Conceptual Modeling of Systems – Athens City Center

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The project aims to create an online guide for urban areas with recreational, touristic, naturalistic, and cultural attractions. While initially developed for a specific area contained within the Avenues Vassilisis Sofias, Vassilisis Amalias, Vassilisis Olgas, Vassilia Konstantinou and Irodou Attikou St, which includes landmarks such as the Parliament, Monument of the Unknown Soldier, National Garden, Presidential Guard, and Zappeion Palace, the scheme is adaptable to similar locations.

Our goal is to document, map (e.g., on Google Maps), describe, and link all points of interest in the designated area, including buildings, monuments, archaeological sites, artwork, flora, fauna, art installations, and public transport. Each entity within these categories is cataloged with its name, relevant information (varies by category), geographical coordinates, website references (if available), and additional pertinent details. For instance, we provide species and origin details for plants in the National Garden and historical context for artworks within the garden. The schema features a few instances for demonstration purposes.

The model is based on the CIDOC CRM version 7.1. (http://www.cidoc-crm.org/) and developed using Protégé (https://protege.stanford.edu/). We used Research Space (https://researchspace.org/) to run the queries and generate the graphs presented in the report.

The report is split on 4 parts:

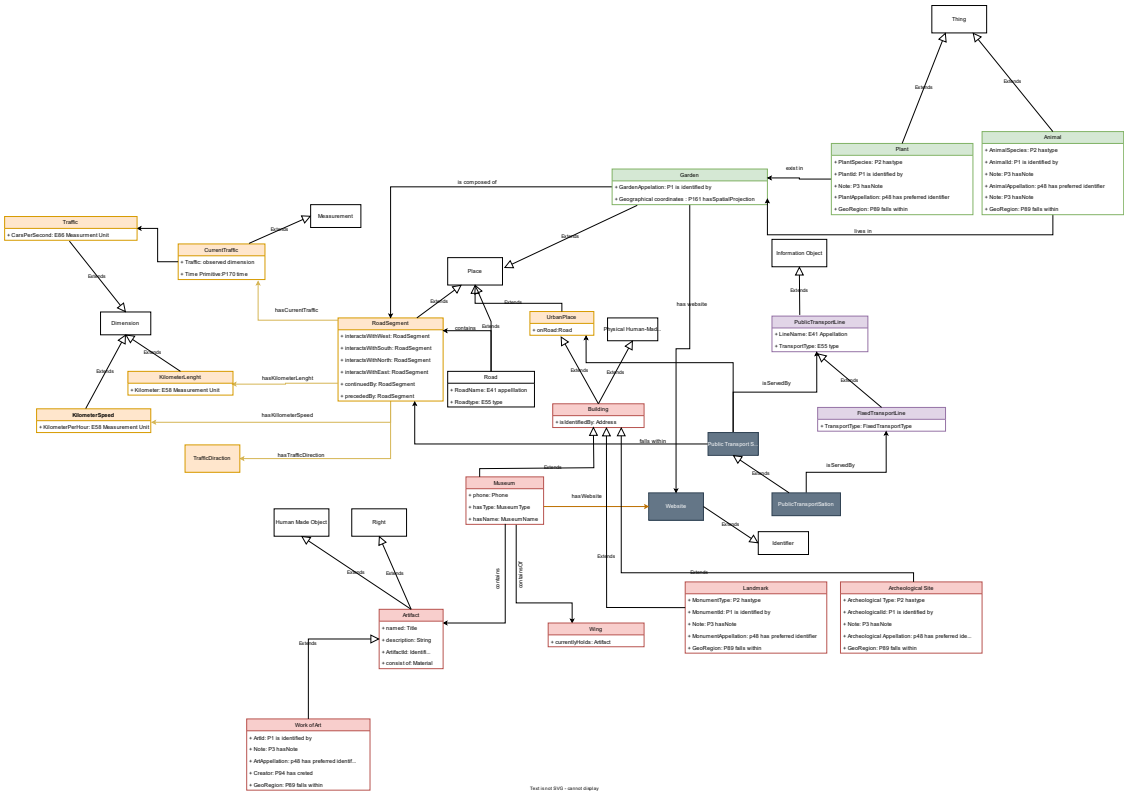
1. **Modeling Views**, where we consider which views will be modelled on our schema.
2. **A graphical UML representation** of our schema.
3. The Research Space **Knowledge Map** of select Entities (classes and instances), showing their relationships with other Entities in our schema.
4. Research Space **Queries**, where we use *SPARQL* to query our schema for information about select Entities. These correspond to frequent use cases for our online application (e.g. a tourist asking the system about the address of the Benaki Museum).

Modeling Views

The following views are included in our schema:

1. Topographical view (roads, buildings, transport)
2. Garden view (National Garden)
3. Museum view (Benaki Museum)
4. Landmarks

Graphical Representation



The different colors represent the different views of our model. The image is saved in SVG format, so it supports zooming well.

Queries (Research Space)

Gardens

1) Where is the National Garden?

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX ont: <http://www.co-ode.org/ontologies/ont.owl#>
PREFIX cidoc-crm: <http://example.org/cidoc-crm/>

SELECT ?location
WHERE {
   ont:NationalGarden rdf:type ont:Garden ;
                      ont:onRoad ?location .
}
```

2) Which is the website of the National Garden?

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX ont: <http://www.co-ode.org/ontologies/ont.owl#>

SELECT ?website
WHERE {
  <http://www.co-ode.org/ontologies/ont.owl#NationalGarden> ont:website
?website .
}
```

3) How is the plant Laurus Nobilis normally called?

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX ont: <http://www.co-ode.org/ontologies/ont.owl#>
PREFIX cidoc-crm: <http://www.cidoc-crm.org/cidoc-crm/>

SELECT ?preferredIdentifier
WHERE {
  <http://www.co-ode.org/ontologies/ont.owl#LaurusNobilis> cidoc-
crm:P48_has_preferred_identifier ?preferredIdentifier .
}
```

Museums

1) Which is the address of the Benaki Museum?

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX ont: <http://www.co-ode.org/ontologies/ont.owl#>

SELECT ?address
WHERE {
  <http://www.co-ode.org/ontologies/ont.owl#Benaki.Museum> ont:address
?address .
}
```

2) What is the purpose of the Zappeion Palace?

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX ont: <http://www.co-ode.org/ontologies/ont.owl#>
PREFIX cidoc-crm: <http://www.cidoc-crm.org/cidoc-crm/>

SELECT ?P2_has_type WHERE {
  <http://www.co-ode.org/ontologies/ont.owl#Zappeion.Hall>
    cidoc-crm:P2_has_type ?P2_has_type.
}
```

Landmarks

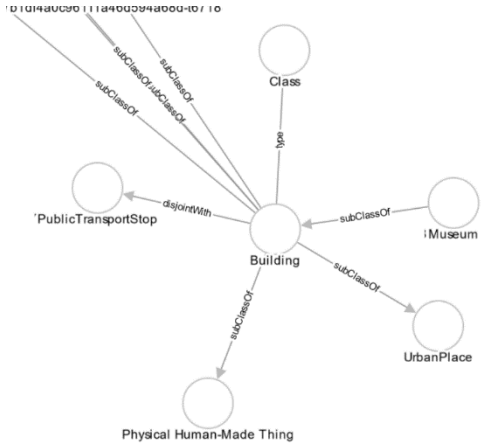
1) Where is the “Little Fisherman” situated?

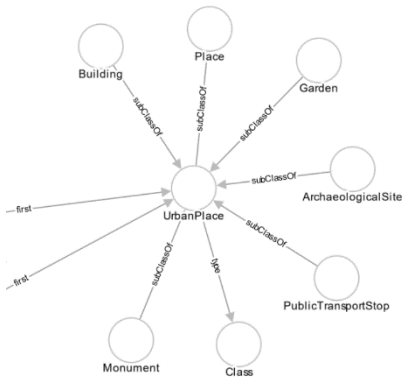
```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX ont: <http://www.co-ode.org/ontologies/ont.owl#>
PREFIX cidoc-crm: <http://www.cidoc-crm.org/cidoc-crm/>

SELECT ?P168_place_is_defined_by WHERE {
  <http://www.co-ode.org/ontologies/ont.owl#Fisherman_Statue>
   cidoc-crm:P168_place_is_defined_by ?P168_place_is_defined_by.
}
```

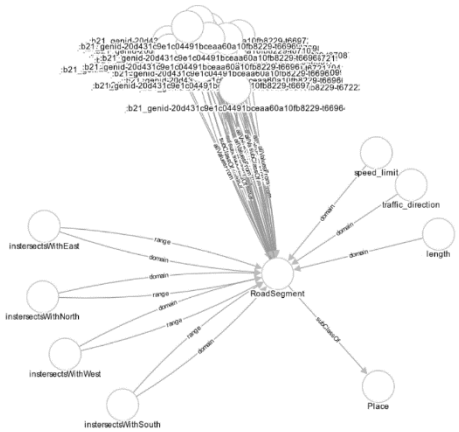
Knowledge Map (Research Space)

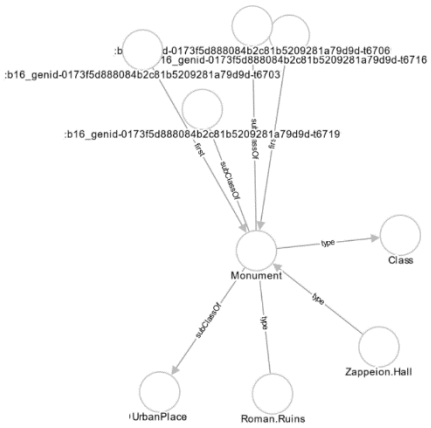
Below are indicative knowledge graphs generated by Research Space for select classes and instances.

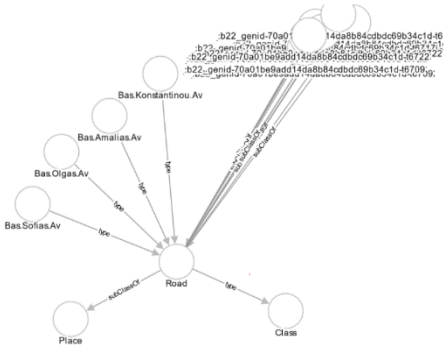
Classes



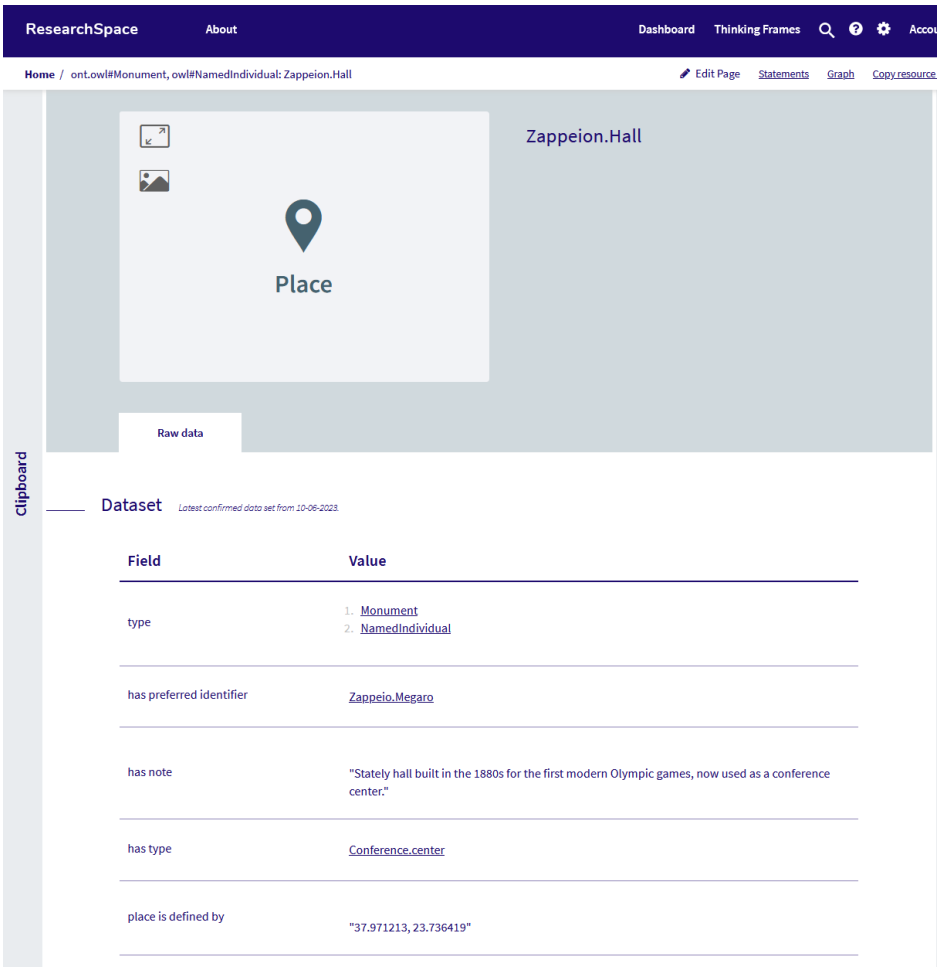


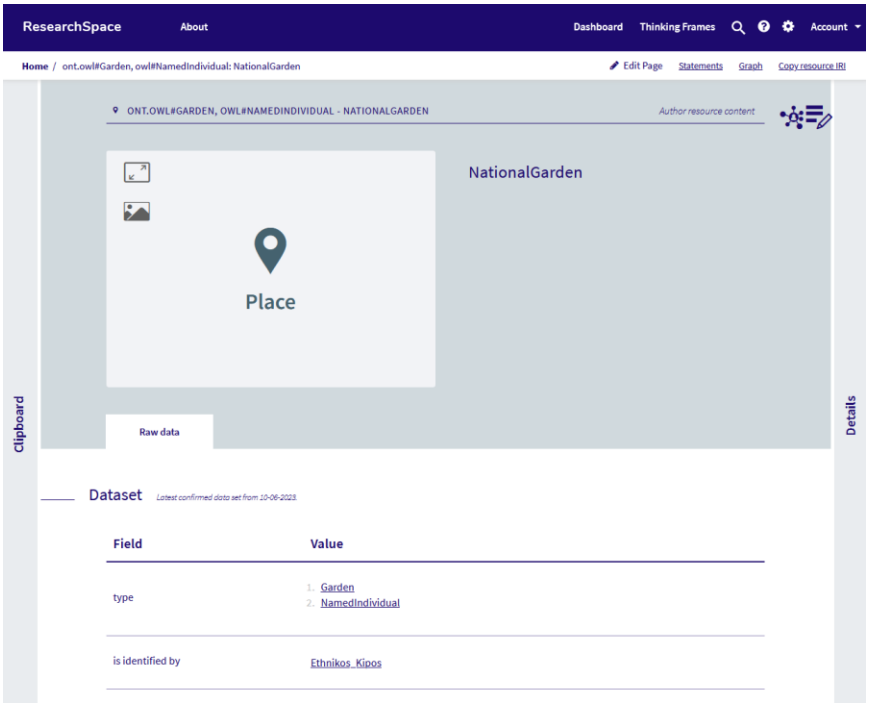



:b16_genid-0173f5d888084b2c81b5209281a79d9d-t6706
:b16_genid-0173f5d888084b2c81b5209281a79d9d-t6716
:b16_genid-0173f5d888084b2c81b5209281a79d9d-t6703
:b16_genid-0173f5d888084b2c81b5209281a79d9d-t6719
first
rest
rest
subClassOf
Monument
type
Class
type
type
subClassOf
subClassOf
Zappeion.Hall
UrbanPlace
Roman.Ruins


Bas.Konstantinou.Av
Bas.Amalias.Av
Bas.Olgas.Av
Bas.Sofias.Av
type
type
type
type
Road
subClassOf
type
Place
Class

Instances


ResearchSpace
About
Dashboard
Thinking Frames
Home / ont.owl#Monument, owl#NamedIndividual: Zappeion.Hall
Edit Page
Statements
Graph
Copy resource
Clipboard
Zappeion.Hall
Place
Raw data
Dataset
Latest confirmed data set from 10-06-2023.
Field
Value
type
1. Monument
2. NamedIndividual
has preferred identifier
Zappeio.Megaro
has note
"Stately hall built in the 1880s for the first modern Olympic games, now used as a conference center."
has type
Conference.center
place is defined by
"37.971213, 23.736419"


ResearchSpace
About
Dashboard
Thinking Frames
Account
Home / ont.owl#Garden, owl#NamedIndividual: NationalGarden
Edit Page
Statements
Graph
Copy resource IRI
ONT.OWL#GARDEN, OWL#NAMEDINDIVIDUAL - NATIONALGARDEN
Author resource content
NationalGarden
Place
Clipboard
Details
Raw data
Dataset
Latest confirmed data set from 10-06-2023.
Field
Value
type
1. Garden
2. NamedIndividual
is identified by
Ethnikos_Kipos