A generic **browsing mechanism** that gives the user a flexible, highly – configurable, detailed overview of an RDF dataset/database.

**BASIC PRINCIPLES**
1. Ability to display data of any schema/rdf format.
2. Ability to display all nodes of any class/instance.
3. Configurable rules to improve the layout or presentation for known classes and properties.
   3.1 Hide URIs that are meaningless for the user
4. Display high density information in one screen (that is not possible in solutions based on “object templates”)

**INNOVATION**
Current systems that allow principles 1, 2 fail with principles 3,4 and those that allow for 4 fail with 1,2,3
## Person Record

### Name
- Agostino Carracci

### Note

### Appellation
- Carracci, Agostino

### Gender
- Male

### Profession
- draughtsman
- printmaker
- printer

### Nationality
- Italian

### Birth date
- 1557

---

<table>
<thead>
<tr>
<th>Actor</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>group</td>
<td>Circle/School of Carracci, Agostino</td>
</tr>
<tr>
<td>group</td>
<td>Circle/School of Carracci, Agostino</td>
</tr>
<tr>
<td>group</td>
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</tr>
<tr>
<td>group</td>
<td>Circle/School of Carracci, Agostino</td>
</tr>
</tbody>
</table>
Mona Lisa in EDM before 16-09-2009
SOLUTION

• **Create an indented list** to handle the density and depth of information.
• **Invert incoming links** to display all the nodes of every class-instance.
• **Use priority based rule chains**, to define style and order of properties, depending on super classes and super properties.
• **Apply rules** for replacing labels.
• Provide the mechanisms for **configuring the display** of the information based on user’s preferences.
• Use **default options** for anything not converted by a rule.
• Improve the **usability and readability** of the web interface.

USE CASES

• Browsing Triple Stores
• Browsing Graph Databases
• Browsing RDF instance files e.g. X3ML transformed data
• Browsing RDF-OWL schema files
Requirements as Actions

- **Basic Functionality:** Start from an RDF resource (URI) and *create a tree* with all the outgoing and incoming properties of this resource.

- **Input:**
  - Support *Triple Stores*
  - Support *RDF file input*

- **Principles:**
  - Be *schema agnostic*
  - Create *loosely coupled component*

- **Presentation:**
  - Display the *labels* instead of the URIs
  - Display the *type* of each entity
  - Expand/collapse big *texts*
  - Collapse/extend to hide/show many results
  - Display *Images*

- **Advanced Actions:**
  - Mark *same instances*
  - Display *path* of selected element
  - Support *geospatial functionalities*
Requirements as Actions

- **Configuration:**
  - define default **depth** of the visualization
  - change name of the **labels**
  - modify **appearance of entities**
  - give **priorities** to **properties** according to the type of each entity
  - give **priority** to **sub properties**
Technologies

➢ **RDV API:** Provides the *core functionalities* to the developers to create their own applications.

  • Maven Java API
  
  • MicroServices based / Loosely Coupled Components Architecture
    o *12 select functions (select * with labels)* - **Level 1 component**
    o *XMLPropertiesReader* - **Level 1 component**
    o *4 return functions (return outgoing links with weight)* - **Level 2 component**
    o *RDFfileManager* - **Level 3 component**
    o *TripleStoreManager* - **Level 3 component**
    o *Prioritiser&sorter* - **Level 3 component**

➢ **RDV WebApp:** Uses the RDV API to provide the *visualization functionalities* to the end users.

  • Maven Java WebApp
  
  • JavaScript
  
  • jQuery
  
  • Bootstrap
  
  • Tomcat / Jetty
Basic Functionality

- **Collapse** to hide/show many results
- **default depth** of the visualization

1. Subject
2. Scroll bar
3. Collapse-expand button and black label color for entities
✓ **Create hrefs with the URIs**

*When tree depth > 6 levels then open in another tab*
Entities

✓ **Display labels** *(or uris without prefix)*
✓ **Display type labels**

Entity appearance examples:

<table>
<thead>
<tr>
<th>Label</th>
<th>Type</th>
<th>Type Icon</th>
</tr>
</thead>
<tbody>
<tr>
<td>bronze</td>
<td>[ core#Concept ]</td>
<td></td>
</tr>
<tr>
<td>Peregrine Edward Towneley</td>
<td>[ CRM: E21_Person ]</td>
<td></td>
</tr>
<tr>
<td>The British Museum: Gallery South Stairs</td>
<td>[ CRM: E53 Place ]</td>
<td></td>
</tr>
<tr>
<td>The Townley Caryatid</td>
<td>[ CRM: E22_Man-Made_Object ]</td>
<td></td>
</tr>
</tbody>
</table>

CRM Entity categories

Symbol & color Legend:

- Other Entities
- Temporal Entities
- Actors
- Physical Things
- Conceptual things
- Places
✓ priorities to properties according to the type of each entity
✓ **Lists of entities**

**Different cases:**
- 3 or less: expanded

```
P1_is_identified_by
  1979,0305,0.117 [ CRM: E42_Identifier ]
  JH.117Hillier no. [ CRM: E42_Identifier ]
  779444 [ CRM: E42_Identifier ]
```
Lists of entities

Different cases:
• 3 or less: expanded
• More than 3: expand-collapse button
✓ **Lists of entities**

**Different cases:**
- 3 or less: expanded
- More than 3: expand-collapse button
- More than 10: open list in pop up window
- More than 200: warning message
✓ Display Images

- Thumbnail (resize on mouseover)
- Lists of images (same functionality as any other list)
- Pop up image gallery (click on thumbnail)
Mark same instances

- Mark same instances
- Guide to next and previous same instances and highlight
Expand/collapse big texts

Different cases:
• Less than 600 characters: expanded

In a style adapted from Athenian work of the 5th century BC. One of a group of five surviving caryatids found at the site, arranged to form a colonnade in a religious sanctuary, probably of Demeter. The sanctuary was built on land owned by Regilla, wife of the Greek magnate and philosopher Herodes Atticus. One fragmentary caryatid, now in the Villa Albani, Rome, is signed by the Athenian sculptors Kriton and Nikolaos.
Expand/collapse big texts

Different cases:
• Less than 600 characters: expanded
• 600-1000 characters: expand-collpase button
Expand/collapse big texts

Different cases:
• Less than 600 characters: expanded
• 600-1000 characters: expand-collapse button
• More than 1000 characters: open text in pop-up window

Parian marble kouros.

Statue of a nude standing youth, less than life-size, from the base of the neck to below the knees is preserved, the head and lower legs are missing. Both arms are broken away above the biceps. Except for minor abrasions, the surface is in excellent condition.

The youth stands to the front, balanced on both legs, the right slightly drawn back. The arms were at the sides, the forearms bent forward to reach the front of the thighs, where the points of attachment remain. The hair was short, as no trace remains on the neck.

The bony structure of the chest is heavily emphasised, in contrast with the remainder of the modelling, the other body forms being slender and soft. The collar-bones are prominent; the shoulders are narrow and sloping. The breasts are high placed and in high relief, which is carried back to the armpits; both nipples are chipped, but were originally large. The lower edge of the ribs is strongly outlined; the navel is eye-shaped, the lower abdomen and the hips are long and narrow. The thighs and legs are square-cut in section. At the back the shoulders are flat and the pelvis prominent, the spine slightly incurved.
**Dimension appearance**

Current appearance:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>P43_has_dimension</td>
<td>*/object/GAA3387/height/1 [ CRM: E54_Dimension ○ ]</td>
</tr>
<tr>
<td>P2_has_type</td>
<td>Height [ CRM: E55_Type ○ ]</td>
</tr>
<tr>
<td>P91_has_unit</td>
<td>*/Centimeter</td>
</tr>
<tr>
<td>P90_has_value</td>
<td>72.0</td>
</tr>
<tr>
<td>type</td>
<td>E54_Dimension</td>
</tr>
</tbody>
</table>

Future improvement:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>P43_has_dimension</td>
<td>Height: 72.0 Centimeter [ CRM: E54_Dimension ○ ]</td>
</tr>
</tbody>
</table>
Location functionality

✓ **Location** functionality

Current appearance:

![Location functionality screenshot](image1.png)

Future improvement (use a geolocation API when coordinates are available):

![Location functionality screenshot](image2.png)
Show path of selected element

- Right click: show path of selected element
- Pop up window: only elements related to the path of the selected object
Configurable:

- create templates
- expansion depth
- type of the entities
- priorities to properties according to the type of each entity
- property label
- thumbnails
**Configuration - Create templates**

- **Create templates**

![Model Overview](image)

![Table of templates](image)

### Table of templates

<table>
<thead>
<tr>
<th>AA</th>
<th>Template name</th>
<th>Author</th>
<th>Related Ontology</th>
<th>Related Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Archaeology</td>
<td>Nikos Minadakis</td>
<td>CIDOC</td>
<td>........</td>
</tr>
<tr>
<td>2</td>
<td>Biology</td>
<td>Lida Harami</td>
<td>LIDO</td>
<td>.....</td>
</tr>
</tbody>
</table>

### New template (or Edit template)

![New template](image)
✓ *expansion depth*

<table>
<thead>
<tr>
<th>Depth</th>
<th>Related Property or Entity type</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>has name</td>
</tr>
</tbody>
</table>
- **type of the entities**
- **priorities to properties** according to the type of each entity

---

### Entity Type configuration

<table>
<thead>
<tr>
<th>Original entity type label</th>
<th>New entity type label</th>
<th>Color</th>
<th>Icon</th>
<th>Property label</th>
<th>Property priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actor</td>
<td>Person</td>
<td></td>
<td></td>
<td>has appellation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>has .....</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>has .....</td>
<td>3</td>
</tr>
</tbody>
</table>
✓ **property type label**

### Property label configuration

<table>
<thead>
<tr>
<th>Original property label</th>
<th>New property label</th>
</tr>
</thead>
<tbody>
<tr>
<td>has appellation</td>
<td>has name</td>
</tr>
</tbody>
</table>
✓ **thumbnails**

### Thumbnail configuration

#### Information about thumbnail configuration

- **Show thumbnail next to entity label in the following case:**
  - File extension

#### File extension

<table>
<thead>
<tr>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>png</td>
</tr>
<tr>
<td>jpeg</td>
</tr>
<tr>
<td>gif</td>
</tr>
</tbody>
</table>

#### Show characteristic thumbnail next to subject entity label in the following case:

<table>
<thead>
<tr>
<th>Subject entity type</th>
<th>Property of characteristic thumbnail original location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actor</td>
<td>has characteristic image</td>
</tr>
</tbody>
</table>

[Add to table button]
Integration with Metaphacts Platform for Fundamental Searching

Find: Things HAS TYPE Bronze

Find:

* HAS TYPE
  - Bronze
  - or
  - and

- HAS TYPE
  - Bronze

100044
100108
100203
100887
100889
100891
101414
102603
103134
103361
# Integration with Metaphacts Platform for Fundamental Searching

## View in RDF visualizer

Filter Results

<table>
<thead>
<tr>
<th>property</th>
<th>object</th>
</tr>
</thead>
<tbody>
<tr>
<td>has met</td>
<td>German Archaeological Institute</td>
</tr>
<tr>
<td>has type</td>
<td>coins</td>
</tr>
<tr>
<td>has type</td>
<td>Bronze</td>
</tr>
<tr>
<td>has type</td>
<td>ae</td>
</tr>
<tr>
<td>has type</td>
<td>coin</td>
</tr>
<tr>
<td>has type</td>
<td>300010957</td>
</tr>
<tr>
<td>by</td>
<td>German Archaeological Institute</td>
</tr>
<tr>
<td>from</td>
<td>German Archaeological Institute</td>
</tr>
<tr>
<td>is identified by</td>
<td>100044</td>
</tr>
<tr>
<td>was produced by</td>
<td>production of coin 100044</td>
</tr>
</tbody>
</table>
Integration with Metaphacts Platform for Fundamental Searching

https://www.dainst.org/COIN/100044

<table>
<thead>
<tr>
<th>100044 [ CRM: E22_Man-Made_Object ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2_has_type</td>
</tr>
<tr>
<td>coins [ CRM: E55_Type ]</td>
</tr>
<tr>
<td>P43_has_dimension</td>
</tr>
<tr>
<td>urm:uuid:fa92ac2c-3085-407a-8fa4-182ebb319ad5 [ CRM: E54_Dimension ]</td>
</tr>
<tr>
<td>weight of coin 100044 [ CRM: E54_Dimension ]</td>
</tr>
<tr>
<td>diameter of coin 100044 [ CRM: E54_Dimension ]</td>
</tr>
<tr>
<td>PS2_has_current_owner</td>
</tr>
<tr>
<td>German Archaeological Institute [ CRM: E40_Legal_Body ]</td>
</tr>
<tr>
<td>P45_consists_of</td>
</tr>
<tr>
<td>Bronze [ CRM: core#Concept ]</td>
</tr>
<tr>
<td>P3_has_note</td>
</tr>
<tr>
<td>Datierung: ca. 215-Anfang 2. Jh. v. Chr. Westermann 1991, 14; BMC (Mysien) S. 121-122, 75-83</td>
</tr>
<tr>
<td>P50_has_current_keeper</td>
</tr>
<tr>
<td>German Archaeological Institute [ CRM: E40_Legal_Body ]</td>
</tr>
<tr>
<td>P10a1_was_produced_by</td>
</tr>
<tr>
<td>production of coin 100044 [ CRM: E12_Production ]</td>
</tr>
<tr>
<td>P7_took_place_at</td>
</tr>
<tr>
<td>Pergamon [ CRM: E53_Place ]</td>
</tr>
<tr>
<td>type</td>
</tr>
<tr>
<td><a href="http://www.cidoc-crm.org/cidoc-crm/E12_Production">http://www.cidoc-crm.org/cidoc-crm/E12_Production</a></td>
</tr>
<tr>
<td>P17_was_motivated_by</td>
</tr>
<tr>
<td>Attaliden [ CRM: E39_Actor ]</td>
</tr>
<tr>
<td>P10_falls_within</td>
</tr>
<tr>
<td>hellenistisch [ CRM: E4_Period ]</td>
</tr>
<tr>
<td>P1_is_identified_by</td>
</tr>
<tr>
<td>100044 [ CRM: E41_Appellation ]</td>
</tr>
</tbody>
</table>
• We used a part of the British Museum’s database BMCollection-2013-09-25.tar as test data

• Size of Triple Store: 52,261,811

• Demo url: http://139.91.183.60:8084/RDFVisualizer-webapp
Next Steps

- Return reverse properties
- Entities with multiple types
- Complete mark same instances functionality
- Use geolocation API
- Choose “label missing” policy
- Make UI configurable and more user friendly
- Documentation and Uploading to Github
- Publication