An Approach to Semantic Representation and Modeling in the Development of *De Rerum Natura* Digital Exhibition

by Carlo Teo Pedretti
(University of Bologna)

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Case Study: *Vedere l'Invisibile*

To celebrate six centuries (1417-2017) from the discovery of Lucretius' *De rerum natura*, the University of Bologna has decided to promote an exhibition (***Vedere l'Invisibile***) **with a focus on the reception of Lucretius in the contemporary imagination**. The exhibition is the result of intense interdisciplinary activities which experts from different fields (e.g. art historians, Latinists etc.).

The exhibition contains works by several famous contemporary artists such as Baj, Cavaliere, Paolini, Kaufmann, Mezzaqui as well as some of the most important Italian poetic translations of *De rerum natura* (Ungaretti, Sanguineti, Orelli, De Angelis).

DRN: Purpose and goals / 1

- Differently from other exhibitions, ***Vedere l'Invisibile* has been built around a specific literary work** (Lucretius' *De rerum natura*) and its propagations in other domains. Therefore, **De rerum natura influence upon other cultural heritage domains also maintains a primary importance** in the design phase of the digital exhibition experience.
- The final users should be able to **discover works of art connected to or influenced by *De rerum natura***, narrowing the bond between textual and artistic expressions.

DRN: Purpose and goals / 2

De Rerum Natura Online (DRN) is the output of my MA thesis and a digital exhibition that collects the aforementioned heterogeneous materials to create a dynamic and interactive navigation of the collection.

In order to achieve this result, DRN has been designed taking into consideration:

- A **modular** and **flexible** framework solution
- Implementation of **Semantic Web technologies**
- **Reusability**, accessibility and reproducibility of its collection

Research questions

1. Is it possible to **build a narration** which involves heterogeneous data sources within the context of a digital exhibition without recurring to a vertical, silo approach?

2. To what extent can an adapter design pattern be capable to process and **represent information homogeneously**, harmonizing contents and models?
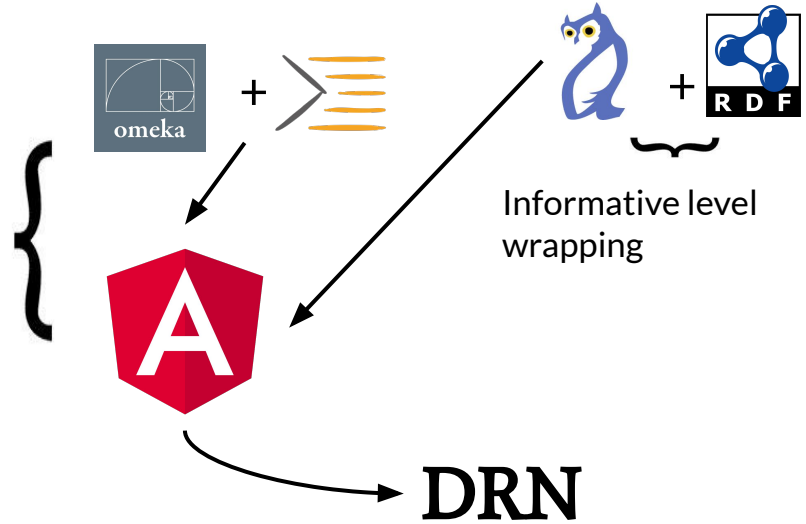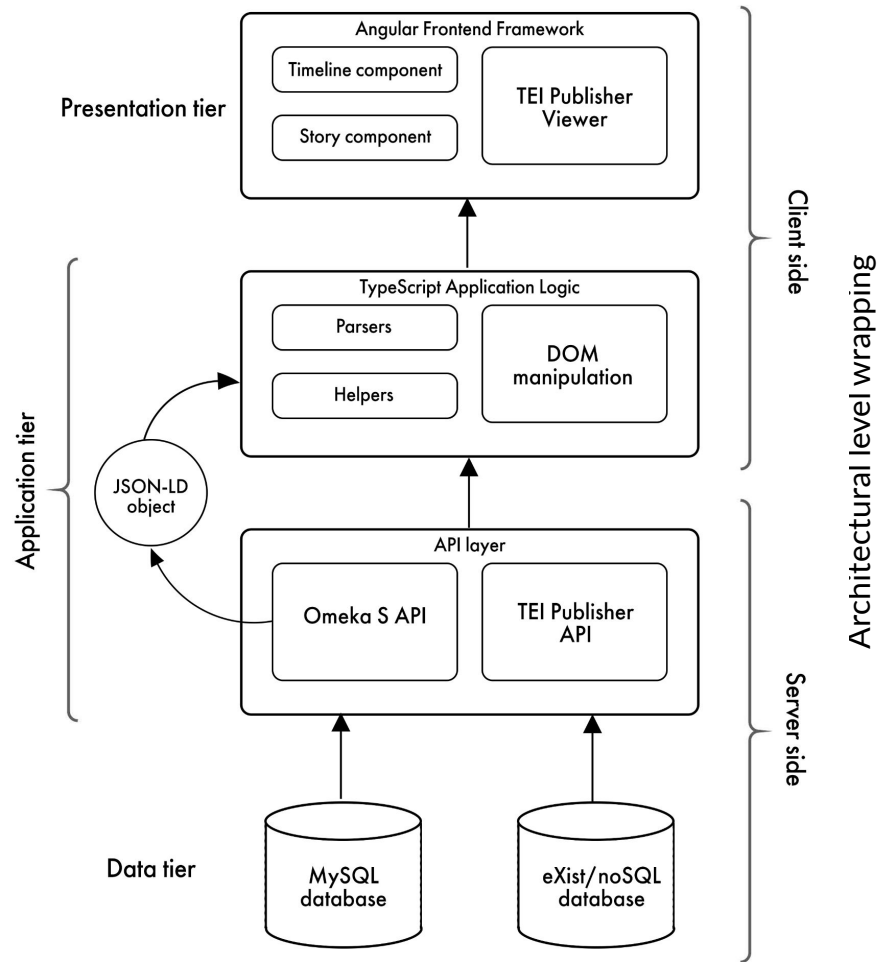
Sources: TEI Publisher and Omeka S
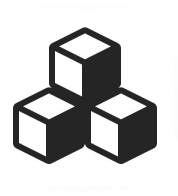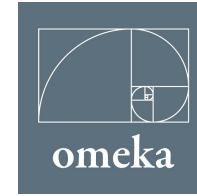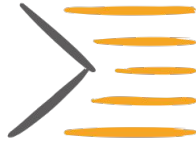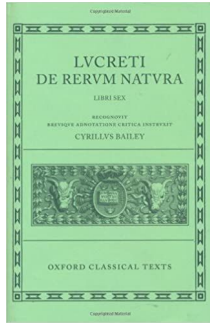
- **Specificity of contents**: two main heterogeneous contents (works of art and literary texts).
- **Specificity of fruition systems**: one oriented to viewing and reading texts; the other to browse digital items with metadata.
- The goal is to **build a cross narration** in order to integrate the contents into an homogeneous fruition.

TEI Pub + Omeka S + RDF = DRN

Presentation tier

Angular Frontend Framework
- Timeline component
- Story component
- TEI Publisher Viewer

TypeScript Application Logic
- Parsers
- Helpers
- DOM manipulation

JSON-LD object

API layer
- Omeka S API
- TEI Publisher API

Application tier

Client side

Server side

Architectural level wrapping

Data tier
- MySQL database
- eXist / noSQL database

omeka

+

Informative level wrapping

A

DRN

Documentation:
https://github.com/friendlynihilist/lucretius

Data model and serialization

- **Open Annotation** (OA) **provides an RDF-based approach to connect text chunks to a web resource** by employing **XPath selectors**.
- **CIDOC CRM Erlangen + RDF(S)** are employed to model the contents and their relationships in order **to build a story which contains a collection of topics**, plus an internal and external references to items and named entities.
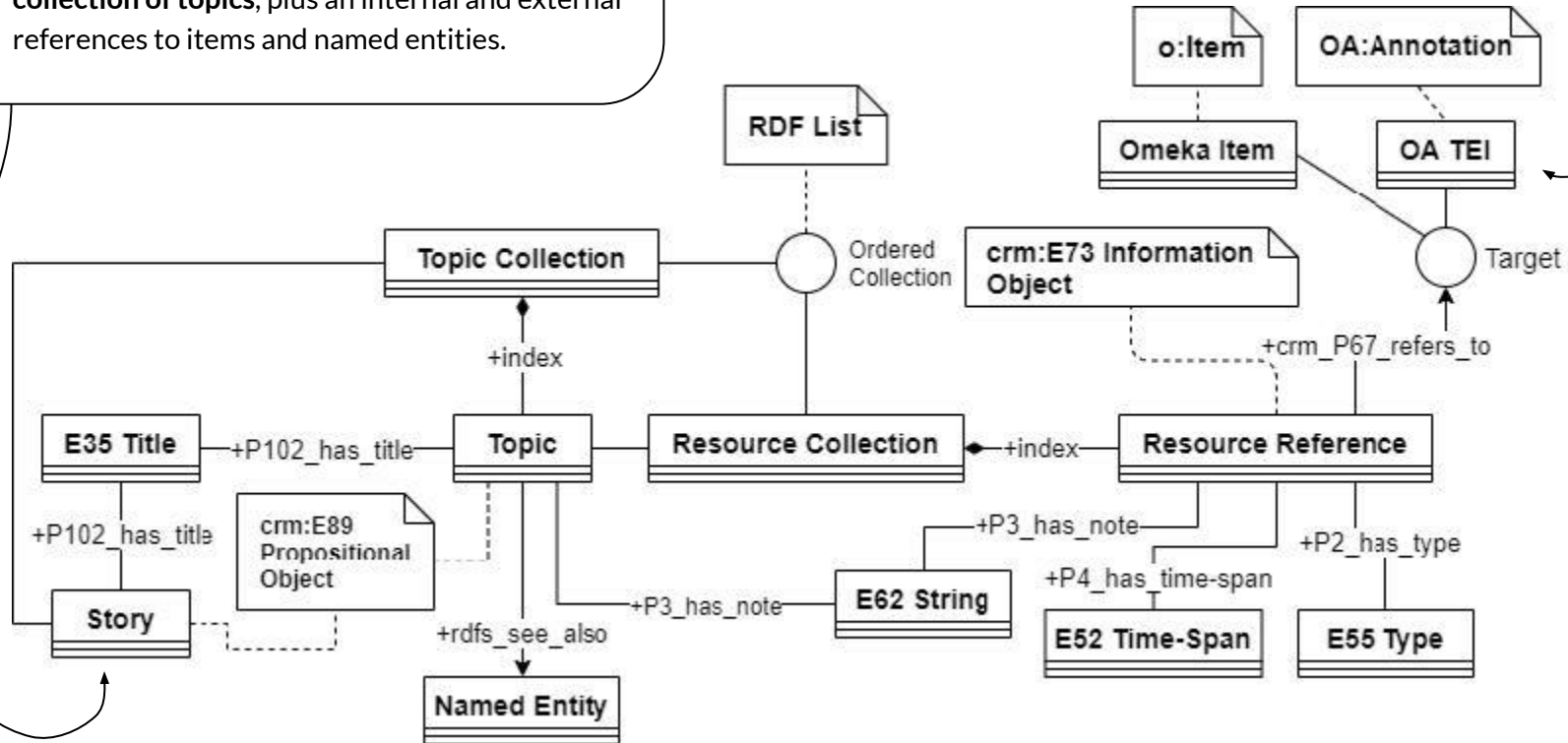
La peste d'Atene in triples... / 1

```
@prefix ecrm: <http://erlangen-crm.org/150716/> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .

<http://example.org/story_1>
  a <http://erlangen-crm.org/150716/E89_Propositional_Object> ;
  ecrm:P102_has_title <http://example.org/storyTitle_1> .

<http://example.org/storyTitle_1>
  a ecrm:E35_Title ;
  rdfs:label "La␣peste␣d'Atene" .

<http://example.org/topicCollection_1>
  ecrm:P67_refers_to <http://example.org/story_1> ;
  rdf:_1 <http://example.org/topic_1> ;
  rdf:_2 <http://example.org/topic_2> ;
  [...]
  rdf:_9 <http://example.org/topic_9> .
```

```
@prefix ecrm: <http://erlangen-crm.org/150716/> .
@prefix ex: <http://example.org/schema#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .

<http://example.org/topic_1>
  a <http://erlangen-crm.org/150716/E89_Propositional_Object> ;
  ecrm:P102_has_title <http://example.org/topicTitle_1> ;
  ex:hasNamedEntity <http://example.org/Arturo_Schwarz> ;
  ecrm:P3_has_note <http://example.org/topicBody_1> .

<http://example.org/topicTitle_1>
  a ecrm:E35_Title ;
  rdfs:label "Le␣acqueforti␣di␣Baj" ;
  rdf:value "Le␣acqueforti␣di␣Baj" .

<http://example.org/Arturo_Schwarz>
  rdfs:seeAlso <http://viaf.org/viaf/54154160> ;
  a <http://example.org/Person> ;
  rdfs:label "Arturo␣Schwarz" .

<http://example.org/topicBody_1>
  a <http://erlangen-crm.org/091125/E62.String> ;
  rdf:value "Nell'aprile␣del␣1958,␣Arturo␣Schwarz␣pubblica␣De␣
      rerum␣natura,␣una␣cartella,␣stampata␣in␣51␣esemplari,␣che␣
      raccoglie␣36␣acqueforti␣di␣Enrico␣Baj␣[...]" .
```

1. *La peste d'Atene* presents nine different topics

2. A topic is defined by a title and a body. It could also contain references to Named Entities and interpretative notes.

La peste d'Atene in triples... / 2

```
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix oa: <http://www.w3.org/ns/oa#> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .

<https://137.204.168.14/lib/api/items/25> rdfs:seeAlso <TEI-
    DRN:sez1/ann1> .
<TEI-DRN:sez1/ann1>
  a oa:Annotation ;
  oa:hasBody <https://137.204.168.14/lib/api/items/25> ;
  oa:hasTarget <TEI-DRN:sez1/ann1/trg> .

<TEI-DRN:sez1/ann1/trg>
  oa:hasSource <TEI-DRN:sez1> ;
  oa:hasSelector <TEI-DRN:sez1/ann1/trg/sel> .

<TEI-DRN:sez1/ann1/trg/sel>
  a oa:XPathSelector ;
  rdf:value "//*/*[position()>63␣and␣position()<79]/text()" .
```
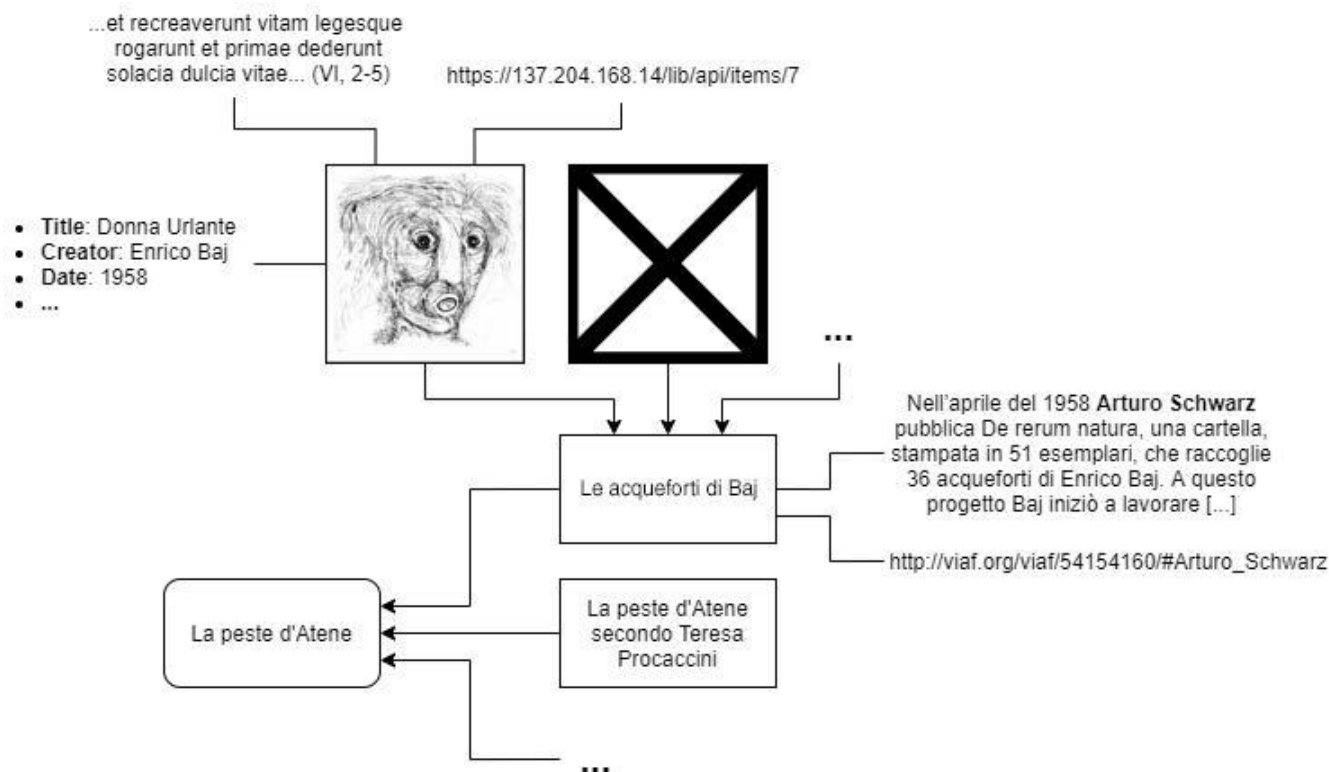
3. Moreover, and most importantly, **target items could also have references to textual parts** of De rerum natura, as in the above example.

Implementation example

...et recreaverunt vitam legesque rogarunt et primae dederunt solacia dulcia vitae... (VI, 2-5)

https://137.204.168.14/lib/api/items/7

- **Title:** Donna Urlante
- **Creator:** Enrico Baj
- **Date:** 1958
- ...

Le acqueforti di Baj

Nell'aprile del 1958 **Arturo Schwarz** pubblica De rerum natura, una cartella, stampata in 51 esemplari, che raccoglie 36 acqueforti di Enrico Baj. A questo progetto Baj iniziò a lavorare [...]

http://viaf.org/viaf/54154160/#Arturo_Schwarz

La peste d'Atene

La peste d'Atene secondo Teresa Procaccini

...

Interface and interaction design

- **Generous interfaces** (cf. Whitelaw).
- One of the goals of a **multiple views approach** is to enhance contents integration, overcoming distance between sources and offering an homogeneous fruition to the end user.
Using **stories (museal paths) as a privileged access point to the collection,** texts and linked resources.

Further developments

- Evaluation of system effectiveness in communicative terms. Do visitors reach a more thorough understanding of the collection by using DRN?
- Multiple views. Data visualization techniques such as force-directed graphs to represent relationships between institutional actors (e.g. artists and curators).
- Development of a data management system that allows the curator to describe museal paths in natural language.

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Carlo Teo Pedretti
https://github.com/friendlynihilist/lucretius
carloteo.pedretti@studio.unibo.it

Thank you!

Carlo Teo Pedretti

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