

Best-Practice Patterns for Biomedical Ontologies: Moving Under the Meta-Modeling Hood

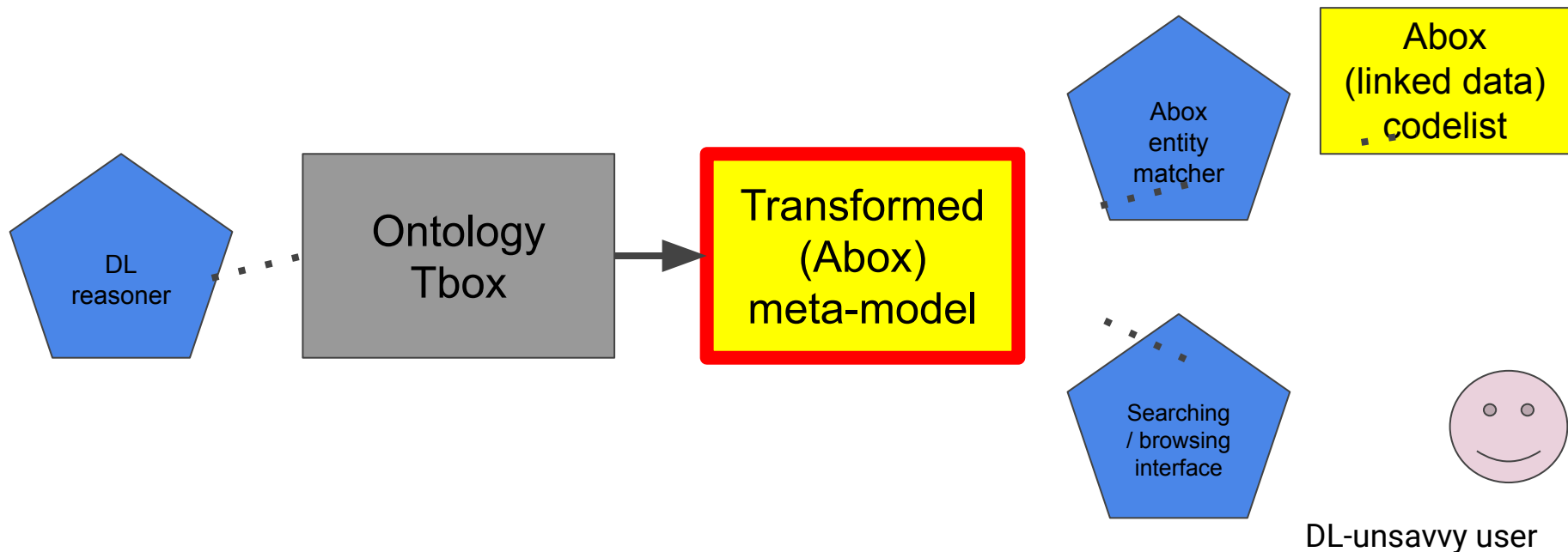
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Motivations

- *Ontological universals* ('types') are not necessarily modeled as OWL classes: they may also be represented by *individuals*
- This is, in fact, a *meta-modeling* approach from the logics viewpoint: an advantage is that universals can then be endowed with (meta-)types and *relationships*, while still keeping the ontology within OWL DL
- Such meta-modeling is common in diverse *linked open data* vocabularies; less so in biomedical ontologies, which are more "class-centric"
 - Sometimes even *ontological particulars* ('instances') in biomedical ontologies are modeled as *classes* (an example is in the paper →). This is probably due to the Tbox-centric nature of mainstream OWL DL reasoning tasks?
- Complementing the biomedical ontologies with their meta-modeling (Abox) versions could bring these advantages:
 - Easier structural alignment with instance-centric linked data vocabularies
 - Better understandability of the domain modeling by people unfamiliar with OWL Tbox axioms

Scenario: Abox meta-model as 'softened proxy' of a biomedical ontology



From ontologies to patterns

There are many biomedical ontologies available, which differ both in the *real-world semantics* of their entities and in the *structural patterns* used

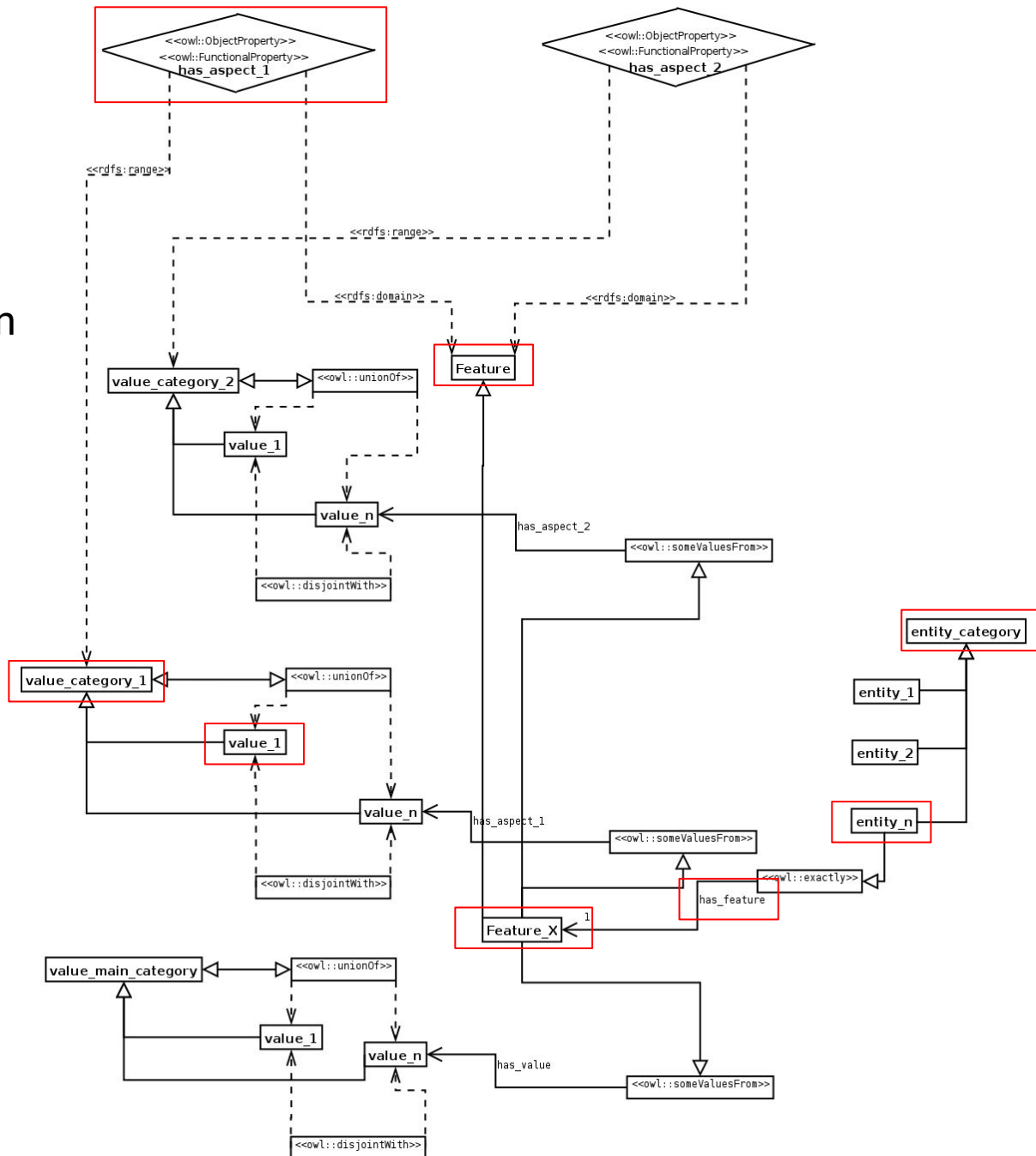
A condensed summary of biomedical ontology structural patterns could be the published *ontology design patterns*, in particular, those tailored for and exemplified in the biomed domain: <http://www.gong.manchester.ac.uk/odp/html/>

Approach:

1. **Create an appropriate *instance-level* version of the *patterns* and of their *examples*.**
2. **Explore the nature of the *transformation* from the class-centric to the instance-centric modeling style.**

Example: EFV pattern

Original class-centric pattern



Ongoing and future work

The study so far only carried out in full for a *family of three patterns* (EQ, EPQ and EFV). Similar analysis for other patterns from the pattern portal is in progress.

Next, we plan to

- Verify how the Tbox axioms of the original patterns can be *emulated in the Abox* by either SPARQL UPDATE queries (reasoning) or SHACL constraints (data validation)
- Undertake a *qualitative study* of the likelihood of specific biomedical ontology classes to be *populated by instances*...
- ...and, consequently, estimate which of them might deserve to be *converted to (Abox) code lists* and which not.