

Mapping of BioTop to Upper Ontologies

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Background

Most current biomedical ontologies are characterized by

- fragmentation and overlap
- missing cross-ontology links
- lack of clear and unambiguous formal definitions
- purpose-specific architecture and design decisions

BioTop - Rationale

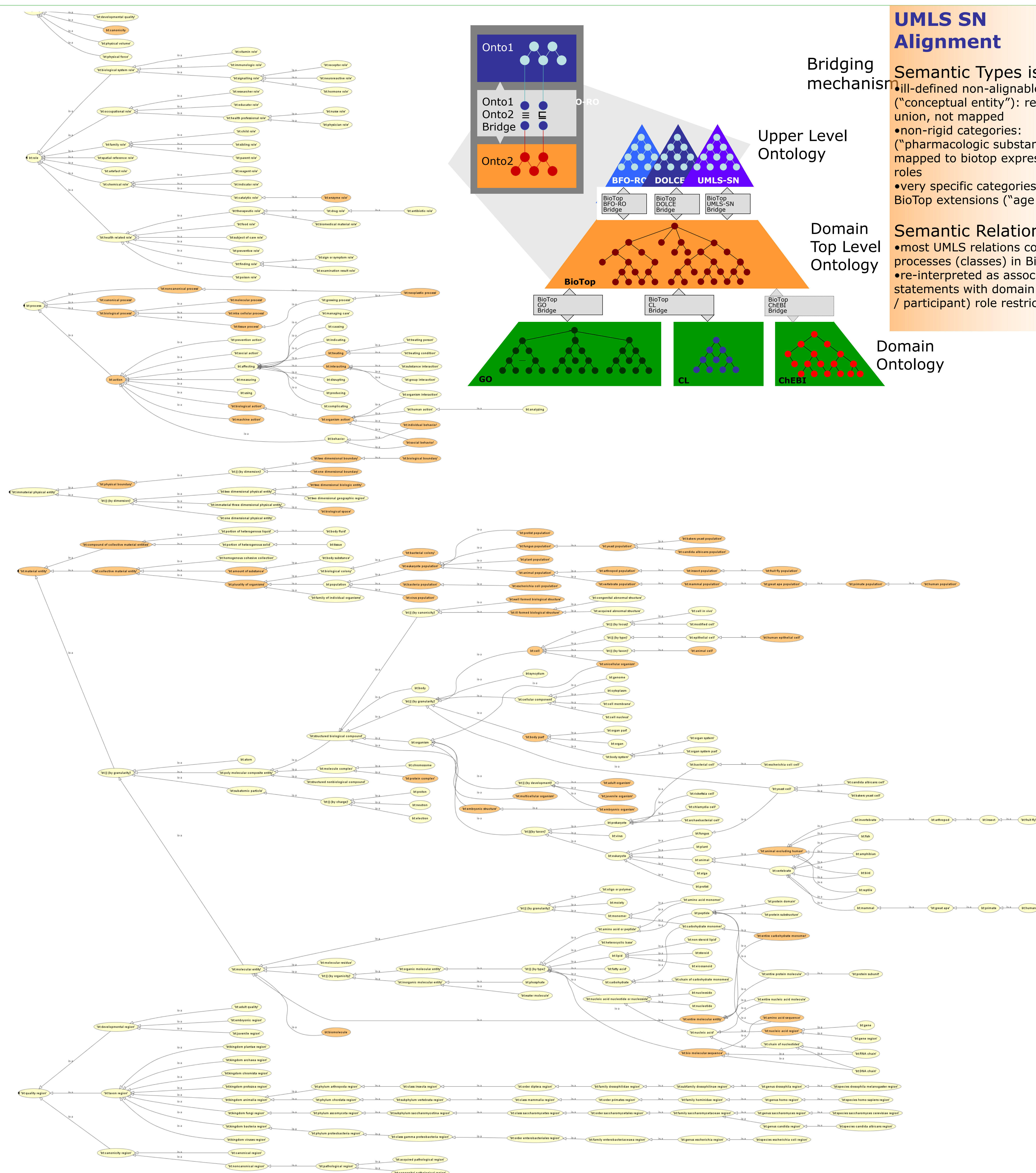
- To consolidate and integrate domain ontologies bridging the gap to upper level ontologies
- To enforce formal descriptions of basic entities in biology and medicine using description logics
- To maintain neutrality with regard to granularity and observer-biased views

BioTop - Characteristics

- DL expressivity: ***SH***
- 339 classes
- 60 relation types
- 373 subclass axioms
- 80 equivalent class axioms
- 66 disjoint class axioms
- Sources, publications, discussion lists:
<http://purl.org/biotop>

Alignment and Mapping

- Basic Formal Ontology (BFO)
- OBO Relation Ontology (RO)
- DOLCE Lite
- UMLS Semantic Network
- GENIA Ontology
- Gene Ontology
- Cell Ontology
- Taxdemo: mapping of sample biological taxonomy
- DebugIT Core Ontology (DCO)



UMLS SN Alignment

Semantic Types issues:

- ill-defined non-alignable categories ("conceptual entity"): represented by union, not mapped
- non-rigid categories: ("pharmacologic substance"): mapped to biotop expressions with roles
- very specific categories: required BioTop extensions ("age group")

Semantic Relations issues:

- most UMLS relations correspond to processes (classes) in BioTop
- re-interpreted as associative statements with domain / range (agent / participant) role restrictions

DOLCE Lite Alignment

- qualities and quality region
- roles and functions
- masses / collections
- DOLCE subdivisions of qualities and quality regions
- DOLCE relations

BFO / RO Alignment

- **issues:**
 - quality vs. quality region
 - state vs. quality
 - subdivisions of bfo:material_entity
 - subdivisions of bfo:processual_entity
 - biotop: immaterial nonphysical entities
 - counts vs. collections
 - lack of formal bfo definitions and linkage with RO
 - existing RO relations insufficient (no relation for inheritance)

