



Going Meta

S3 - Episode 4

Measuring the Quality of your
Ontologies

Metric categories

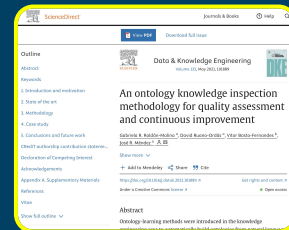
- Structural
- Requirements fitness /Competency Questions
- Pragmatic/Documentation & (Web)Use fitness
- Logical Soundness

Structural Metrics

Class Connectivity Coverage: Fraction of classes that participate in at least one object property (as domain or range)

$$CCC = \Sigma |OPCi| / \Sigma |Ci|$$

Source: DKE quality-inspection methodology in An ontology knowledge inspection methodology for quality assessment and continuous improvement ([link](#))



Metric/Score	1	2	3	4	5
CBOOnto	>8	(6-8]	(4-6]	(2-4]	[1-2]

Structural Metrics

Properties Richness (PROnto): Number of properties defined in the ontology divided by the number of relationships and properties.

$$\text{PROnto} = \Sigma |PCi| / (\Sigma |RCi| + \Sigma |PCi|)$$



Source: *OQuaRE: A SQuaRE-based approach for evaluating the quality of ontologies* ([link](#))

Metric/Score	1	2	3	4	5
PROnto	[0-20]%	(20-40]%	(40-60]%	(60-80]%	>80%

Structural Metrics

Lack of Cohesion in Methods (LCOMOnto):
Mean length of all path from leaf classes to Thing.

$$\text{LCOMOnto} = \sum \text{path}(|C(\text{leaf})|) / m$$

Where m is the total number of paths in the ontology

Source: OQuaRE: A SQuaRE-based approach for evaluating the quality of ontologies ([link](#))

Metric/Score	1	2	3	4	5
LCOMOnto	>8	(6-8]	(4-6]	(2-4]	<=2

Structural Metrics

Coupling between Objects (CBOOnto): Number of related classes. It is the average number of the direct parents per class minus the relationships of Thing

$$\text{CBOOnto} = \Sigma |\text{SupCi}| / (\Sigma |\text{Ci}| - |\text{RThing}|)$$

Source: OQuaRE: A SQuaRE-based approach for evaluating the quality of ontologies ([link](#))

Metric/Score	1	2	3	4	5
CBOOnto	>8	(6-8]	(4-6]	(2-4]	[1-2]

Pragmatic Metrics

Annotation Richness (ANOnto): Mean number of annotation properties (label and comments) per class.

$$\text{ANOnto} = \frac{\sum |AC_i|}{\sum |C_i|}$$

Source: OQuaRE: A SQuaRE-based approach for evaluating the quality of ontologies ([link](#))

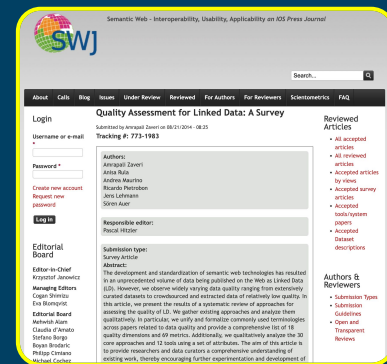
Metric/Score	1	2	3	4	5
ANOnto	[0-20]%	(20-40]%	(40-60]%	(60-80]%	>80%

Pragmatic Metrics

Dereferenceability / Accessibility (LD quality)
Portion of ontology IRIs (ontology IRI, term IRIs) that dereference with useful representations.

HTTP GET on representative IRIs; OK / total.

Source: *Quality Assessment for Linked Data: A survey* ([link](#))

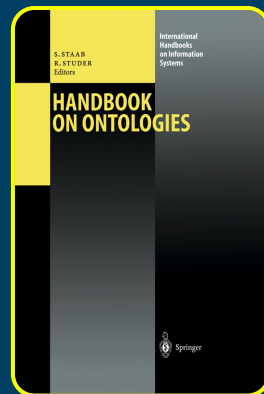


Requirements fitness metrics

CQ Fitness Score

...evaluate the ontology by identifying a set of **competency questions**, which are the basis for a rigorous characterization of the knowledge that the ontology has to cover.

Source: Chapter 13 - Ontology Evaluation in “Handbook on Ontologies” ([link](#))



Logical Soundness Metrics

Consistency

Global consistency of the ontology -> Run a reasoner.

Unsatisfiable classes indicate contradictory constraints

Let's test it with Pellet in Protégé !!

Source: DKE quality-inspection methodology in An ontology knowledge inspection methodology for quality assessment and continuous improvement ([link](#))

See you next month!