

Multilingualism in the Web of Data

Elena Montiel-Ponsoda

Ontology Engineering Group, Universidad Politécnica de Madrid



Monnet is supported
by the European Union
under Grant No. 248458

1. Available representation models

- RDF(S), OWL
- SKOS & SKOS-XL
 - Is this enough? What is the evolution?

2. Latest trends

- *lemon*: representing **rich linguistic descriptions** (lexical, terminological, etc.) **relative** to ontologies and linked data

3. Ontology localization

RDF(S), OWL

ifrs:FinancialAssets $\xrightarrow{\text{rdfs:label}}$ “financial assets”@en

The screenshot displays a software interface with two main panels. The left panel, titled 'Inferred class hierarchy', shows a tree structure of classes. The right panel, titled 'Class Annotations', shows a list of annotations for the class 'Río'.

Inferred class hierarchy (Left Panel):

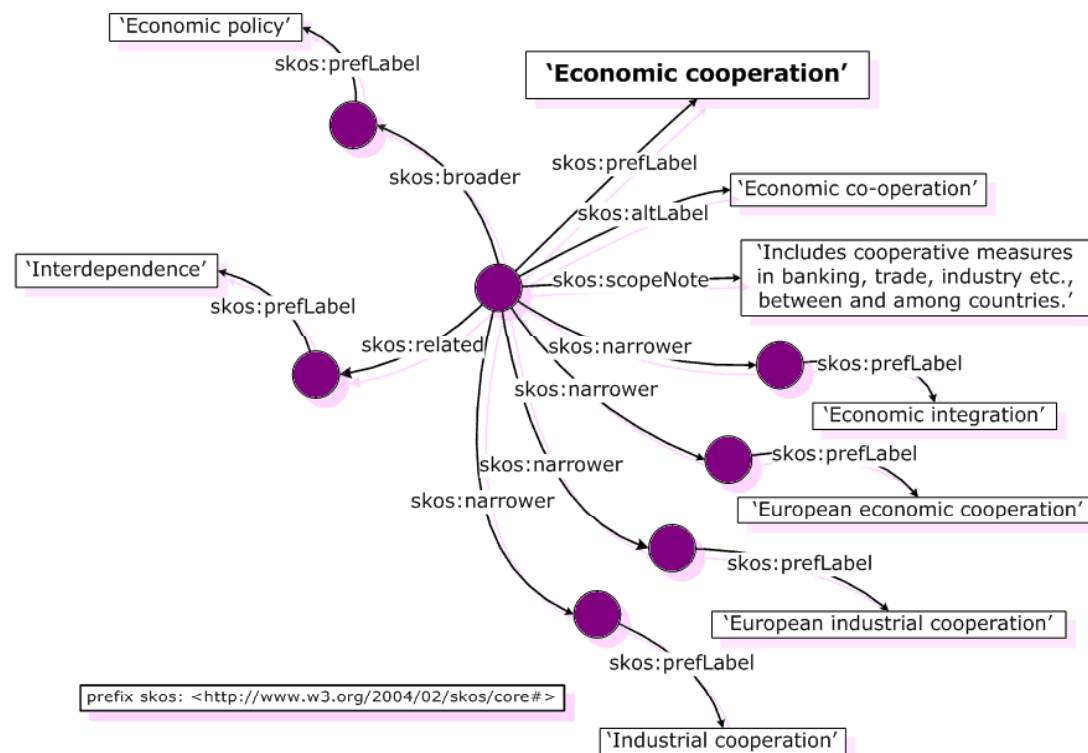
- Thing
 - Cuenca_Hidrográfica
 - Fenómeno_hidrográfico
 - Aguas
 - Aguas_Continetales
 - Aguas_Subterráneas
 - Aguas_Superficiales
 - Aguas_Corrientes
 - Aguas_Corriente
 - Aguas_Corriente
 - Arroyo
 - Glaciar
 - Río
 - Torrente
 - Corriente
 - Aguas_Quietas
 - Aguas_de_Transició
 - Masa_de_Agua_Arti
 - Surgencias
 - Estanque_Salado
 - Fuente_Salada
 - Lago_Salado
 - Manantial_Salado
 - Aguas_Dulces

Class Annotations (Right Panel):

Annotations: Río

- source**: "Water Framework Directive. European Union"@en
- provenance**: "River - Water Framework Directive. European Union"@en
- provenance**: "Curso de agua principal - Catalogo de fenomenos. Proyecto GEOALEX"@es
- provenance**: "Río - Directiva Marco del Agua. Union Europea"@es
- comment**: "A body of inland water flowing for the most part on the surface of the land but which may flow underground for part of its course."@en
- comment**: "Masa de agua continental que fluye en su mayor parte sobre la superficie del suelo, pero que puede fluir bajo tierra en parte de su curso"@es
- label**: "River"@en
- label**: "Curso de agua principal"@es
- label**: "Curso fluvial"@es

- SKOS—Simple Knowledge Organization System— model for expressing the basic structure and content of concept schemes such as **thesauri**, **classification schemes**, **subject heading lists**, **taxonomies**, **folksonomies**, and other similar types of controlled vocabulary¹.



RDF(S), OWL

ifrs:FinancialAssets $\xrightarrow{\text{rdfs:label}}$ “financial assets”@en

SKOS

ifrs:FinancialAssets $\xrightarrow{\text{skos:prefLabel}}$ “financial assets”@en

\uparrow
rdfs:SubPropertyOf

SKOS labels: prefLabel, altLabel & hiddenLabel.

Agrovoc/agrovoc_skos_200605.rdf - Eclipse Platform

File Edit Project Model Scripts Inference Resource Window Help

Address: <http://www.fao.org/aos/agrovoc#c_2108>

skos:broader

Resource Form

Name: <http://www.fao.org/aos/agrovoc#c_2108>

Annotations

- skos:altLabel: Ganado lechero {@es}
- skos:changeNote: <@2c48d672:123de745217:-639f>
- skos:prefLabel:
 - Bovin laitier {@fr}
 - Dairy cattle {@en}
 - Gado leiteiro {@pt}
 - Ganado de leche {@es}
 - mliekový dobytok {@sk}
 - ماشية الألبان {@ar}
 - โคขุน {@th}
 - 乳牛 {@zh}
 - 乳用牛 {@ja}

Incoming References

- skos:broader: Vache laitière
- skos:narrower: Bovin
- skos:related: Lait

Other Properties

- type: skos:Concept
- skos:broadMatch
- skos:broader: Bovin
- skos:broaderTransitive
- skos:closeMatch
- skos:exactMatch
- skos:mappingRelation
- skos:narrowMatch
- skos:narrower: Vache laitière
- skos:narrowerTransitive
- skos:related: Lait
- skos:relatedMatch
- skos:semanticRelation
- skos:topConceptOf

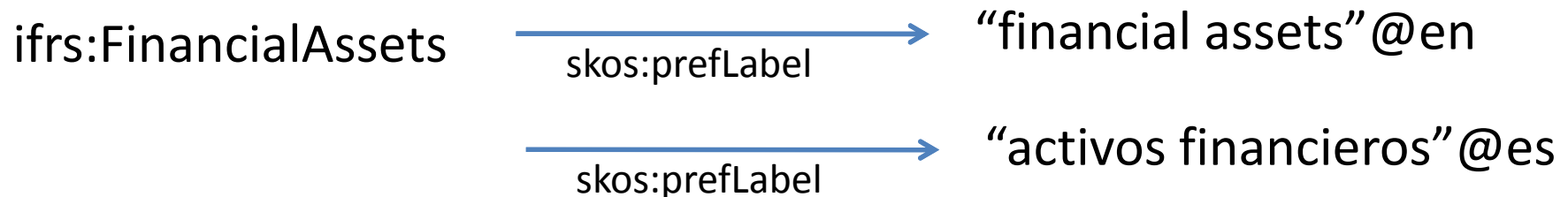
Properties

- skos:hasTopConcept
- skos:inScheme
- skos:member
- skos:memberList
- skos:semanticRelation
 - skos:broaderTransitive
 - skos:broader
 - skos:mappingRelation
 - skos:narrowerTransitive
 - skos:related
- skos:notation
- comment
- label
- seeAlso
- skos:note
- versionInfo

Form Source Code

- SKOS enables a simple form of **multilingual labeling**.

```
ex:asset rdf:type skos:Concept;  
skos:prefLabel "financial assets"@en;  
skos:prefLabel "activos financieros"@es.
```

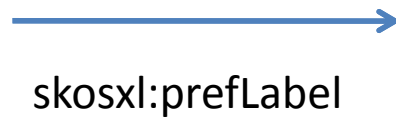


How can we create **explicit links** between labels?

Say that one is *translation* of the other, *acronym*, etc.?

SKOS-XL

ifrs:FinancialAssets



ifrs:FinancialAssetsLabel

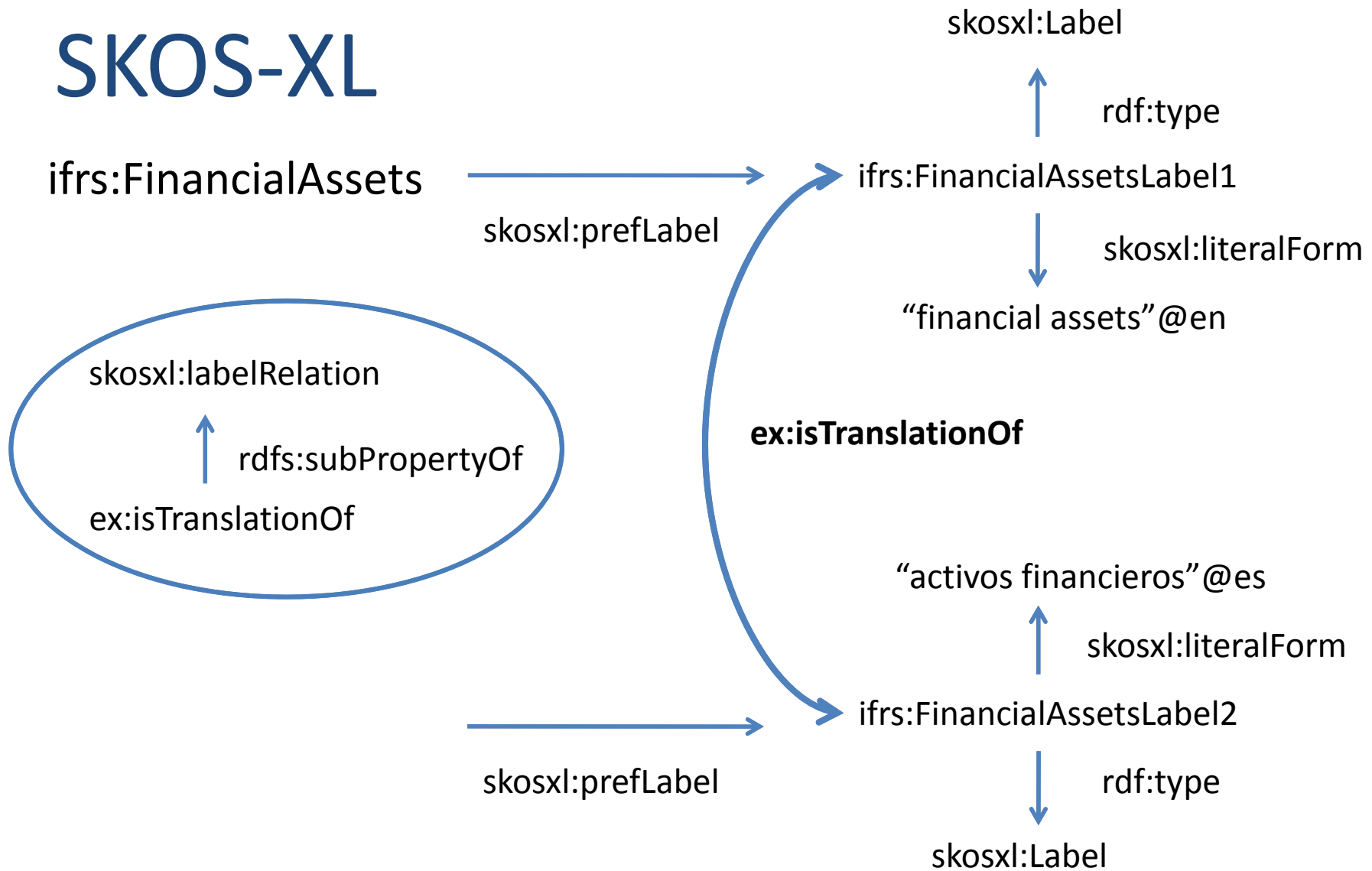


rdf:type

skosxl:literalForm

"financial assets"@en

SKOS-XL



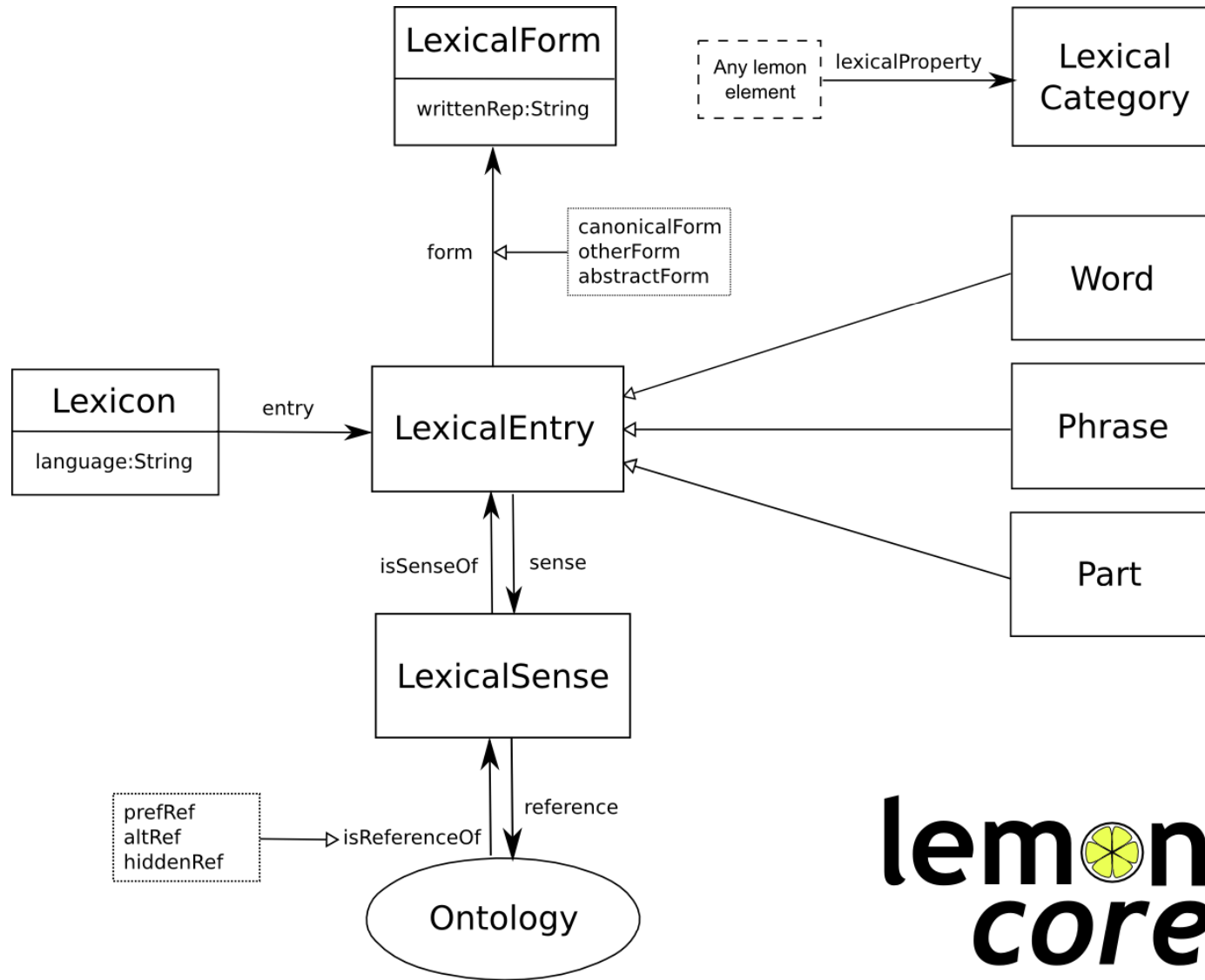
What is the evolution?

SKOS-XXXXXXXXL ???

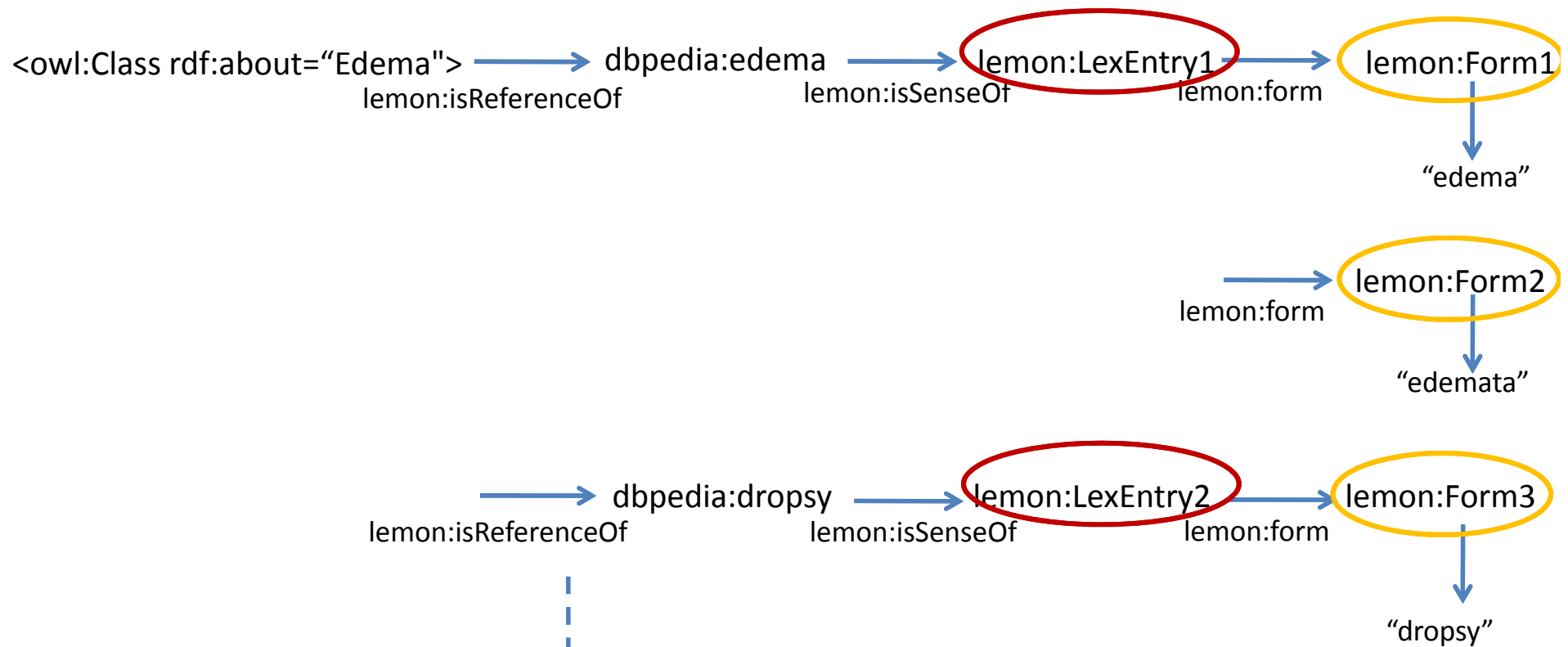
lemon

lemon, RDF-based lexicon model for ontologies

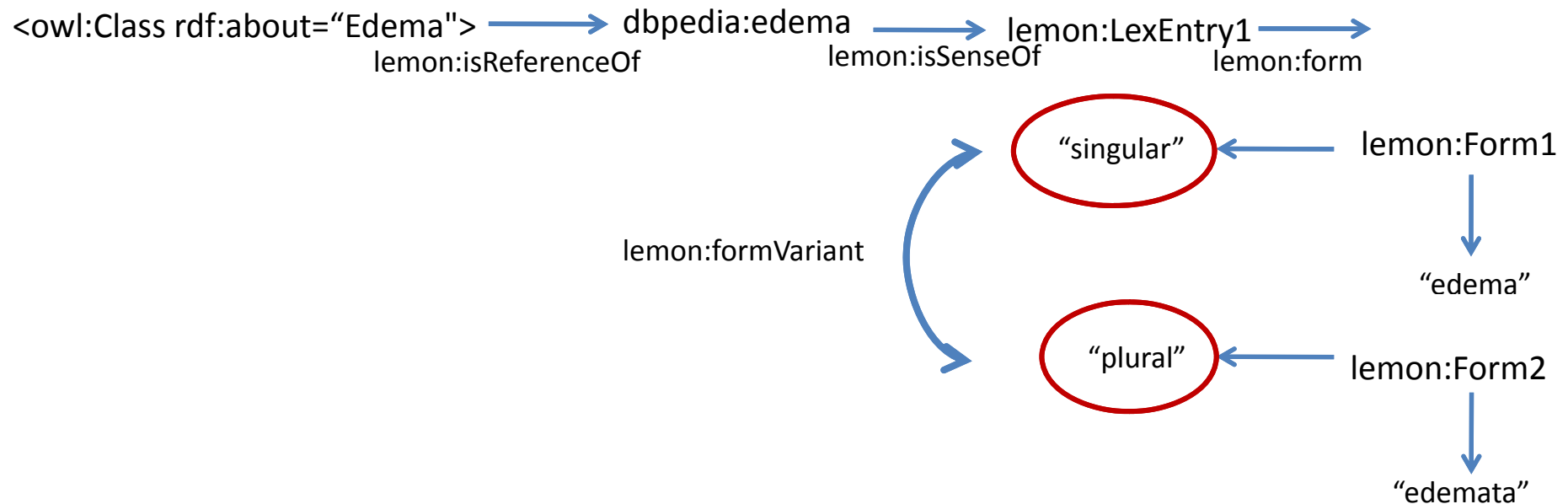
- Main features:
 - Semantics by reference
 - Rich multilingual lexical and terminological description of ontology elements
 - Concise (i.e., trade off between complexity and expressivity)
 - Descriptive not prescriptive (i.e., uses data categories)
 - Modular and extensible



Ontology

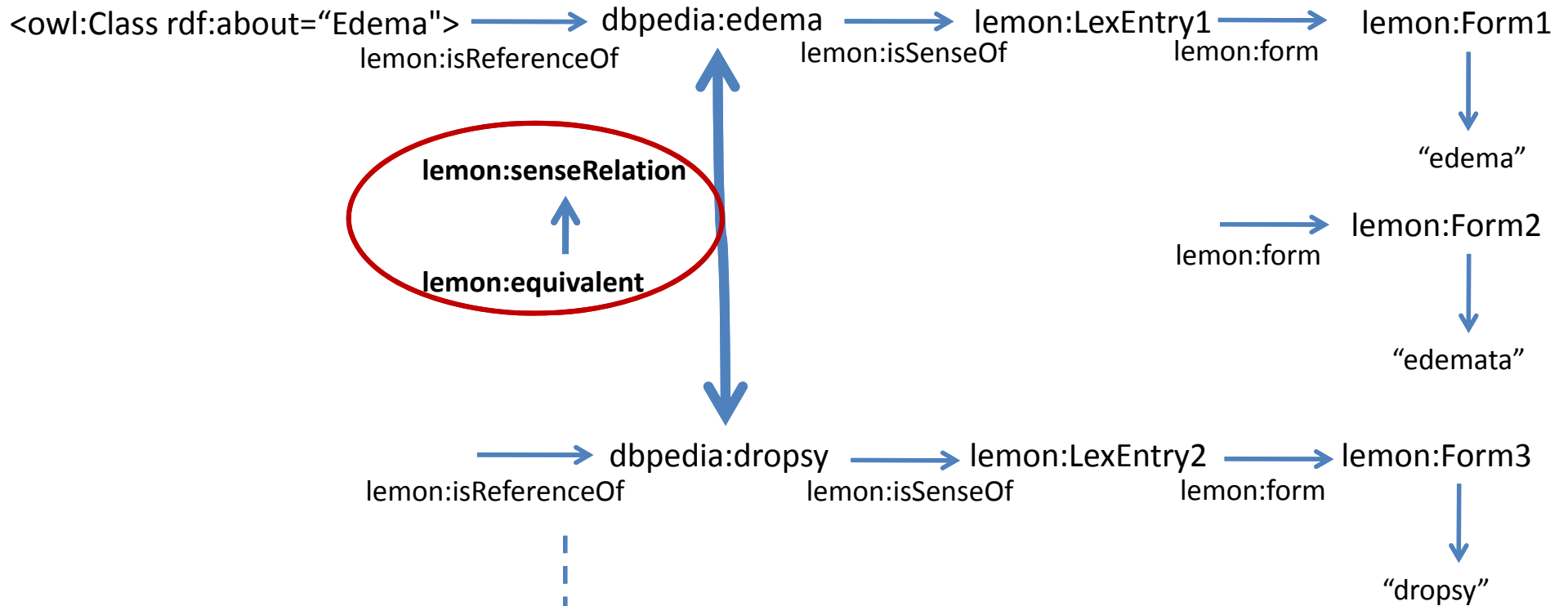
lemon 

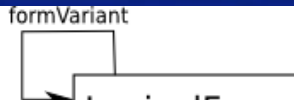
Ontology

lemon 

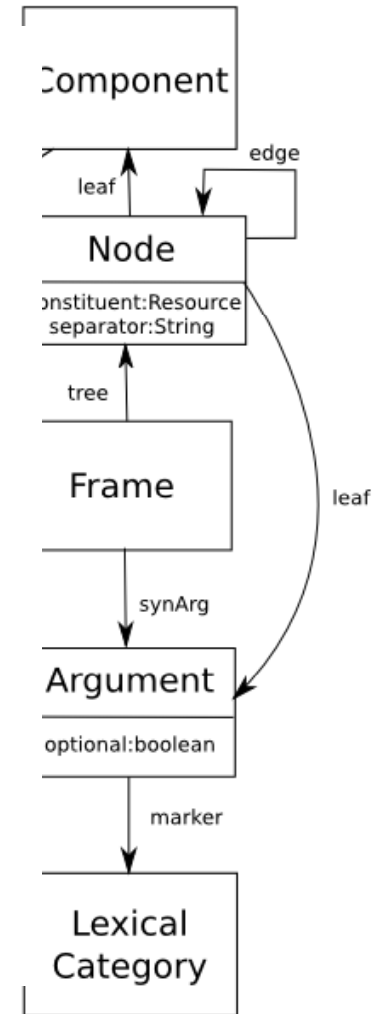
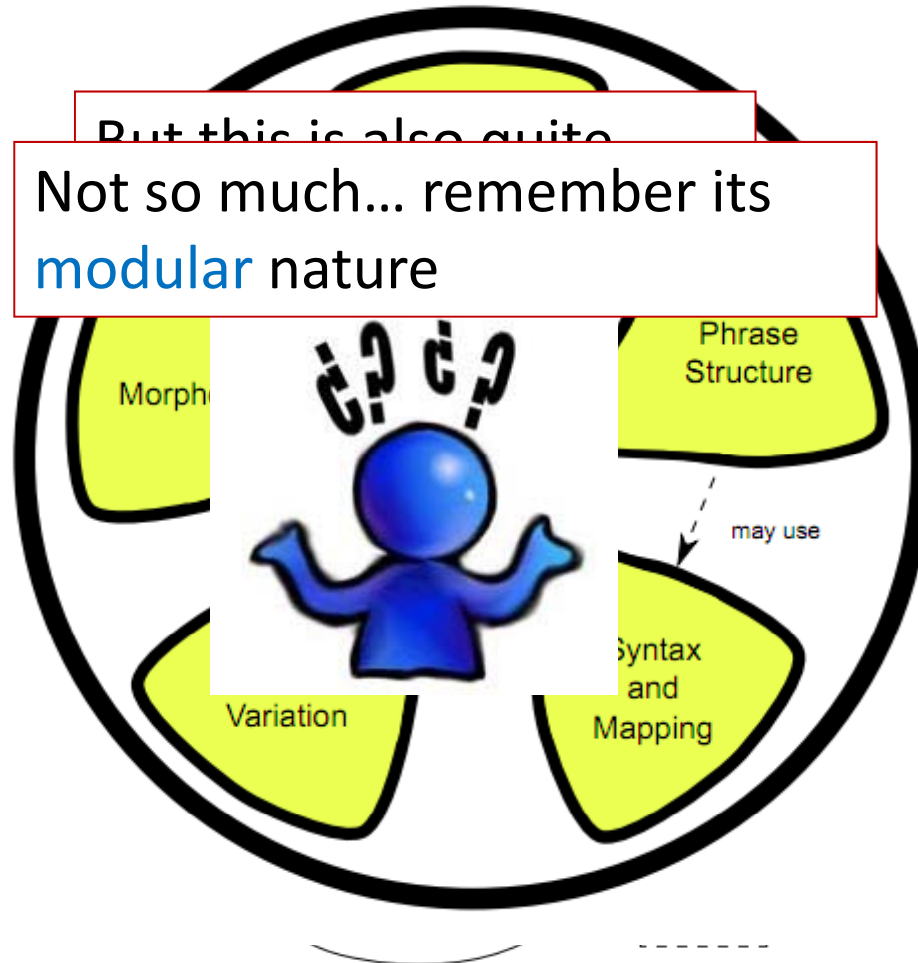
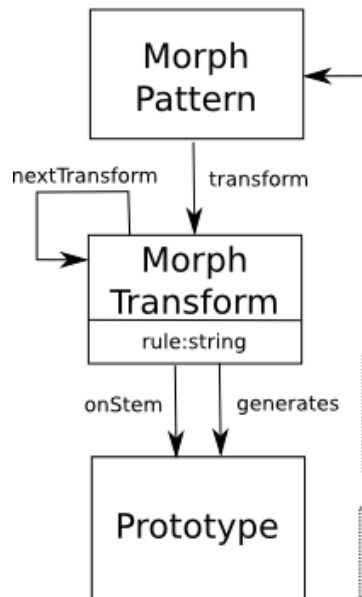
Ontology

lemon





But this is also quite
 Not so much... remember its
 modular nature

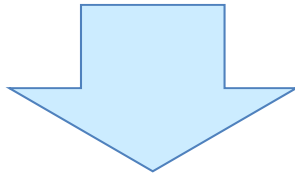


* LexicalEntry has three subclasses: Word, Phrase, Part
 ‡ definition and example are stated as nodes with a value
 * condition has subproperties propertyDomain and propertyRange
 † decomposition and element may also be used with Frames and Arguments resp.

- OntoLex W3C Community Group

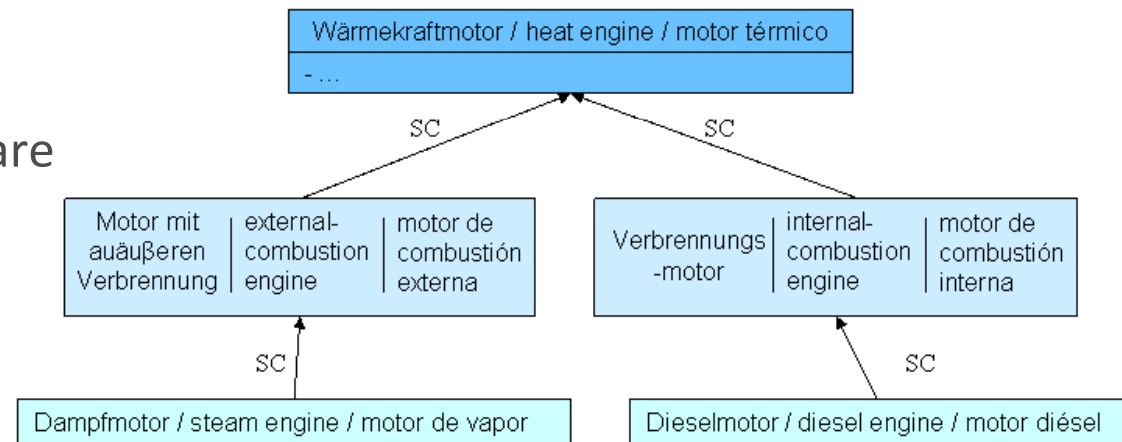
www.w3.org/community/ontolex/

Ontology Localization



Multilingual Ontology

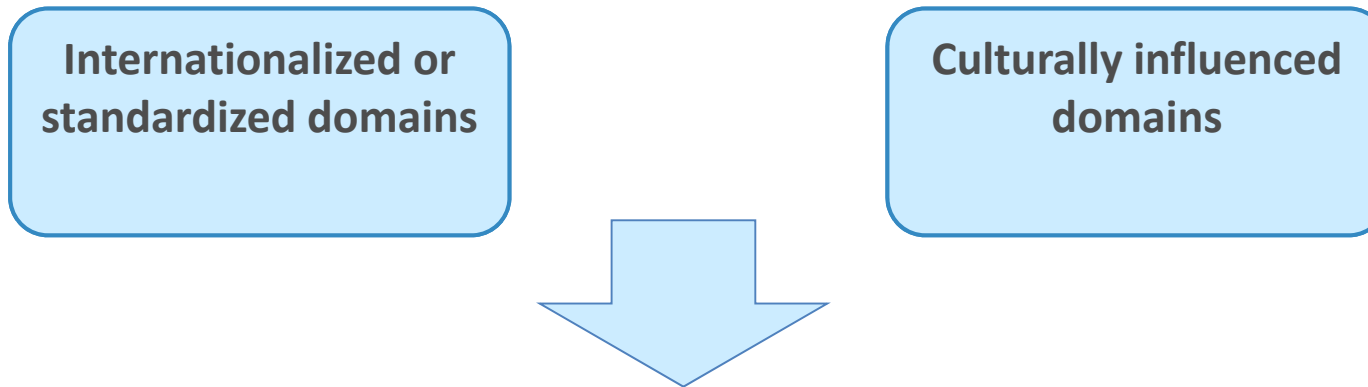
(an ontology in which labels are documented in multiple NLS)



but...

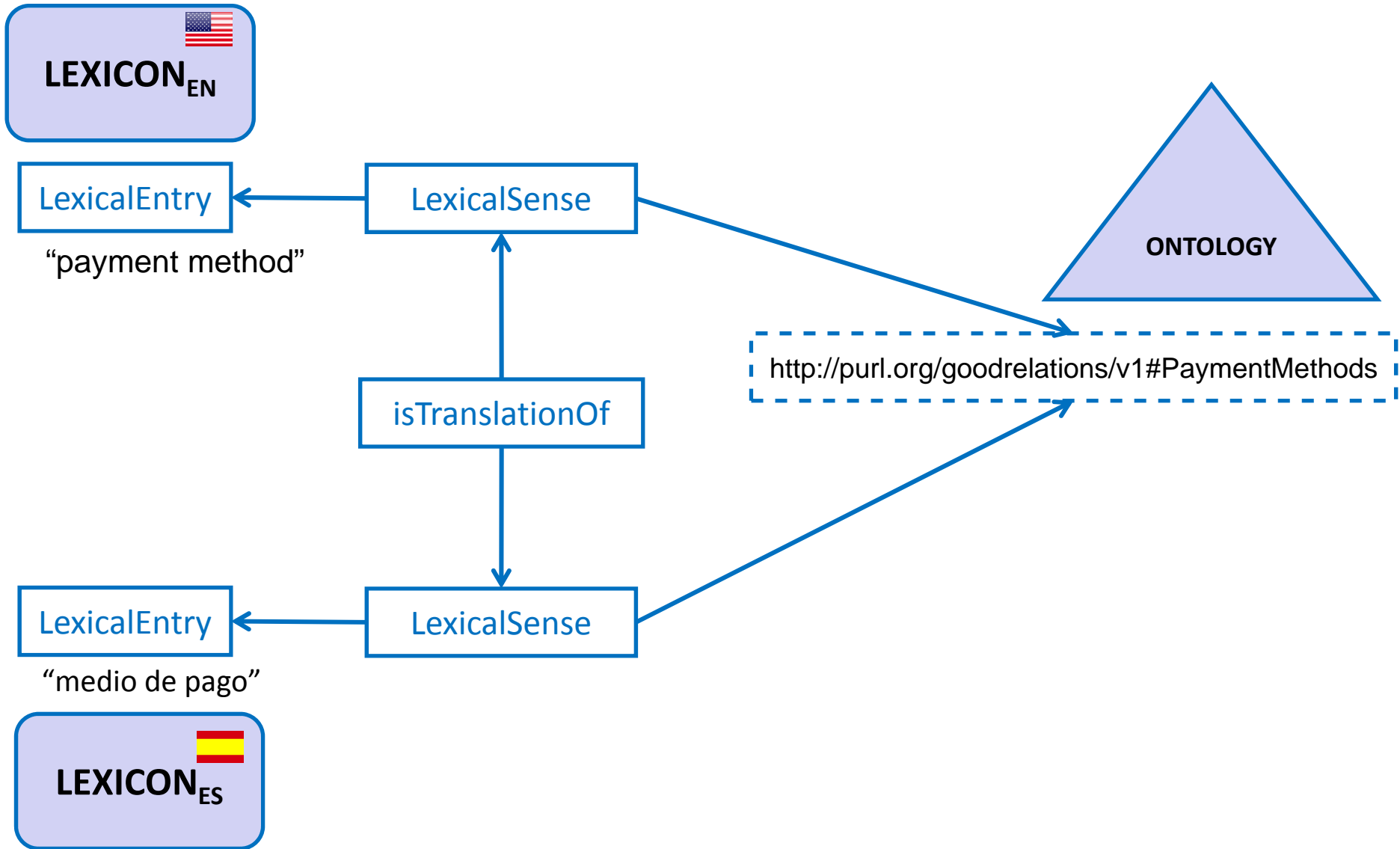
Does a 1 to 1 correspondence between always exist?

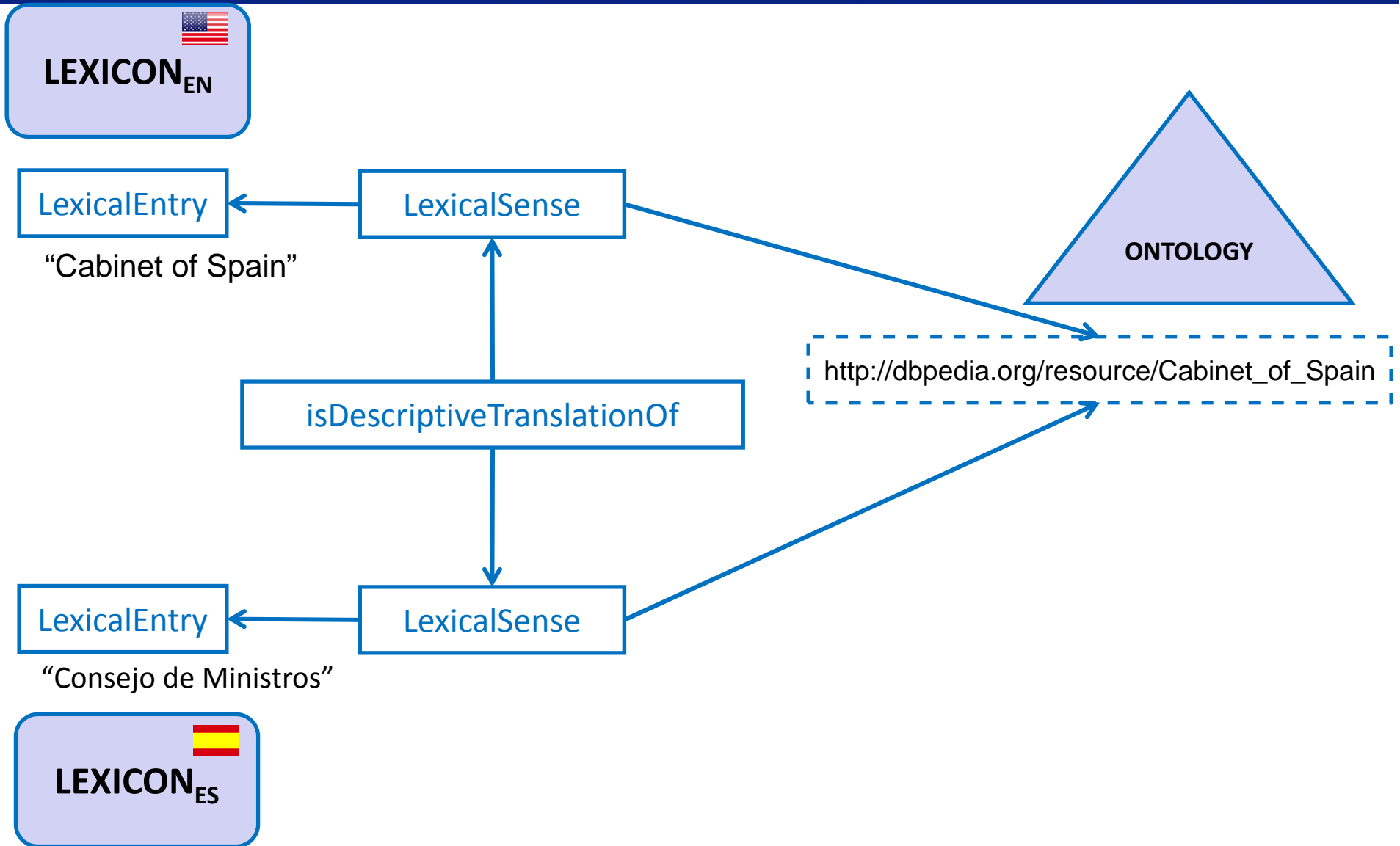
Types of domains

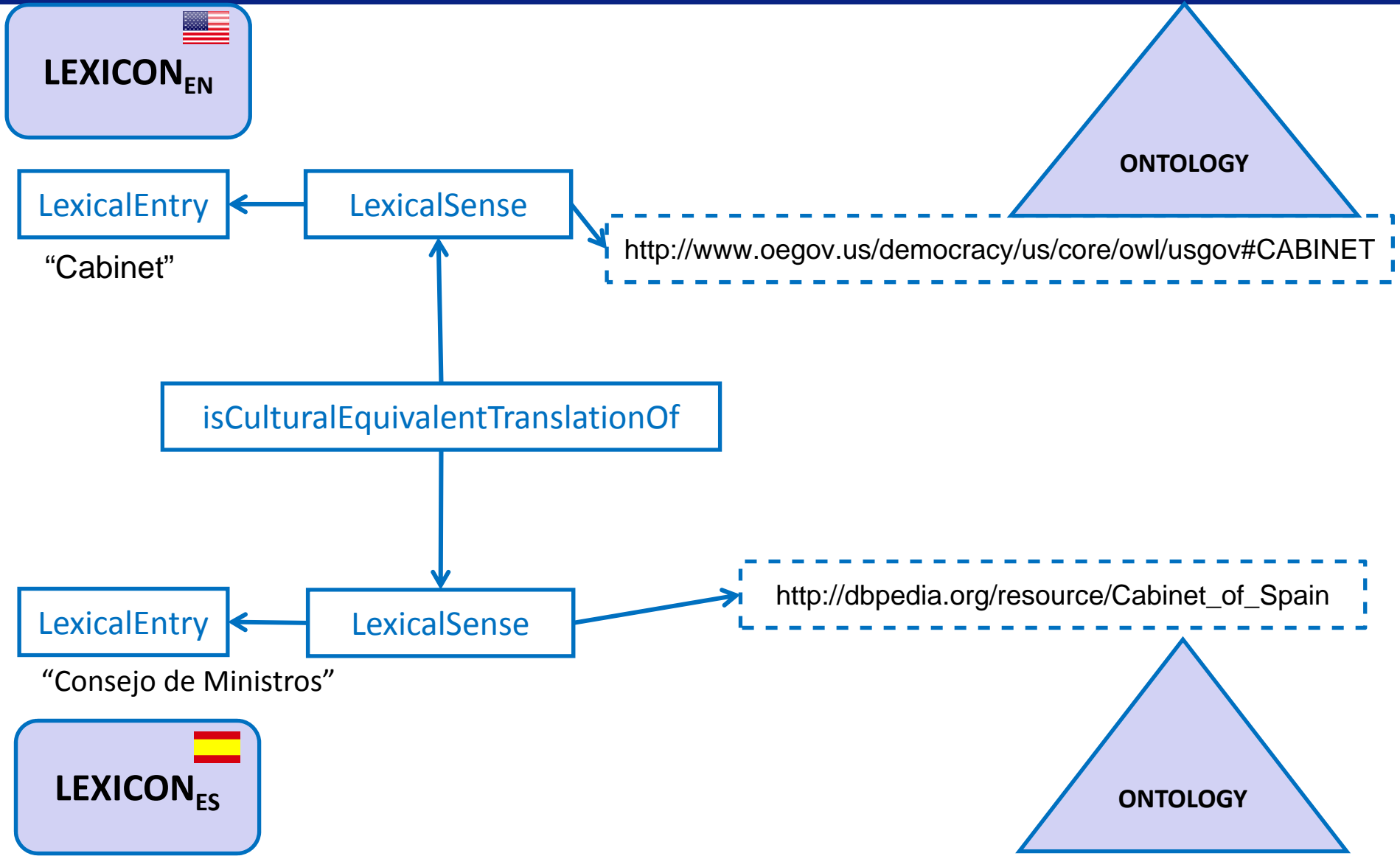


Types of conceptualizations









Multilingualism in the Web of Data

Elena Montiel-Ponsoda

Ontology Engineering Group, Universidad Politécnica de Madrid



Monnet is supported
by the European Union
under Grant No. 248458