

# A Meta-Level Ontology for Specialized Communication

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(LogOnto)  
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- Terminologies help reduce the complexity of specialist language(s) IN USE
- Set of domain-specific concepts and their fine-grained natural language descriptions
- Meaning organized by “concepts”
  - epistemological view of concept as unit of knowledge
  - a concept is defined by its relation to other concepts and its natural language definition
  - exists independent from any designation
  - rich descriptive data
- Clear and elaborate definition authoring methods (genus differentia) - basis for re-engineering
- Target a specific subject field and a specific user group

# Example Lexicon vs. Terminology

:Einschlag

```
lemon:canonicalForm [ lemon:writtenRep "Einschlag"@de;
isocat:DC-1297 isocat:DC-1883; # gender=male
isocat:DC-1298 isocat:DC-1387; # number=singular
isocat:DC-2720 isocat:DC-1331 ]; # case=nominative
```

```
lemon:altForm [ lemon:writtenRep "Einschlaege"@de;
isocat:DC-1297 isocat:DC-1883; # gender=male
isocat:DC-1298 isocat:DC-1387; # number=singular
isocat:DC-2720 isocat:DC-1293]; # case=genitive
```

```
[ lemon:writtenRep "Einschlaegs"@de;
isocat:DC-1297 isocat:DC-1883; # gender=male
isocat:DC-1298 isocat:DC-1387; # number=singular
isocat:DC-2720 isocat:DC-1293]; # case=genitive
```

```
[ lemon:writtenRep "Einschlaege"@de;
isocat:DC-1297 isocat:DC-1880; # gender=male
isocat:DC-1298 isocat:DC-1354; # number=plural
isocat:DC-2720 isocat:DC-1331]; # case=nominative
isocat:DC-1345 isocat:DC-1333.
```

- [1] Lightning strike
- [2] Element of character or a person
- [3] Felling/logging in forestry
- [4] Steering angle (vehicles)
- [5] hem in textile
- ...

InterActive Terminology for Europe (IATE)

AGRICULTURA, SILVICULTURA E PESCA [COM]

DE:

Abhieb

Schlag

Abholzen

Einschlag

Holzschlag

PT:

abate

derrubamento

abate de árvores

produção de abate

produção de madeira

derrubamento de árvores

derrubamento de árvores

EN:

felling

removal

tree felling

timber-cutting

...

# Example of Intensional Definition

## Typical ISO Example

### **Mechanical Mouse**

computer mouse in which movements are detected by a ball on its underside that activates rollers in physical contact with the ball

## Investopedia Example

### **Affinity Card**

A type of credit card issued by a bank and a charitable organization whose logo appears on the card. Each time the card is used, a percentage of the transaction is donated to the organization.

## Ontologies

- Human users and language-based applications require natural language (NL) content - costly to generate
- Focus on formal semantics - lack of NL expertise
- Predominance of English labels - three times more non-English speaking Internet users (Cimiano and Buitelaar 2014)
- Lack of ontological resources

## Terminologies

- Distribution format, representation language, data semantics, etc.
- Lack of machine readability
- Difficult to interchange and integrate
- Hope on SW technology as "incubator" for more sophisticated language resources (Pretorius 2014)

- Restricted to few domains, mostly biomedicine
- Mostly English and not equipped for multilinguality
- Need for definition authoring process (Seppälä and Ruttenberg 2013)

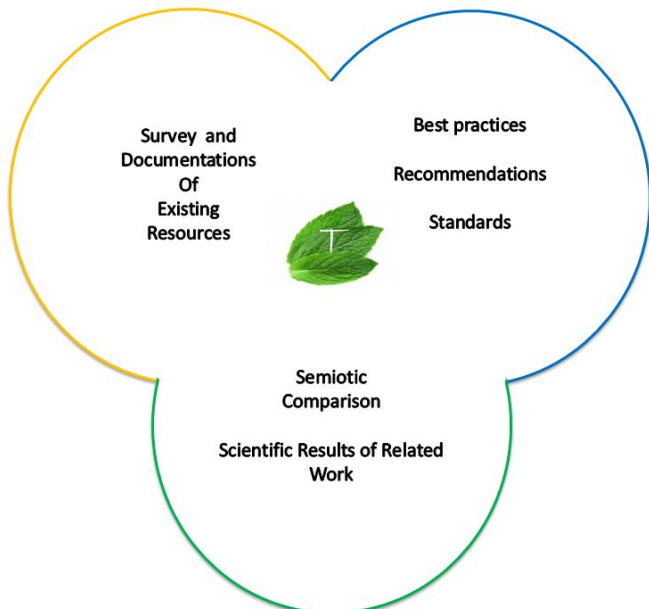
## Chemical Entities of Biological Interest (CHEBI)

```
id: CHEBI:24870
name: ion
def: "A molecular entity having a net electric charge." []
synonym: "ion" EXACT IUPAC_NAME [IUPAC:]
synonym: "iones" RELATED [ChEBI:]
synonym: "ions" RELATED [ChEBI:]
synonym: "Ion" EXACT [ChEBI:]
synonym: "ion" EXACT [ChEBI:]
synonym: "Ionen" RELATED [ChEBI:]
is_a: CHEBI:23367
```

# Design Parameter for Meta-Level Ontology

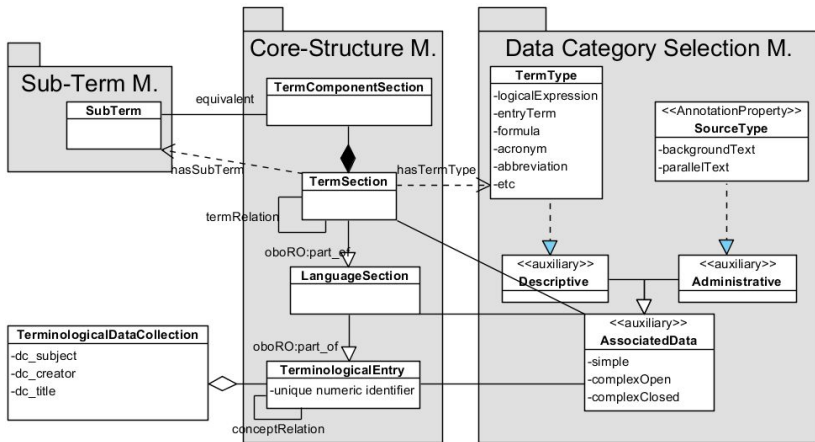
- Modularity: core-structure, data category selection, sub-term
- Re-Use: Dublin Core, Ontology Metadata Vocabulary, semiotics.owl, OBO Foundry relations ontology, upper level ontologies...
- Integration of various methods: standards, best practices,...

# Need for Method Integration

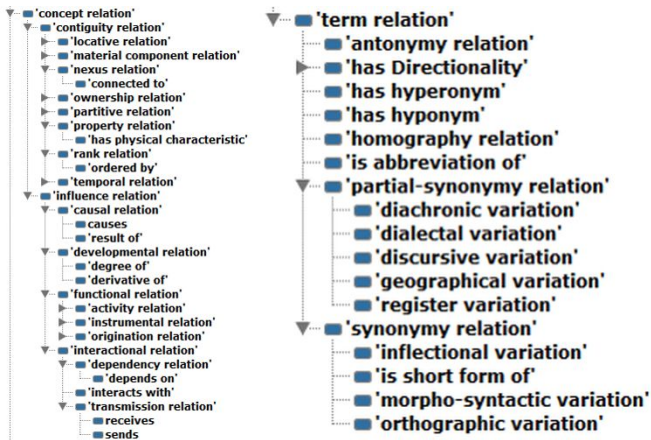




# Meta-Level Ontology

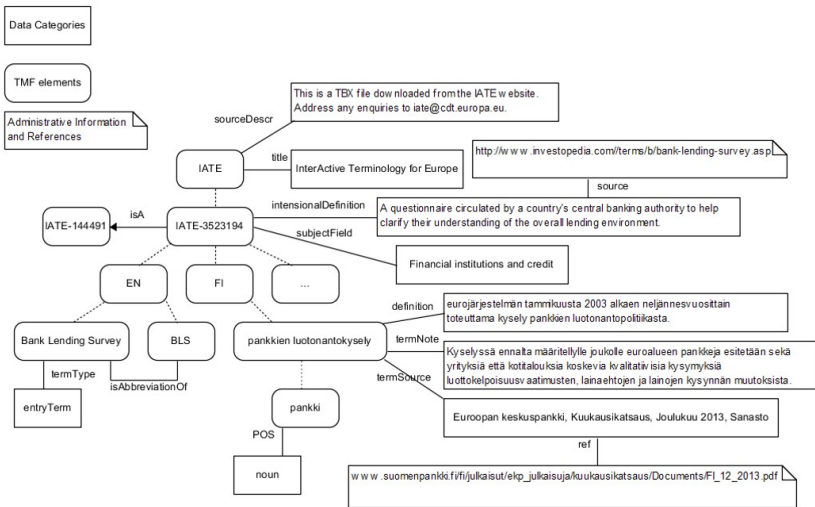


# Relations



©Anita Nuopponen (concept relation topology)

# IATE Example



- Use meta-level ontology to create RDF resources for terminologies
- Alignment of terminological RDF models with existing formal ontologies
- Re-Engineering of existing terminologies to ontologies

No	Guidelines	Example
1	Use unique numeric identifiers for each component to form URIs	<code>http://exampleterminology.org/terminology/1490</code>
2	Start from a unique empty top concept	<code>owl:thing</code>
3	Use <code>Class</code> for terminological entries	<code>SubClassof(owl:Thing a:1490)</code>
4	Each class must have at least one parent from which it inherits all properties	
5	Use <code>SubClassOf</code> for parent-child relations	<code>SubClassof(a:1491 a:1490)</code>
6	Use <code>ObjectProperty</code> and assertions for non-hierarchical relations between concepts	<code>ObjectPropertyAssertion(a:hasIssuer a:Security a:Entity)</code>
7	Use <code>EquivalentClasses</code> to state equivalence between two classes	A relationship between concepts of two different terminologies
8	Use <code>DisjointClasses</code> to state that class expressions are pairwise disjoint	Two sibling concepts cannot share any individuals
9	Use <code>Individuals</code> to represent language sections and terms	<code>a:1490pt1 "dação"</code>
10	Relate terms and sections by using <code>obo:part_of</code>	<code>a:1490pt1 obo:part_of a:1490pt</code>
11	Use of <code>ISOCat</code> data categories for any extensions of the meta-level ontology	

- Semi-automated re-engineering of terminologies to expressive ontologies
- Alignment of different types of NL and logical definition
- Multilingual verbalization to obtain multilingual NL definitions
- Modeling degree of equivalence - almost never 1:1 correspondence (e.g. statement of financial position vs. balance sheet)
- Culture-specific modeling

Thank you for your attention!