

# FAIR Data for Heritage Science

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# Webinar May 9th 2023

- Presentation
  - Open Science and FAIR data principles
  - Controlled Vocabularies and Linked Data (“authorities”)
  - Project: FAIR Data for Heritage Science - purpose, goals and method
  - Results: Good data practices and curated vocabularies
  - Reflections: What more did we learn?

Short break

- Questions
- Discussion

# Open Science and FAIR data



“To ensure that science truly benefits the people and the planet and leaves no one behind, there is need to transform the entire scientific process.

Open Science is a movement aiming to make science more open, accessible, efficient, democratic, and transparent.”

[https://en.unesco.org/sites/default/files/open\\_science\\_brochure\\_en.pdf](https://en.unesco.org/sites/default/files/open_science_brochure_en.pdf)

# Open and FAIR

## EU Open Data Directive [\(EU\) 2019/1024](#)

(27) The volume of research data generated is growing exponentially and has potential for re-use beyond the scientific community. In order to be able to address mounting societal challenges efficiently and in a holistic manner, it has become crucial and urgent to be able to access, blend and re-use data from different sources, as well as across sectors and disciplines.

(...) and to support the dissemination of research data that are **findable, accessible, interoperable** and **re-usable** (the **FAIR principle**)

## Vetenskapsrådet

"De forskningsdata som finansieras av offentliga medel, och som enligt gällande lagstiftning får tillgängliggöras, publiceras öppet tillgängliga på internet inom skälig tid efter att forskningsresultaten har publicerats."

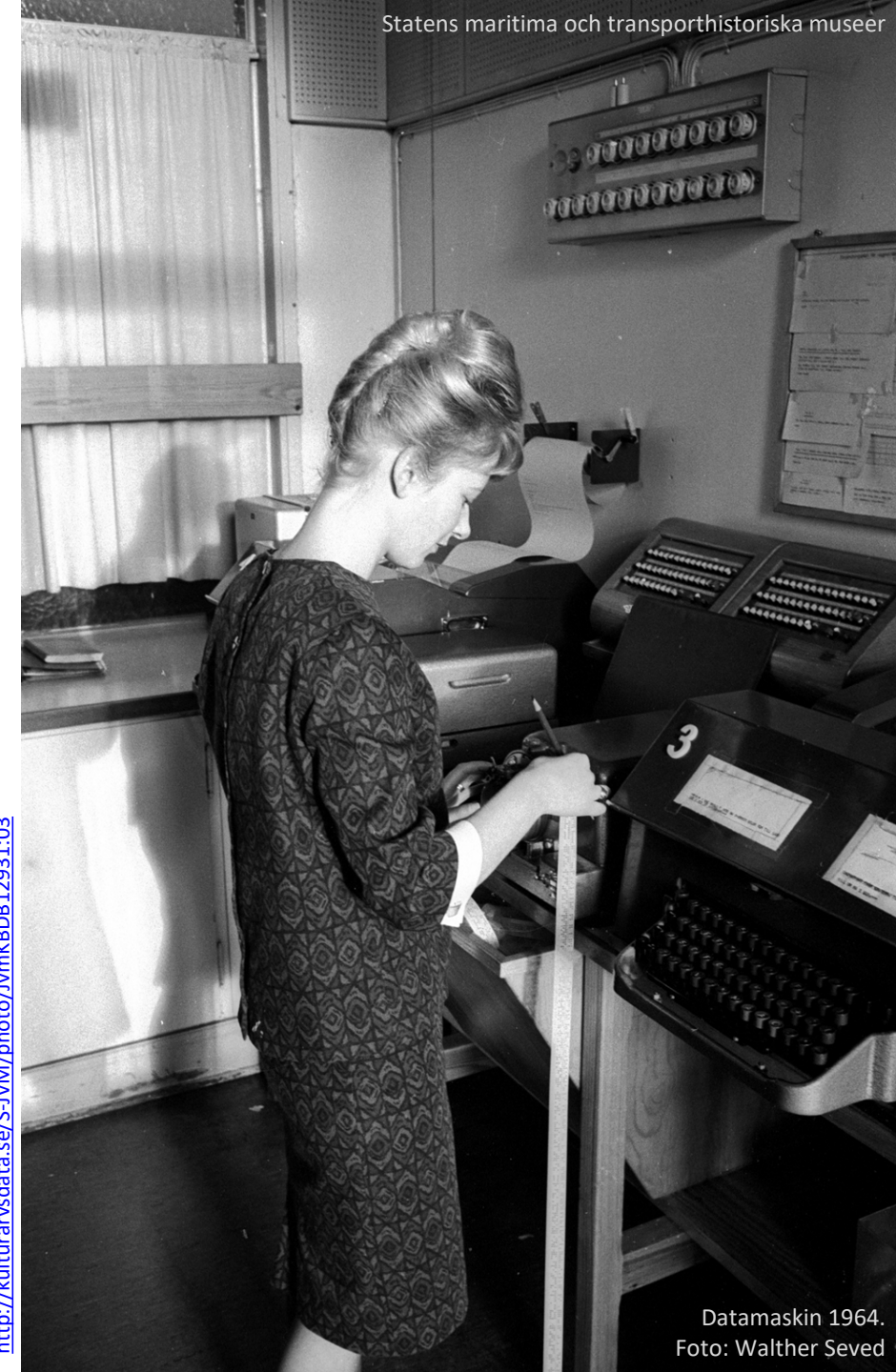
"Vetenskapsrådet rekommenderar att de forskningsdata som framställs genom forskning hanteras i enlighet med **FAIR-principerna**."

Implementering ska vara genomförd 2026

[VR Rekommendationer forskningsdata](http://kulturarvsdata.se/S-JVM/photo/JvmKBDB12931:03)

(Prop. 2020/21:60, s 101)

<http://kulturarvsdata.se/S-JVM/photo/JvmKBDB12931:03>




Datamaskin 1964.  
Foto: Walther Seved



# FAIR data principles

How to make data *machine readable*, so that it becomes *useful for people*

**F**indable 

I want to **find** data/documents/images etc

**A**ccessible 

I want to access and **download** the information

**I**nteroperable 

I want to **combine** data from different sources

**R**eusable 

I want to know how I can **reuse and publish** what I found

# FAIR data benefits the Producer as much as the User

Ensuring that your research output meets the criteria for FAIR data, you are not just complying with the requirement of the funders – you are helping yourself as well!

You want your peers to

- Be able to **find** your work
- Be able to **understand** your work
- Be able to **build upon** your work
- Be able to **cite and credit** your work



# Controlled Vocabularies and Linked Data



# FAIR can be *a lot*...

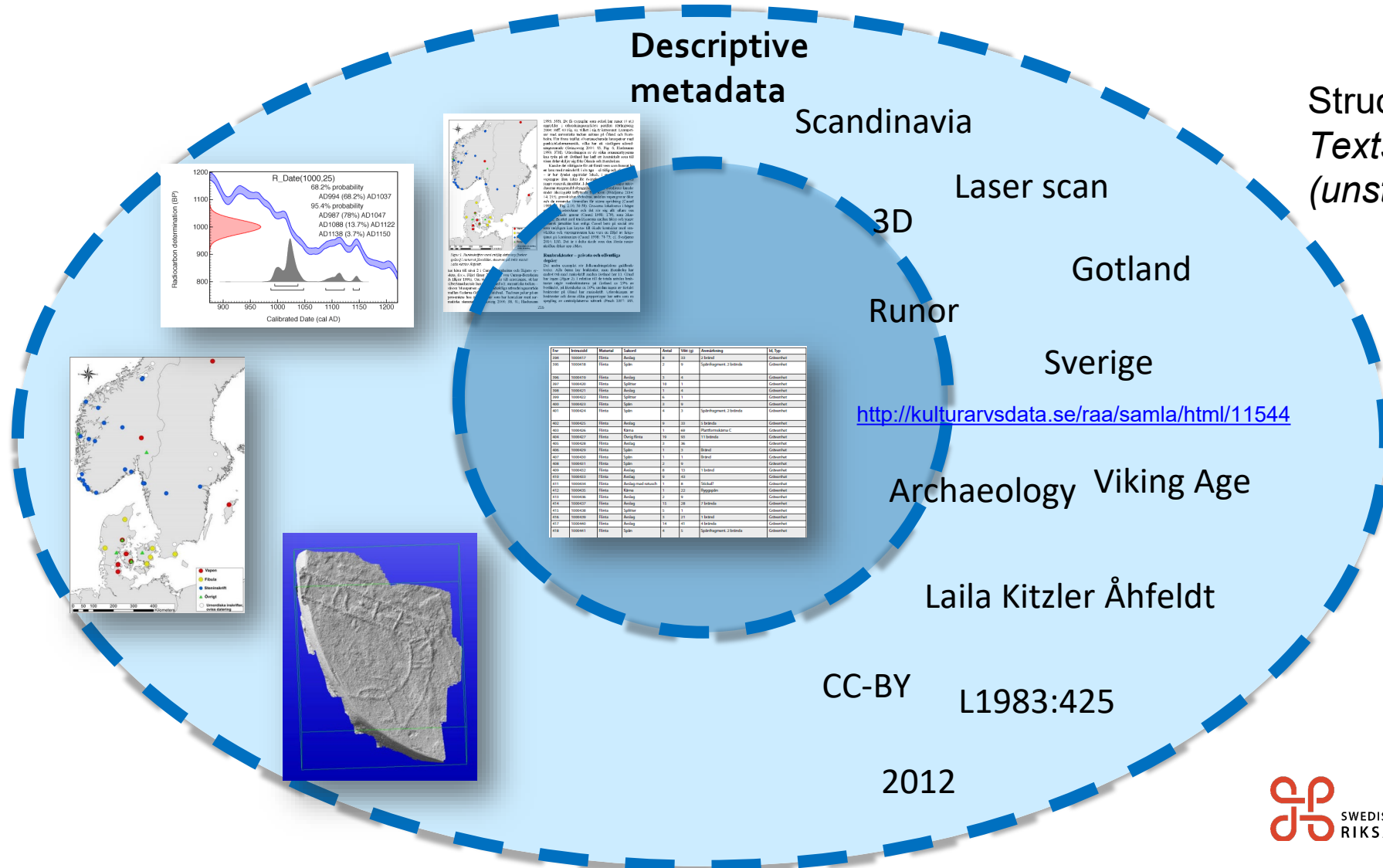


For the individual:  
A lot rests on good  
**vocabularies** and  
**metadata**

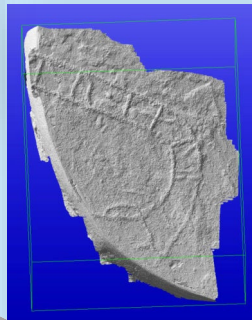
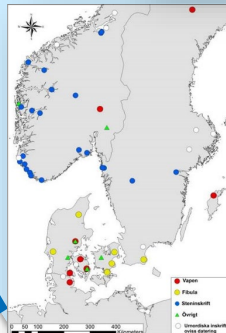
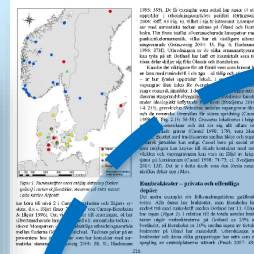
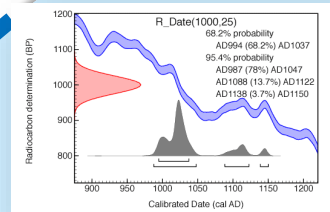
# RESEARCH OUTPUT

# MACHINE READABLE

Text  
Photos  
Illustrations  
Tables  
Databases  
Diagrams  
Geodata  
*Etc...*



Structured data  
*Texts*  
(unstructured)



ID	Material	Subst	Antal	Vikt (g)	Anmärkning	ID Typ
10000001	Sten	Sten	1	10	Sten	Sten
10000002	Sten	Sten	1	10	Sten	Sten
10000003	Sten	Sten	1	10	Sten	Sten
10000004	Sten	Sten	1	10	Sten	Sten
10000005	Sten	Sten	1	10	Sten	Sten
10000006	Sten	Sten	1	10	Sten	Sten
10000007	Sten	Sten	1	10	Sten	Sten
10000008	Sten	Sten	1	10	Sten	Sten
10000009	Sten	Sten	1	10	Sten	Sten
10000010	Sten	Sten	1	10	Sten	Sten
10000011	Sten	Sten	1	10	Sten	Sten
10000012	Sten	Sten	1	10	Sten	Sten
10000013	Sten	Sten	1	10	Sten	Sten
10000014	Sten	Sten	1	10	Sten	Sten
10000015	Sten	Sten	1	10	Sten	Sten
10000016	Sten	Sten	1	10	Sten	Sten
10000017	Sten	Sten	1	10	Sten	Sten
10000018	Sten	Sten	1	10	Sten	Sten
10000019	Sten	Sten	1	10	Sten	Sten
10000020	Sten	Sten	1	10	Sten	Sten
10000021	Sten	Sten	1	10	Sten	Sten
10000022	Sten	Sten	1	10	Sten	Sten
10000023	Sten	Sten	1	10	Sten	Sten
10000024	Sten	Sten	1	10	Sten	Sten
10000025	Sten	Sten	1	10	Sten	Sten
10000026	Sten	Sten	1	10	Sten	Sten
10000027	Sten	Sten	1	10	Sten	Sten
10000028	Sten	Sten	1	10	Sten	Sten
10000029	Sten	Sten	1	10	Sten	Sten
10000030	Sten	Sten	1	10	Sten	Sten
10000031	Sten	Sten	1	10	Sten	Sten
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10000033	Sten	Sten	1	10	Sten	Sten
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10000036	Sten	Sten	1	10	Sten	Sten
10000037	Sten	Sten	1	10	Sten	Sten
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10000043	Sten	Sten	1	10	Sten	Sten
10000044	Sten	Sten	1	10	Sten	Sten
10000045	Sten	Sten	1	10	Sten	Sten
10000046	Sten	Sten	1	10	Sten	Sten
10000047	Sten	Sten	1	10	Sten	Sten
10000048	Sten	Sten	1	10	Sten	Sten
10000049	Sten	Sten	1	10	Sten	Sten
10000050	Sten	Sten	1	10	Sten	Sten

<http://kulturarvsdata.se/raa/samla/html/11544>



# Metadata through Controlled Vocabularies

Use standardised terminology with the help of **controlled vocabularies (thesaurus)**.

- a. General concepts and terms (e.g. Roman, Textile, Church, Weapon, Art History, Geology)
- b. Specific persons, sites, art works, species (e.g. John III, Birka, Göteborg, The Mona Lisa, Pinus sylvestris)

**Authority:** when a term or object has a **unique identifier** as a **persistent link** (URL).

Authorities are useful to both machines and humans

- Offers exact definition
- Enables machine identification, translation and interoperability
- Helps users to find *additional* information that doesn't fit into your database

John III



<https://www.wikidata.org/wiki/Q52944>

John III



<https://www.wikidata.org/wiki/Q53454>

John III



<https://www.wikidata.org/wiki/Q103260>

Using an authority allows for connecting data from different sources

U 571

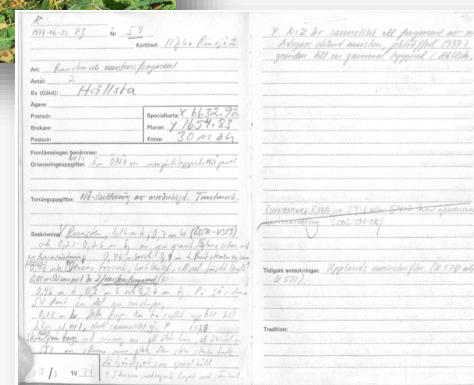
?

?



U 571

<http://kulturarvsdata.se/uu/srdb/42ca18a6-154f-45bf-8ac7-d66ab09cfaae>



U 571. Hällsta, Lohärads sn.

# Authority delivers additional information

Useful both for machines and humans



U 571

<http://kulturarvsdata.se/uu/srdb/42ca18a6-154f-45bf-8ac7-d66ab09cfaae>

## Objektuppgifter

Föremål: [sten](#), [fragment](#), [runsten](#)

Fragment av runsten

Material: [granit](#) ([sten](#))

Granit

Ristare: Okänd

Runtyp: Okänd

## Proveniensen

Plats: Hållsta

Socken: [Lohärads socken](#)

Härad: [Lyhundra härad](#)

Landskap: [Uppland](#)

Kommun: [Norrtälje](#)

Län: [Stockholm](#)

Land: [Sverige](#)

## Ursprunglig plats

Nej

## Datering

725–1100

[Vikingatid](#)

## ID i nationellt lämningsregister

Sverigefmsid:

10004500540002

kmrld:

[dee78457-d3eb-418a-8407-5da76a23ab72](#)

raänr: 54:2

raaParish: Lohärad

parishCode: 0045

## Objekt-URI

<http://kulturarvsdata.se/uu/srdb/42ca18a6-154f-45bf-8ac7-d66ab09cfaae>

## Koordinater WGS84

Äldsta belagda (lat, long):

59.7868, 18.563



# What we can do with FAIR data


Possible to create specialised digital solutions using multiple data sources, as long as there are **persistent identifiers** and **standardised metadata**

*Runor* is a digital search platform for information, publications and images on 7,000 runic inscriptions.

The content is selected and aggregated from several different databases and collections:

- Uppsala University: Nordic database for runic texts
- Uppsala University Library: documents, illustrations, photos
- National Heritage Board Archive: documents, illustrations, photos
- National Heritage Board: Historic Environment Record, Ancient Sites and Monuments
- National Archive: Swedish Runic Bibliography
- Collections at museums, archives and libraries

**Runor** <https://app.raa.se/open/runor/search>



**Sö 179**  
Gripsholm  
Kärnbo socken  
Även känd som:  
L 927

**FAKTA**  
Objekttyp: sten, runsten  
Fyndnummer: -  
Material: granit (sten)  
Ristare: Åskil 2, Attribuerad  
Runtyp: -  
Stil: Fp  
Ingvarssten

**Proveniens**  
Plats: Gripsholm  
Socken: Kärnbo socken  
Tidigare socken: -  
Härad: Selebo härad  
Landskap: Södermanland  
Kommun: Strängnäs  
Län: Södermanland  
Land: Sverige

**Placering**  
-


**Runtext**  
- tula : lit : raisa : stain : þinsal | at : sun : sin : haralt : brupur :  
inkuurs : þain furu : trikila : flari : at : kuli : auk : a-austarla | orn  
: kafu : tuu : sunar-la : a sirkilant

**Fornvästnordiska**  
Tóla lét reisa stein þenna at son sinn Harald, bróður Ingvars. Þeir fóru  
dreggila flari at gulli ok austarla erni gáfu, dóu sunnarla á Særklandi.

**Runsvenska**  
Tola lét reisa stein þenna at son sinn Harald, bróður Ingvars. Þeir  
fóru dreggila flari at gulli ok austarla ærni gáfu, dóu sunnarla á  
Særklandi.

**Engelska**  
Tóla had this stone raised in memory of her son Harald, Ingvar's  
brother. They travelled valiantly far for gold, and in the east gave  
(food) to the eagle. (They) di

**K-samsök**  
Klicka på en bild för förstoring och information.



**DOKUMENTATION**

Relaterade dokument (3)

- ☒ Delat inventeringsbokuppslag, Lokal 33/34 (2)
- ☒ Inventeringsbokuppslag (1)
- ☒ Inventeringsbokuppslag (2)



# Swedigarch

## – National Infrastructure for Digital Archaeology

Developed between 2022-2027

- **Uppsala University**
- Umeå University
- Lund University
- Karlstad University
- Stockholm University
- Gothenburg University
- National Heritage Board
- National Historical Museums
- Increase access to Swedish archaeological data for interdisciplinary and international research
- Facilitate datadriven analyses of archaeological information from excavations, heritage collections and scientific analyses
- Provide a resource for research on heritage and environmental history, planning and sustainability analyses

[www.swedigarch.se](http://www.swedigarch.se)



**STATENS  
HISTORISKA  
MUSEER**



Swedigarch is funded by the Research Council as a National Research Infrastructure



Research Grant nr 2021-



Web/App  
Development



Data driven  
analysis

Open API

SPARQL

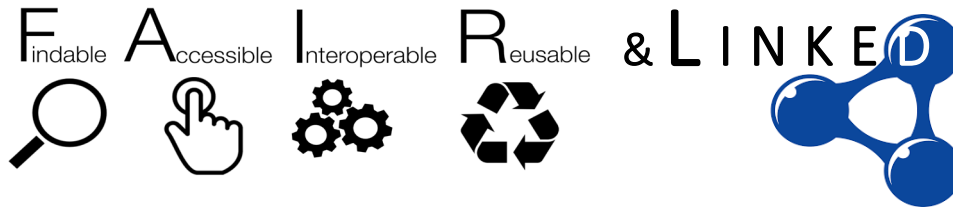
## DIGITAL HERITAGE INDEX

(AGGREGATOR DEVELOPED BY NATIONAL HERITAGE BOARD)



Swedish  
Museum and Archive  
collections

Metadata and linked data



**E-ARCHIVE AND  
HISTORIC ENVIRONMENT  
RECORD,**



**National records**  
Ancient sites, Historical  
buildings, Archaeological  
reports

**AGES**



**Archaeological Geodata  
Excavations and Surveys**  
Features, Finds, Samples

**SEAD**



**Analysis data**  
Paleoecology,  
Laborative archaeology,  
Petrology etc

**DYNAMIC  
COLLECTIONS**



**3D & Remote sensing**  
Sites, buildings,  
excavations, artefacts

**STATENS  
HISTORISKA  
MUSEER**

**ARCHAEOLOGICAL  
COLLECTIONS**

**National collections**  
Artefacts, coins,  
osteology etc

# The Project: FAIR Data for Heritage Science



<http://kulturarvsdata.se/bhm/object/UM000333>

Seved Walther, Järnvägmuseet

# Heritage Laboratory at the National Heritage Board

Museums, heritage institutions, universities etc can apply to use expertise and technology available at the Laboratory **free of charge**

Projects must meet certain criteria and the results must be made **open** to the public after completion





# National and International collaboration



**IPERION HS**

<https://www.iperionhs.eu/>

**Consortium**

24 partners

**MOLAB** mobile laboratory for *in-situ* diagnostics

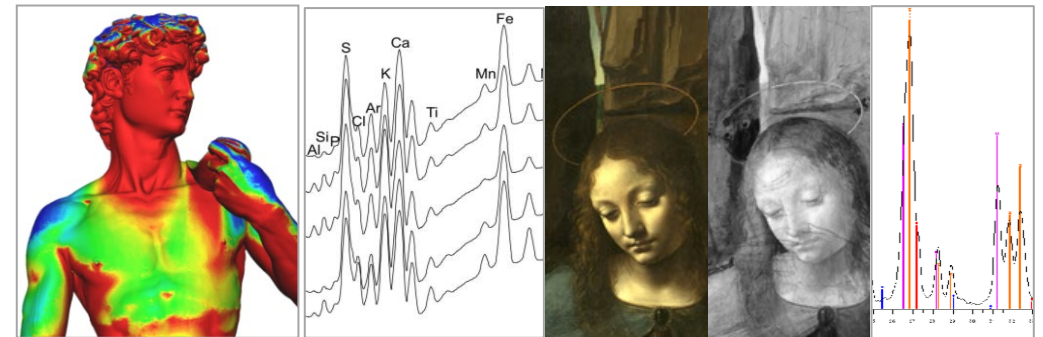
**FIXLAB** access to large-scale facilities and advanced laboratories

**ARCHLAB** access to archives and expert competencies

**DIGILAB** sharing scientific datasets for heritage science



<https://heritagescience.se/>



# From Open Access to Open Science – a journey

2020

Reports published online

Internal server for data storage –  
available on request

Varied data practices, documentation  
within the Laboratory

Mindset:

- Why should I spend time on this?
- Where do I start?





# Preliminary study 2020-2021: platforms and solutions

Requirements for

- Laboratory staff
- Collaborators
- Heritage Science Sweden network
- Swedish National Heritage Board

FAIR data principles compliance

Good user interface for uploading and accessing data



# Decision – try Zenodo

[https://zenodo.org/communities/heritage\\_laboratory/](https://zenodo.org/communities/heritage_laboratory/)

## Pros

- Open API, OAI-PMH
- Trusted organisation, EU financed
- RDA, EOSC, DataCite etc
- Persistent identifiers
- Versioning
- Embargo function
- Possible to add controlled vocabularies
- IPERION Heritage Science Community
- Create own Community
- Free of charge

## Cons

- Manually add keywords and authorities (“Subjects”)
- Limited user support
- Only upload one *type* of data at the time (dataset, images, video, publication...)

The screenshot displays the Zenodo interface for the 'Heritage Laboratory' community. The top navigation bar includes the Zenodo logo, a search bar, and links for 'Upload', 'Communities', 'Log in', and 'Sign up'. The main header identifies the community as 'Heritage Laboratory'. Below this, a 'Recent uploads' section features a search bar and a list of three items. Each item shows its date, version, type (Dataset, Open Access, or Conference paper), and a 'View' button. The first item is 'XRF maps of Paracas textiles and threads' (June 21, 2021, Dataset, Open Access). The second is 'Undersökningar av Paracastextilier. Dokumentation av gästkollegeprojekt' (February 13, 2018, Dataset, Open Access). The third is 'Paracas textiles – Colour and condition. Investigation of the mordants and state of degradation of the Paracas textile collections in Peru and Sweden' (September 4, 2017, Conference paper, Open Access). To the right, a green 'New upload' button is visible. Below it, a section titled 'Heritage Laboratory' provides a description of the community, its mission, and a link to 'Read more'. At the bottom of this section, it lists the 'Curated by' (Heritage\_Laboratory), 'Curation policy', 'Created' date (July 8, 2020), and 'Harvesting API' (OAI-PMH Interface).

zenodo Search Upload Communities Log in Sign up

### Heritage Laboratory

Recent uploads

Search Heritage Laboratory

June 21, 2021 (v1) Dataset Open Access View

**XRF maps of Paracas textiles and threads**

Hacke, Marei; Javér, Anna; Thuresson, Kaj;

XRF dataset used in two publications: Javér, A., M. Hacke, C. Thays Delgado, and K. Thuresson. 2017. Paracas textiles – Colour and condition. Investigation of the mordants and state of degradation of the Paracas textile collections in Peru and Sweden. In ICOM-CC 18t

Uploaded on June 21, 2021

February 13, 2018 (v1) Dataset Open Access View

**Undersökningar av Paracastextilier. Dokumentation av gästkollegeprojekt**

Hacke, Marei; Javér, Anna; Thuresson, Kaj;

Summary of data and analyses reports that form the background to the publication: Javér, A., M. Hacke, C. Thays Delgado, and K. Thuresson. 2017. Paracas textiles – Colour and condition. Investigation of the mordants and state of degradation of the Paracas textile collections in P

Uploaded on June 21, 2021

September 4, 2017 (v1) Conference paper Open Access View

**Paracas textiles – Colour and condition. Investigation of the mordants and state of degradation of the Paracas textile collections in Peru and Sweden**

Javé, Anna; Hacke, Marei; Thays Delgado, Carmen; Thuresson, Kaj;

ABSTRACT During the course of the repatriation of a collection of Paracas textiles from Sweden to Peru, an investigation of the textiles' physical conditions and a study of their colourant auxiliaries were undertaken. Conservators from the National Museums of World Cul

Uploaded on June 21, 2021

New upload

### Heritage Laboratory

The Heritage Laboratory of the Swedish National Heritage Board is a central facility for the development and application of heritage science, including conservation science, archaeometry and art historical research.

As a national laboratory resource we foster implementation of best practice and collaboration on a national and international level. We use experimental and analytical techniques to examine, document and identify materials and to study their ageing and working properties. Our investigations may extend from minute fragments of objects or single materials to entire collections, buildings, sites and landscapes.

[Read more](#)

**Curated by:**  
Heritage\_Laboratory

**Curation policy:**  
We accept articles and data deposits from members of the Heritage Laboratory and our guest colleagues and collaborators.

**Created:**  
July 8, 2020

**Harvesting API:**  
[OAI-PMH Interface](#)

# Findable and Accessible Research Data

zenodo

Search Upload Communities

asalarsson@archasa.se

June 23, 2021

Dataset Open Access

Edit

New version

25 views 14 downloads

See more details...

Indexed in

OpenAIRE

Publication date: June 23, 2021

DOI: DOI 10.5281/zenodo.5018689

Keyword(s): Osteology Archaeology cremations Sweden Neolithic Pitted Ware culture

Subject(s): osteology archaeology cremations European neolithic Middle Neolithic Sweden Västmanland Tortuna parish L2002:2423 SHM 34553

Awarding University: Uppsala University

Related identifiers: Documented by http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-107370 (Thesis)

Fracturing and coloring of cremated bones from a Neolithic mortuary house at Bollbacken, Sweden

Larsson, Åsa Maria

Thesis supervisor(s)

Kaliff, Anders

Spreadsheet containing analysis of types of fractures and coloring of cremated human and animal bones found in a mortuary house at the site Bollbacken, Västmanland, Sweden. The site belonged to the Pitted Ware culture and was dated to ca 2600-2300 BCE. The analysis was done as part of a PhD project studying cremation practices in 3rd millennium BCE Sweden, particularly evidence of whether the dead had been cremated shortly after death, or when they were de-fleshed.

Preview

Site	Site ID	Parish	County	Feature ID	Find ID	X	Y	No	Species	Anato Reg
Bollbacken	L2002:2423	Tortuna	Västmanland	95	643	020	667,5	1	Canis familiaris	Extr
Bollbacken	L2002:2423	Tortuna	Västmanland	95	643	020	667,5	1	Canis familiaris	Extr
Bollbacken	L2002:2423	Tortuna	Västmanland	95	643	020	667,5	1	Canis familiaris	Pedis
Bollbacken	L2002:2423	Tortuna	Västmanland	95	643	020	667,5	1	Homo sapiens	Upper
Bollbacken	L2002:2423	Tortuna	Västmanland	95	643	020	667,5	1	Homo sapiens	Manus
Bollbacken	L2002:2423	Tortuna	Västmanland	95	643	020	667,5	1	Homo	Cranit

Files (93.3 kB)

## Cite as

Larsson, Åsa Maria. (2021). Fracturing and coloring of cremated bones from a Neolithic mortuary house at Bollbacken, Sweden [Data set]. Zenodo.  
<https://doi.org/10.5281/zenodo.5018689>

Authority for the upload

Metadata (free text)

Metadata with link (authorities)

Related publication

ORCID:  
Authority  
for me



# Problem solved...?

Finding a *technical* solution is not enough.

Questions remained:

- Which data to share?
- How to prepare data?
- How to describe data?

Data management templates were **too general** to offer practical, discipline specific guidance

Compilations of controlled vocabularies were **too extensive** - difficult to know which were “best”

Too little information, and too much information

They needed something that was ***just right***



# 2022: Research and Development Project

- Investigate how to implement FAIR principles in everyday practices in a heritage laboratory
- Identify the most relevant vocabularies for metadata for the Heritage Science.
- Curate a list with pre-selected options for common metadata/authorities.
- Guidance to good practice for research data management, relevant to the Heritage Laboratory.
- Extra help needed! Research data advisor was brought in for the project.



Sjöhistoriska museet

[http://kulturarvsdata.se/smm-sm/photo/Fo179059\\_11DIG](http://kulturarvsdata.se/smm-sm/photo/Fo179059_11DIG)



# Research and Development Project

## Desired effects:

- The Heritage Laboratory's operations will be more discoverable
- It will be easier to reuse and to keep building on the knowledge
- Support and inspiration to others (i.e. Heritage Science Sweden, IPERION HS)
- Long term: Easier to find analysis and research on cultural historical objects, buildings and sites



Marei Hacke at World Cultures Museum analysing khipus from Peru.  
Photo: Beatrice Törnros

# Implementation

- In close collaboration with the lab team
- Initial meetings one on one to get a case to work with
- Use the cases throughout the process of gathering information, and searching for relevant vocabularies
  - 18th century furniture
  - 20th century paintings
  - Medieval silver coins
  - Viking Age shield
  - Pre-columbian textiles from South America
  - Tests on modern exhibition materials



Marei Hacke showing Barbro Bornsäter the laboratory.  
Photo: Åsa M Larsson

# Implementation

- Follow up with the lab team to show what we found
- Workshops with everyone to go through their case and how we worked with it
- Zenodo workshop towards the end of the project

The screenshot displays the Zenodo website interface for the 'Heritage Laboratory' community. The top navigation bar is blue with the Zenodo logo, a search bar, and links for 'Upload', 'Communities', 'Log in', and 'Sign up'. Below the header, the community name 'Heritage Laboratory' is prominently displayed. A 'Recent uploads' section follows, featuring a search bar and a list of three datasets. Each dataset entry includes a date tag (e.g., 'June 21, 2021 (v1)'), a 'Dataset' label, an 'Open Access' badge, a title, author information, a brief description, and a 'View' button. The datasets are: 1) 'XRF maps of Paracas textiles and threads' by Hacke, Marej, Javér, Anna; Thuresson, Kaj; 2) 'Undersökningar av Paracastextilier. Dokumentation av gästkollektprojekt' by the same authors; and 3) 'Paracas textiles – Colour and condition. Investigation of the mordants and state of degradation of the Paracas textile collections in Peru and Sweden' by Javé, Anna; Hacke, Marej; Thays Delgado, Carmen; Thuresson, Kaj. To the right of the upload list is a green 'New upload' button. Further right is a sidebar for the 'Heritage Laboratory' community, which includes a description of the laboratory's role, a statement on fostering best practices, and links for 'Curated by:', 'Curation policy:', 'Created:', and 'Harvesting API:'.

zenodo Search Upload Communities Log in Sign up

## Heritage Laboratory

Recent uploads

Search Heritage Laboratory

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### XRF maps of Paracas textiles and threads

Hacke, Marej; Javér, Anna; Thuresson, Kaj;

XRF dataset used in two publications: Javér, A., M. Hacke, C. Thays Delgado, and K. Thuresson. 2017. Paracas textiles – Colour and condition. Investigation of the mordants and state of degradation of the Paracas textile collections in Peru and Sweden. In ICOM-CC 18t

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February 13, 2018 (v1) Dataset Open Access View

### Undersökningar av Paracastextilier. Dokumentation av gästkollektprojekt

Hacke, Marej; Javér, Anna; Thuresson, Kaj;

Summary of data and analyses reports that form the background to the publication: Javér, A., M. Hacke, C. Thays Delgado, and K. Thuresson. 2017. Paracas textiles – Colour and condition. Investigation of the mordants and state of degradation of the Paracas textile collections in P

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September 4, 2017 (v1) Conference paper Open Access View

### Paracas textiles – Colour and condition. Investigation of the mordants and state of degradation of the Paracas textile collections in Peru and Sweden

Javé, Anna; Hacke, Marej; Thays Delgado, Carmen; Thuresson, Kaj;

ABSTRACT During the course of the repatriation of a collection of Paracas textiles from Sweden to Peru, an investigation of the textiles' physical conditions and a study of their colourant auxiliaries were undertaken. Conservators from the National Museums of World Cul

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New upload

### Heritage Laboratory

The Heritage Laboratory of the Swedish National Heritage Board is a central facility for the development and application of heritage science, including conservation science, archaeometry and art historical research.

As a national laboratory resource we foster implementation of best practice and collaboration on a national and international level. We use experimental and analytical techniques to examine, document and identify materials and to study their ageing and working properties. Our investigations may extend from minute fragments of objects or single materials to entire collections, buildings, sites and landscapes.

[Read more](#)

**Curated by:**  
Heritage\_Laboratory

**Curation policy:**  
We accept articles and data deposits from members of the Heritage Laboratory and our guest colleagues and collaborators .

**Created:**  
July 8, 2020

**Harvesting API:**  
[OAI-PMH Interface](#)

[https://zenodo.org/communities/heritage\\_laboratory/](https://zenodo.org/communities/heritage_laboratory/)

- Some data sets had already been uploaded to the Heritage Laboratory community on Zenodo but with very little metadata
- During (and after) the workshop a lot of metadata was added
- Using both Keywords and Subjects makes it more likely for the data to be found in less specific searches

June 21, 2021

DatasetOpen Access

## XRF maps of Paracas textiles and threads

Hacke, Marej; Javér, Anna; Thuresson, Kaj

XRF dataset used in two publications:

Javér, A., M. Hacke, C. Thays Delgado, and K. Thuresson. 2017. Paracas textiles – Colour and condition. Investigation of the mordants and state of degradation of the Paracas textile collections in Peru and Sweden. In ICOM-CC 18th Triennial Conference Preprints, Copenhagen, 4–8 September 2017, ed. J. Bridgland, art. 1804. Paris: International Council of Museums.

and

Sabatini, F., Bacigalupo, M., Degano, I. et al. Revealing the organic dye and mordant composition of Paracas textiles by a combined analytical approach. *Herit Sci* 8, 122 (2020). <https://doi.org/10.1186/s40494-020-00461-5>

Preview

EM1932.01.0013.E XRF map images.zip

EM1932.01.0013.E XRF map images

- EM1932\_01\_0013\_E map01\_(Al K12).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(Ar K12).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(Br K12).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(Br L1).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(Ca K12).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(Ca K12).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(Cu K12).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(Fe K12).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(K K12).bmp 1.1 MB
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- EM1932\_01\_0013\_E map01\_(Mo K12).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(Mo L1).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(Ni K12).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(P K12).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(S K12).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(Si K12).bmp 1.1 MB
- EM1932\_01\_0013\_E map01\_(Ti K12).bmp 1.1 MB

Files (874.8 MB)

Name	Size	
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md5:d459e8d3c2a4b71e81df5e8edf5aed		
EM1932.01.0014.C XRF results images.zip	3.1 MB	<a href="#">Preview</a> <a href="#">Download</a>
md5:c3e67c0c8d44f1395b10a55cfc638b32		
MapParacas thread samples calculated.rtx	384.3 MB	<a href="#">Download</a>
md5:f0f407b99a6849ff248981c471bf6544		
threads 2 XRF results images.zip	2.3 MB	<a href="#">Preview</a> <a href="#">Download</a>
md5:26579fd33c66213bb3a6bb411e1f3762		
XRF map of threads.zip	33.4 MB	<a href="#">Preview</a> <a href="#">Download</a>
md5:89ad1cb1fe35cab61dca7012780699c		
XRFmap_1935.32.0211.rtx	128.5 MB	<a href="#">Download</a>
md5:3812d6aed38e7c98ac5e819c0e7374e7		
XRFmap_1935.32.0212.map 02.rtx	20.0 MB	<a href="#">Download</a>
md5:0da069c789a0edf1258c9ca8ff64588		
XRFmap_1935.32.0212.map 01.rtx	89.4 MB	<a href="#">Download</a>
md5:b198e30e8afda6f3fd1d512a4f9ee2ac		
XRFmap_1935.32.0213.map 01.rtx	59.1 MB	<a href="#">Download</a>
md5:9ab0f9900a1c11b9860153951bee3543		

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Publication date:

June 21, 2021

DOI:

DOI: [10.5281/zenodo.5006689](https://doi.org/10.5281/zenodo.5006689)

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XRF

Paracas

textile

3.5.1-01504-2017

3.5.1-00106-2016

3.5.1-03996-2017

Subject(s):

Paracas

1932.01.0013

1932.01.0014.C

1935.32.0211

1935.32.0212

1935.32.0213

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1935.32.0205a

1932.16.0165

1935.32.0122a

1935.32.0122b

1935.32.0173

1935.32.0198

1935.32.0179

1935.32.0190

1935.32.0188

Heritage Science

XRF

Textile Material

Native Andean

Related identifiers:

Supplement to

10.1186/s40494-020-00461-5 (Journal article)

<https://www.icom-cc-publications-online.org/1615/Paracas-textiles-Colour-and-condition-Investigation-of-the-mordants-and-state-of-degradation-of-the-Paracas-textile-collections-in-Peru-and-Sweden> (Conference paper)

<http://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1330879&dsid=8105> (Report)

Communities:

Heritage Laboratory

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Versions

Version 1

10.5281/zenodo.5006689

Jun 21, 2021

Cite all versions?

You can cite all versions by using the DOI 10.5281/zenodo.5006688. This DOI represents all versions, and will always resolve to the latest one. [Read more.](#)

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Hacke, Marej; Javér, Anna; Thuresson, Kaj. (2021). XRF maps of Paracas textiles and threads [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.5006689>

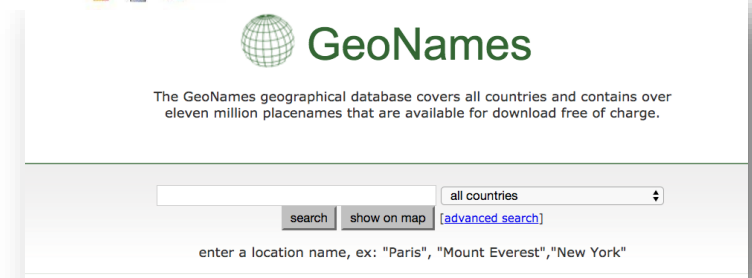


# Controlled Vocabularies for Heritage Science

OK to mix terms and authorities from several different vocabularies

The aim is to help people **find** and **understand** your research data, not to find the *perfect* definition.

- **MeSH** ([meshb.nlm.nih.gov/](http://meshb.nlm.nih.gov/)): Scientific methods and instruments, anatomy
- **Gold Book** ([goldbook.iupac.org/](http://goldbook.iupac.org/)): Scientific terms, units
- **Getty Vocabularies** ([vocab.getty.edu/](http://vocab.getty.edu/)): Cultural objects, places, persons, materials etc
- **VIAF** ([viaf.org/](http://viaf.org/)): Persons, organisations etc. Linking together library vocabularies
- **Geonames** ([www.geonames.org/](http://www.geonames.org/)): Geographical locations
- **Wikidata** ([www.wikidata.org/](http://www.wikidata.org/)): Almost everything and possible to create new ones



# Metadata basics: Start with "good enough"

Prepare a template for common metadata for your research output

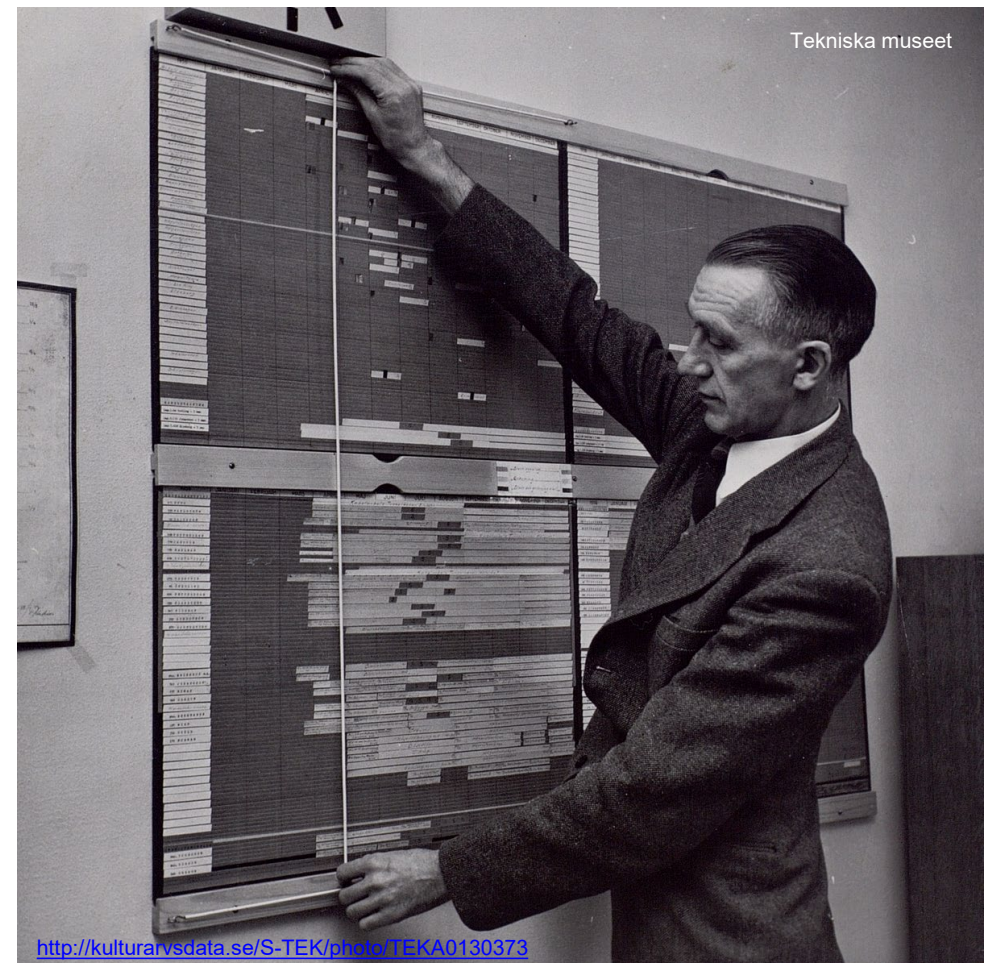
- Terms, and if possible, Unique IDs for
  - **Subjects** (e.g. Heritage Science, Archaeology, Art History, Literature etc)
  - **Geographical location** (Country, Province, City)
  - **Materials** (e.g. silver, pollen, bone, coin, pottery, pigment)
  - **Methods** (e.g. microscopy, photogrammetry, SEM-EDS, Xray)
  - **Time/Style Period** (e.g. Expressionism, Bronze Age, Tang dynasty)
  - **Person** (Artist, Subject)
- Unique IDs for
  - **Objects** (Artefacts, Art works, Sites, Buildings included in your research)

# Curated list for the Heritage Laboratory

TYPE	VOCABULARY	SEARCH	COMMENT
<b>Method/Instrument (HS)</b>	Getty Vocabularies	<a href="http://vocab.getty.edu/">http://vocab.getty.edu/</a>	From a Heritage Science perspective
<b>Method/Instrument (Alt.)</b>	Medical Subject Headings, MeSH	<a href="https://meshb.nlm.nih.gov/">https://meshb.nlm.nih.gov/</a>	Complement to Getty - also for modern materials
<b>Method/instrument (Swedish)</b>	Kungliga biblioteket	<a href="https://id.kb.se/">https://id.kb.se/</a>	Subject headings in Swedish
<b>Scientific terms</b>	IUPAC Compendium of Chemical Terminology	<a href="https://goldbook.iupac.org/">https://goldbook.iupac.org/</a>	Terms, measuring units etc
<b>Material</b>	Getty Vocabularies	<a href="http://vocab.getty.edu/">http://vocab.getty.edu/</a>	Ex: gold, red ocher, teak, cashmere
<b>Subject</b>	Getty Vocabularies	<a href="http://vocab.getty.edu/">http://vocab.getty.edu/</a>	Ex: Heritage Science, Art History, Book history, Carpentry
<b>Subject (Swedish)</b>	Kungliga biblioteket	<a href="https://id.kb.se/">https://id.kb.se/</a>	Ex: Byggnadsvård, Konservering, Arkitektur, Tryckerihistoria
<b>Object type</b>	Getty Vocabularies	<a href="http://vocab.getty.edu/">http://vocab.getty.edu/</a>	Ex: sword, coins, painting, chair
<b>Object type (Swedish)</b>	Kungliga biblioteket	<a href="https://id.kb.se/">https://id.kb.se/</a>	Ex: svärd, orientaliska mattor, medletida handskrifter
<b>Geographic location</b>	GeoNames	<a href="https://www.geonames.org/">https://www.geonames.org/</a>	Ex: Continent, country, region, place
<b>Geographic location historical</b>	Getty Vocabularies	<a href="http://vocab.getty.edu/">http://vocab.getty.edu/</a>	Ex: Mesopotamia, Gallia Cisalpina, Birka, Plamyra
<b>Person</b>	Getty Vocabularies	<a href="http://vocab.getty.edu/">http://vocab.getty.edu/</a>	Mainly artists, creators
<b>Person</b>	VIAF	<a href="https://viaf.org/">https://viaf.org/</a>	OBS! Copy "Permalink"
<b>Period/Style</b>	Getty Vocabularies	<a href="http://vocab.getty.edu/">http://vocab.getty.edu/</a>	Ex: European Bronze Age, Gothic, Harlem Renaissance, Olmec
<b>Numismatics</b>	Nomisma	<a href="http://nomisma.org/browse">http://nomisma.org/browse</a>	Numismatic terms, locations, people etc
<b>Organisation ID</b>	VIAF	<a href="https://viaf.org/">https://viaf.org/</a>	OBS! Copy "Permalink"
<b>Object ID</b>	Collection system or Kulturarvsdata (K-Samsök)	<a href="https://www.kringla.nu/kringla/">https://www.kringla.nu/kringla/</a>	From organisation's Collection system. If K-samsök partner search ID via Kringla: Click to expand "Teknisk data". Copy "Objekt-URI"
<b>Building ID (Sweden)</b>	Kulturarvsdata (K-samsök)	<a href="https://www.kringla.nu/kringla/">https://www.kringla.nu/kringla/</a>	Click to expand "Teknisk data". Copy "Objekt-URI" (Bebyggelseregistret)
<b>Site ID (Sweden)</b>	Kulturarvsdata (K-samsök)	<a href="https://www.kringla.nu/kringla/">https://www.kringla.nu/kringla/</a>	Click to expand "Teknisk data". Copy "Objekt-URI" (Fornsök)
<b>Runic inscription ID (Global)</b>	Kulturarvsdata (K-samsök)	<a href="https://app.raa.se/open/runor/se/arch">https://app.raa.se/open/runor/se/arch</a>	Copy "Objekt-URI"
<b>Anything</b>	Wikidata	<a href="https://www.wikidata.org/">https://www.wikidata.org/</a>	Also possible to generate missing authorities

# Guide to good practices for data management

- Plan for FAIR data management from the start of a project
- Good data practices
  - Create and describe data correctly
  - Save and share in open formats
- Use vocabularies and authorities (unique identifiers)
- Document output as structured data (think machine actionable)
- Plan for making the data available





# Guide to good practices for data management

- Project life cycle
- Plan for creating digital data
- Project documentation
- Naming and organising files
- Good practice for datasets (database, spreadsheet)
- Tips and tricks for FAIR data
- Findable data
- Accessible data
- Interoperable data
- Reusable data
- Open formats
- Licensing



[LMA Research Data Management Working Group](#) CC BY-NC 4.0

# It is about practice, not technology

## Describe your data

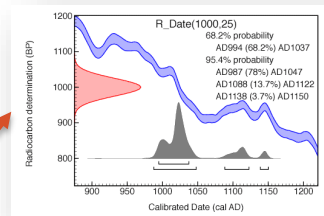
Heritage science	<a href="http://vocab.getty.edu/aat/300417282">http://vocab.getty.edu/aat/300417282</a>
Microscopy	<a href="http://id.nlm.nih.gov/mesh/D008853">http://id.nlm.nih.gov/mesh/D008853</a>
Scanning electron microscopy	<a href="http://vocab.getty.edu/aat/300224957">http://vocab.getty.edu/aat/300224957</a>
Microscopy, Electron, Scanning	<a href="http://id.nlm.nih.gov/mesh/D008855">http://id.nlm.nih.gov/mesh/D008855</a>
Fourier transform infrared microspectroscopy	<a href="http://vocab.getty.edu/aat/300391288">http://vocab.getty.edu/aat/300391288</a>
Spectroscopy, Fourier Transform Infrared	<a href="http://id.nlm.nih.gov/mesh/D017550">http://id.nlm.nih.gov/mesh/D017550</a>
X-ray fluorescence	<a href="http://vocab.getty.edu/aat/300224161">http://vocab.getty.edu/aat/300224161</a>

**Do not aim for perfect!**  
**Anything is better than nothing**

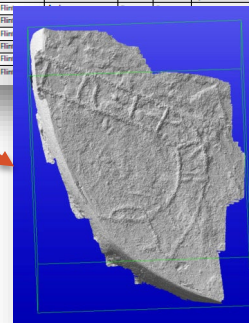
**Document your material**  
(What, where, when, how)

**See your data!**

Fnr	Intrastid	Material	Sakord	Antal	Vikt (g)	Anmärkning	M. Typ
394	1000417	Flinta	Avslag	8	33	2 bränd	Grävenhet
395	1000418	Flinta	Spån	2	9	Spånfragment, 2 brända	Grävenhet
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399	1000422	Flinta	Spån	6	1		Grävenhet
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401	1000424	Flinta	Spån	4	3	Spånfragment, 2 brända	Grävenhet
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410	1000433	Flinta	Avslag	9	43		Grävenhet
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415	1000438	Flinta	Spån	5	1		Grävenhet
416	1000439	Flinta	Avslag	3	21	1 bränd	Grävenhet
417	1000440	Flinta	Avslag	14	41	4 brända	Grävenhet
418	1000441	Flinta	Spån	4	5	Spånfragment, 2 brända	Grävenhet



Fnr	Intrastid	Material	Sakord	Antal	Vikt (g)	Anmärkning	M. Typ
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404	1000427	Flinta	Övrig flinta	19	93	11 brända	Grävenhet
405	1000428	Flinta	Avslag	3	36		Grävenhet
406	1000429	Flinta	Spån	1	3	Bränd	Grävenhet
407	1000430	Flinta	Spån	1	1	Bränd	Grävenhet
408	1000431	Flinta	Spån	2	9		Grävenhet
409	1000432	Flinta	Avslag	8	13	1 bränd	Grävenhet
410	1000433	Flinta	Avslag	9	43		Grävenhet
411	1000434	Flinta	Avslag med retusch	1	8	Stickul?	Grävenhet
412	1000435	Flinta	Käma	1	22	Ryggsplån	Grävenhet
413	1000436	Flinta	Avslag	2	9		Grävenhet
414	1000437	Flinta	Avslag	15	28	7 brända	Grävenhet
415	1000438	Flinta	Spån	5	1		Grävenhet
416	1000439	Flinta	Avslag	3	21	1 bränd	Grävenhet
417	1000440	Flinta	Avslag	14	41	4 brända	Grävenhet
418	1000441	Flinta	Spån	4	5	Spånfragment, 2 brända	Grävenhet



“Research data” is what you have created or compiled, which you base your published analyses, interpretations and results on (e.g. photos, tables, diagrams, calculations, distribution maps).

Necessary for **reproducibility** and **credibility**

# Reflections – what more did we learn?

Some things are difficult to find as open resources that are accessible to individuals

- Time periods: There is a bias benefitting the Western world, and the major civilisations.
- Geographic entities that are culturally defined and/or time specific (e.g. 18th Century Sweden, Sápmi)
- Cultural-historical terminologies that are specific to certain regions or time periods. E.g. archaeological artifact types.
- Instruments - technical definitions may vary depending on use
- Unique identifiers for specific objects (sometimes there is only an ID for a group of objects in the collection)



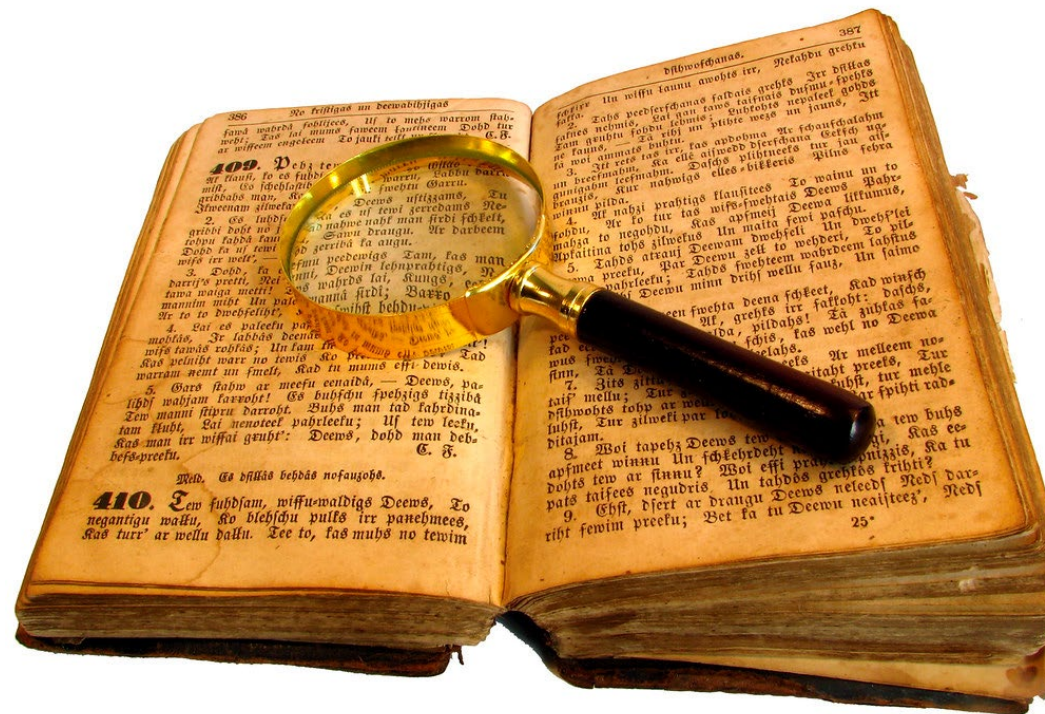
<http://urn.kb.se/resolve?urn=urn:nbn:se:alvin:portal:record-91791>

Uppsala universitetsbibliotek



# Reflections – what more did we learn?

- Do we know how people search?
- How can we predict what search terms will be used?
- The importance of good quality metadata
- Adding both Keywords and Subjects to you Zenodo post
- Link to publication and other relevant objects
- Use a researcher ID



"an old book with a looking glass" by Ēst smiltis no ausīm is licensed under CC BY 2.0.



# Reflections – what more did we learn?

What are the main challenges in completing the transition no later than 2026?

- Educating and training young researchers, preferably already at Masters level.
- Good data practice is necessary in all fields
- Security - how to store and share sensitive data
- Law - what can we and what can we not share
- Ethics - what ethical questions do we need to deal with considering research data



Teaching by Nick Youngson CC BY-SA 3.0 Alpha Stock Images

# Reflections – what more did we learn?

Beyond the Ivory Tower...

- Researchers outside of Academia often lack the support and solutions available to University employees
- Museums, archives and non-profit organisations are often forgotten in systems constructed for Open Science
- Can small organisations with few researchers and specialists afford the set-up required for effective FAIR processes?
- Is there a danger of an even greater divide between Academia and the GLAM sector with increased demands from research funders?



Foto: Eriksson, Elisabeth

<http://kulturarvsdata.se/nomu/object/NM0269313>

Nordiska museet

# Links and tips from participants

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

## **Zenodo network:**

OpenAIRE (which Zenodo is connected to):

<https://www.openaire.eu/>

EOSC (European Open Science Cloud):

<https://eosc-portal.eu/>

SSHOC (Social Sciences & Humanities Open Cloud): <https://marketplace.sshopencloud.eu/>

Open Source software that Zenodo is built upon:

<https://invenio-software.org/products/rdm/>

Example of bespoke repository built upon this software: <https://tudor-portraits.npg.hasdai.org/search?q=&l=list&p=1&s=10&sort=newest>

<https://tudor-portraits.npg.hasdai.org/search?q=&l=list&p=1&s=10&sort=newest>

ARIADNE resources on Zenodo:

[https://zenodo.org/communities/ariadne\\_infrastructure](https://zenodo.org/communities/ariadne_infrastructure)

AriadnePlus Infrastructure for digital archaeology:

<https://ariadne-infrastructure.eu/>

ORCID (create personal PID): <https://orcid.org/>

Heritage PID Resources: <https://tanc-ahrc.github.io/PIDResources/>

FAIR Digital Objects (FDO) – example from Natural history collections: <https://www.dissco.eu/>

DataCite metadata schema: <https://schema.datacite.org/>

Research Organisation Registry: <https://ror.org/>

Vocabulary tools and services E-RIHS: <https://github.com/E-RIHS/hs-interoperability/tree/main/Vocabulary>

Europeana Data Model (multilingual interoperability for heritage collections): <https://pro.europeana.eu/page/edm-documentation>

Nomina Rerum Mediaevalium vocabulary: <https://www.khm.uio.no/forskning/digitalt-feltmuseum/litteratur/nomina-rerum-mediaevalium/nomina-rerum-medievalium.html>

IIIF Maps Community Group:

<https://iiif.io/community/groups/maps/>

# Thank you

Åsa M Larsson  
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[asa.larsson@raa.se](mailto:asa.larsson@raa.se)

Barbro Bornsäter  
Uppsala University Library  
[barbro.bornsater@ub.uu.se](mailto:barbro.bornsater@ub.uu.se)

