KOSonto:

An ontology for knowledge organization systems, their constituents, and their referents

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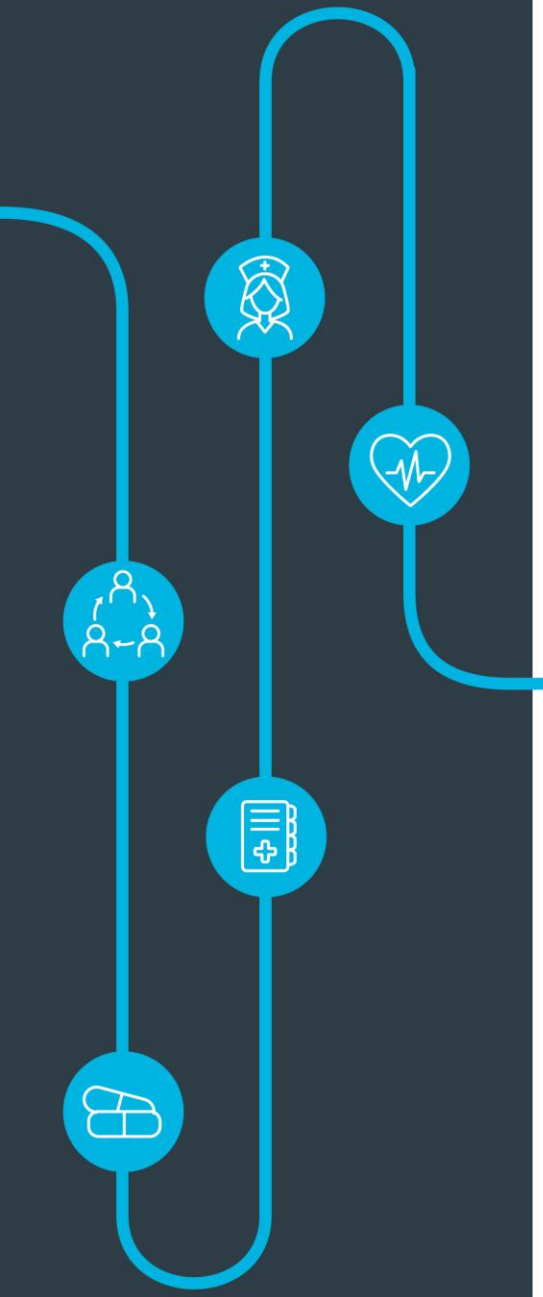

KOSonto:

An ontology for knowledge organization systems, their constituents, and their referents

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Université de Montréal
ESPUM
CReSP Centre de recherche en santé publique
lab TNS

Conflicts of interest

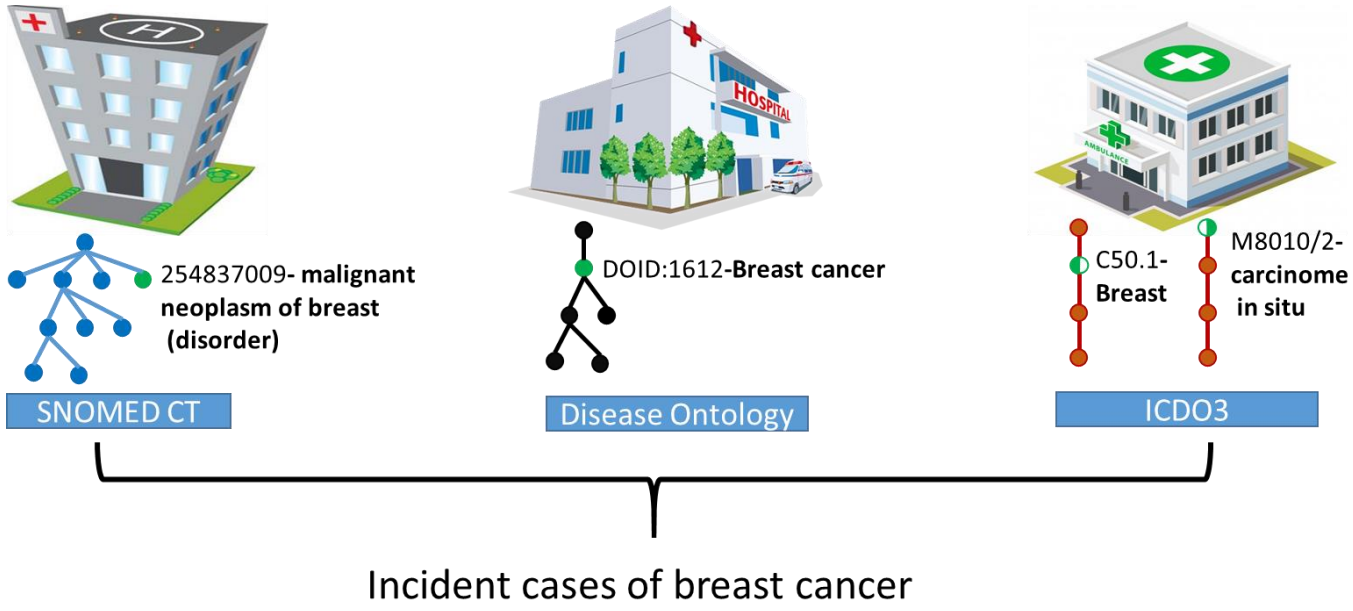
- No conflicts to declare

Context

- Knowledge organisation systems

- Different biomedical subdomains:
  - Clinical: SNOMED CT
  - Biological: LOINC
  - Medication: RxNorm/OCRx
  - Epidemiological: ICD-10

- Different structures



Context

- Overarching term : Keep the different field separated ?

Reviewer

> The paper starts of by lumping together terminologies and ontologies. I think that this step already presents a huge problem for the approach since those two types of resources are essentially extremely different in their usage, goal, and methodological rigor. I can understand that the authors strive to include both types, because that is exactly what we commonly find in biomedical data (

- Inconsistency of certain words:
  - Concepts
  - Ontology
  - Terms
  - Labels

MIVOC

SIST

SLOVENSKI STANDARD
SIST ENV 12017:2003
01-oktober-2003

Medicinska informatika – Slovar medicinske informatike (MIVoc)

Medical Informatics - Medical Informatics Vocabulary (MIVoc)

Medizinische Informatik - Vokabular

Informatique médicale - Vocabulaire

Ta slovenski standard je istoveten z: **ENV 12017:1997**

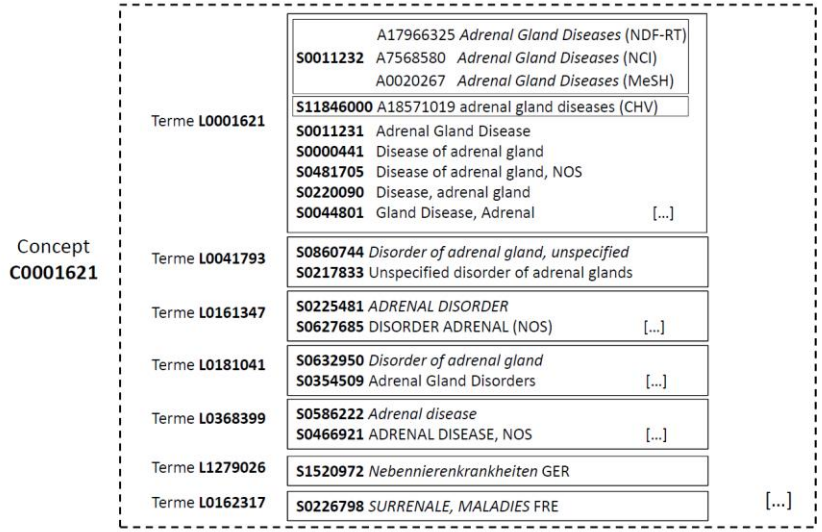
ICS:

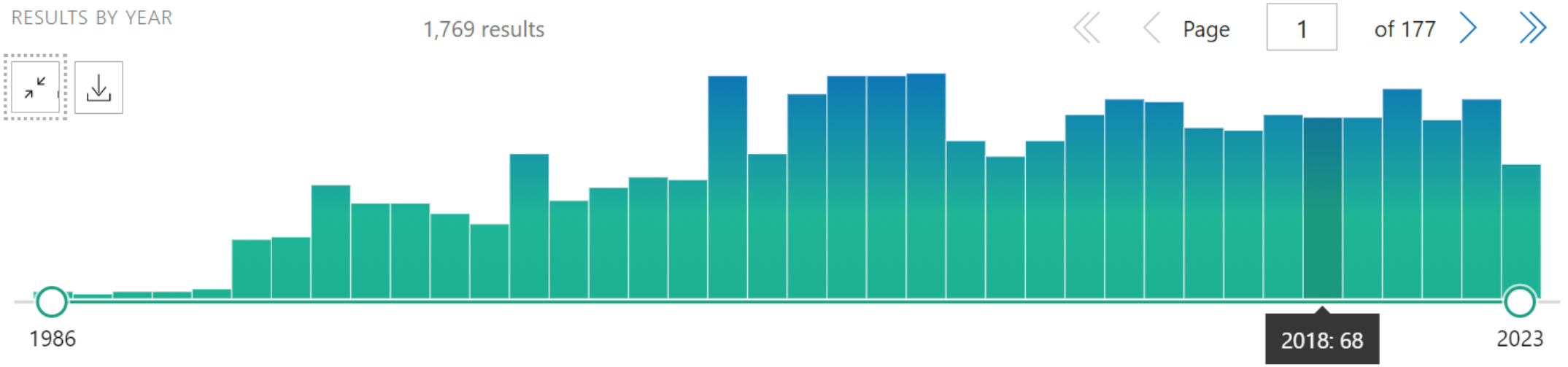
01.040.35	Informacijska tehnologija. Pisarniški stroji (Slovarji)	Information technology. Office machines (Vocabularies)
35.240.80	Uporabniške rešitve IT v zdravstveni tehniki	IT applications in health care technology

SIST ENV 12017:2003 **en**

Context

- UMLS





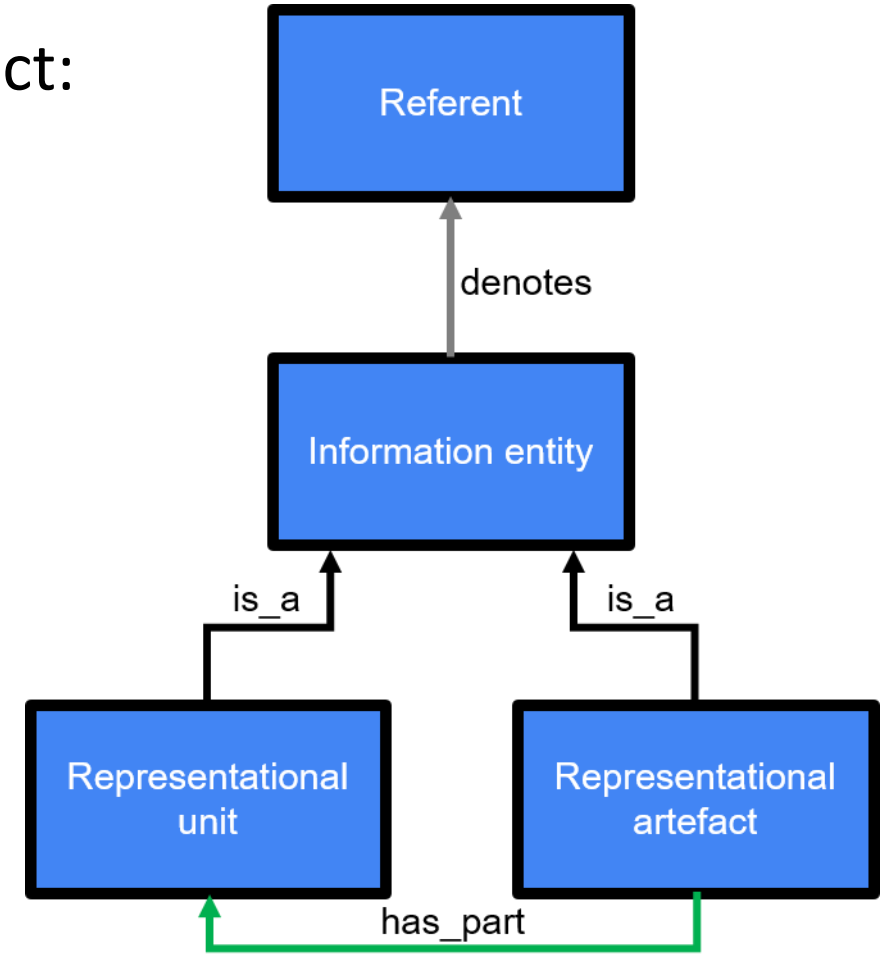
Context

- Principled ontological analysis of :
  - Constituant of KOS
  - Representational commitments
- Ontology based framework for KOS
- KOSonto an OWL model under:
  - BFO (Basic Formal Ontology) and
  - IAO (Information Artifact Ontology)

KOS: a meaningful ontological category

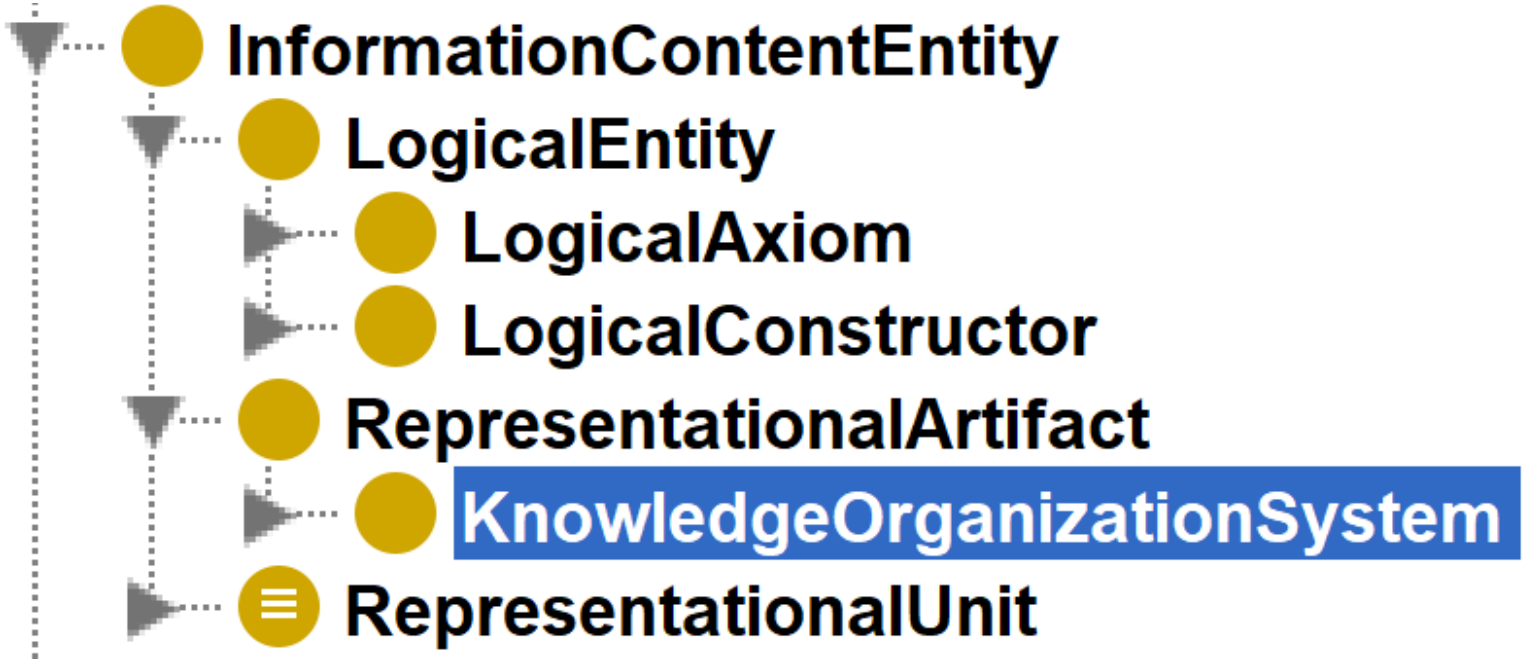
KOS

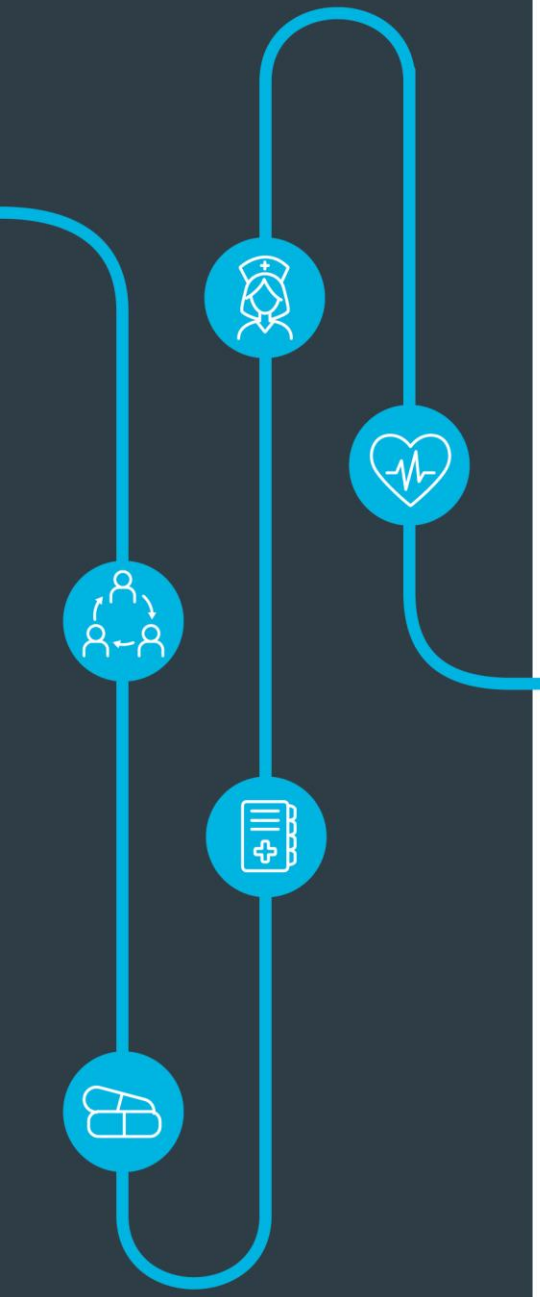
- Under IAO ➔ KOS are Representational artifact:
  - Information entities
  - Artifacts (made by human)
- They denote something ➔ **Referent**
- Atomic form ➔ **Representational Unit**



KOS in KOSonto

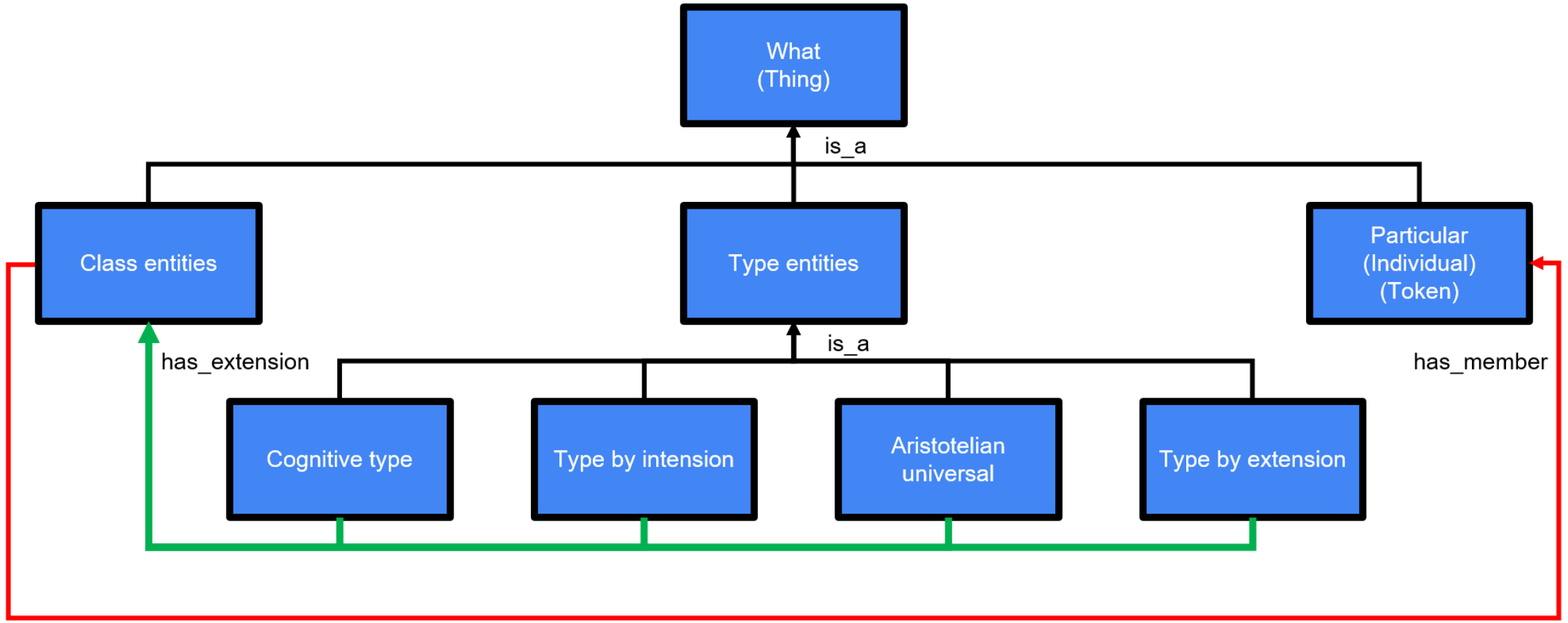
- KOS and RU under IAO



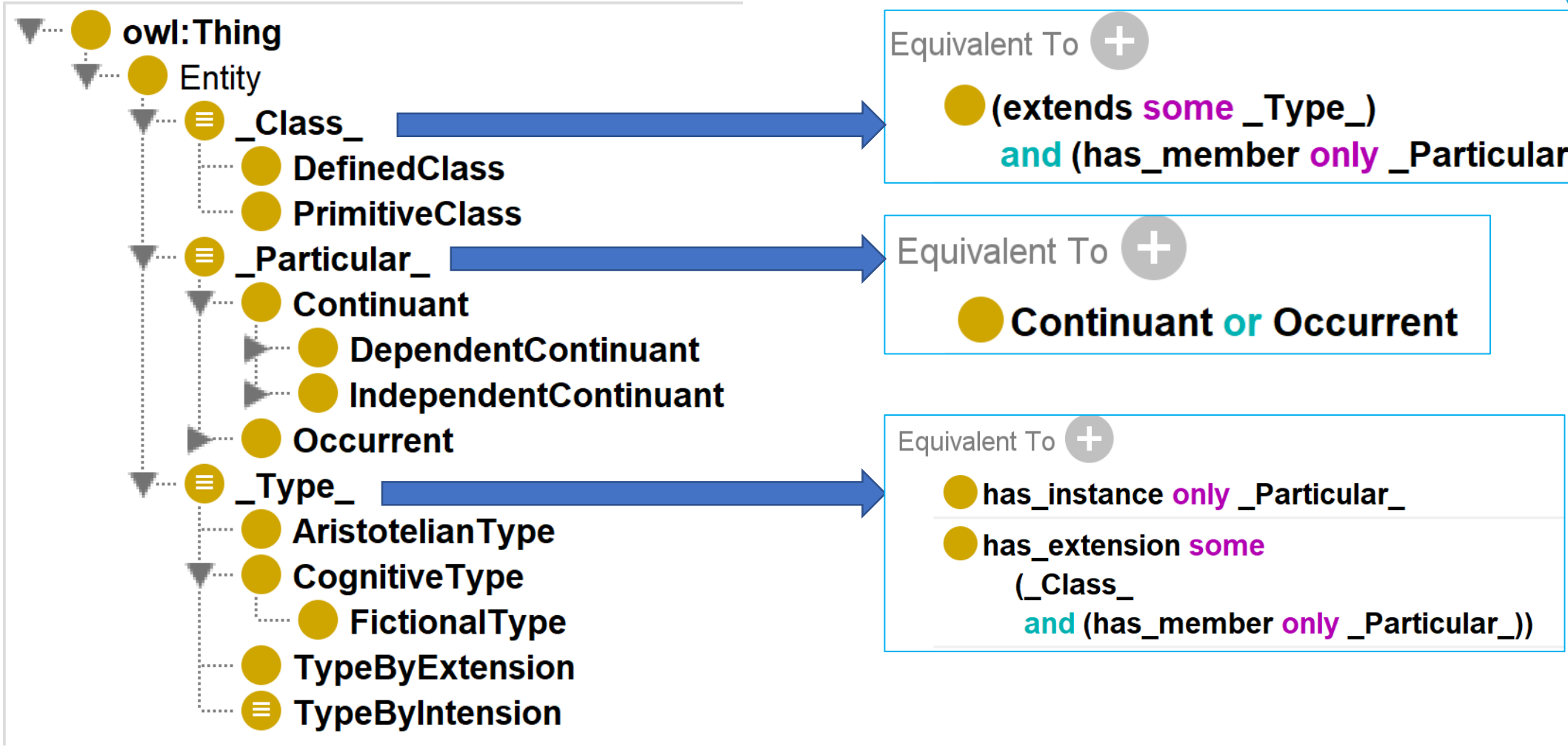


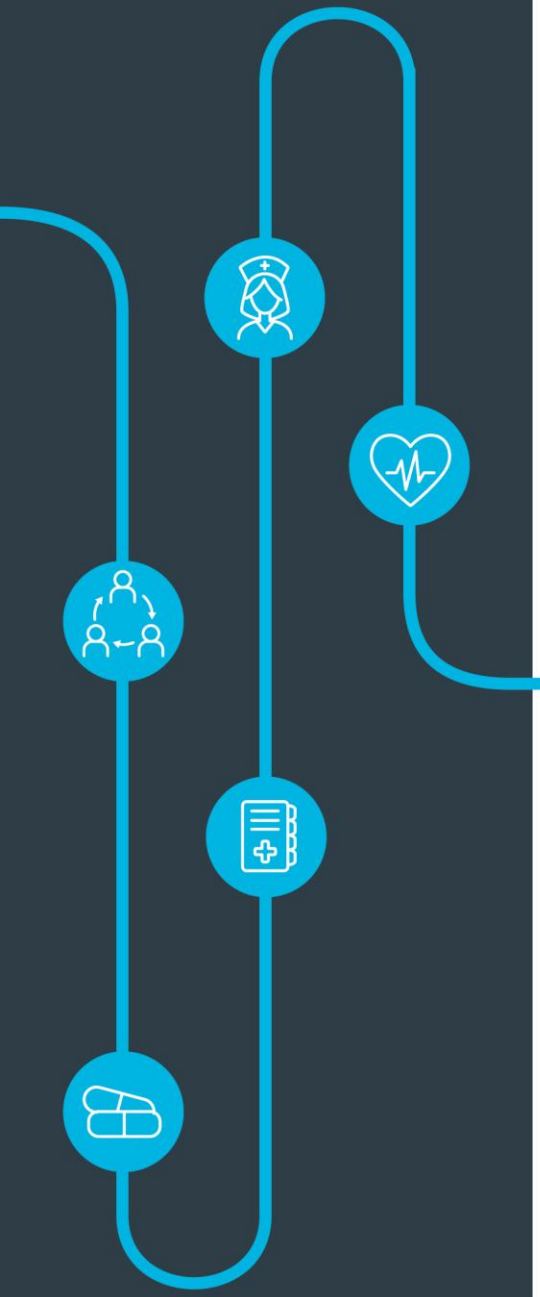
What is denoted?

Referent


What
(Thing)
is_a
Class entities
Type entities
Particular
(Individual)
(Token)
has_extension
is_a
has_member
Cognitive type
Type by intension
Aristotelian
universal
Type by extension

Referent in KOSonto

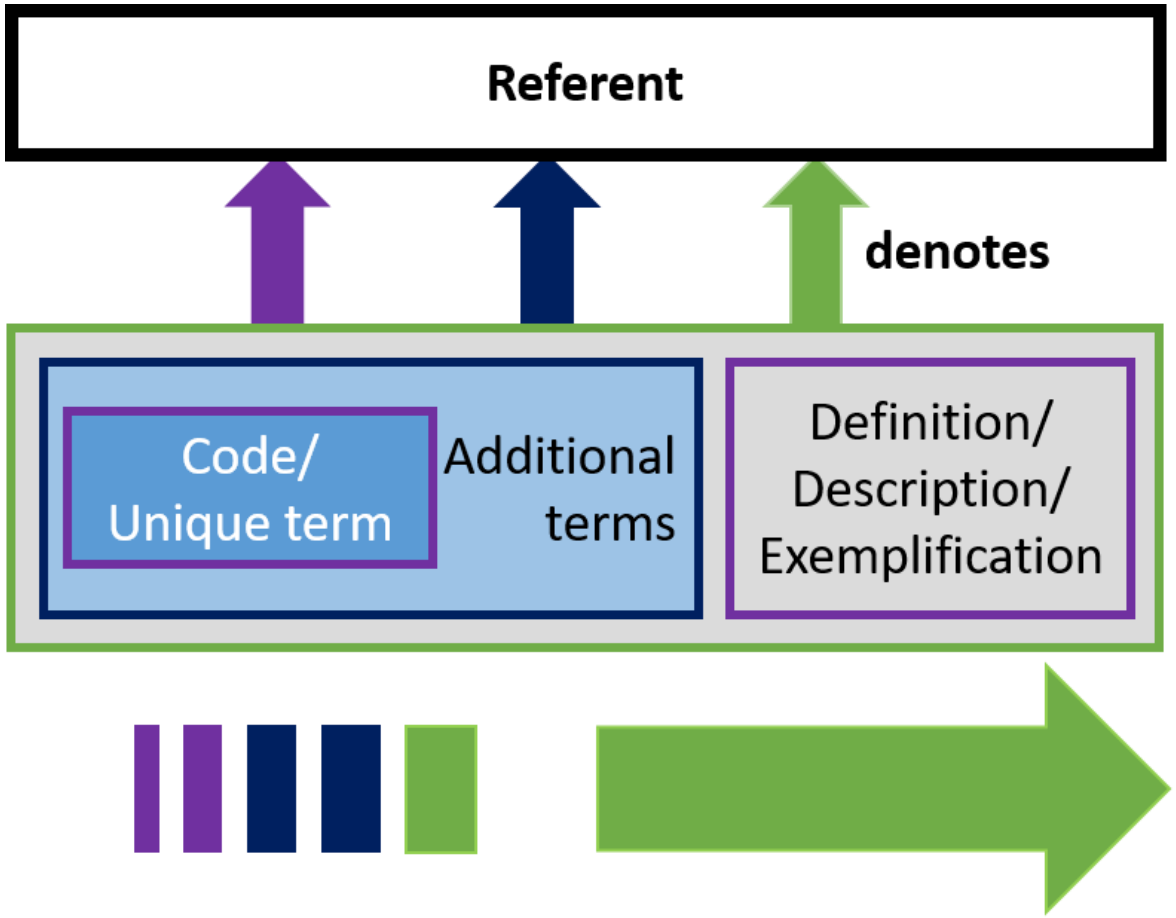




How is it represented?

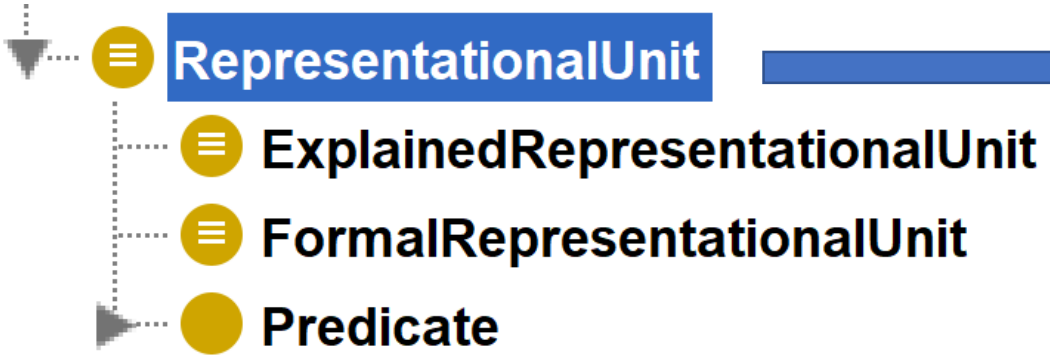
Representational Unit

What is an atomic representation?



Legend :
Each color corresponds to a different level from the least to the most granular: purple, blue, and green.
Box overlaps are inclusive.

RU in KOSonto

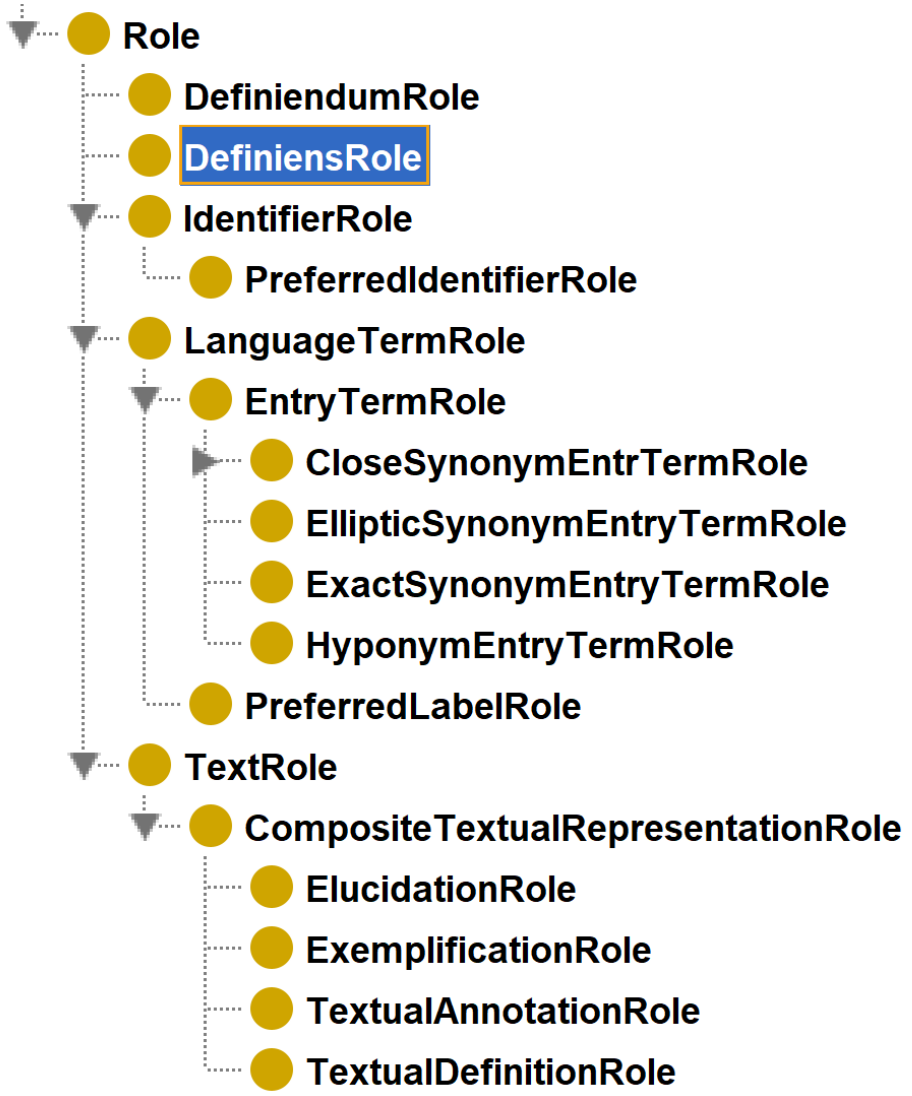


Equivalent To

InformationContentEntity
and (((has_proper_part some
(Literal
and (bearer_of some IdentifierRole)))
and (has_proper_part some
(NaturalLanguageTerm
and (bearer_of some PreferredLabelRole)))) or (has_proper_part some
OWL_ClassExpression))
and (not (has_proper_part some RepresentationalUnit))
and (proper_part_of some KnowledgeOrganizationSystem)

RU in KOSonto

Different role of RU part



Application to biomedical resources

Application to ICD-10

- **Structure :**
  - Tree-shaped is_narrower_than hierarchy
  - Disjointness of siblings RU
  - RU label ➔ Elliptic synonym role
  - Textual composite representation
- **Referent** :
  - Aristotelian universals (D10.0-Benign neoplasm of Lip)
  - Cognitive Type (H40.0 – “Glaucoma suspect”)
  - Type to type relation of exclusion
- When used : diseases, signs, symptoms, or diagnoses?

Application to SNOMED CT

- **Structure :**
  - Hierarchy of classes
  - RU ➔ Formal representational units
  - Post-coordination ➔ Composite representation as RU
  - Label ➔ Synonyms, Fully Specified names
  - Textual composite representation

- **Referent** :
  - Extend Aristotelian Universals / Type by intention

Application to MeSH

- **Structure :**
  - Tree-shaped is_narrower_than hierarchy :
  - Different IDs for the same term
  - Tree independent ID ➔ hypernym (UID)
  - Entry term for the same ID ➔ Hyponyms
  - Textual composite representation

- **Referent** :
  - Topics in biomedical publications ➔ Cognitive Type.

Application to HL7 hl7VS-appointmentReasonCodes

- **Structure :**
  - Flat list
  - Textual composite representation

- **Referent** :
  - Aristotelian universals

Conclusion

Conclusion

- Strictly ontology-based, attempt to lay a foundation for a principled ontological account of KOS
- The most diverse types can be described under a unique framework
- Formal KOS ➔ Formal RU
- Targeted referent ➔ Practical usage

Thank you very much for your time

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