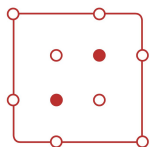# Digital Humanities at the University of Bologna

Silvio Peroni

Digital Humanities Advanced Research Centre (/DH.arc)
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ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA
DEPARTMENT OF CLASSICAL PHILOLOGY
AND ITALIAN STUDIES
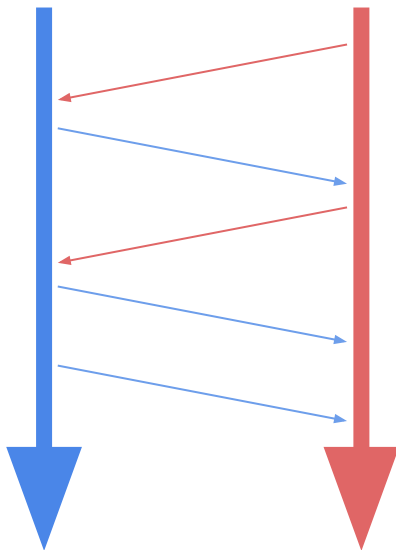
/DH.arc

Two sides of the same coin

Research   **Teaching**

/DH.ARC – DIGITAL HUMANITIES ADVANCED RESEARCH CENTRE

http://dharc.unibo.it
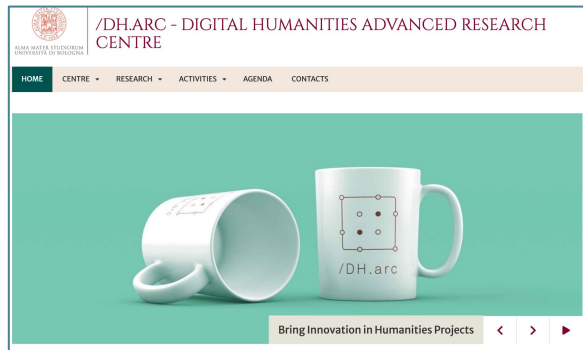
SECOND CYCLE DEGREE/TWO YEAR MASTER IN
DIGITAL HUMANITIES AND DIGITAL KNOWLEDGE

https://corsi.unibo.it/2cycle/
DigitalHumanitiesKnowledge

NEW

PHD PROGRAMME
CULTURAL HERITAGE IN THE DIGITAL ECOSYSTEM

https://phd.unibo.it/chede/en

https://corsi.unibo.it/2cycle/DigitalHumanitiesKnowledge

The international degree programme in Digital Humanities and Digital Knowledge (DHDK) offers a cross-disciplinary curriculum designed to foster close connections between humanities and the sciences of representation and processing of information and knowledge

Three macro-areas of learning:

- Computer Science
- Literary, linguistic, historical/cultural and related to the arts in the digital context
- Complementary: economy, law and communication

Programming principles and languages
Data modelling and multimedia database design
Design and creation of web application and interface management
Extraction and representation of data
Production of multimedia applications in a cultural heritage context

E.g.: Computational Thinking and Programming

Goal: introducing essential and practical aspects of Informatics – namely algorithms, data structures, and algorithmic techniques – to students in the Humanities with no prior knowledge of them

Notions of Python are briefly introduced – however Python is not the main focus of the course: it is just a tool, i.e. a formal language, adopted to communicate with and instruct an information-processing agent

Learning a programming language is like learning a new language: students need to practice it (a lot) to master it properly

Concepts such as abstraction, trial-and-error learning, prior experience, deriving general principles, practice, are key factors when learning a new language

spot meetings (2 hour each) with tutors to address exercises from the theoretical part

basic course (15 lectures of 2 hours each) - mainly theoretical notions

workshop

laboratory (6 lectures of 2 hours each) - learning Python basics

Topics of the course

Basic notions

Abstraction

Algorithm

Computability

Programming language

Recursion

Data structures

Ordered structures

Unordered structures

Tree

Graph

Algorithmic techniques

Brute-force

Divide and conquer

Dynamic programming

Backtracking

Greedy

Each lecture includes a brief description of a "historic hero" who is functional to the lecture to show that essential aspects such as computation, data structures, recursion can be found in everyday life and in places in which they are not usually expected to be

Historic heroes in order of appearance
Noam Chomsky, Ada Lovelace, Alan Turing, Grace Hopper, Donald Knuth, Betty Holberton, Jorge Luis Borges, Douglas Hofstadter, John von Neumann, Leonardo da Pisa, Gabriel García Márquez, AlphaGo, Leonhard Euler, Evelyn Berezin

Project-oriented teaching

Almost all the courses in DHDK includes the development of projects, and some of them are collected in a particular service, i.e. DHDKey

https://projects.dharc.unibo.it/dhdkey/

https://phd.unibo.it/chede/en

The aim of the PhD is to encourage the growth and development of new specialized skills in which digital tools produce renewed interpretative and analytical approaches in the direction of a new and wider valorisation, dissemination and public use of the heritage

Interdisciplinary and international profile for:

12 departments involved

- Superintendencies, museums, libraries, archives, agencies and organization related to the study, management and conservation of cultural heritage
- Private companies that work in cultural heritage
- University research

/DH.arc

The Digital Humanities Advanced Research Centre (/DH.arc, http://dharc.unibo.it) is part of the Department of Classical Philology and Italian Studies (FICLIT)
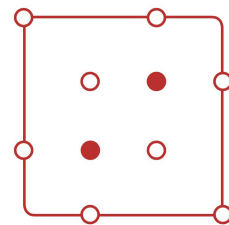
It connects students, researchers, IT staff, and professors from FICLIT, the Department of Computer Science and Engineering (DISI) and affiliated structures, within the University of Bologna

Main aim: is to be a hub for researchers and agencies currently working in the field of DH, and to promote innovative projects in the Humanities

/DH.arc

DHARC Project

The portfolio includes all projects

- born and maintained at the /DH.arc centre
- inherited from prior centres (e.g. Multimedia Centre CRR-MM)
- born in a different context that are lead by /DH.arc members

Digital Library FICLIT

The digital version of cultural archives and collection held and maintained by FICLIT

Continuous process of scanning and gathering metadata

Technologies used

Paolo Bufalini, "Appunti 1981–1991" (quaderno manoscritto)

ITEM

Title

it Paolo Bufalini, "Appunti 1981–1991" (quaderno manoscritto)

en Paolo Bufalini, "Appunti 1981–1991" (manuscript notebook)

Rights

it Università di Bologna. Tutti i diritti riservati. Vietata ogni ulteriore riproduzione

en University of Bologna. All rights reserved. Any other reproduction or distribution is prohibited
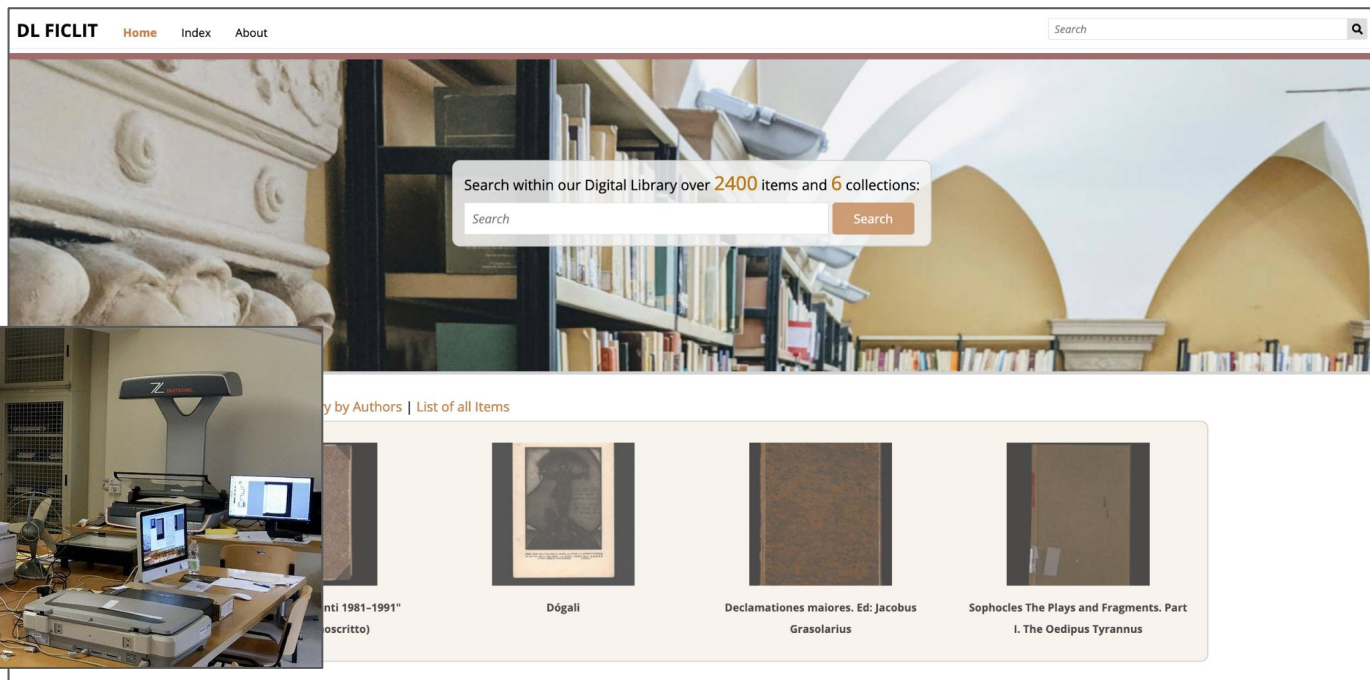
Type

it quaderno

en notebook

Creator

Paolo Bufalini

Date

1981–1991

Description

it Paolo Bufalini (Roma, 1915–2001), politico e partigiano italiano, fu tra i massimi protagonisti della politica italiana del secondo dopoguerra. Laureato in giurisprudenza, ricoprì posizioni dirigenziali nel Partito Comunista Italiano, fu membro del Parlamento e Senatore della Repubblica ininterrottamente dal 1963 al 1992. Parallelamente alla carriera politica, Bufalini coltivò il proprio interesse per i classici e, soprattutto, per la letteratura latina. Particolarmente apprezzate sono le sue traduzioni delle odi di Orazio
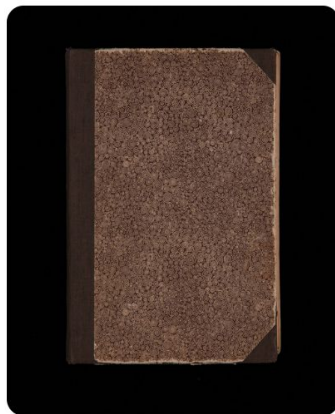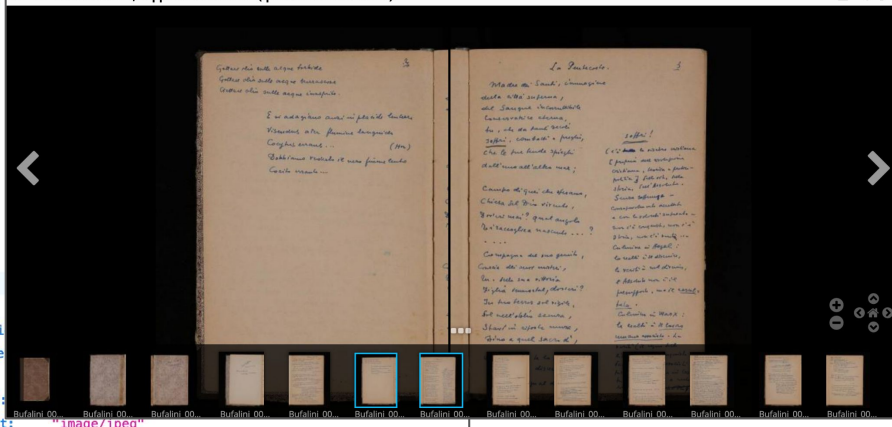
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@id:               "https://dl.ficlit.unibo.it/iiif/12808/manifest"
@type:             "sc:Manifest"
label:             "Paolo Bufalini, \"Appunt… (quaderno manoscritto)"
thumbnail:         {…}
license:           "https://creativecommons.org/licenses/by-nc-nd/4.0/"
attribution:       "Dipartimento di Filologi… – Universtà di Bologna"
logo:              "https://dl.ficlit.unibo.it/themes/ficlit-logo.png"
related:           {…}
seeAlso:           {…}
metadata:          [...]
sequences:
  0:
    @id:           "https://dl.ficlit.unibo.…if/12808/sequence/normal"
    @type:         "sc:Sequence"
    label:         "Current Page Order"
    viewingDirection:
    viewingHint:
    canvases:
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        @id:
        @type:
        label:
        thumbnail:
        width:
        height:
        images:
          0:
            @id:
            @type:
            motivati…
            resource:
              @id:
              @type:
              format:     "image/jpeg"
```

Paolo Bufalini, "Appunti 1981–1991" (quaderno manoscritto)

Semantic Digital Edition of Bufalini's notebook

Between 1981 and 1991, Paolo Bufalini keeps a private notebook with his own thoughts and those of other writers

The Semantic Digital Edition (SDE) is an extension of the original digital edition (TEI/XML) with RDF technologies, to enrich available information with data extracted from external sources

http://projects.dharc.unibo.it/bufalini-notebook/

Daquino, M., Giovannetti, F., & Tomasi, F. (2019). Linked Data per le edizioni scientifiche digitali. Il workflow di pubblicazione dell'edizione semantica del quaderno di appunti di Paolo Bufalini. Umanistica Digitale, No 7 (2019). https://doi.org/10.6092/ISSN.2532-8816/9091
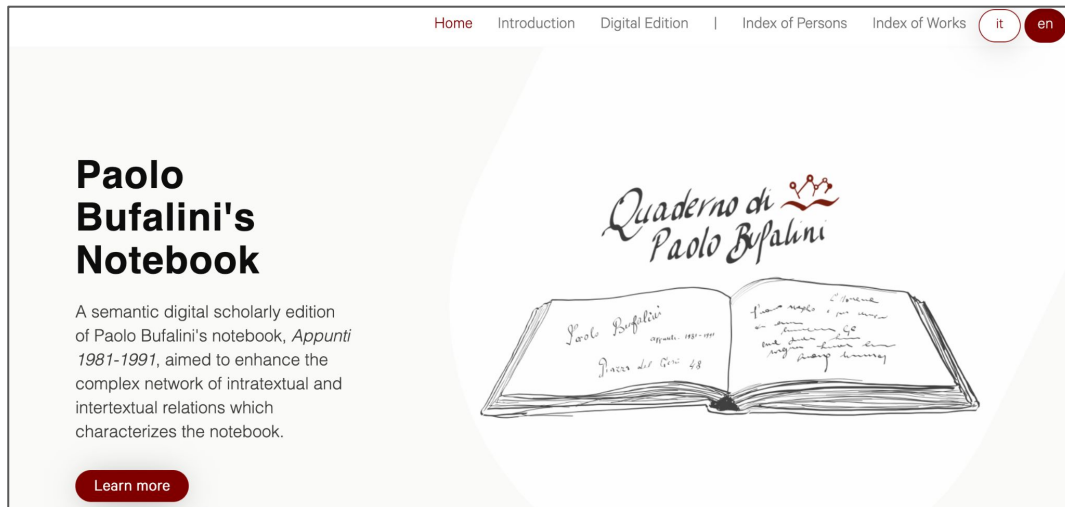
A workflow for creating SDE

Data modeling

- Reuse of existing ontologies
- Provenance-aware approach

Provenance-aware
RDF transformation

- Named graphs
- Nanopublication

Web application

- Serve and exploit RDF data
- Data-driven visualization

Zeri e LODE

Goal: to expose the vastness of one of the most important collections of European cultural heritage, the Zeri Photo Archive, as Linked Open Data (LOD)

Two ontologies for describing all issues not completely covered by existent models (the F Entry and the OA Entry Ontology

Mapping the descriptive elements used in the current Zeri Photo Archive catalog into RDF, converting into CIDOC CRM and into the two new aforementioned ontologies

http://data.fondazionezeri.unibo.it/

Daquino, M., Mambelli, F., Peroni, S., Tomasi, F., & Vitali, F. (2017). Enhancing Semantic Expressivity in the Cultural Heritage Domain: Exposing the Zeri Photo Archive as Linked Open Data. Journal on Computing and Cultural Heritage, 10(4), 1–21. https://doi.org/10.1145/3051487
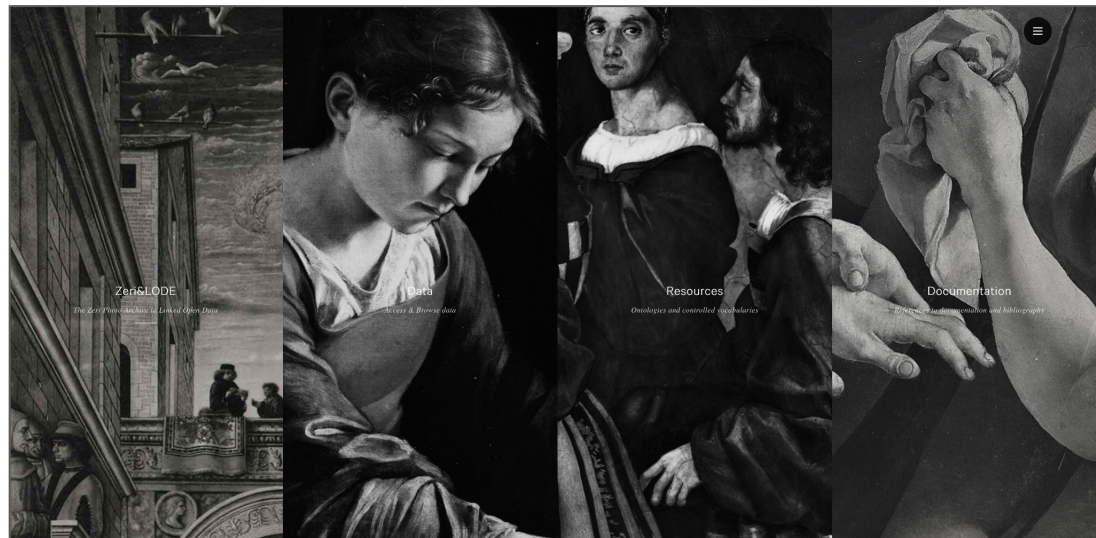
Knowledge graph

Brogi — Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio.

...o to the work of art entry

CLASSIFICATION

Inventory number	92520

Fototeca Zeri

Pittura italiana

428. Pittura italiana sec. XVI. Venezia 4

2. Palma il Vecchio: soggetti profani

PI_0428/2/49

```
1  PREFIX zeri: <https://w3id.org/zericatalog/fentry/>
2  PREFIX fentry: <http://www.essepuntato.it/2014/03/fentry/>
3  PREFIX cidoc: <http://www.cidoc-crm.org/cidoc-crm/>
4  PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5  PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
6  SELECT ?entity ?type ?title WHERE {
7    zeri:92520 fentry:describes ?entity .
8    ?entity rdf:type ?type ; rdfs:label ?title .
9    FILTER(!contains(str(?type), "/cidoc")) .
10   FILTER(LANG(?title) = "en") .
11 }
```

Raw Response | Table | Pivot Table   Show 50 entries

	entity	type	title
1	https://w3id.org/zericatalog/photo/113202	fentry:Photograph	"Photograph "Brogi , Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio.""@en
2	https://w3id.org/zericatalog/photo/113202/shot	fentry:Shot	"Shot of "Brogi , Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio.""@en

Scheda F "Brogi , Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio."
https://w3id.org/zericatalog/fentry/92520
ENTITÀ DI TIPO: FEntry

rdfs:comment	EN IT
	Scheda F, "Brogi , Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio."
rdfs:label	EN IT
	Scheda F "Brogi , Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio."
dcterms:description	Brogi , Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio.
rdf:type	fentry:FEntry
fentry:describes	<https://w3id.org/zericatalog/photo/113202> ↳ Fotografia "Brogi - Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio..."
	<https://w3id.org/zericatalog/photo/113202/shot> ↳ Scatto (immagine) della fotografia "Brogi , Milan..."
	<https://w3id.org/zericatalog/photo/113202/posi...> ↳ Fotografia "Brogi - Milano - Museo Poldi-Pezzoli - Ritra..."
	<https://w3id.org/zericatalog/photo/113202/posi...> ↳ Fotografia "Brogi - Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio.", posi..."

has portrayal

describes

Fotografia "Brogi , Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio."
https://w3id.org/zericatalog/photo/113202
ENTITÀ DI TIPO: Photograph

rdfs:comment	EN IT
	Fotografia "Brogi , Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio."
rdfs:label	EN IT
	Fotografia "Brogi , Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio."
rdf:type	fentry:Photograph
	crm:E28_Conceptual_Object
crm:P102_has_title	<https://w3id.org/zericatalog/photo/113202/proper-title> ↳ Titolo proprio "Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio."

photographer of

Brogi, fotografo della fotografia "Brogi , Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio."
https://w3id.org/zericatalog/photo/113202/photographer/brogi
ENTITÀ DI TIPO: RoleInTime

	Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il ...
rdfs:label	EN IT
	Brogi, fotografo della fotografia "Brogi , Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio."
rdf:type	pro:RoleInTime
pro:withRole	<https://w3id.org/zericatalog/role/photographer> ↳ Fotografo
pro:relatesToEntity	<https://w3id.org/zericatalog/photo/113202> ↳ Fotografia "Brogi , Milano - Museo Poldi-Pezzoli - Ritratto di donna; Jacopo Palma il Vecchio."

OpenCitations

OpenCitations (http://opencitations.net) is an independent not-for-profit infrastructure organization dedicated to open scholarship and the publication of open bibliographic and citation data by the use of Semantic Web (Linked Open Data) technologies

It provides:
- a data model: the OpenCitations Data Model (more later)
- bibliographic and citation databases (CC0) – main collection is OpenCitations Indexes, including more than 1.29 billion citation links
- software available in GitHub repository (https://github.com/opencitations) released with open source licenses
- online services: REST APIs, SPARQL endpoints, dumps, interfaces

Peroni, S., & Shotton, D. (2020). OpenCitations, an infrastructure organization for open scholarship. Quantitative Science Studies, 1(1), 428–444. https://doi.org/10.1162/qss_a_00023

Provenance and change tracking of entities

adding data

removing data

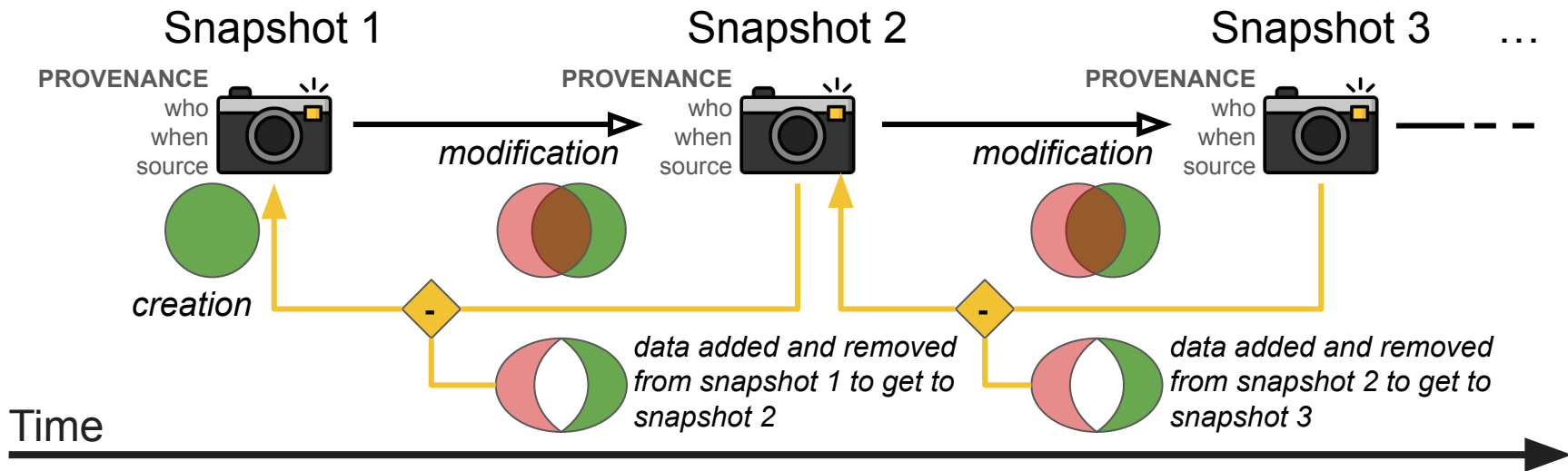remaining data

delta:
data added & removed

snapshot: all the data related to the entity at a given time
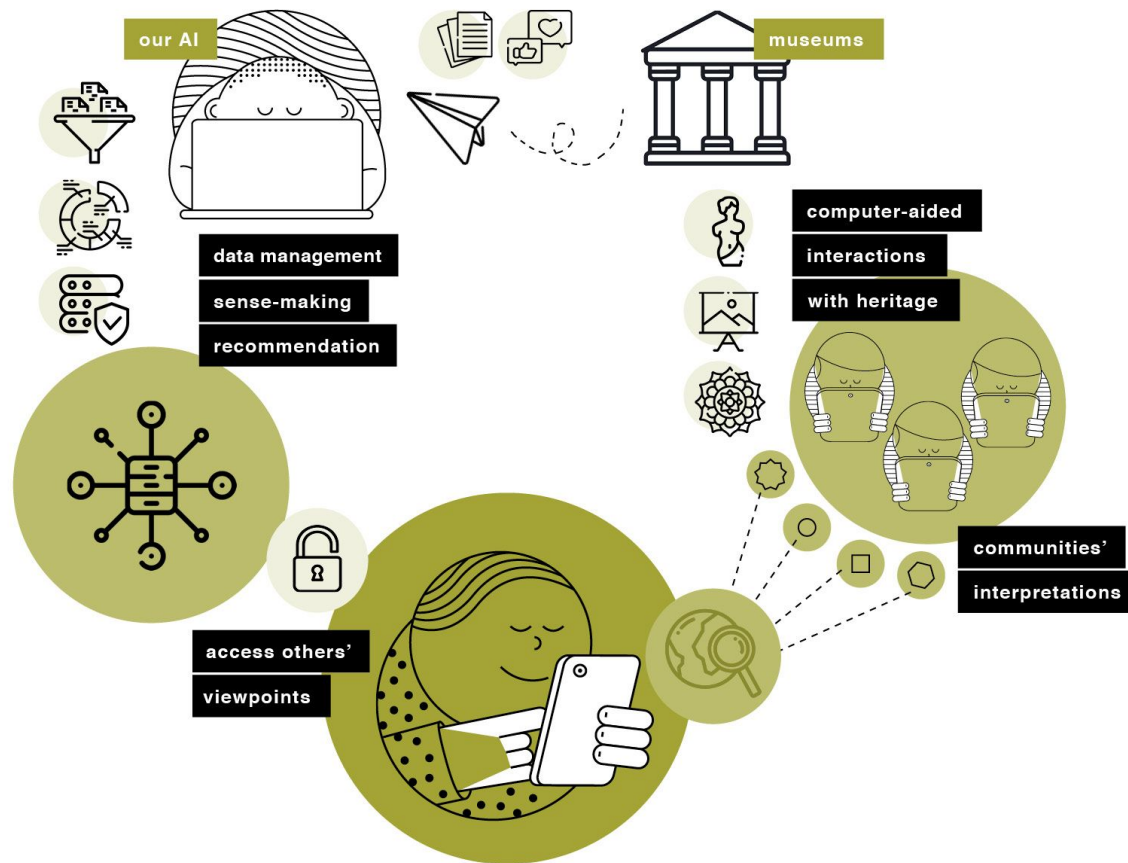
An entity
(e.g. a journal article)

To keep track of the history of an entity we need to store all the data of its last snapshot plus all the deltas built by modifying the previous snapshots

Snapshot 1

Snapshot 2

Snapshot 3   …

PROVENANCE
who
when
source

modification

PROVENANCE
who
when
source

modification

PROVENANCE
who
when
source

creation

-

data added and removed from snapshot 1 to get to snapshot 2

-

data added and removed from snapshot 2 to get to snapshot 3

Time

SPICE

SPICE (Social cohesion, Participation, and Inclusion through Cultural Engagement) is an EU Horizon 2020 funded project

Goal: developing technologies that help communities select paintings, artefacts and other museum objects and share their interpretations with others → Citizen Curation

Daga, E., Asprino, L., Damiano, R., Daquino, M., Agudo, B. D., Gangemi, A., Kuflik, T., Lieto, A., Maguire, M., Marras, A. M., Pandiani, D. M., Mulholland, P., Peroni, S., et al. (2022). Integrating Citizen Experiences in Cultural Heritage Archives: Requirements, State of the Art, and Challenges. Journal on Computing and Cultural Heritage, 15(1), 1–35. https://doi.org/10.1145/3477599
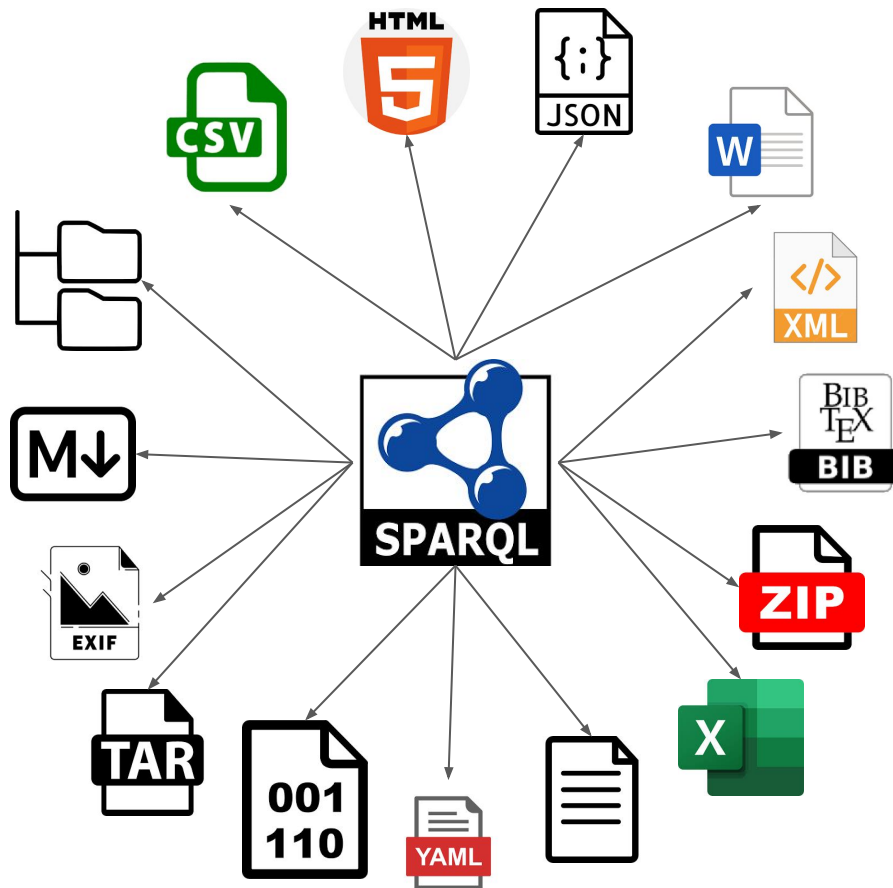
SPARQL Anything

SPARQL Anything is a system for Semantic Web re-engineering that allows users to query anything with SPARQL

- SELECT queries, to get some data out of the particular source
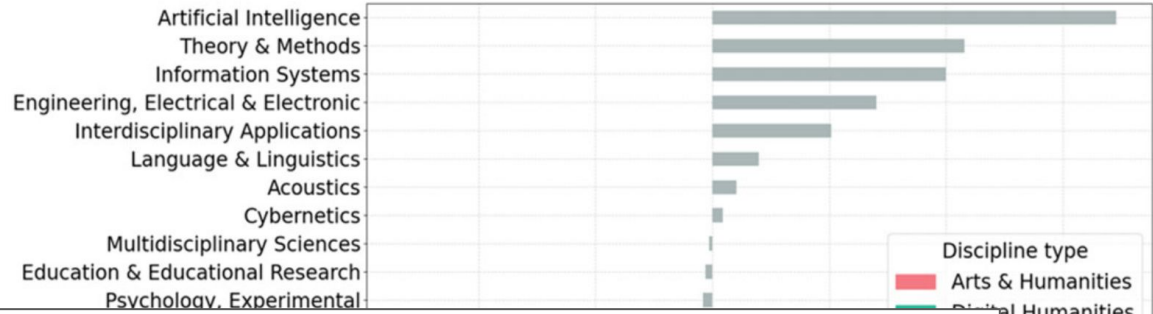- CONSTRUCT queries, for data conversion into RDF data

https://github.com/
SPARQL-Anything/sparql.anything

Daga, E., Asprino, L., Mulholland, P., & Gangemi, A. (2021). Facade-X: An Opinionated Approach to SPARQL Anything. In M. Alam, P. Groth, V. de Boer, T. Pellegrini, H. J. Pandit, E. Montiel, V. Rodríguez Doncel, B. McGillivray, & A. Meroño-Peñuela (Eds.), Studies on the Semantic Web. IOS Press. https://doi.org/10.3233/SSW210035

What are DH?

A study to measure the coverage of DH publications in mainstream bibliographic data sources

DH publications act as a bridge between SSH disciplines – e.g. Linguistics, Psychology, and Pedagogical & Educational Research, that cite DH research – and Computer Science – that is cited mainly by DH research

https://dhjournals.github.io/list/

Spinaci, G., Colavizza, G., & Peroni, S. (2022). A map of Digital Humanities research across bibliographic data sources. Digital Scholarship in the Humanities, fqac016.
https://doi.org/10.1093/llc/fqac016
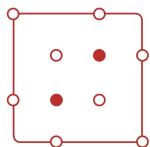
Thank you for your attention

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