

neo4j

# 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)

$$CCC = \frac{\sum |OPCi|}{\sum |Ci|}$$



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]

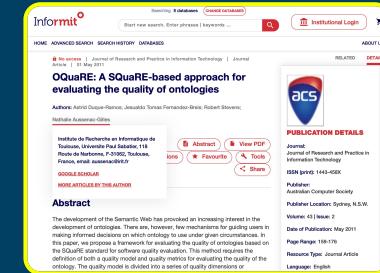
# Structural Metrics

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

$$\text{PROnto} = \frac{\sum |PC_i|}{(\sum |RC_i| + \sum |PC_i|)}$$

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 paths from leaf classes to Thing.

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

*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

$$\text{CBOOnto} = \frac{\sum |\text{SupCi}|}{(\sum |\text{Ci}| - |\text{RThing}|)}$$

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.

$$\text{ANOnto} = \frac{\sum |\text{AC}_i|}{\sum |\text{C}_i|}$$

*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](#))

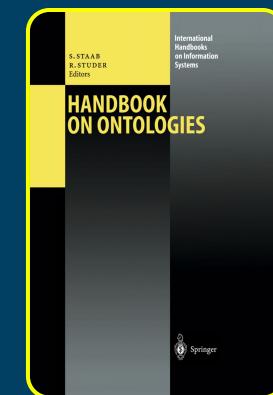


# Requirements fitness metrics

## 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!