



A hybrid approach for the integration of heterogeneous data in the urban planning domain

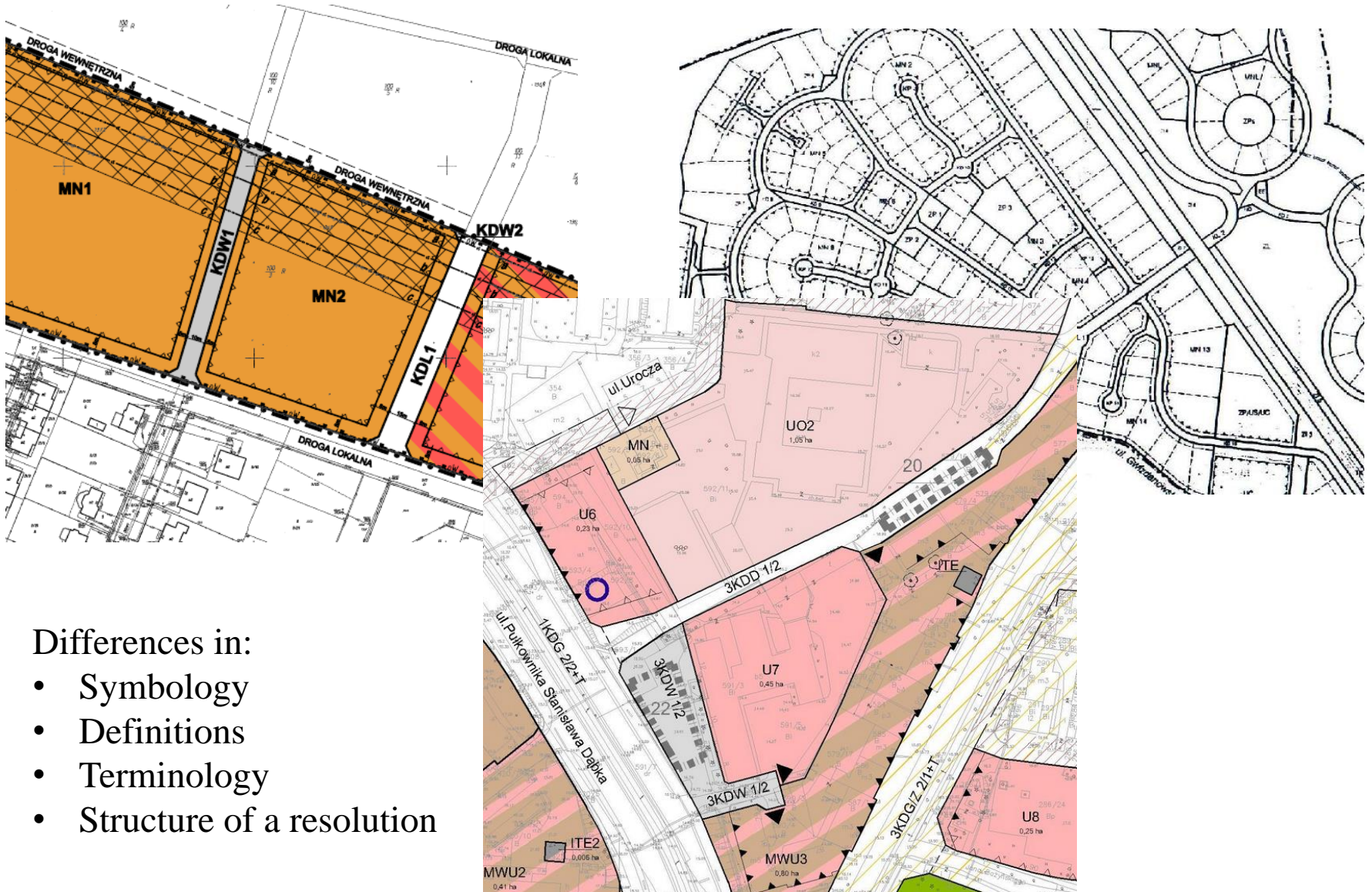
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SPATIAL DEVELOPMENT PLANS

- Basic instrument of the communal spatial policy
- Act of local law. It means that is binding for commune bodies, public institutions, and all citizens
- Must be accessible for everyone
- Interdisciplinarity:
 - Urban and architectural issues,
 - Development parameters and indicators,
 - Environmental issues,
 - Cultural (cultural heritage) issues,
 - Technical infrastructure, transportation issues,
 - Public safety, prediction and counteracting the effects of possible natural disasters.
- Main aims of the plan are:
 - establish the designation of defined areas,
 - identify the ways for their development,
 - identify conditions of development,
 - location of public investments.

HETEROGENEITY OF PLANS



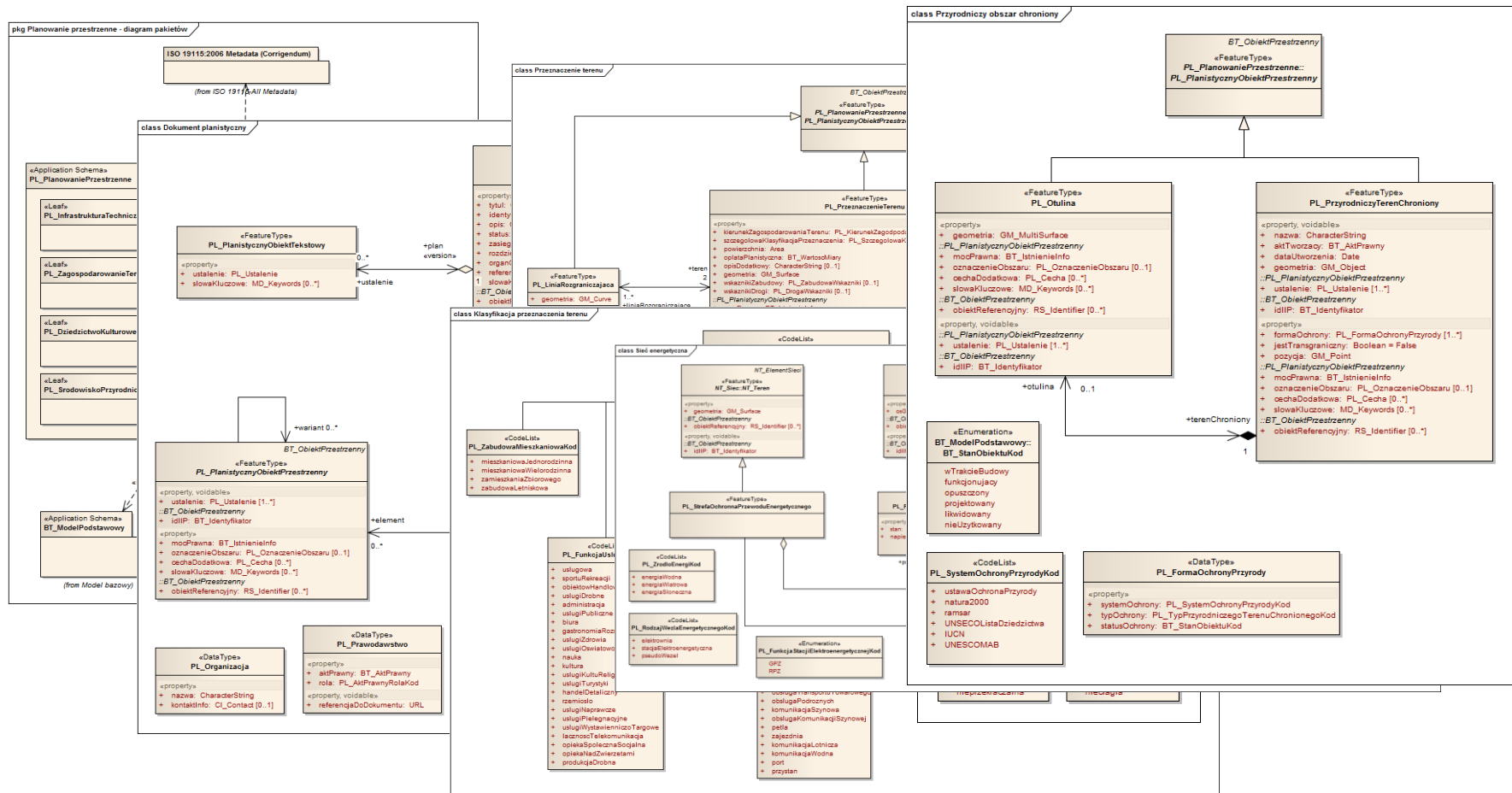
Differences in:

- Symbology
- Definitions
- Terminology
- Structure of a resolution

HOW WE DEAL WITH SUCH DIVERSITY ?

MODELS FOR SPATIAL DEVELOPMENT PLANS

- INSPIRE Application Schema for Land Use
- Proposal from Polish Ministry (not formal)

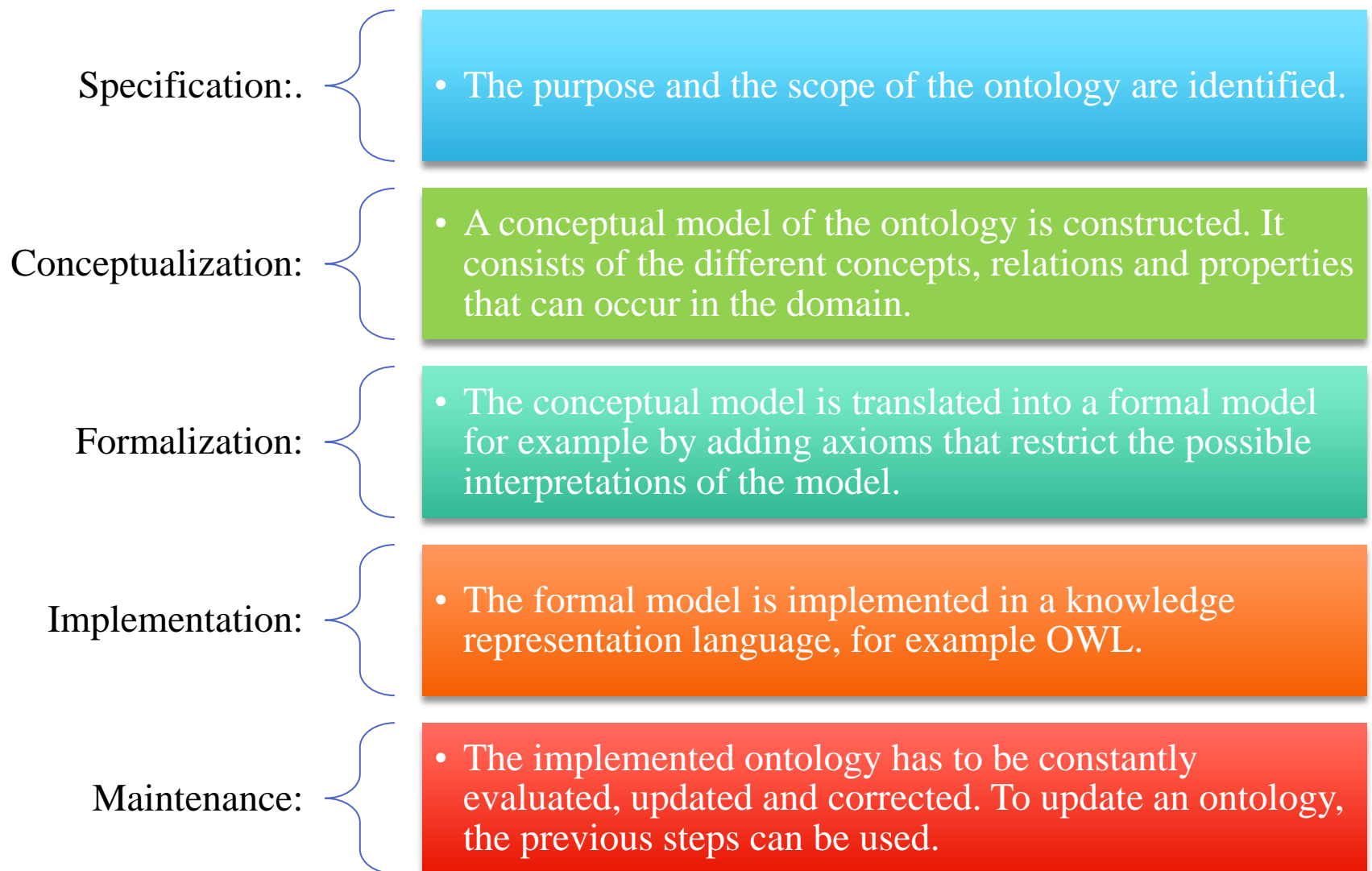


SPATIAL DEVELOPMENT PLANS IN LOD

LOD PRINCIPLES

- RDF data are a building blocks of Linked Data
- To publishing LOD we must follow steps:
 - identifying things by using URIs
 - choosing vocabularies (reusing ontologies)
 - producing RDF statements to describe the things
 - create RDF links
 - serving RDF data on the Web

SPATIAL PLANNING ONTOLOGY



(Pinto and Martins, 2004)

SPATIAL PLANNING ONTOLOGY

- Middle-out ontology approach (Uchold, 1996)
- Competency questions (Gruninger, 1994)

Spatial development plan:

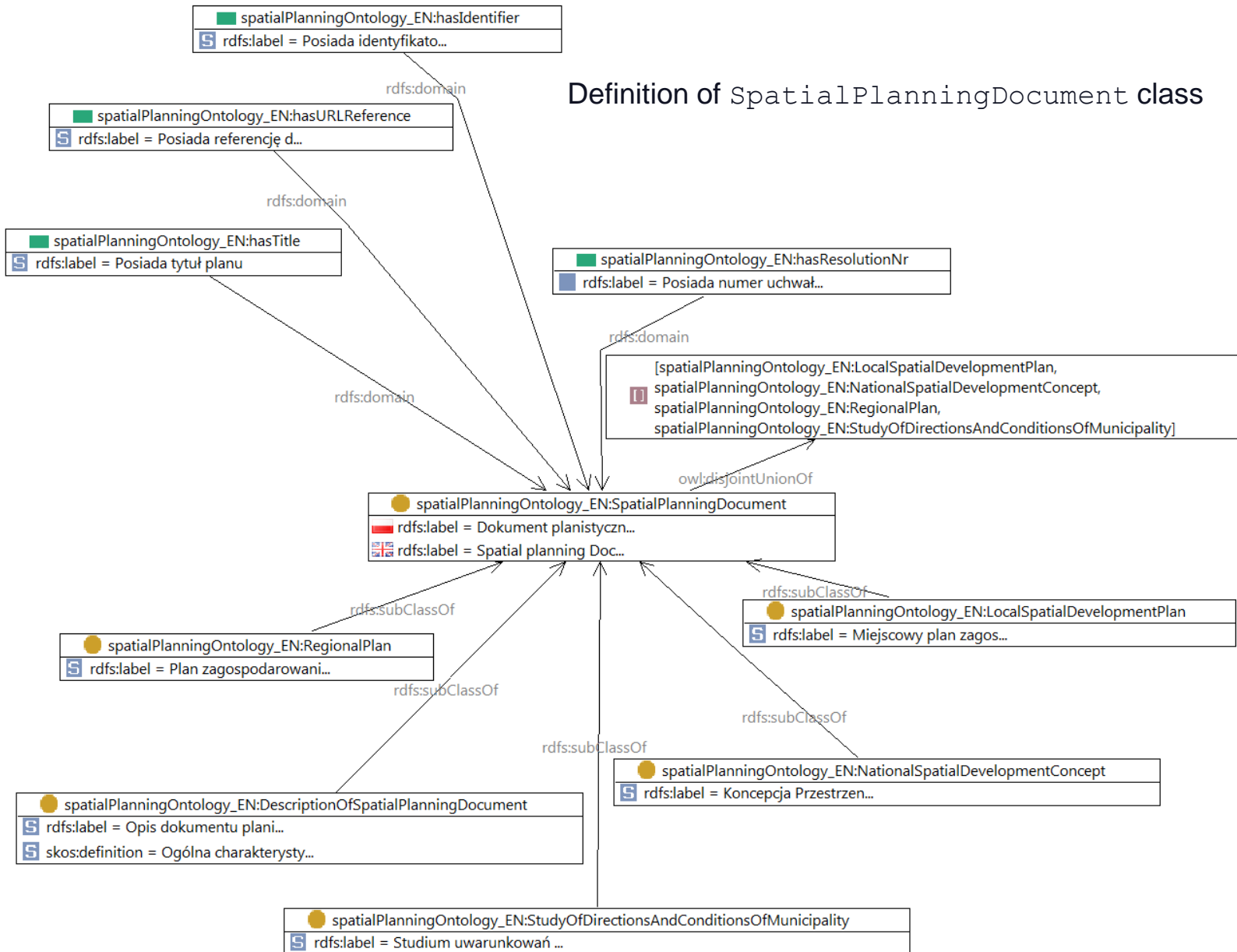
- *What kind of document is spatial development plan?*
- *What are the components of spatial development plan?*
- *In what scales the spatial development plan can be prepared?*
- *Does a spatial development plan exist in a given area?*
- *How many spatial development plans are obligatory in a given municipality/region?*
- ...

Provisions of spatial development plan:

- *Search for areas in plans which has a single-family housing designation as a primary function. What is the allowed maximum height of a building there?*
- *What is a designation of areas in a given plan?*
- *Search for all areas which are designated for given function (eg. sport and leisure)?*
- *What is maximum and minimum development intensity in a given area?*
- ...

SPATIAL PLANNING ONTOLOGY

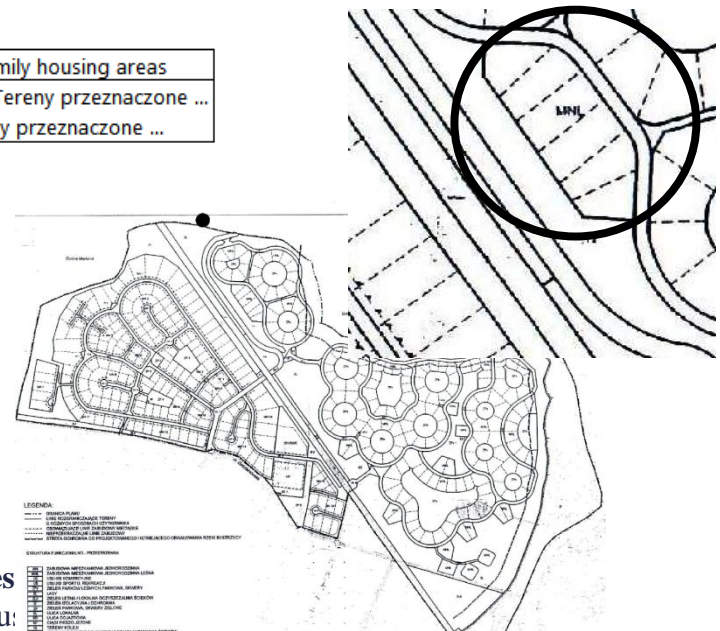
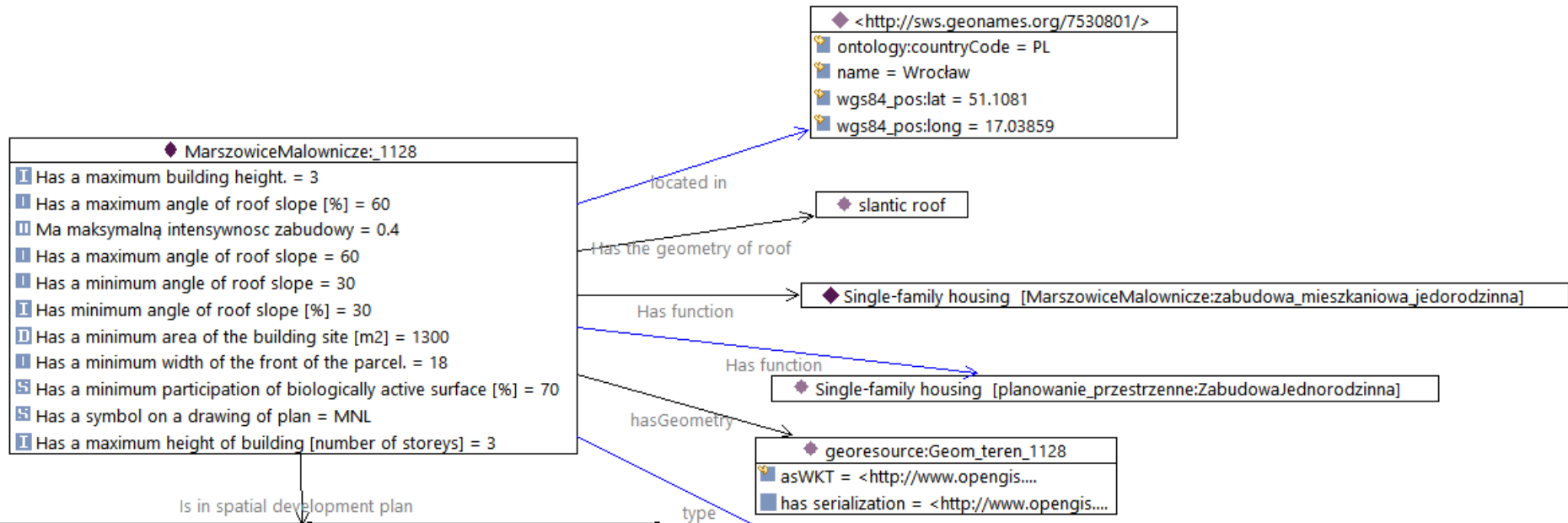
Definition of SpatialPlanningDocument class



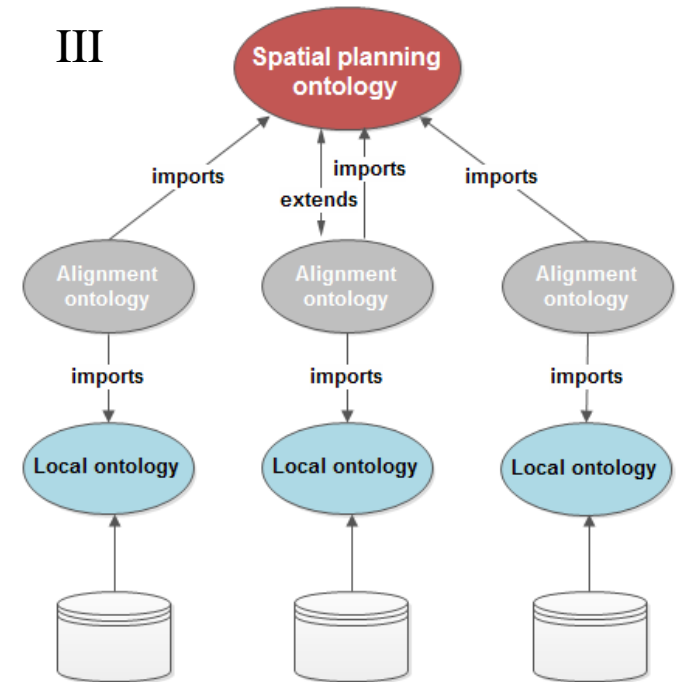
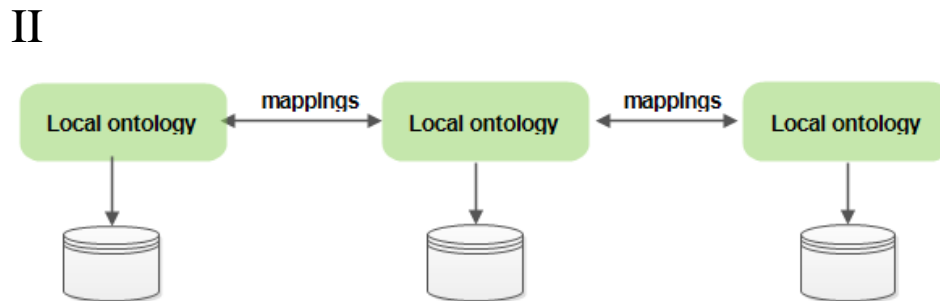
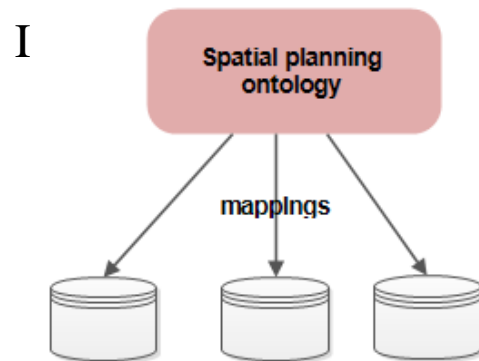
ALIGNMENT WITH GEOSPARQL AND GEONAMES

	spatialPlanningOntology: SpatialPlanningArea
Annotations	<code>rdfs:label „Spatial planning area”</code> <code>skos:closeMatch http://tezaaurus.org/concepts/Spatial_planning_area</code> <code>jena:rule [rule: (?x rdf:type spatialPlanningOntology:LocalPlan) , (?x spatialPlanningOntology:hasLocalPlanArea?y) (?y ontology:locatedIn ?z), (?x spatialPlanningOntology:hasSpatialPlanningArea ?v) -> (?v ontology:locatedIn ?z)]</code>
Class axioms	<code>rdfs:subClassOf geosparql:SpatialObject</code> <code>rdfs:subClassOf geosparql:Feature</code> <code>rdfs:subClassOf spatialPlanningOntology:SpatialPlanningObject</code> <code>owl:equivalentClass: ontology:locatedIn only spatialPlanningOntology:AreaOfPlan</code>
Properties	<code>rdfs:type Class</code>

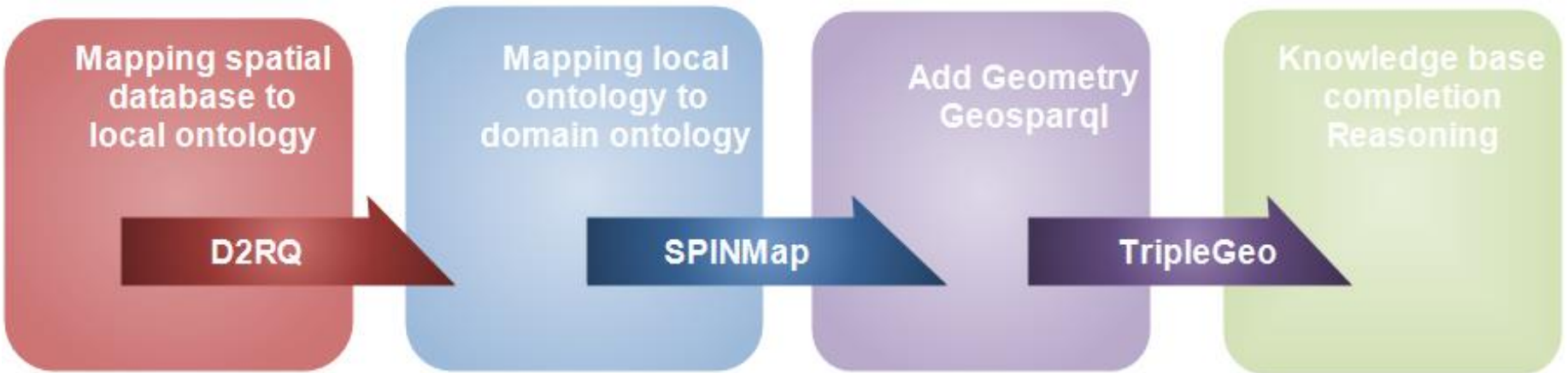
REPRESENTATION OF SPATIAL PLANNING AREA



INTEGRATION OF SPATIAL PLANNING DATA



INTEGRATION OF SPATIAL PLANNING DATA



SPARQL QUERIES

```
SELECT ?zone
WHERE {
?zone spatial_pl_ont:isInPlan ?plan .
?plan spatial_pl_ont:hasTitle
"Miejscowy plan zagospodarowania przestrzennego w rejonie obszaru
rozwoju Marszowice Malownicze IV we Wrocławiu" .
?zone spatial_pl_ont:hasFutureLandUse
spatial_pl_ont:residential}
LIMIT 10
```

```
[teren]
MarszowiceMalownicze:_1128
MarszowiceMalownicze:_1129
MarszowiceMalownicze:_1354
MarszowiceMalownicze:_1355
MarszowiceMalownicze:_1356
MarszowiceMalownicze:_1358
MarszowiceMalownicze:_1359
MarszowiceMalownicze:_1450
MarszowiceMalownicze:_1457
MarszowiceMalownicze:_1460
```

CONCLUSIONS

- Spatial development plans only for human consumption,
- RDF can be a way how to publish spatial development plans according to Web of Data,
- It allows for integration of spatial planning data from different sources,
- It allows for effective discovery of plans,
- No need to change the structure of plans,
- Need for common, shared ontology for spatial planning.

Thank you for your attention

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