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DOLCE

Descriptive Ontology for Linguistic and Cognitive Engineering

- <http://www.loa.istc.cnr.it/dolce/overview.html>
- developed in the IST Project 2001-33052 **WonderWeb**
Ontology Infrastructure for the Semantic Web
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2 application domain

- DOLCE is a **foundational** ontology that provides general distinctions and notions reusable to formally describe a huge variety of application domains
 - no strong metaphysical commitment: categories can be intended to mirror cognition, common sense, nat. language...
 - rigorous, systematic, interdisciplinary approach
 - focus on design rationale to simplify the comparison and integration with different ontological options
- several extensions exist: manufacturing, artefacts, ontological levels, observations, roles and social entities,...

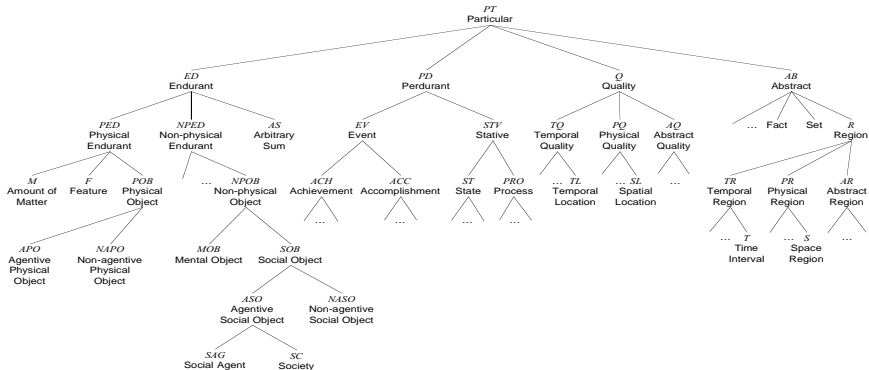
3 intended purpose

- original purpose: to explicitly and formally characterize the **intended meaning** of the terms in the vocabulary used in different resources
 - facilitate integration and interoperability of resources
 - intended to be compatible with different ontological views
- enrich conceptual modeling languages with ontological constraints

4 how DOLCE represents the world

- given its general purpose, DOLCE is compatible with both a continuous and discrete representation of the world
- we are not aware of any attempt to model quantum mechanics in DOLCE

5 the taxonomy of DOLCE



6 industrial use cases

7 overlaps with other ontologies

- there are several application ontologies adopting DOLCE
- there are several ongoing initiatives to establish precise links between DOLCE and
 - Basic Formal Ontology (BFO)
 - Unified Foundational Ontology (UFO)
 - Process Specification Language (PSL)

8 primitive relations

- *Parthood*: “ x is part of y ”
- *Temporary Parthood*: “ x is part of y during time t ”
- *Constitution*: “ x constitutes y during time t ”
- *Participation*: “ x participates in y during time t ”
- *Quality*: “ x is a quality of y ”
- *Quale*: “ x is the quale of y (during time t)”

9 kind of knowledge

- DOLCE has a cognitive and commonsensical bias, i.e., it mainly aims at describing the world at the human-level
- however:
 - most of DOLCE's distinctions/relations come from philosophical, analytical, and formal notions
 - there is no strong commitment on conceptualism, more realist or nominalist approaches could be taken into account within DOLCE

10 granularity

- by means of parthood
- by means of constitution
 - especially relevant when the properties and the persistence of the whole differ from the ones of its constituents
 - extension: theory of *ontological levels*
- granularity intended as resolution of the information
 - via *quality spaces*

11 materials

12 processes

- DOLCE embraces the classical distinction between endurants vs. perdurants (objects vs. events)
- processes are further distinguished on the basis of their dynamic and homogeneity:
 - achievements vs. accomplishments vs. states vs. processes
- extension: foundation of business process specification languages (e.g., BPMN) and manufacturing processes

13 manufacturing

- extensions of DOLCE:
 - ontology of manufacturing
 - product and process modeling
 - ontology of artefacts and functions
 - ontology of design and designing

14 physical properties, materials models, and measurement

- extensions of DOLCE:
 - ontology of measurement and observations
 - DOLCE founds the W3C Semantic Sensor Network Ontology (recently integrated with Sensor, Observation, Sampler, and Actuator (SOSA) an Open Geospatial Consortium Standard)

15 representation language and implementation

- Rich FOL axiomatization: 37 basic categories, 7 primitive relations, 80 axioms, 100 definitions, 20 theorems
- Kif, OWL (DOLCE-Lite), Common Logic (COLORE repository)
- there exist independent proofs of consistency of DOLCE
- there exist modularized versions of DOLCE