



Making archaeological datasets

F-A-I-R

A panoramic view of the ARIADNE story

Julian Richards

Archaeology Data Service, University of York

Introducing the F-A-I-R principles

“One of the grand challenges of data-intensive science is to facilitate knowledge discovery by assisting humans and machines in their discovery of, access to, integration and analysis of scientific data.”

FAIR DATA

- Findable
- Accessible
- Interoperable
- Re-usable

- **Findable**
 - Data are described with good metadata
 - Metadata are indexed in a searchable resource
 - Data are assigned a Permanent identifier
- **Accessible**
 - Data should be open and online
- **Interoperable**
 - Use a formal, open, shared language for knowledge representation
- **Re-usable**
 - Data should have clear data licenses
 - Metadata should meet domain-relevant standards



Challenges and opportunities

- There is lots of data in archaeology
 - Fragmented, distributed, heterogeneous, hidden, short-lived
- IT is there to enable
 - Infrastructure, integration, standards, mapping, access, preservation



Life before ARIADNE...

ads ARCHAEOLOGY DATA SERVICE

HOME ARCHSEARCH ARCHIVES DEPOSIT LEARNING ADVICE RESEARCH ABOUT US BLOG LOGIN

EXPLORE DISCOVER DEPOSIT

INNOVATE Supporting research, learning and teaching with free, high quality and dependable digital resources

Featured Collection

Lower Palaeolithic technology, raw material and

Welcome to the new ADS website. There are a number of new features of the website that will make it easier and more enjoyable to use. Please read the 'About' site section for more details. This site works best with the Firefox, Chrome and Safari browsers. Why not register as a myADS user to take full advantage of the additional features. On registration these personal myADS features become available.

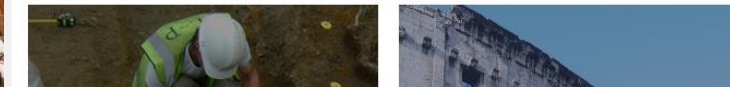
Workbook
Using the tools at the bottom of each page save your favourite resources and regular searches in the myADS Workbook.

History
Your recent exploration of the site and the archives is automatically saved in your myADS History.

Additional services
Registered ADS users can take advantage of a number of additional myADS services, such as tailored email alerts and download of configurable results sets.

Language

FASTIONLINE



SURVEY

coming soon!

DANS Data Archiving and Networked Services

HOME DEPOSIT SEARCH TRAINING AND CONSULTANCY PROJECTS ABOUT DANS NEWS AND EVENTS

You are here: Home > About DANS > Services > Archiving and reusing data > EASY > E-depot Dutch archaeology (EDNA)

E-depot Dutch archaeology (EDNA)

The e-depot for Dutch Archaeology (EDNA) was established by DANS and the Cultural Heritage Agency (RCE) to archive digital research data of Dutch archaeologists in a sustainable manner and make them available. The data then remain accessible and usable in the long-term. Since 2007, archaeologists in the Netherlands are formally obliged to deposit their data via DANS, according to the Quality Standard for Dutch Archaeology (KNA). The data are stored in EASY, the online archiving system of DANS, and are used mainly by archaeologists, policy makers, companies and people interested in culture.

Archaeological collection

EDNA contains data of archaeological research (GIS data, field drawings, data tables, photographs) and the final reports on this research. This concerns research in the broadest sense: from field survey to excavation, from specialist research to dissertation. The archived reports and datasets can be found in EASY per archaeological organization or per specific project (for example the Betuweroute and Maaswerken), and are accessible for other scientists. More than 80% of the archaeological data in EASY is publicly accessible.

International collaboration

By participating in European portals such as Europeana and ARIADNE, DANS provides better visibility for the archaeological data in EASY.

Contact: **Hella Hollander** (project leader Archaeology) and **Valentijn Glissen** (data manager).

[Read more about depositing data](#) or [go to EASY directly](#)

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More »

Newsletter
Twitter
YouTube
LinkedIn

DANS is an Institute of KNAW and NWO

home

coming soon!

national AIAC and the University

ARIADNE

© 2004-2016 AIAC Design by L - P : Archaeology Powered by ARK



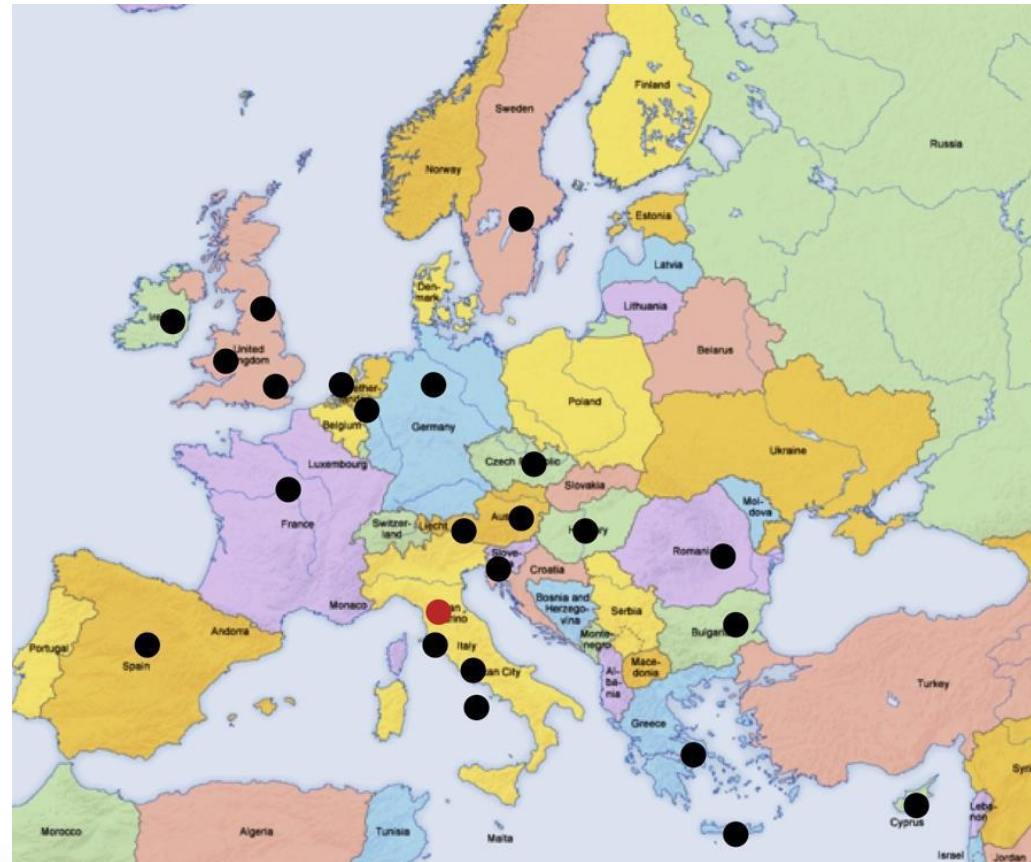
Project basics

- 4 year project (02/2013- 02/2017)
- FP7 Instrument “Integrating Activity”
- Funding 6.5m Euros
- Coordinators
 - Prof. Franco Niccolucci, University of Florence
 - Prof. Julian Richards, University of York
- Website: www.ariadne-infrastructure.eu



ARIADNE Community

- 23 partners in 18 European countries
- 9 ICT organisations
- 14 archaeological organisations
- 15 Associate partners
- Community building
 - Transnational access
 - Training events
 - Special interest groups

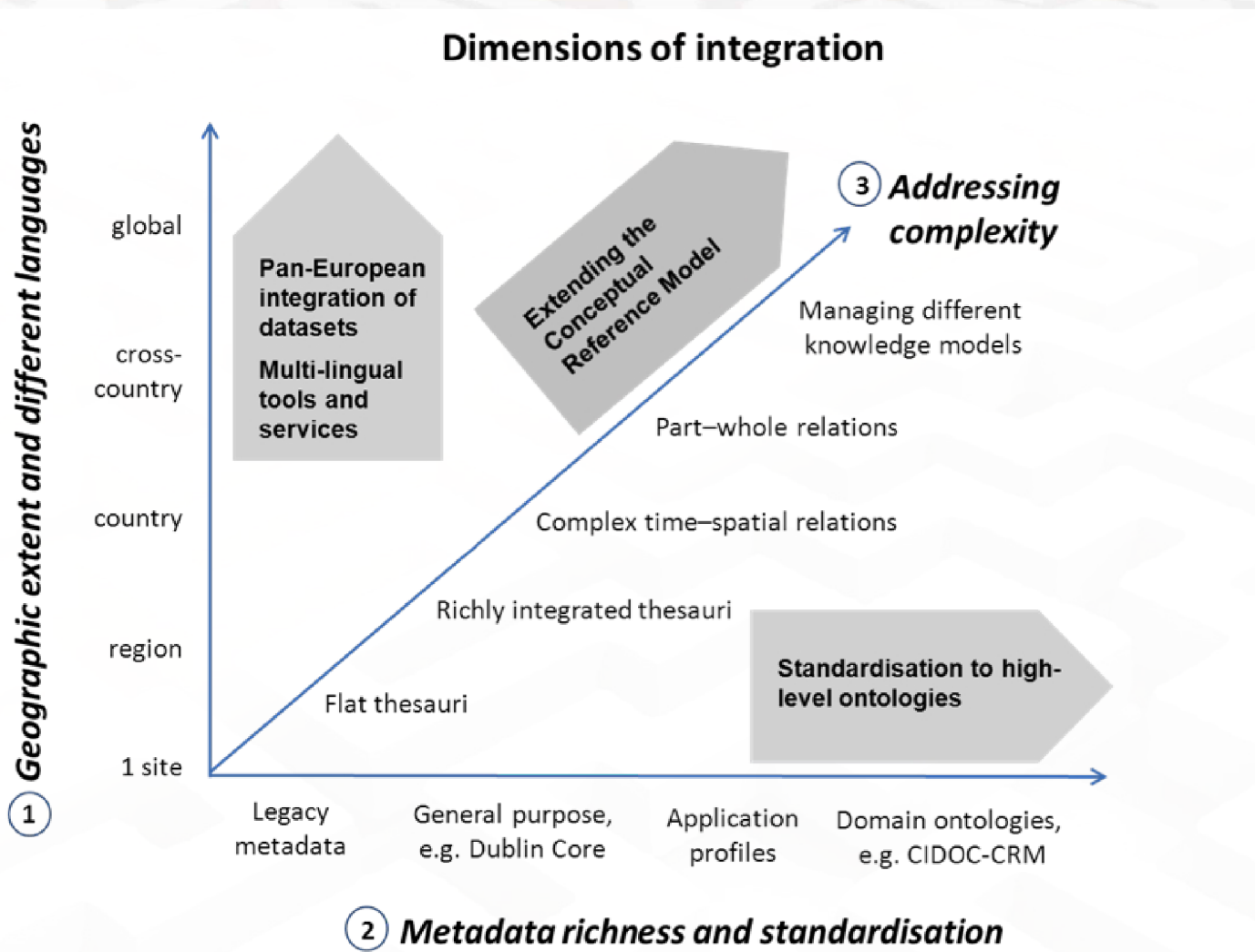


User Needs Research

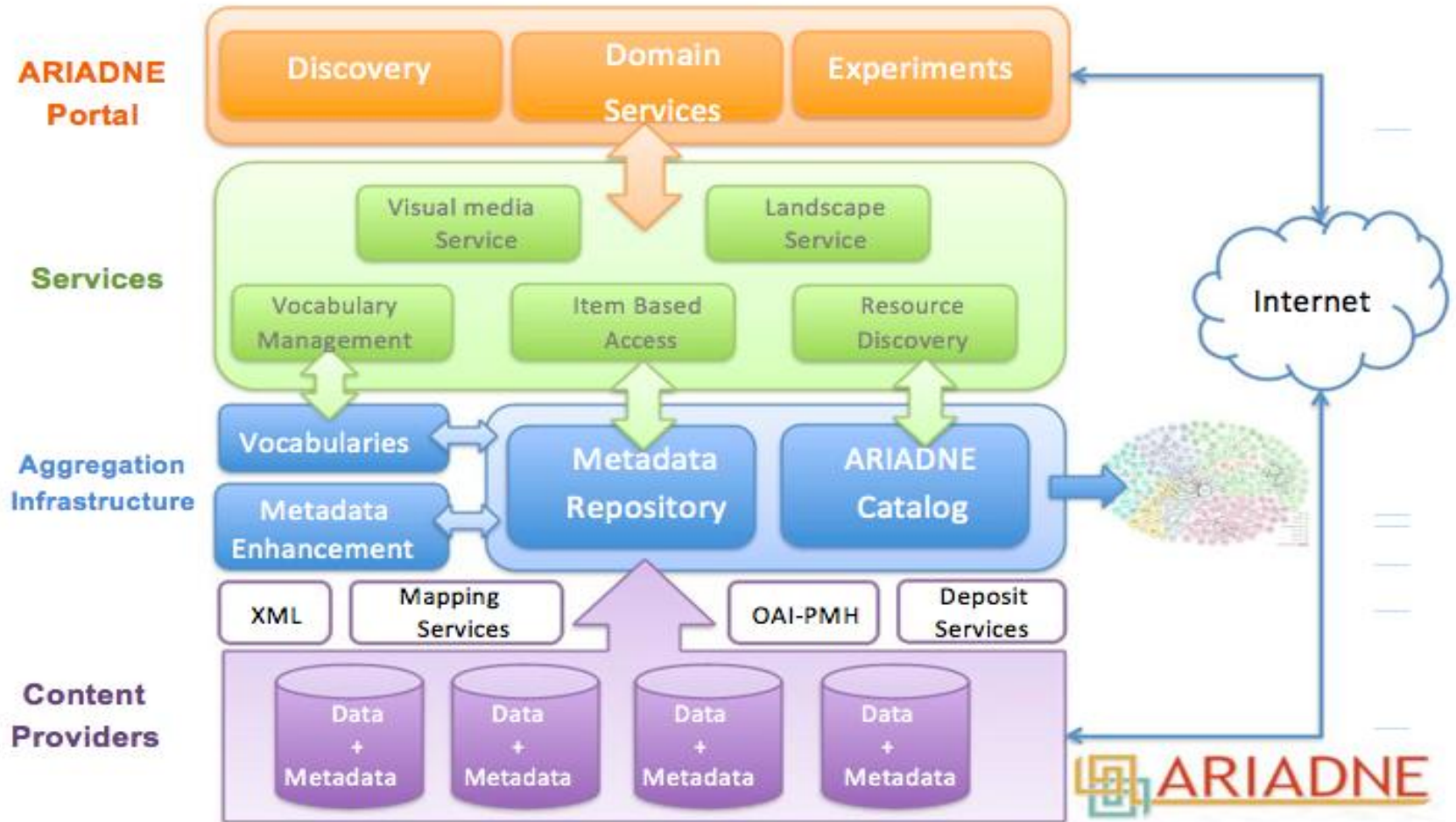
- 94% of researchers agreed that it is important that datasets are available online in an uncomplicated way.
- 87% of researchers agreed that they often do not know what research data is available because it is stored in so many different places and databases.
- 74% of researchers consider it important to have easy access to international datasets.
- The additional effort required to prepare data (formatting, metadata, etc.) is considered to be a barrier to data sharing by 80% of researchers.
- The perceived lack of professional recognition and reward for sharing data is a barrier to data sharing for 72% of researchers.
- A lack of institutional or international repositories for archaeology data sets was a barrier to data sharing for 60% of researchers.



The ARIADNE roadmap



The ARIADNE Architecture



Improving findability and accessibility

Sebastian Cuy

ARIADNE Portal

Discovery

Domain Services

Experiments

Services

Visual media Service

Landscape Service

Vocabulary Management

Item Based Access

Resource Discovery

Carlo Meghini:
ACDM

Doug Tudhope

Aggregation Infrastructure

Vocabularies

Metadata Repository

ARIADNE Catalog

Metadata Enhancement

Dimitris Gavrilis:
Registry

Content Providers

XML

Mapping Services

OAI-PMH

Deposit Services

Data + Metadata

Data + Metadata

Data + Metadata

Data + Metadata

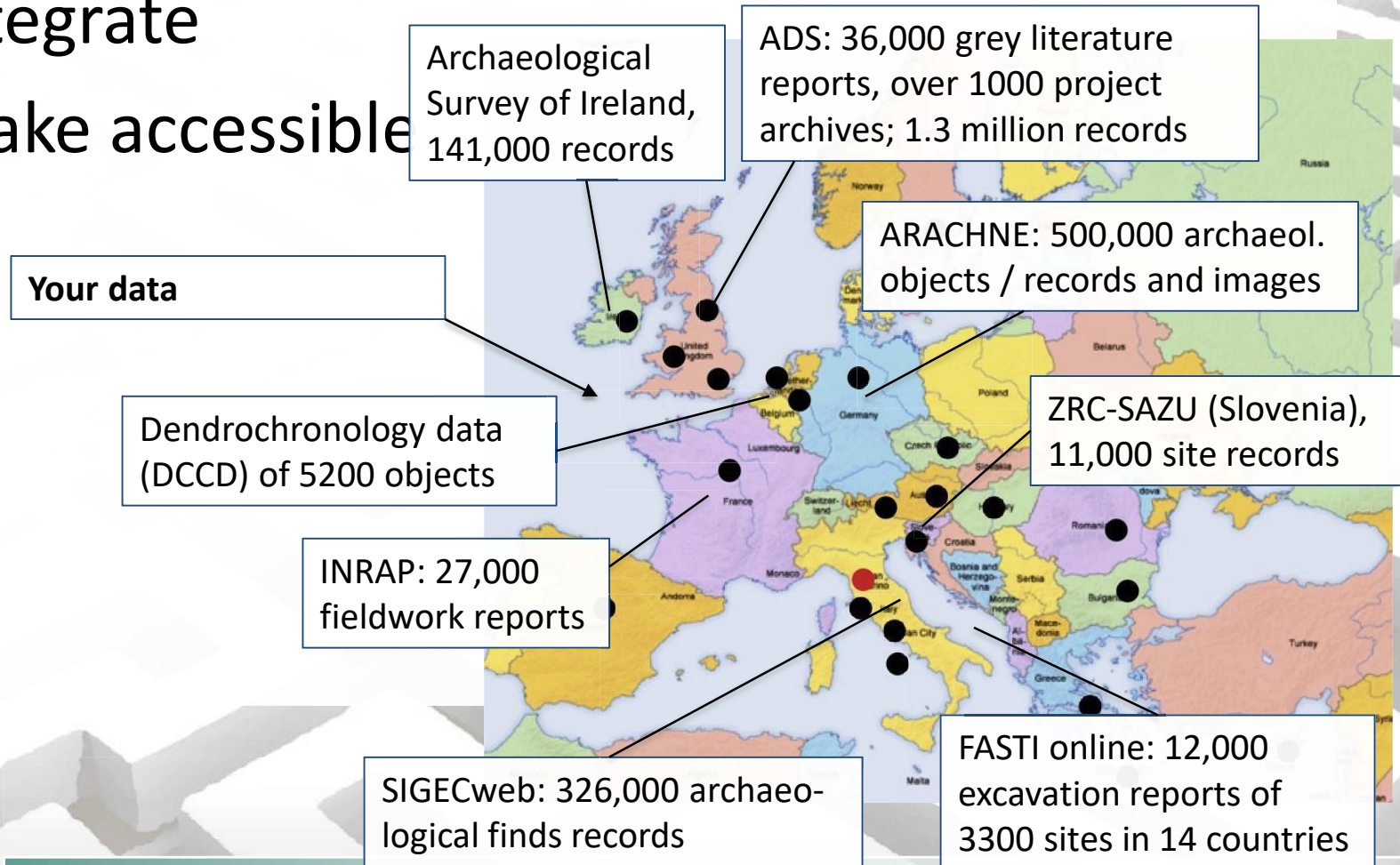
ARIADNE

Achille Felicetti:
TNA activity

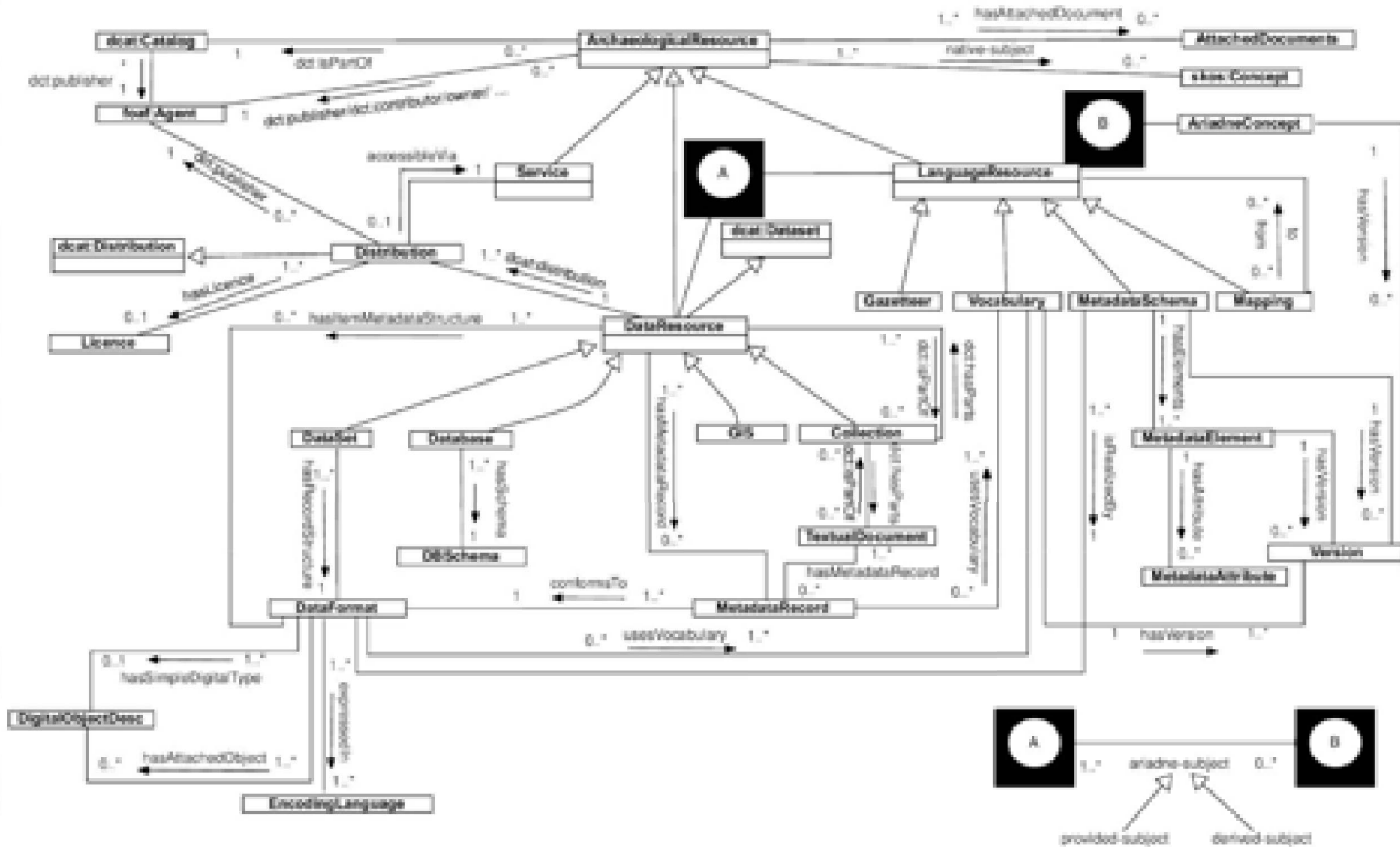


Data sharing

- Mobilize
- Integrate
- Make accessible

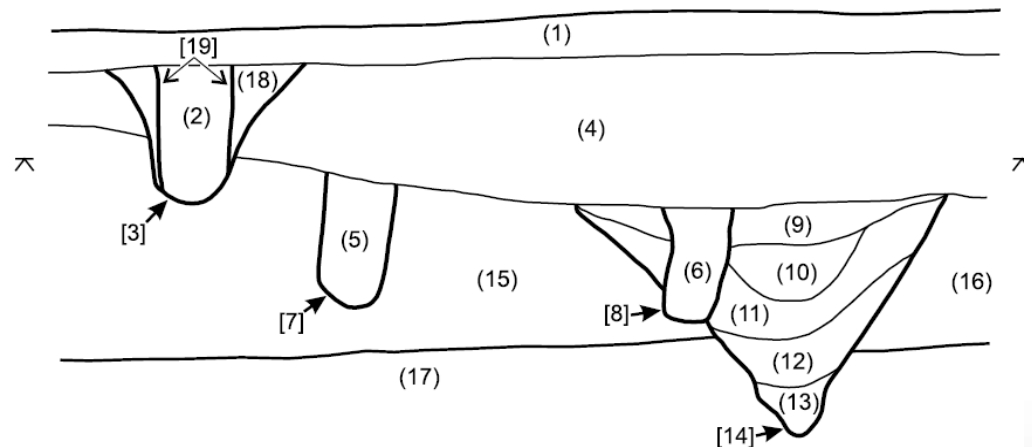


The ACDM: ARIADNE Common Data Model

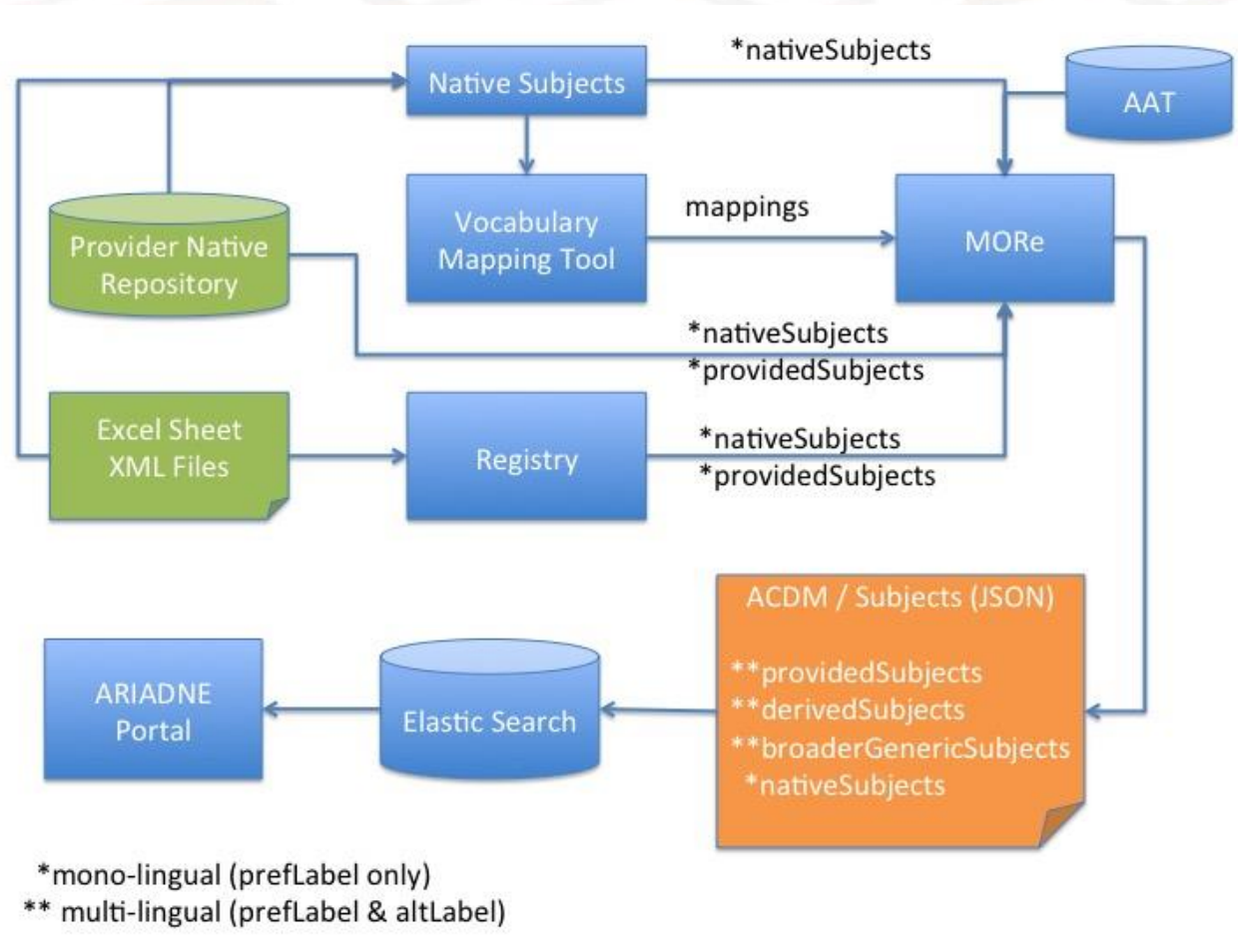


Achieving interoperability

- We have datasets in many languages and complying with many different standards
- ARIADNE uses the CIDOC CRM with extensions for archaeology to achieve integration
 - Existing datasets are mapped to the ARIADNE data model
 - Subject concepts are mapped to the Getty A&AT

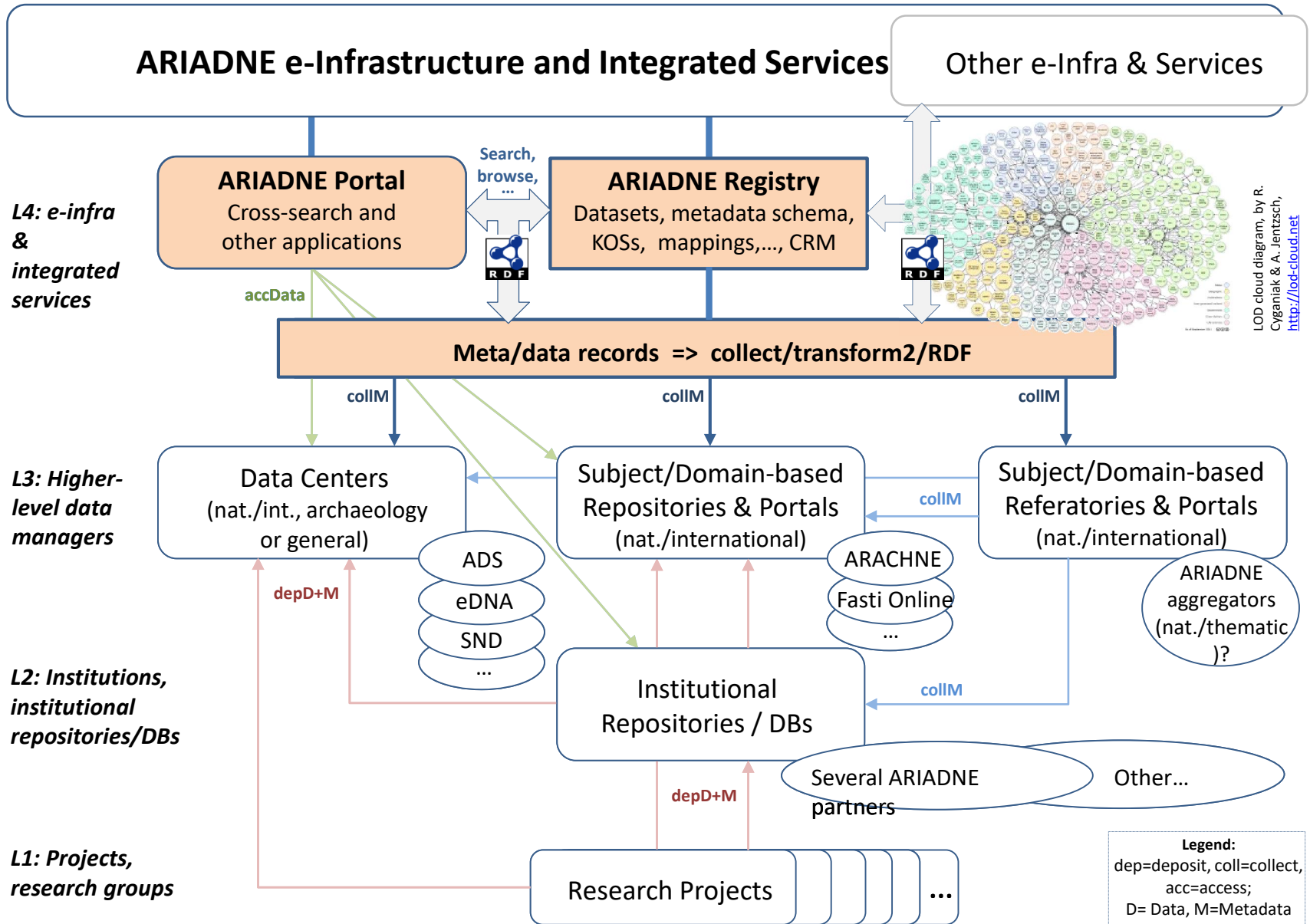


Metadata enrichment in the Registry



Interoperability Framework

ARIADNE Users Framework



The ARIADNE Portal

The screenshot displays the ARIADNE Portal interface. At the top, there are navigation links for 'Catalog', 'Services', and 'About'. The main header features the ARIADNE logo, which consists of a stylized maze icon followed by the word 'ARIADNE' in a bold, red, sans-serif font. Below the logo is a search bar with a dropdown menu set to 'All fields' and a search button. The 'Welcome' section contains a paragraph explaining the portal's purpose. The 'Browse the Catalog' section includes three interactive elements: a map of Europe, a timeline chart showing data distribution from 1,000,000 BC to 2016 AD, and a word cloud of archaeological terms.

[Catalog](#) [Services](#) [About](#)

ARIADNE

All fields ▾ Search for resources in the Ariadne catalog ... 🔍

Welcome

ARIADNE brings together and integrates existing archaeological research data infrastructures so that researchers can use the various distributed datasets and new and powerful technologies as an integral component of the archaeological research methodology.

Browse the Catalog

Where

When

What

- pits (earthworks)
- churches (buildings)
- lime kilns
- ditches
- kilns
- barns
- houses
- forts
- drains
- farms
- farmhouses
- unidentified






All fields ▾ broo


- penannular brooches / penannular brooches / brooches, penannular / penannular brooch ⓘ
- ring brooches / ring brooches / brooches, annular / brooch, annular / ring brooch/ ... ⓘ
- brooches / brooches / breastpins / broaches / brooch ⓘ

Welcome

- Vocabulary concepts from the Getty Art & Architecture Thesaurus (AAT) are offered as users type a query
 - Enables query expansion
 - Supports multilingualism






Start a new search...  [Catalog](#)

ring brooches

Getty AAT ID 300263352

Note Brooches in the shape of a ring, with a movable pin that may extend beyond the diameter of the ring; usually of metal and often ornamented. Used to fasten costume and worn especially during the Medieval period in Europe.

URI <http://vocab.getty.edu/aat/300263352>

Broader  brooches

Terms

English [ring brooches](#) [brooches, annular](#) [brooch, annular](#) [ring brooch](#) [annular brooches](#) [annular brooch](#) [brooches, ring](#) [ring-brooch](#)
[brooch, ring](#) [ring-brooches](#)

Spanish [broches](#) [ring brooch](#) [broche](#)

Dutch [ringbroches](#) [ringbroche](#)

Provider mapping

ANNULAR BROOCH

Match URI <http://www.w3.org/2004/02/skos/core#exactMatch>

Source URI http://purl.org/heritagedata/schemes/mda_obj/concepts/97114





Start a new search...

Catalog

Services

About

Current search

ARIADNE subject: ring brooches

* [Search]

Filters

Where

Leaflet | © OpenStreetMap contributors

When

[Date range selection]

Total results: 5

Order By Title



An Archaeological Evaluation at 98-100 Bull Close Road, Norwich, Norfolk

Type: Sites and monuments databases or inventories Publisher: Archaeology Data Service

An Archaeological Evaluation at 98-100 Bull Close Road, Norwich, Norfolk



Archaeological Excavation Report: Norwich Road and Exeter Crescent Road alignment, RAF Lakenheath ERL 161

Type: Sites and monuments databases or inventories Publisher: Archaeology Data Service

Archaeological Excavation Report: Norwich Road and Exeter Crescent Road alignment, RAF Lakenheath ERL 161



Report on a Second Phase of Archaeological Evaluation at Land adjoining Swanton Morley Airfield, Beetley, Norfolk

Type: Sites and monuments databases or inventories Publisher: Archaeology Data Service

Report on a Second Phase of Archaeological Evaluation at Land adjoining Swanton Morley Airfield, Beetley, Norfolk



The Mucking Anglo-Saxon cemeteries

Type: Fieldwork archives Publisher: Archaeology Data Service

The Anglo-Saxon cemeteries at Mucking, Essex, represent the burials of over 800 individuals from the 5th to early 7th centuries AD. The mixed rite Cemetery II is one of the largest and most complete Anglo-Saxon cemeteries yet excavated (282 inhumations, 463 cremation burials), while the pa...



Multilingual results via AAT mappings

ARIADNE Portal
Query on AAT subject:
*Settlements and
Landscapes*

shows

results from IACA
(Fasti), INRAP and
DANS in multiple
languages

The screenshot shows the ARIADNE Portal search interface. The browser address bar displays the URL: `portal.ariadne-infrastructure.eu/search?subjectUri=300008346&subjectLabel=Settlements+and+Landscapes&q=%2A&sort=title`. The search bar contains the text "Start a new search...". The current search is "Subject: Settlements and Landscapes". The filters section includes a "Where" map showing a heatmap of Europe and a "When" area chart showing a distribution of results over time from 1,000,000 to 2016. The search results are displayed in a list format, showing 4,721 total results. The first five results are:

- Așezarea neolitică de la Buduiasca, Teleur 003 2004**
Type: **Event/intervention resources** Publisher: **International Association for Classical Archaeology**
Fasti record for interventions in the year 2004 at Așezarea neolitică de la Buduiasca, Teleur 003
- Așezarea neolitică de la Buduiasca, Teleur 003 2006**
Type: **Event/intervention resources** Publisher: **International Association for Classical Archaeology**
Fasti record for interventions in the year 2006 at Așezarea neolitică de la Buduiasca, Teleur 003
- Așezarea neolitică de la Buduiasca, Teleur 003 2005**
Type: **Event/intervention resources** Publisher: **International Association for Classical Archaeology**
Fasti record for interventions in the year 2005 at Așezarea neolitică de la Buduiasca, Teleur 003
- Auchy-les-Mines / Haisnes-lez-La Bassée (62), La Porte des Flandres U+003B Le Chemin du Marais : rapport de diagnostic**
Type: **Event/intervention resources** Publisher: **Institut national de recherches archéologiques préventives**
A lissu de l'opération de diagnostic menée sur les communes de Auchy-Les-Mines et de Haisnes-lez-la-Bassée, deux sites datés de la période gallo-romaine et de La Tène ancienne ont été observés. Ces deux ensembles sont bien distincts, et distants de 300 mètres environ. Les vestiges archéologi...
- Tracé 3A en 3B toegangsweg S-007 en S-137 te Kalkwijk**
Type: **Fieldwork archives** Publisher: **Data Archiving and Networked Services (DANS)**
Zijn er aanwijzingen voor (grotere) archeologische vindplaatsen? Wat is de mate van verstoring van de bodem? In de top van het dekzand is een podzolbodeme gevormd. De top van het dekzand is deels verstoord. Er zijn enkele stukjes houtskool aangetroffen in een laag verspoeld dekzand. Dit kan...



ARIADNE and PeriodO

- PeriodO is a Linked Open Data gazetteer
 - Scholarly definitions of historical, art-historical and archaeological periods
 - Now includes period terms from ARIADNE partners
 - The terms have PeriodO URIs
- Allows for easier linking of datasets that define periods differently
 - (when is always linked with where in archaeology)

PeriodO Current backend: Canonical [switch] Sign in Menu

Browse by: Period Collection

Periods
Viewing 1 - 25 of 3745

Show 25 periods at a time.

Previous 1 2 3 ... 149 150 Next

Label	Earliest start	Latest stop
2nd Millenium BCE	-2000	-1000
2nd Millenium BC Egypt (2000-1000 BC)	-2000	-1000
2nd Millenium BC Levant (2000-1000 BC)	-2000	-1000
3rd millenium BC	-3000	-2000
4th millenium BCE	-4000	-3000
13th Century AD Eastern Mediterranean (AD 1200-1300)	1200	1300
16th Century	1500	1600
17th Century	1600	1700
17th Century (1600 - 1699)	1600	1699

Filters

Time range

Hide outliers?
Hiding range from -2600000 to -49942

Text

Match string

Source Reset

- 944 British Museum.
- 659 ARIADNE Consortium. ARIADNE Data Collection. 2015.
- 525 David G. Anderson. Digital Index of North American Archaeology (DINAA). 2012.
- 212 AIAC and L - P : Archaeology. FASTI - Home. 2004.
- 116 Roger Bagnall. Pleiades: A community-built gazetteer and

<http://perio.do/>



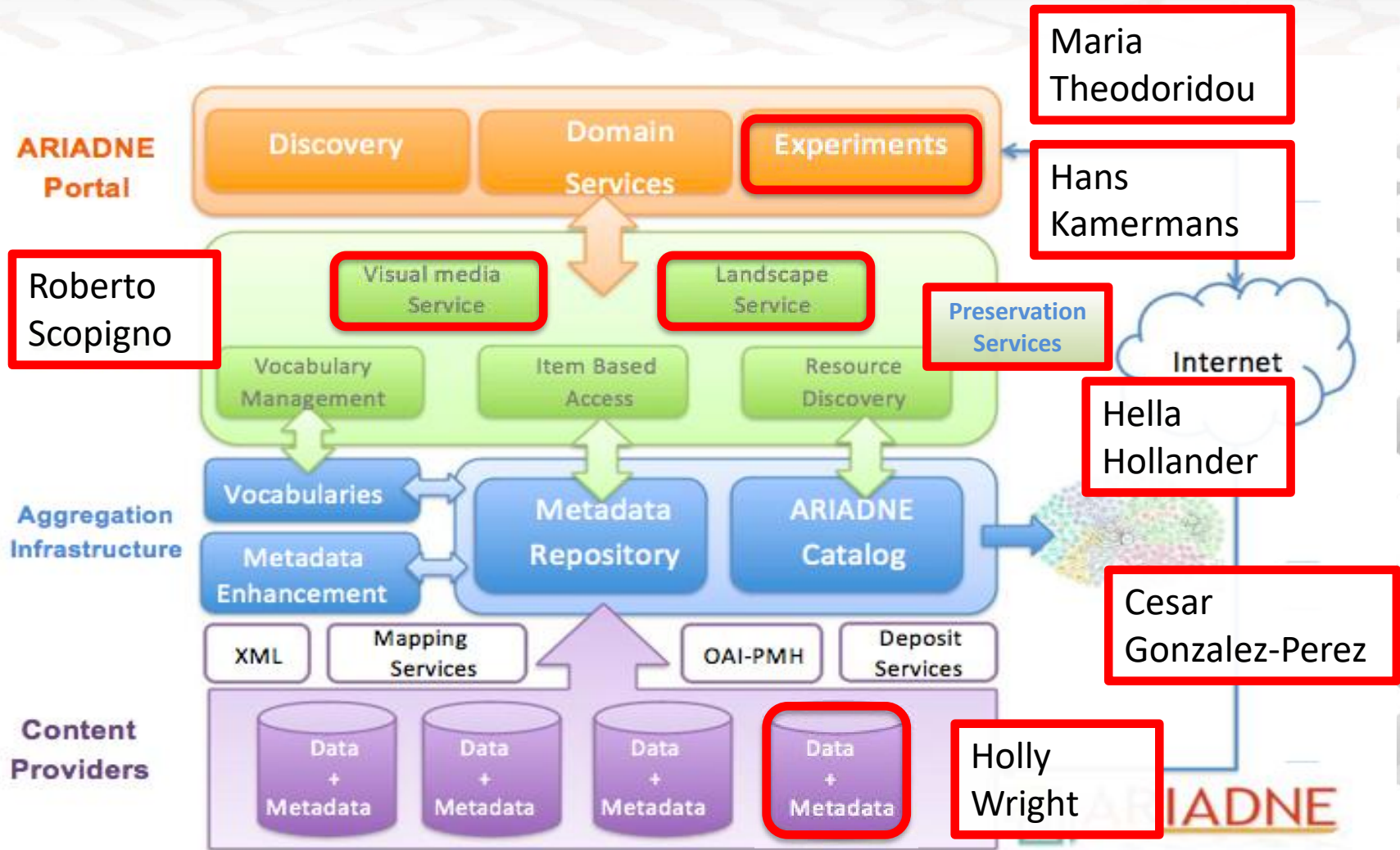
Transnational Activity

Training events

- 2D/3D documentation for archaeology
- Legacy data and dataset design
- Mapping existing datasets to CIDOC CRM



Improving interoperability and reusability



ARIADNE visual media service

Create your online showcase for 3d models, images and RTI.

[Upload »](#)

[Browse »](#)

3D models

3D representations produced with 3D scanners or photogrammetry are extremely high-resolution and hard to visualize at interactive rate. This service produces a web page that supports interactive visualization of your data, after converting it into an efficient multiresolution encoding.

[View details »](#)

[Demo](#)

RTI images

Relightable images (called Reflection Transformation Images, RTI, or Polynomial Texture Maps, PTM) are becoming an [increasingly used media](#). This service closes a current gap, giving support for easy publication on the web and interactive visualization of RTI images.

[View details »](#)

[Demo](#)

High-resolution images

High-resolution images are a commodity resource in archaeology. Unfortunately, they are most often disseminated and published on the web by using low-resolution versions (a single 40Mpixel images is 120MB in uncompressed format and around 10MB when lossy compressed).

[View details »](#)

[Demo](#)



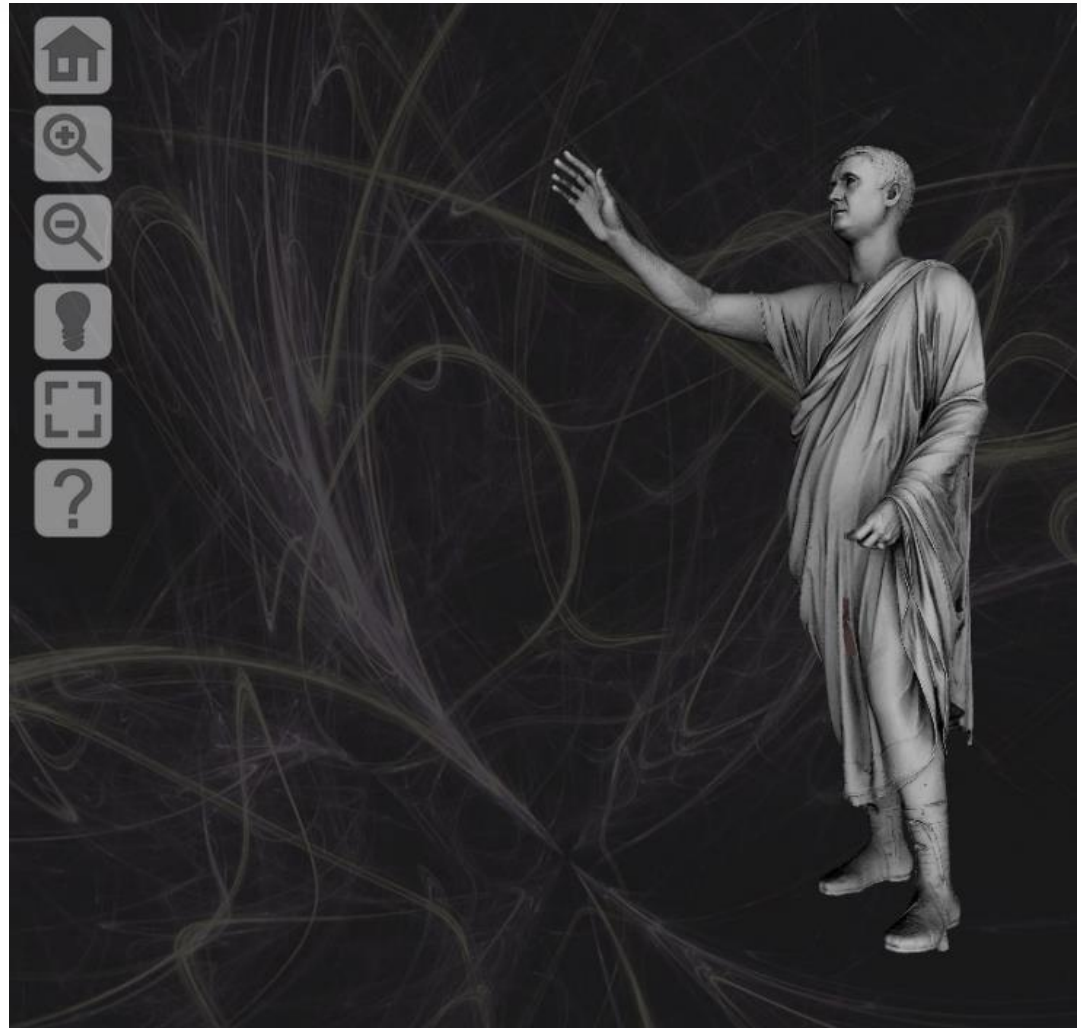
<http://visual.ariadne-infrastructure.eu/>

Visual media service

Viewing the results

3D:

- 80.23 MB
- 3D model of the Arringatore produced by 3D laser scanning
- National Archaeological Museum and CNR-ISTI



<http://visual.ariadne-infrastructure.eu/3d/arringatore>



Visual media service

Viewing the results

RTI:

- 199.4 mb
- Reverse, Medallion, Rome, Hadrian
- Palazzo Blu, ISTI-CNR, Simoneschi collection



http://visual.ariadne-infrastructure.eu/rti/mediallion_hadrian_reverse



Landscape services

Landscape Services

Cloud Service

3D Terrain Service

Help

Contacts

ARIADNE

Landscape Services

Landscape Services for [ARIADNE](#) are a set of responsive web services that include large terrain datasets generation, 3D landscape composing and 3D model processing, leveraging on powerful open-source frameworks and toolkits such as [GDAL](#), [OSGjs](#), [OpenSceneGraph](#) and [ownCloud](#). Here a few examples of 3D datasets produced by the services:



Cloud Service

This is the main service to **access**, **manage** and eventually **share** your online data. This includes DEM input data, Geo-images, 3D models, etc.

Cloud Service



3D Terrain Service

You can use this service to process DEM, geo-images and shapefiles to produce large 3D terrain Datasets optimised for real-time visualization and web streaming.

3D Terrain Service



Terrain Gallery

View, download or delete your generated 3D Terrain datasets. You can also interactively explore a 3D dataset online and present it in your web site, through desktop browsers, smartphones or tablets.

Terrain Gallery



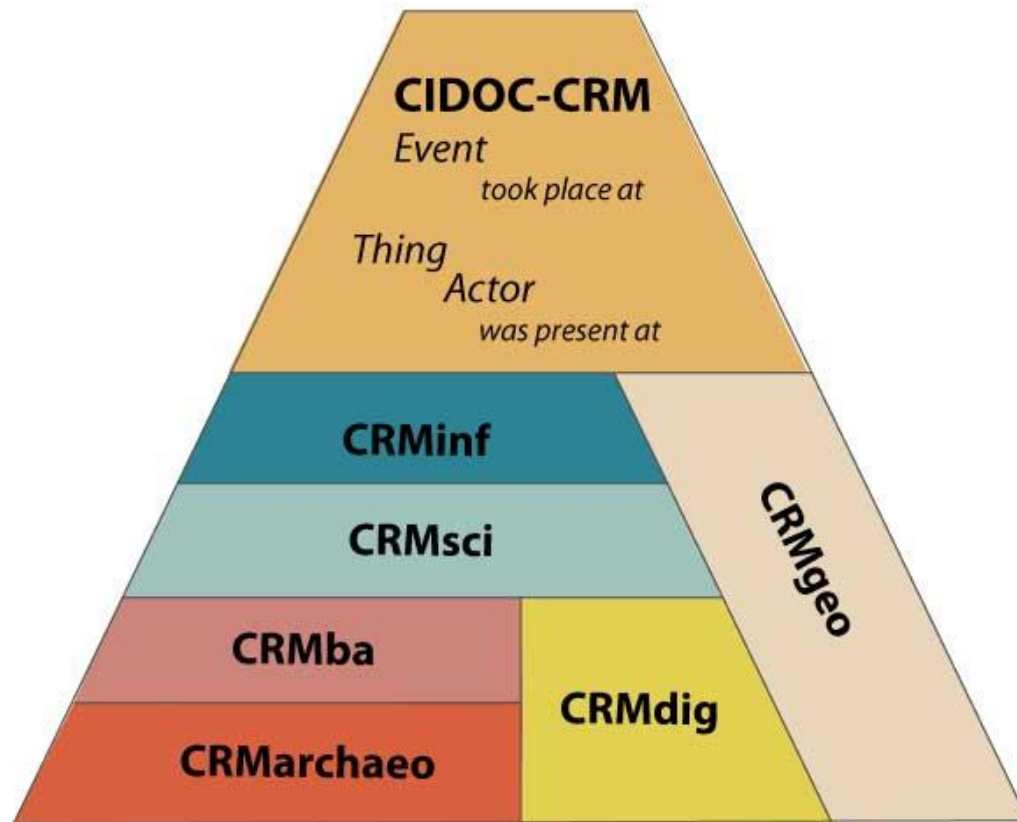
<http://landscape.ariadne-infrastructure.eu/>

ARIADNE Reference Model

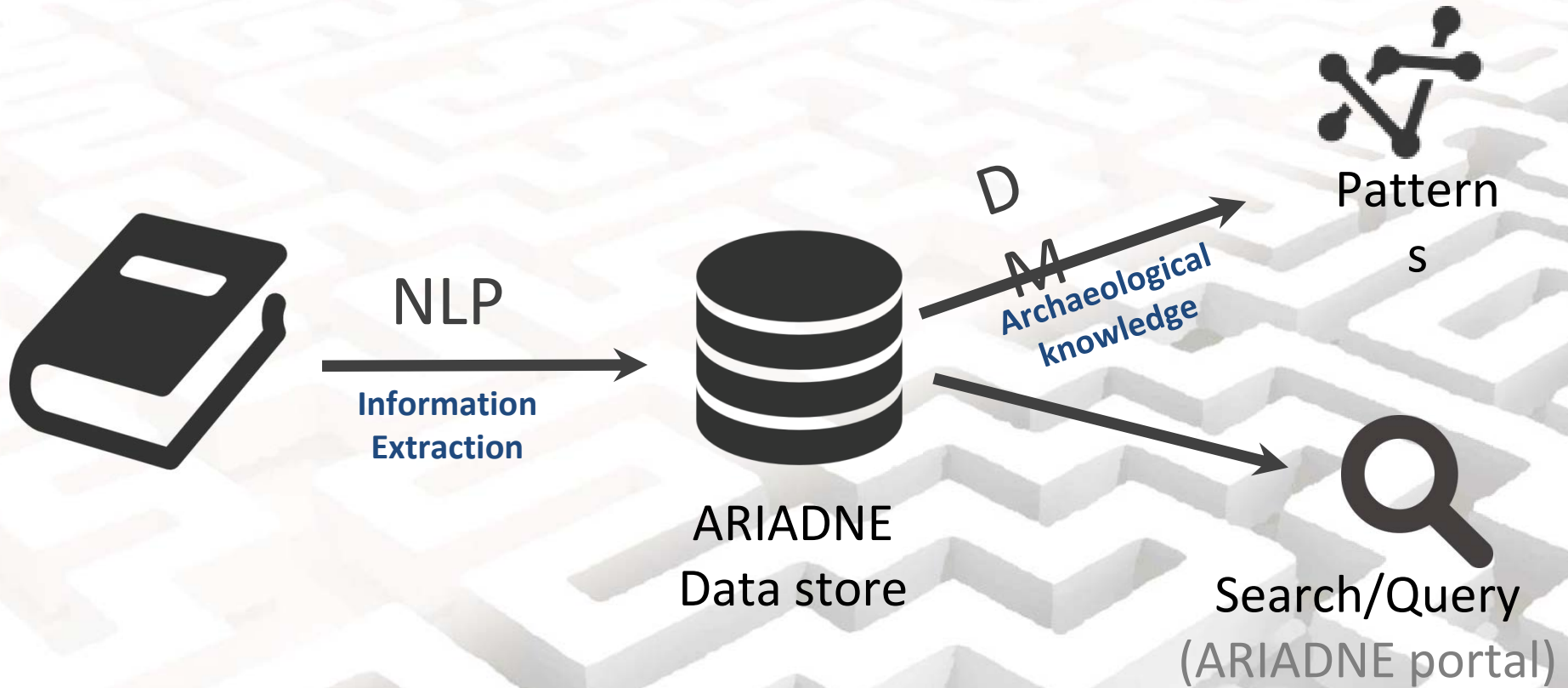


*Few concepts,
high recall*

*Special concepts,
high precision*

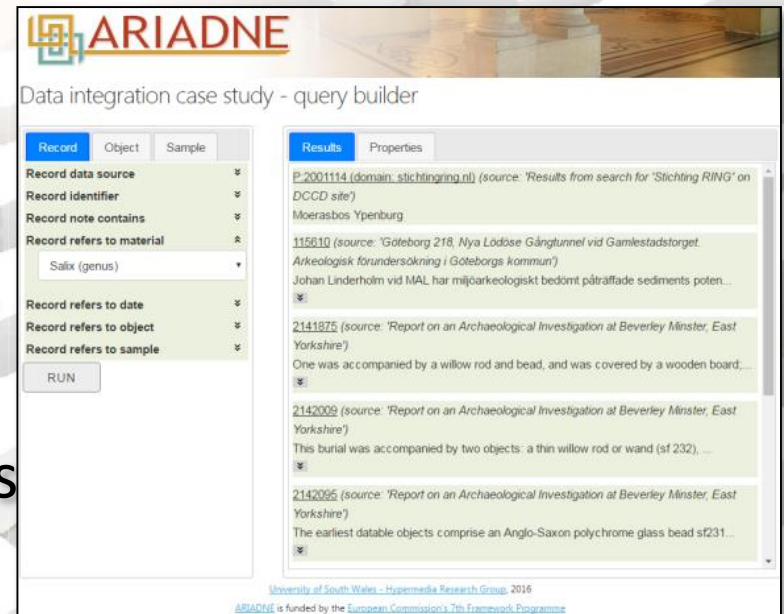


NLP and Data Mining



Dendrochronology Case Study

- Extracts of 5 archaeological datasets, output from NLP on 25 grey literature reports
- Multilingual - English, Dutch and Swedish data
- Data integration via CIDOC CRM and Getty AAT
- 1.09 million RDF triples
- 23,594 records
- 37,935 objects
- Demonstration query builder for easier cross-search and browse of integrated datasets



The screenshot displays the ARIADNE (Archaeological Research Integration and Analysis) query builder interface. The header shows the ARIADNE logo and the text "Data integration case study - query builder". The interface is divided into two main sections: a query builder on the left and a results pane on the right.

Query Builder Section:

- Buttons: Record, Object, Sample
- Record data source: [dropdown]
- Record identifier: [dropdown]
- Record note contains: [dropdown]
- Record refers to material: Salix (genus) [dropdown]
- Record refers to date: [dropdown]
- Record refers to object: [dropdown]
- Record refers to sample: [dropdown]
- RUN button

Results Section:

- Buttons: Results, Properties
- Result 1: P2001114 (domain: stichtingring.nl) (source: 'Results from search for 'Stichting RING' on DCCD site') Moerasbos Ypenburg
- Result 2: 115610 (source: 'Göteborg 218, Nya Lådösa Gångtunnel vid Gamlestadsstorget. Arkeologisk förundersökning i Göteborgs kommun') Johan Linderholm vid MAL har miljörkeologiskt bedömt påträffade sediments poten... [dropdown]
- Result 3: 2141876 (source: 'Report on an Archaeological Investigation at Beverley Minster, East Yorkshire') One was accompanied by a willow rod and bead, and was covered by a wooden board, ... [dropdown]
- Result 4: 2142002 (source: 'Report on an Archaeological Investigation at Beverley Minster, East Yorkshire') This burial was accompanied by two objects: a thin willow rod or wand (sf 232), ... [dropdown]
- Result 5: 2142095 (source: 'Report on an Archaeological Investigation at Beverley Minster, East Yorkshire') The earliest datable objects comprise an Anglo-Saxon polychrome glass bead sf231... [dropdown]

University of South Wales - Hypermedia Research Group, 2016
ARIADNE is funded by the European Commission's 7th Framework Programme



Standards: Guides to Good Practice



Archaeology Data Service / Digital Antiquity Guides to Good Practice

Log in

Dendrochronological Data in Archaeology: A Guide to Good Practice

Peter Brewer, Laboratory of Tree-Ring Research, University of Arizona, USA

Esther Jansma, Cultural Heritage Agency and Utrecht University, The Netherlands

VERSION 1.1 - JUNE 2016

Section 1. Aims and Objectives

- 1.1 Background to the Guide
- 1.2 Scope of the Guide
- 1.3 Data and Metadata

Section 2. Creating Dendrochronological Data

- 2.1 Project Planning and Requirements
- 2.2 Sources of Data
- 2.3 File Types (whilst creating, working with, and processing data)
- 2.4 File Naming Convention
- 2.5 Documenting Data Creation and Processing

Section 3. Archiving Dendrochronological Data

- 3.1 Deciding What to Archive
- 3.2 Deciding How to Archive
- 3.3 Archiving File Types
- 3.4 Converting Data Formats
- 3.5 Archiving Strategies
- 3.6 Metadata and Documentation

Section 4. Copyright

- 4.1 Copyright for Dendrochronology



New Guides:

- Dendrochronology
- 3D Models in Archaeology

3D Models in Archaeology: A Guide to Good Practice

Martina Trognitz, IANUS, Deutsches Archäologisches Institut (DAI),
Kieron Niven, Archaeology Data Service,
Valentijn Gilissen, Data Archiving and Networked Services (DANS).

With additional contributions from Ruth Beusing (DAI), Bruno Fanini (CNR), Kate Fernie (2Culture Associates), Roberto Scopigno (CNR), Seta Stuhec (OEAW), and Benjamin Štular (ZRC-SAZU)

2016

Section 1. Aims and Objectives

- 1.1 3D Models in Archaeology
- 1.2 Scope of this Guide
- 1.3 Issues and Concerns

Section 2. Creating 3D Data

- 2.1 Project Planning and Requirements
- 2.2 Sources and Types of 3D Data
- 2.3 File Formats

Section 3. Archiving 3D data

- 3.1 Significant Properties
- 3.2 File types for Archiving and Dissemination
- 3.3 Documentation and Metadata



Data Archiving and Networked Services

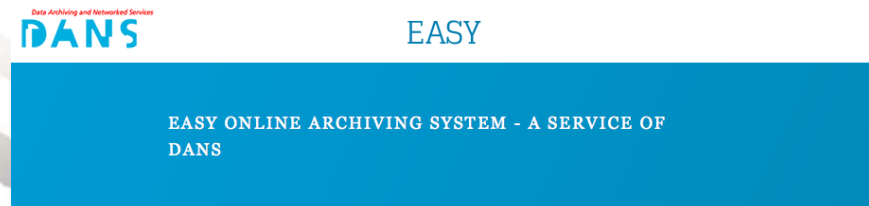
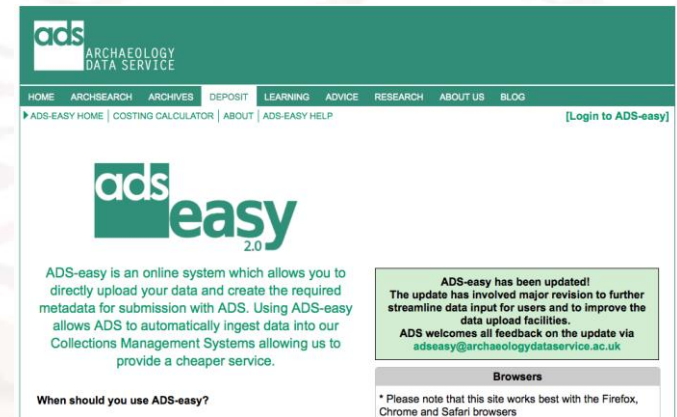


DEUTSCHES
ARCHÄOLOGISCHES INSTITUT



Preservation Services

- Care for preservation
- Developing trusted digital repositories:
 - ADS, DANS, IANUS, OAEW
- International collaboration on guidelines



5-10 year Innovation Agenda

- Research e-infrastructures and digital resources for archaeological research and the related domains
- Open sharing and re-use of data: promoting a culture of data sharing, re-use and citation, removing barriers to data sharing
- Data archives for the curation of archaeological research data: reliable and cost-effective community archives for long-term data curation and access
- Capacity building: guidance, training and support for data practices
- Providing services and enabling novel applications



Conclusion

Ariadne was the daughter of Minos, King of Crete. She gave a ball of thread to Theseus so that he could find his way out of the Minotaur's labyrinth.

Our ARIADNE is a research infrastructure. We give a portal so researchers can find archaeological datasets and tools to visualise and publish their results.



IMPROVING FINDABILITY AND ACCESSIBILITY

Introduction

Achille Felicetti, PIN

The ARIADNE Common Data Model

Carlo Meghini, CNR

The ARIADNE Registry

Dimitris Gavrilia, ATHENA DCU

Metadata Mappings: What, When & Where

Doug Tudhope, Univ South Wales

The ARIADNE Portal

Sebastian Cuy, DAI

Transnational Activity and training

Achille Felicetti, PIN

IMPROVING INTEROPERABILITY AND REUSABILITY

Introduction

Visual Media Services

Natural Language processing and Data Mining

Linked Data Experiments

Information modeling

Guides to Good Practice

Preservation services

Carlo Meghini, CNR

Roberto Scopingo, CNR

Hans Kamermans, Leiden Univ

Maria Theodoridou, FORTH

César Gonzalez-Perez, CSIC

Holly Wright, ADS, Univ of York

Hella Hollander, DANS

Thanks for your attention

email: info@ariadne-infrastructure.eu

<http://www.ariadne-infrastructure.eu>

<http://portal.ariadne-infrastructure.eu>

Twitter: @ariadne-infrastructure

ARIADNE is a project funded by the European Commission under the Community's Seventh Framework Programme, contract no. FP7-INFRASTRUCTURES-2012-1-313193.

The views and opinions expressed in this presentation are the sole responsibility of the authors and do not necessarily reflect the views of the European Commission.

