



Checkpoint 3 + UFO & OntoUML

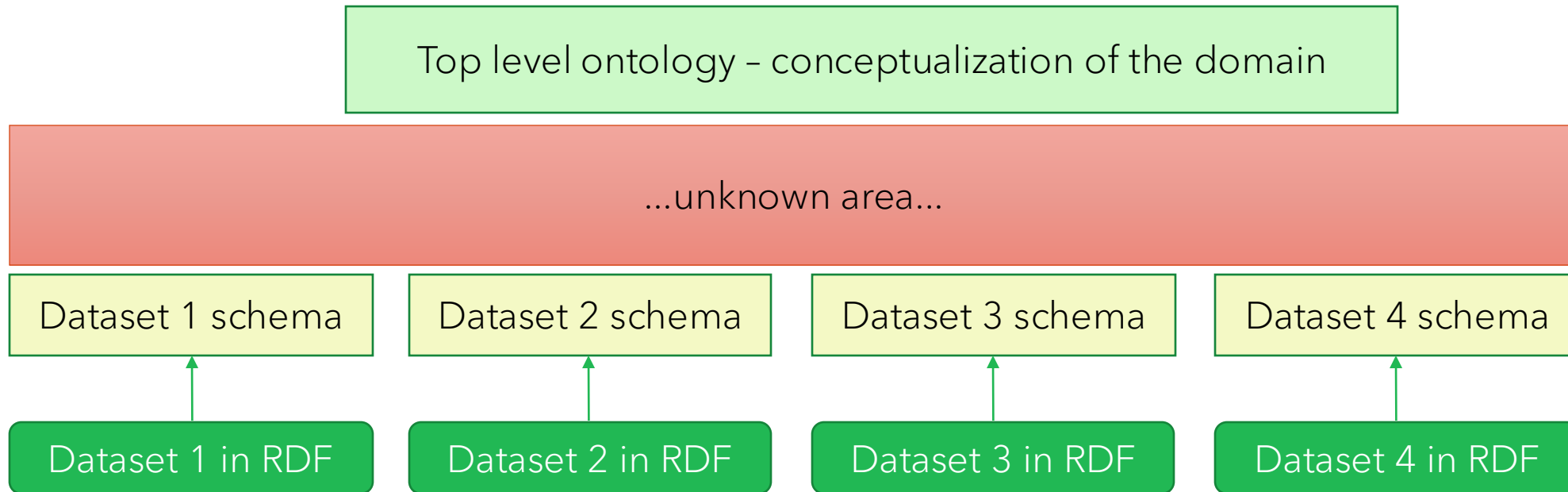
12th tutorial

Ontologies and Semantic Web

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Checkpoint 3 - (expected) status after CP2



Checkpoint 3 - goals

- 1st phase – fill this to interconnect knowledge:

...unknown area...

- 2nd phase – use SPARQL query to answer the question to receive data using ontology concepts:

Dataset 1 in RDF

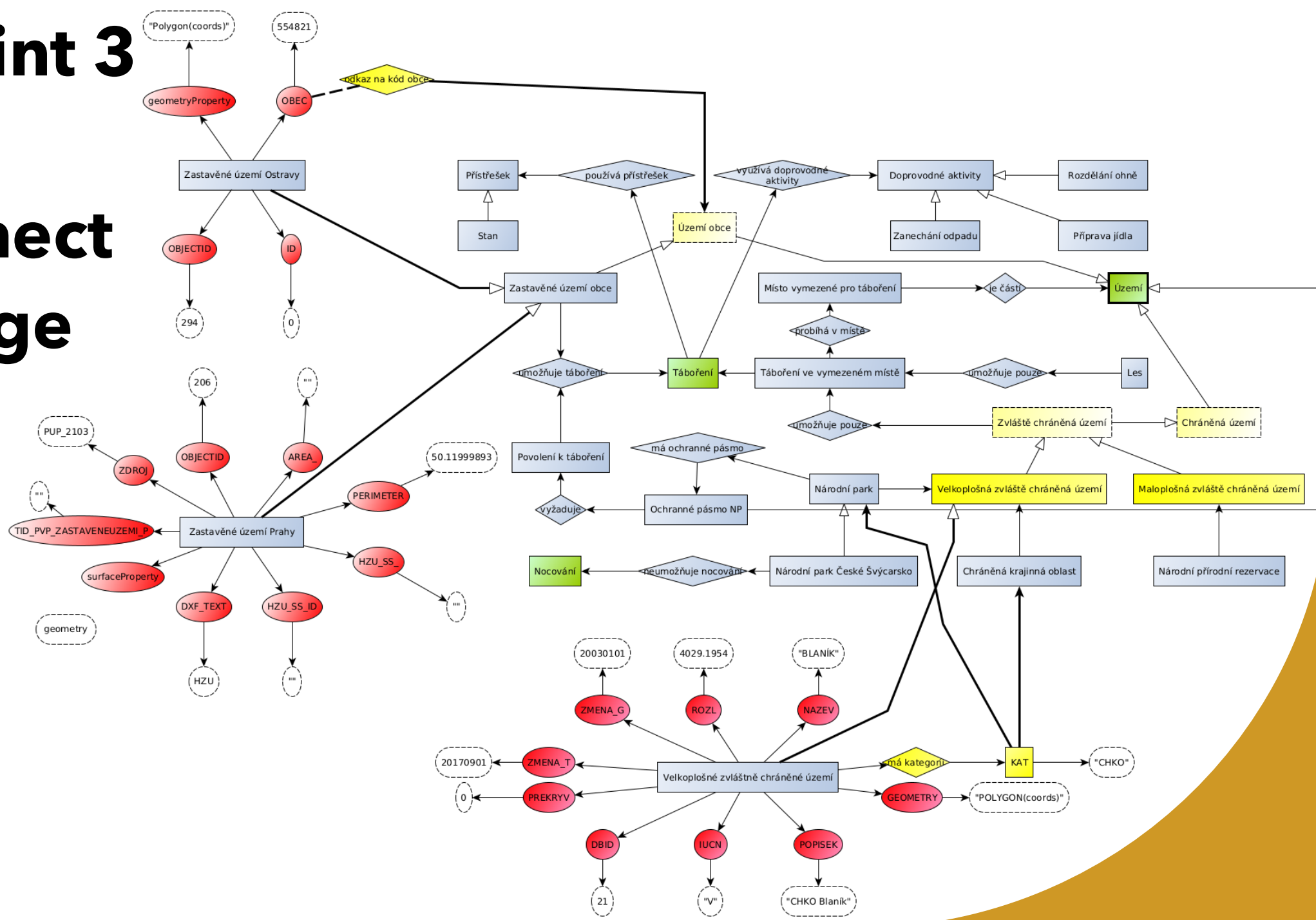
Dataset 2 in RDF

Dataset 2 in RDF

Dataset 2 in RDF

Checkpoint 3

Interconnect knowledge

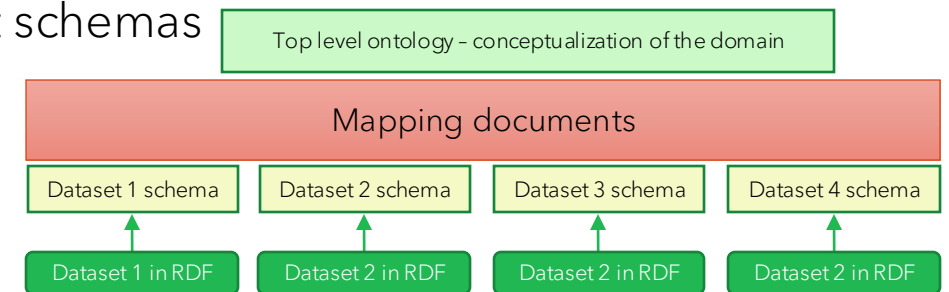


Checkpoint 3 - where to create connections

- Mapping is used to connect schema of the specific data into the general knowledge in the ontology. That prevents us from creating the mapping on the ontology level. Therefore, we have two options:

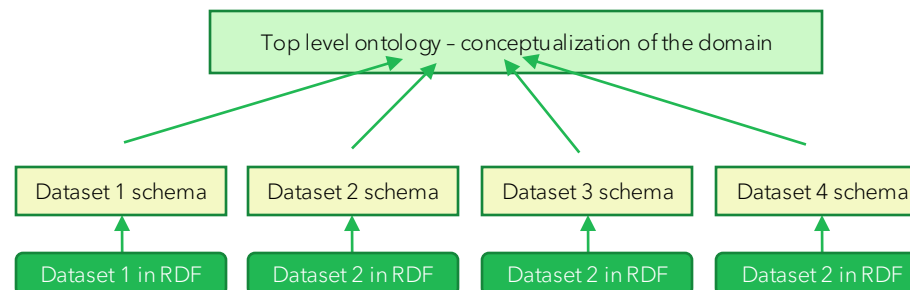
1. Create mapping layer between ontology and dataset schemas

- This may include multilevel complex mappings based on the values of attributes of objects from other datasets



2. Include mapping in the dataset schemas

- Easy mappings between objects from one dataset and ontology



Checkpoint - SPARQL queries

- Once everything is done, upload all data, schemas, ontologies and mappings into the GraphDB and ask (non-trivial) SPARQL queries to answer the question of the project.

Checkpoint 3

Expected outputs



Include mapping files (or changed dataset schemas) in the output,



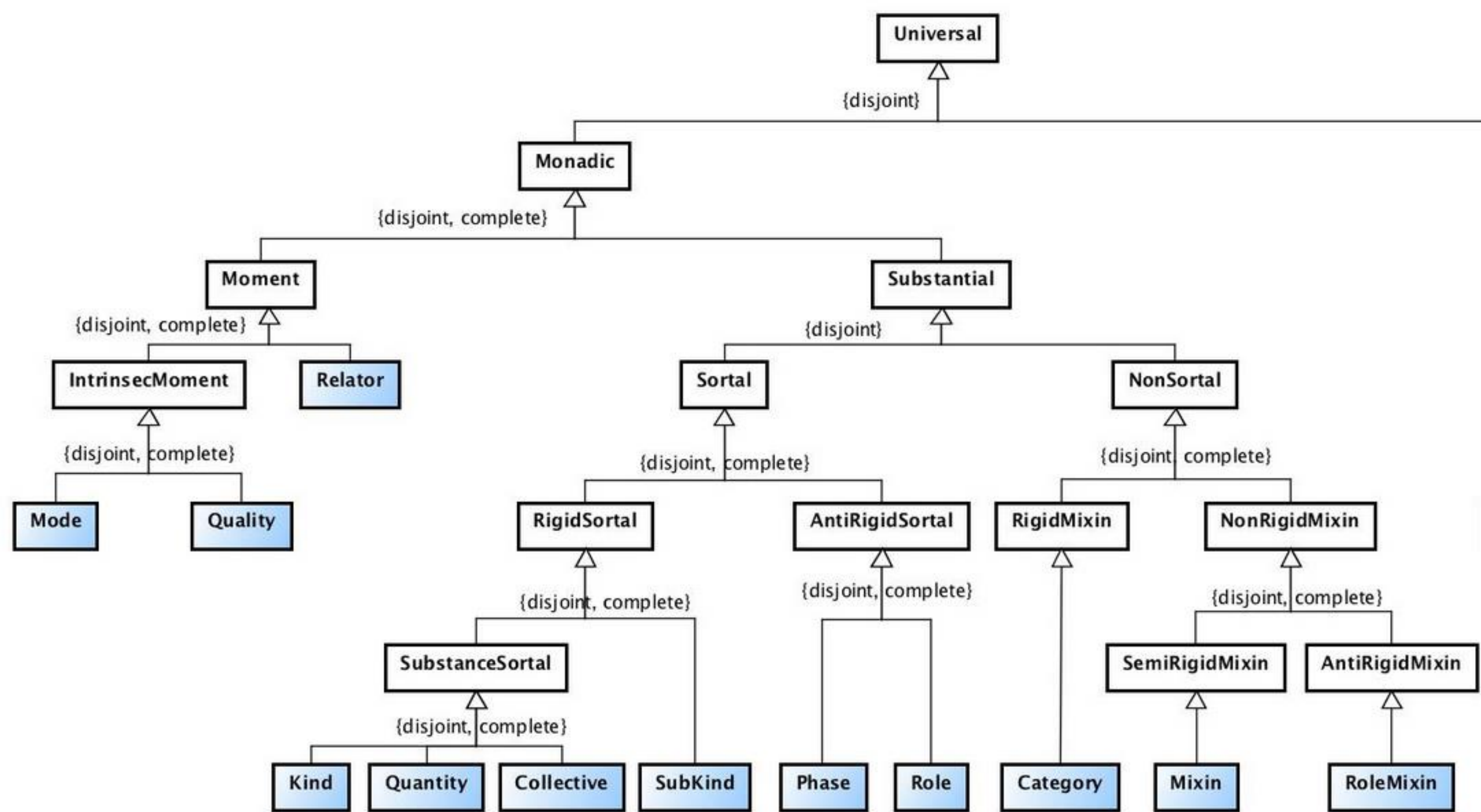
Include SPARQL query/ies answering the question,



Into the PDF output document add description of the mapping, question you want to answer, SPARQL query and analysis of the query output (discussion). In some cases, you want to have variable in the input, so discuss it and include various examples (e.g. visualized in a map or something)



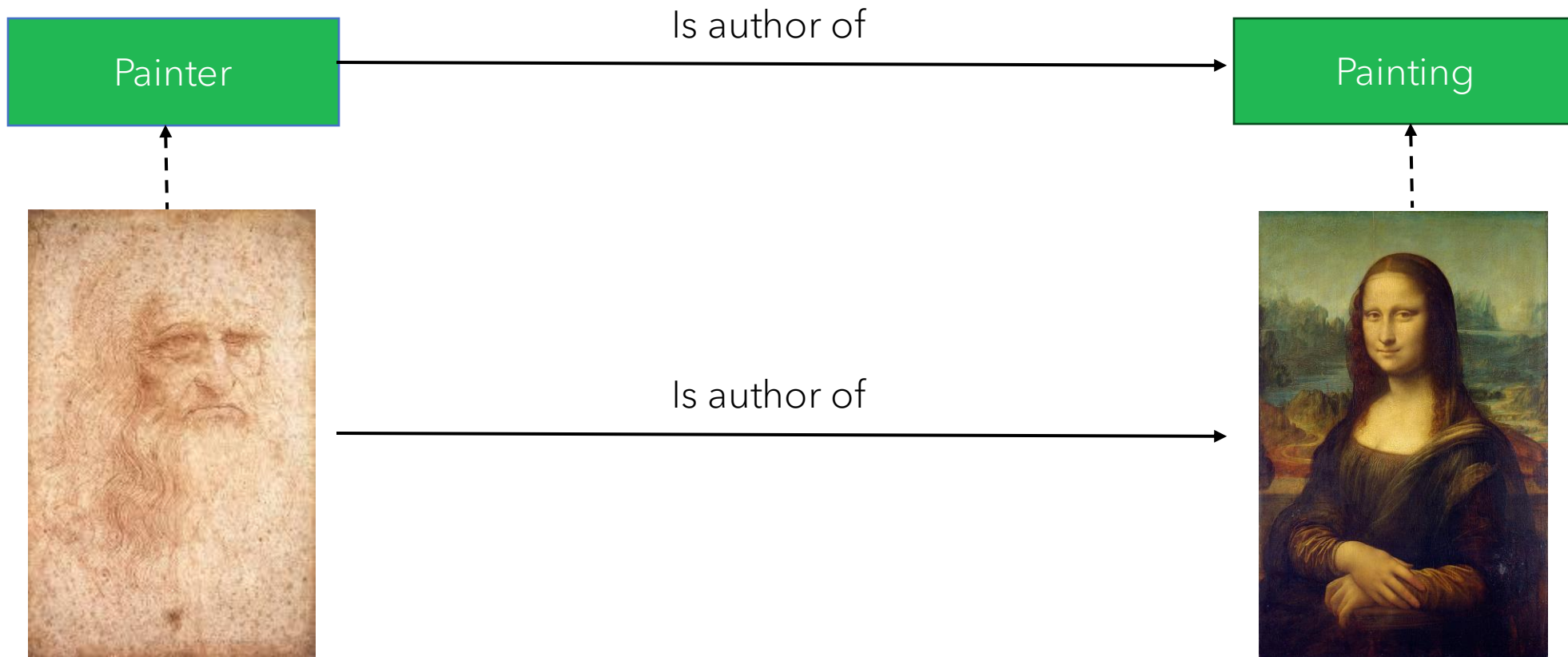
Unified Foundational Ontology - UFO and OntoUML



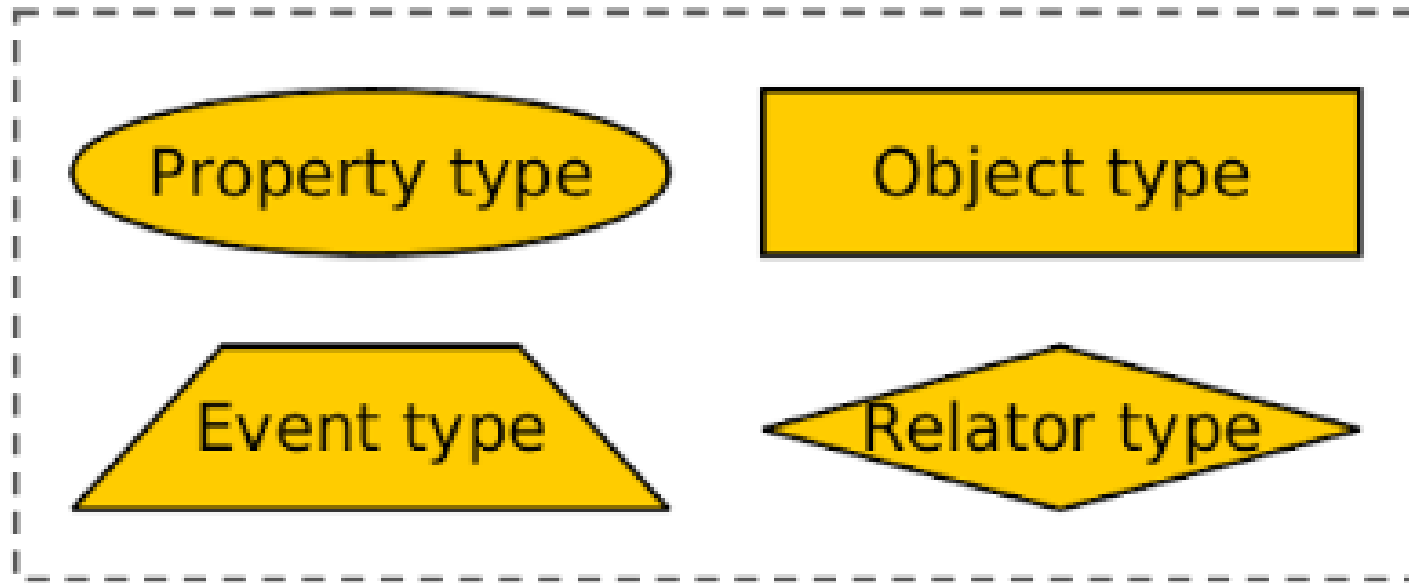
UFO and OntoUML

- UFO - foundational ontology
- OntoUML - formal language based on UFO

Types and Individuals



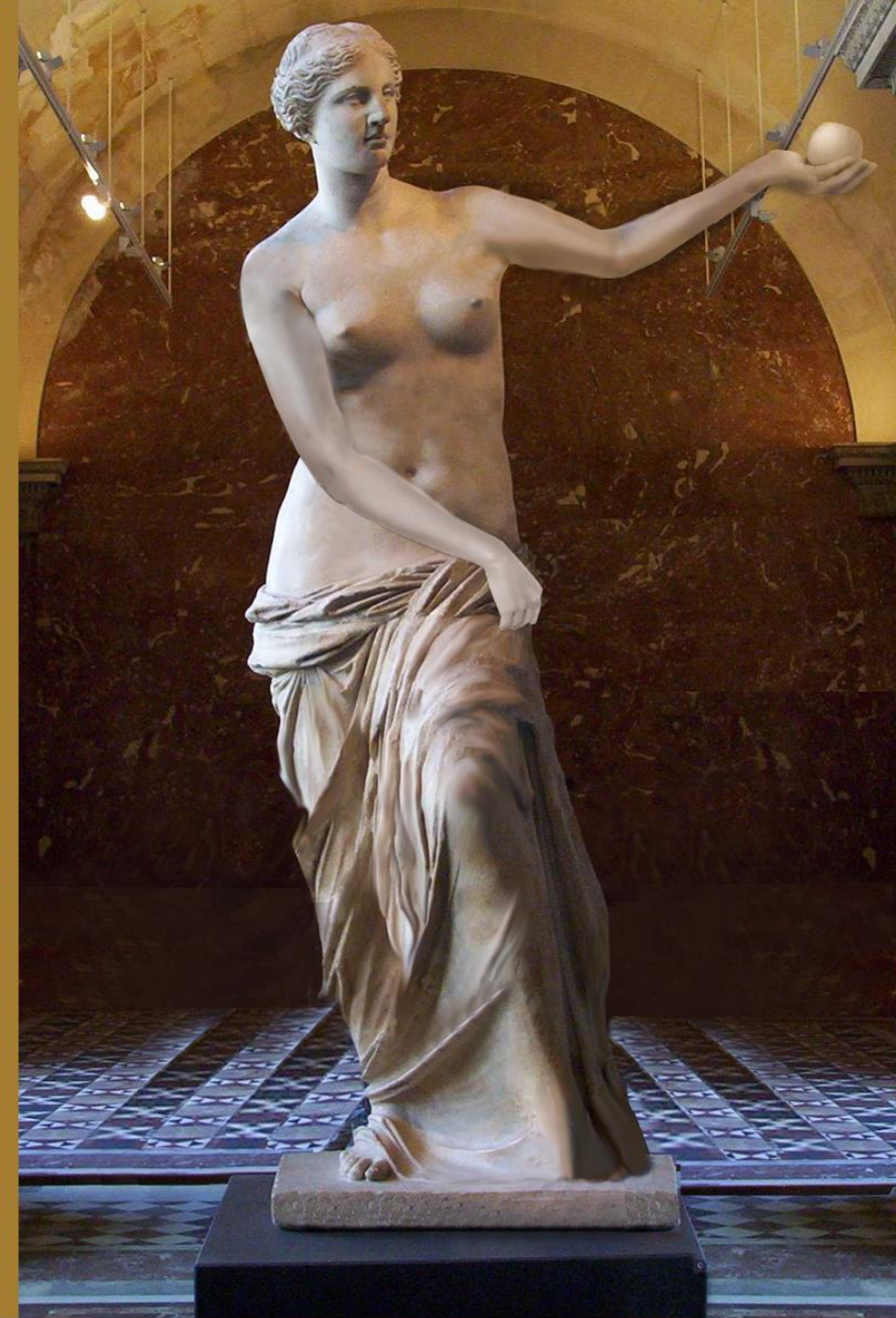
UFO Stereotypes



Identity principle



Photoshop Reconstruction of
Venus de Milo



Venus with arms, as they are believed
to have existed - the right holding up the
slipping tunic, the left an apple.



Identity principle



Rigidity

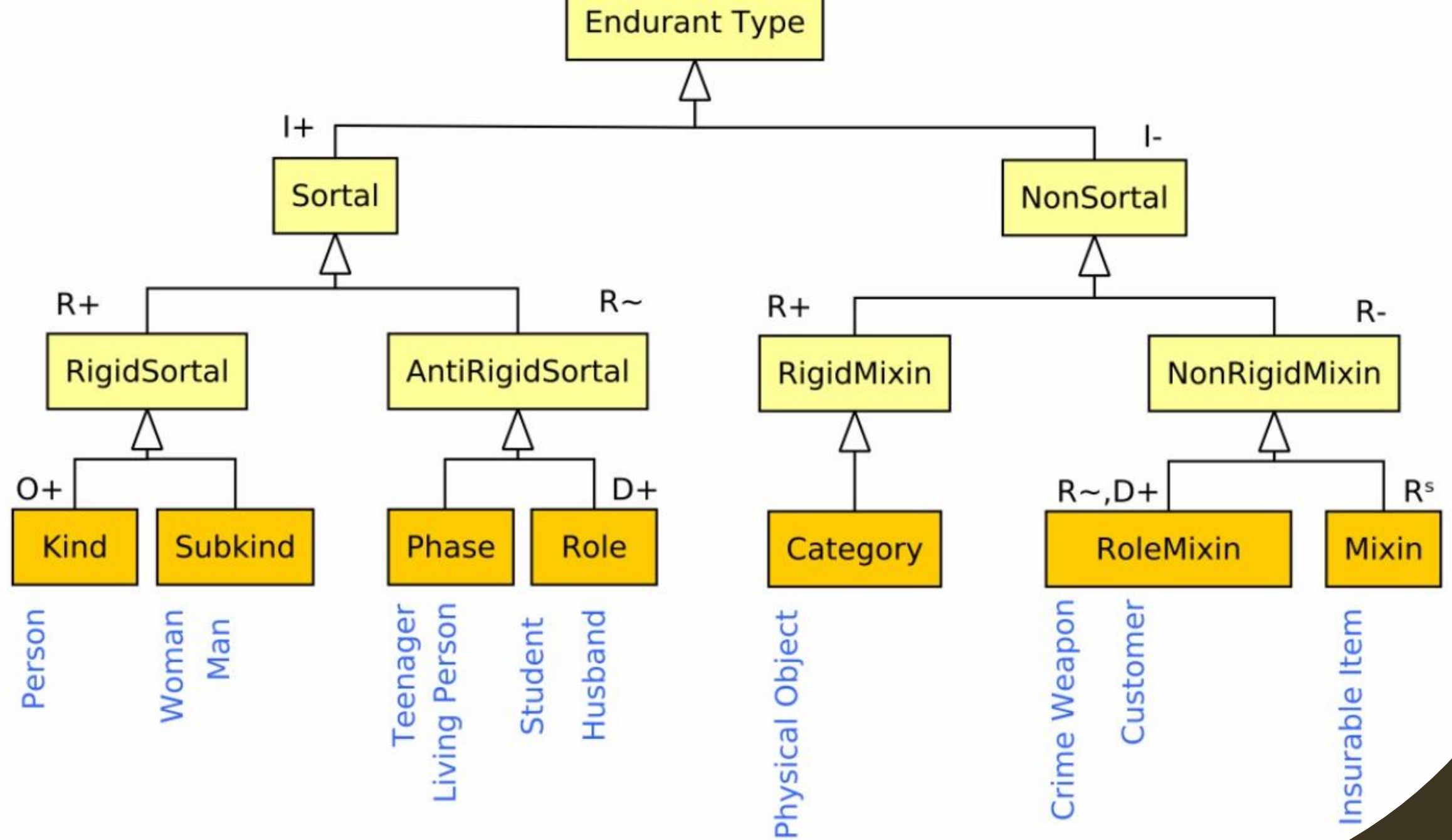
Dog

French
Bulldog

Puppy

Adult
dog

Young
dog



Meta-properties of endurant types

Let's T, T' be endurant types, R relation.

- Identity

$I^+(T)$ – carries identity

$O^+(T)$ – owns (supply) identity

- Rigidity

$$R^+(T) = \Box(\forall x T(x) \rightarrow \Box(T(x))) \quad (\text{Rigid})$$

$$R^-(T) = \neg R^+(T) = \Diamond(\exists x T(x) \wedge \Diamond \neg T(x)) \quad (\text{Non-Rigid})$$

$$R^\sim(T) = \Box(\forall x T(x) \rightarrow \Diamond(\neg T(x))) \quad (\text{Anti-Rigid})$$

$$R^s(T) = R^-(T) \wedge \neg R^\sim(T) \quad (\text{Semi-Rigid})$$

- Relational Dependence

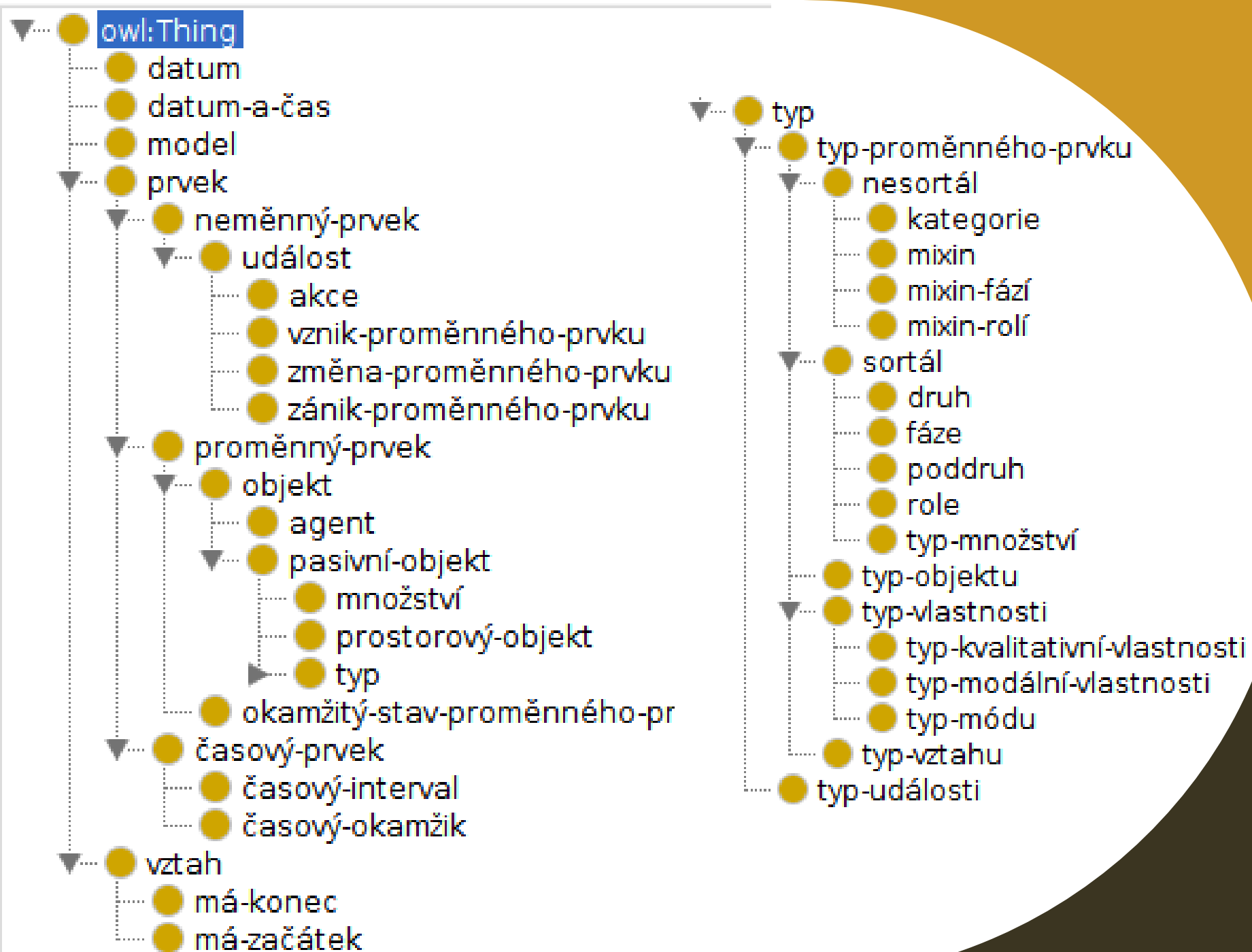
$$D^+(T, T', R) =_{\text{def}} \Box(\forall x T(x) \rightarrow \exists y T'(y) \wedge R(x, y))$$

Integrate UFO ontology

- Download UFO ontology from https://cw.fel.cvut.cz/wiki/_media/courses/osw/tut12.zip
- Create new project in Protégé
- Import ufo-types.rdf
- Add ontology prefix for UFO
- Look into classes



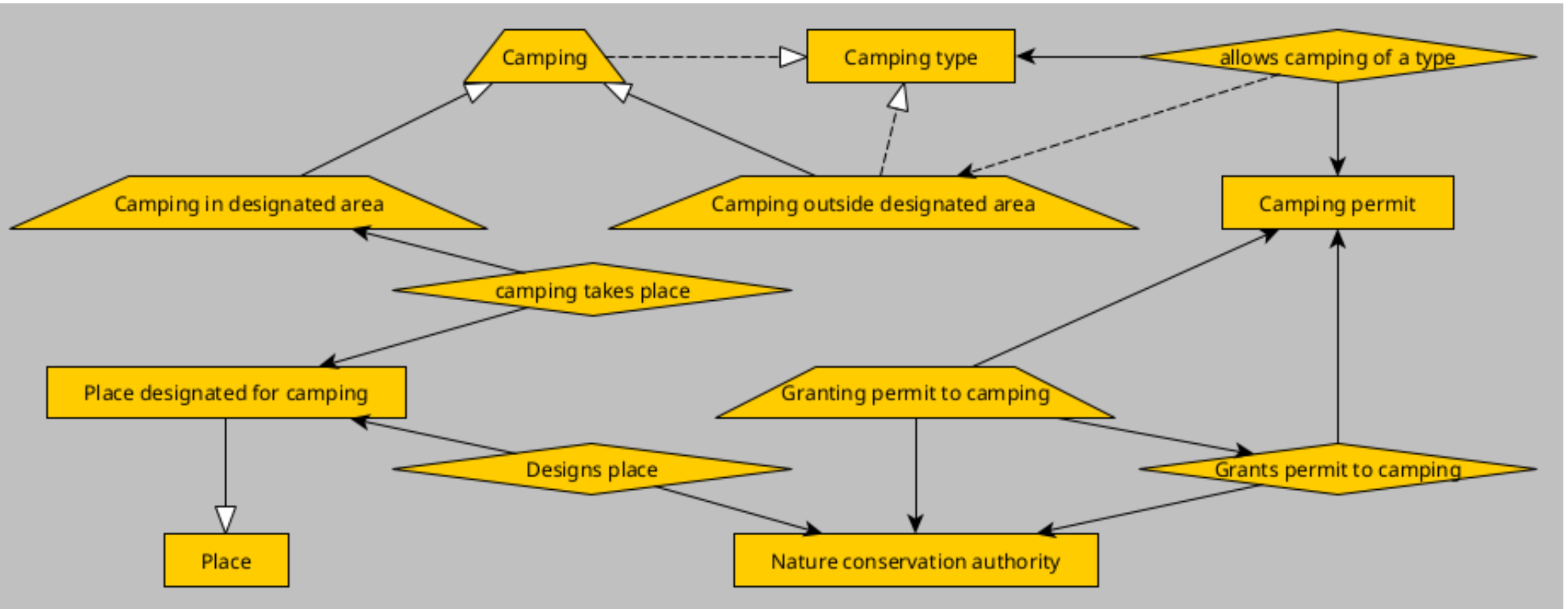
Integrate UFO ontology



How to integrate UFO types

- Lets model this in UFO
- (3) V ochranném pásmu národního parku se souhlas orgánu ochrany přírody dále vyžaduje k
 - a) táboření mimo místa vyhrazená orgánem ochrany přírody opatřením obecné povahy a mimo zastavěná území obcí,

OntoUML vizualization - punning



UFO Modelling in Protégé

- Handle punning
 - some resources are both classes and instances at the same time

Protégé has a big problem with that, so it is necessary to create two resources



Check UFO and OntoUML integrity

- <https://github.com/opendata-mvcr/sgov-validator/tree/master/src/main/resources/rules>