherwise.
<b>R21</b>	4.1.13	Include an example value in the element guidance pop-ups or link to guidance on the input form page.
<b>R22</b>	4.1.13	Include fail warnings or completeness indicator for mandatory and/or strongly recommended elements.
<b>R23</b>	4.1.14	Indicate to users where objects which can be used to generate thumbnails for items within the collection should be provided.
<b>R24</b>	4.1.14	Include a descriptive pop-up for the :hasAttachedDocuments element.
<b>R25</b>	4.1.15	Expand notes on this resources to explain to users that file upload is available within MORE.
<b>R26</b>	4.1.15	Consider a content provision workflow diagram which shows the path through the different parts of the infrastructure.
<b>R27</b>	4.1.15	Include further worked examples of the use of the template for different resource classes.
<b>R28</b>	4.1.15	Rename the 'Objects' drop-down to reflect the language of the ACDM.
<b>R29</b>	4.1.15	Ensure no data resources classes are hidden from the user by the visual structure of the Registry interface.
<b>R30</b>	4.1.15	Consider implementing organisational level user accounts in the Registry.

Table 2: Registry Recommendations

## 5 Aggregation Service, Validation Services, Metadata Enrichment Services: the MORE aggregation tool

The MORE aggregation workflow has been proven through experience in LoCloud and other European projects. Documentation for use of the tool within the ARIADNE infrastructure is not available from the Support portal or within MORE.

It is unclear how the Validation Service is validating content against the ACDM based on the records available in the prototype portal: there are different approaches to item and collection level metadata represented. The *ARIADNE Catalogue: Entering Data Resources, a short user guide* and guidance received during content provision suggests that the only class of resource utilising item level descriptions within the Collection class is TextualDocument, whose instances are associated with their parent collection by dct:isPartOf. There are resources within the prototype portal which reflect this relationship which are not composed of TextualDocuments. Clear guidance for (meta)data depositors on ARIADNE's expectations and the ACDM specifications on the appropriateness of providing item level descriptions will shape expectations for how content appears in the portal.

Within the MORE web tool the content provision workflow is strong: the user is guided by the tool through the steps towards publication to the portal.

Metadata enrichment services are also similar to those experienced in other projects, with the exception of the perio.do mapping service. Testing in Task 12.6 should be carried out in collaboration with partners who have not used the tools and services available through the LoCloud, CARARE and 3D-Icons projects in the past as this may influence the results of the true user experience as they will have gained previous user experience from these projects.

The Registry web input tool was designed for 'Users without any content in an existing format and available through a repository [so that they] can use the registry service to catalogue content from scratch, manually or through the REST API' (D12.3, 21). With the availability of a file upload directly to MORE, and spreadsheet and xml templates within the Registry, content providers have a variety of options for supplying metadata. In this context, particular attention could be paid to ensuring that manual entry workflow in the Registry is suitable for those who will use it. For those without content in an existing format who are using the Registry as a cataloguing tool, ARIADNE's integration of metadata and position on uploading of content to the infrastructure should be made clear.

The levels of user support required for maintaining the quality of the content input into ARIADNE should be considered. Strong user guidance documentation, in a variety of formats, would provide a means of addressing this need on an ongoing basis.

### Recommendations [R42-45]:

- Documentation for the use of MORE should be available within the Support Portal and accessible from within MORE.

- Include worked examples of provision of the Collection class in user guidance, including metadata provision for the items or data resources of which the collection is composed, would illustrate for users how their content will be represented in the portal.
- Further testing should be carried out with a panel of users who do not have previous experience of MORE and associated tools.
- Manual entry workflow in the Registry should be harmonised with user guidance and the latest version of the ACDM.

## 6 Support Portal and Documentation

The Support portal, documentation and user guidance need to be approached holistically in order to provide clear and coherent guidance to a variety of users at different points of interaction with the infrastructure.

The documents listed under Mapping Guidelines in the Support Portal are the ACDM specifications rather than a guide to users on how to map their content to the ACDM. Examples listed in the tables which outline the requirements for each resource within the model are helpful, however bringing the ACDM and the short user guide *ARIADNE Catalogue: Entering Data Resources* together into a set of guidelines which explain the workflow, the structure of ACDM records and also expand on the expected values would provide a valuable resource to users. Examples for each class of resource within the model would help users to understand the relationships between data resources and language resources more clearly.

A step by step process description for using the Registry is available to guide the user through the tool, the 60 slide ARIADNE Registry Tool Manual available from the Web tool area of the Help section within the Registry. The manual explains how to enter resources in the Registry but does not guide users on the kind of content expected in the given classes. For example, under Import the Collection (10), the manual describes adding an association, :hasItemMetadataStructure, to the entry for a collection, without referencing the type of content expected in this association, or referring the user to where to find that information. It is also not clear whether the association is required or optional. The Registry FAQ, also within its Help section, has useful relevant content and could be expanded.

In addition, some resources or elements have dependencies which are somewhat hidden from the user experience of the web forms within the Registry and are not intuitive. For example, the requirement to add an agent before adding a resource needs to be highlighted. Given that the initial creation of an agent is mandatory, this feature should be presented to the user on first login – users currently can circumvent this requirement and begin to add resource, a process which fails where there are no agents available and then returns the user to the agent class.

Correct workflows at the time of ingest will have an impact on all of the integration activities; for example, there is little guidance currently available to users for mapping period terms, and no guidance for this operation available from MORE, where the Perio.do mapping enrichment service is available. D2.1 found that ‘work effort for depositing data in the required format’ was the second most common barrier for researchers to deposit their research data (106). Availability and visibility of clear and comprehensive support documentation would also address concerns mentioned in D2.1 around the work effort for providing metadata in the required format.

ARIADNE's Support Portal should hold all of the documentation relevant to the use of the infrastructure and its components, organized to reflect users' interaction with the infrastructure, from basic guidance on using the ARIDANE Portal through to the use of APIs for content provision and investigation of the Catalogue and all FAQs relevant to ARIADNE.

**Recommendations [R46-49]:**

- User guidance should include example of all data resources classes worked with their language resource associations.
- Expand the Registry FAQ.
- Change navigation around adding an instance of foaf:agent from within a data resource. (See recommendation under 'Add Dataset' (20) above).
- Comprehensive step-by step workflow and mapping guidance could be provided both in one resource and broken into parts which reflect various user interactions with the infrastructure.

## 7 Strategy for further testing

Following the adjustment and alteration of the different services and tools based upon the series of recommendations outlined in this report, feedback will be gathered from the other data providers within the project to gauge their experiences during the project.

### Survey Instrument

The feedback from the wider ARIADNE user group will be carried out using online survey tool (surveymonkey.com) across a period of one month (May, 2016) and can be completed by participants in a relatively short time period (10 – 15 minutes). This online user satisfaction survey will be developed based upon the structure of this report and advance additional understanding of the designed services and tools based upon the following criteria:

#### Initial ARIADNE Infrastructure to User Requirements

- Rating of the how each different ARIADNE services and tools resolve the issues and challenges outlined in the initial the ARIADNE Infrastructure to User Requirements

#### User Design Interaction Satisfaction

- Verify consistency across family of interfaces
- Check terminology, fonts, color, layout, i/o formats
- Assessment of design across web browser and devices

#### Experience and assessment of Registry tool

- Each specific service (add resource, add dataset etc..) will be assessed based upon ease of use and evaluation of the expected results
- Utilising the System Usability Scale (SUS) the registry service will be generally assessed

#### Documentation of Portal and Tools

- Overall satisfaction with guidance
- Identification of additional gaps or misdirection within existing documentation
- Assessment of documentation based upon potential users within the wider archaeological community

#### Technical Support Functionality

- Responsiveness of support



- Resolution (quality & timeliness)
- Overall satisfaction with support

## 8 Conclusions and Recommendations

The infrastructure implemented in WP12 has met many of the use requirements specified. Some aspects not yet visible will require further testing in Task 12.6. Some clarification of use requirements for the Preview Service may be necessary: D12.2 designs a service that previews search results, as described above and illustrated in the prototype portal, as a list, on a map and timeline (D12.2, p24) but which can also preview individual records. D12.3 has implemented a Preview Service through which researchers can preview their own datasets in a number of formats, which seems to be more closely aligned with the Registry (p17). D2.2 (p108) and D13.2 (p30-32) both refer to the high priority given to this feature for quickly assessing relevance by users.

The Support portal, documentation and user guidance need to be approached holistically in order to provide clear and coherent guidance to a variety of users at different points of interaction with the infrastructure. Depositor users will be most affected by the quality and availability of documentation and support. Documentation for the MORE tool and enrichment services would be helpful additions to the Support Portal.

The Registry input tool provides the necessary functionality to enable depositing of metadata. The user experience could be improved and more closely guided with changes in design. There are very useful features for guidance within the input forms in the Registry; optimizing these could positively impact the both the quality of metadata provision and the user experience. Expansion of the FAQ available within the Registry, and the integration of all documentation into the Support Portal is also recommended.

Recommendations		
	3	12.1 Requirements
<b>R31</b>	3.1.1	Resolve the use of language around the terms 'Registry' and 'Catalogue' in any support documentation and user interfaces.
<b>R32</b>	3.1.1	Clarification of the use requirements for the Preview Service.
<b>R33</b>	3.1.2	Appropriate, targeted guidance for the user in the use of the Registry to add data resources is required.
<b>R34</b>	3.1.2	A business and sustainability model is required.
<b>R35</b>	3.1.3	Guidance for users on the nature of the errors thrown during the deposit and ingest process would be helpful.
<b>R36</b>	3.1.3	A word cloud of the 'derived subject' facet or Getty AAT terms, either as a filter or a second word cloud in the 'What' browsing area.
<b>R37</b>	3.1.4	The project should communicate clearly to users its approach to

		data and metadata.
<b>R38</b>	3.1.5	The source vocabularies available through the Vocabulary matching tool could be expanded to allow broader mapping to AAT.
<b>R39</b>	3.1.5	Guidance documentation on how to prepare vocabularies for inclusion in the tool and for mapping would be required.
<b>R40</b>	3.2.1	Documentation is required for the perio.do enrichment service.
<b>R41</b>	3.2.5	Clarify, from D12.1 and D12.2, what kind of integration and interoperability is sought for scientific datasets.
	<b>4</b>	<b>Registry</b>
<b>R1</b>	4.1.1	Include the addition of an instance of foaf:agent as part of the registration process, or as part of navigation during first addition of a data resource.
<b>R2</b>	4.1.1	Include page navigation or pop-up which directs users to guidance for content provision on first one to five logins.
<b>R3</b>	4.1.1	One sentence descriptions of each data resource where the user chooses which resource class is suitable for his/her content.
<b>R4</b>	4.1.1	Include a basic visualisation of the relationships between data resources and language resources within user guidance, including highlighting of mandatory language classes for data resources
<b>R5</b>	4.1.2	Expand the use of pop-up element descriptions to all elements in the input forms.
<b>R6</b>	4.1.3	Implement an auto-complete function on the dct:publisher element as an alternative to exposing the full list of agents to all users.
<b>R7</b>	4.1.3	Standardise the recording and display of personal and organisational names within the Registry.
<b>R8</b>	4.1.3	Eliminate the potential to circumvent adding an agent before adding metadata on a data resource.
<b>R9</b>	4.1.3	Expand guidance on the use of elements currently available in the Registry to include guidance on the use of the different fields which relate to subjects.
<b>R10</b>	4.1.4	Indicate mandatory elements in the input form for temporal information.
<b>R11</b>	4.1.4	Provide a fail warning for inappropriate or missing values.

<b>R12</b>	4.1.5	Include appropriate examples of the use of the Associations area in the different resource classes in user guidance.
<b>R13</b>	4.1.6	Update the :hasVersion element to include a pop-out which reflects the values expected in the ACDM v2.6.
<b>R14</b>	4.1.7	Consider navigational changes which reflect the required workflow of adding metadata schemas before adding a mapping.
<b>R15</b>	4.1.8	Highlight in user guidance that the Distribution class is mandatory.
<b>R16</b>	4.1.8	Introduce a fail warning or completeness indicator where mandatory elements are missing.
<b>R17</b>	4.1.10	Implement an auto-complete operation with values from IANA's MIME Media Types for dct:format.
<b>R18</b>	4.1.10	Implement a drop-down on :identifierType with acceptable values for this element.
<b>R19</b>	4.1.11	Allow users to specify which of the ACDM Service types (described in ACDM v2.6) their Service data resource represents.
<b>R20</b>	4.1.12	Enable the addition of an instance of the Licence class from within the Distribution class, through a pop-out or otherwise.
<b>R21</b>	4.1.13	Include an example value in the element guidance pop-ups or link to guidance on the input form page.
<b>R22</b>	4.1.13	Include fail warnings or completeness indicator for mandatory and/or strongly recommended elements.
<b>R23</b>	4.1.14	Indicate to users where objects which can be used to generate thumbnails for items within the collection should be provided.
<b>R24</b>	4.1.14	Include a descriptive pop-up for the :hasAttachedDocuments element.
<b>R25</b>	4.1.15	Expand notes on this resources to explain to users that file upload is available within MORE.
<b>R26</b>	4.1.15	Consider a content provision workflow diagram which shows the path through the different parts of the infrastructure.
<b>R27</b>	4.1.15	Include further worked examples of the use of the template for different resource classes.

<b>R28</b>	4.1.15	Rename the 'Objects' drop-down to reflect the language of the ACDM.
<b>R29</b>	4.1.15	Ensure no data resources classes are hidden from the user by the visual structure of the Registry interface.
<b>R30</b>	4.1.15	Consider implementing organisational level user accounts in the Registry.
	<b>5</b>	<b>Aggregation services</b>
<b>R42</b>		Documentation for the use of MORE should be available within the Support Portal and accessible from within MORE.
<b>R43</b>		Include worked examples of provision of the Collection class in user guidance, including metadata provision for the items or data resources of which the collection is composed, would illustrate for users how their content will be represented in the portal.
<b>R44</b>		Further testing should be carried out with a panel of user who do not have previous experience of MORE and associated tools.
<b>R45</b>		Manual entry workflow in the Registry should be harmonised with user guidance and the latest version of the ACDM.
	<b>6</b>	<b>Support Portal</b>
<b>R46</b>		User guidance should include example of all data resources classes worked with their language resource associations.
<b>R47</b>		Expand the Registry FAQ.
<b>R48</b>		Change navigation around adding an instance of foaf:agent from within a data resource. (See recommendation under 'Add Dataset' 4.1.3 above).
<b>R49</b>		Comprehensive step-by step workflow and mapping guidance could be provided both in one resource and broken into parts which reflect various user interactions with the infrastructure.

*Table 3: Recommendations for the infrastructure*

## 9 References

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