neonto

Knowledge Graphs. Empirically better.
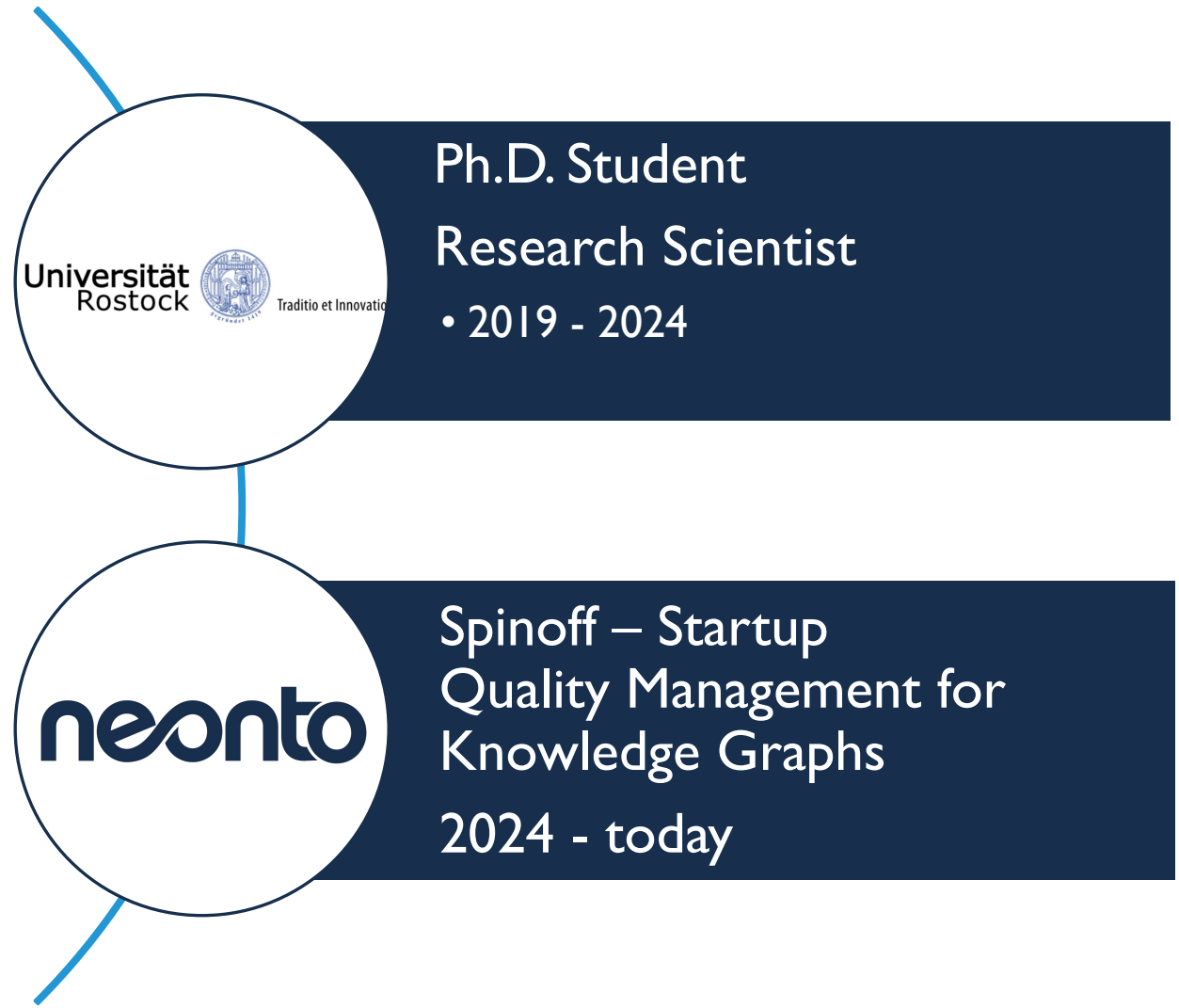
Evaluating Knowledge Graph Quality in Practice

Brief Vita

Ph.D. Student

Research Scientist

- 2019 - 2024

Spinoff – Startup
Quality Management for Knowledge Graphs

2024 - today

Universität Rostock
Traditio et Innovatio

neonto

What is Knowledge Graph Qualiy

Ontology Quality Dimensions

🔍 Accuracy

🦎 Adaptability
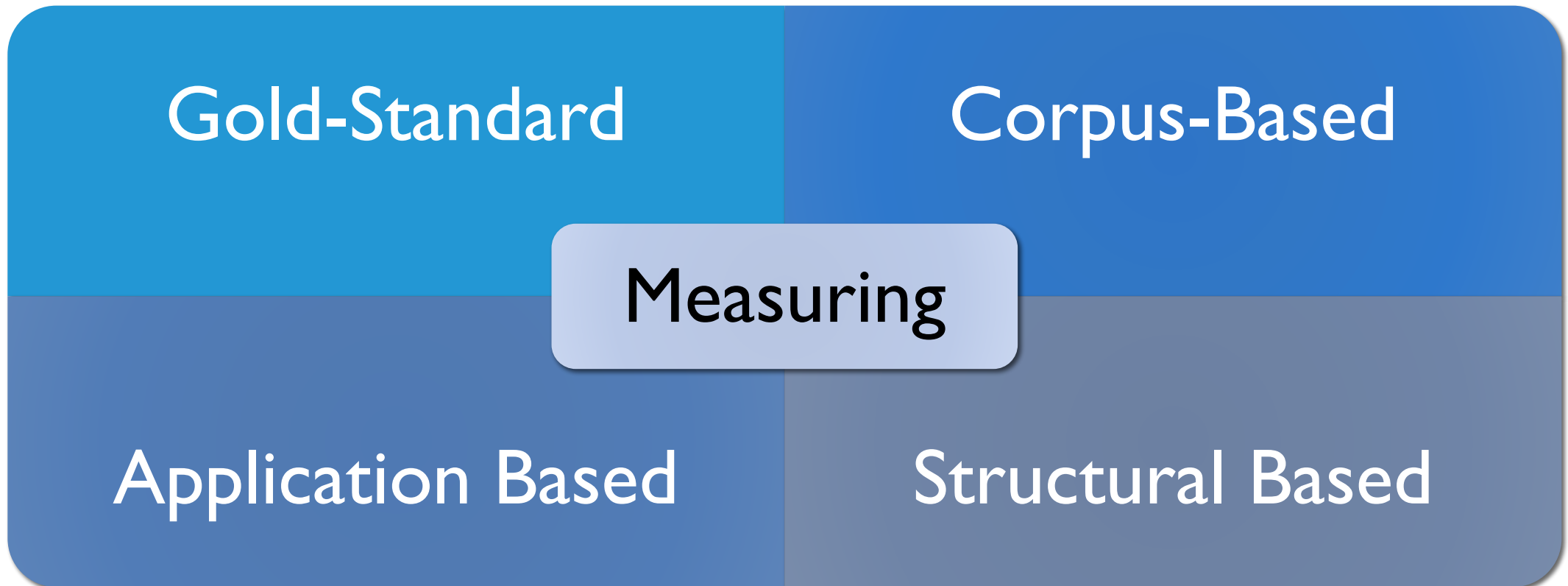
👁️ Clarity

📖 Completness

🧱 Organizational Fitness

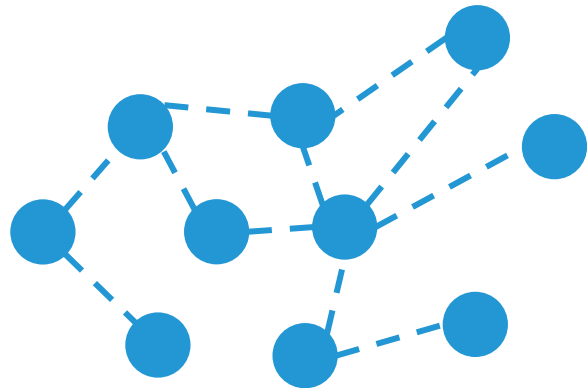They all make sense!

But sometimes contradict each other.

Very high level…

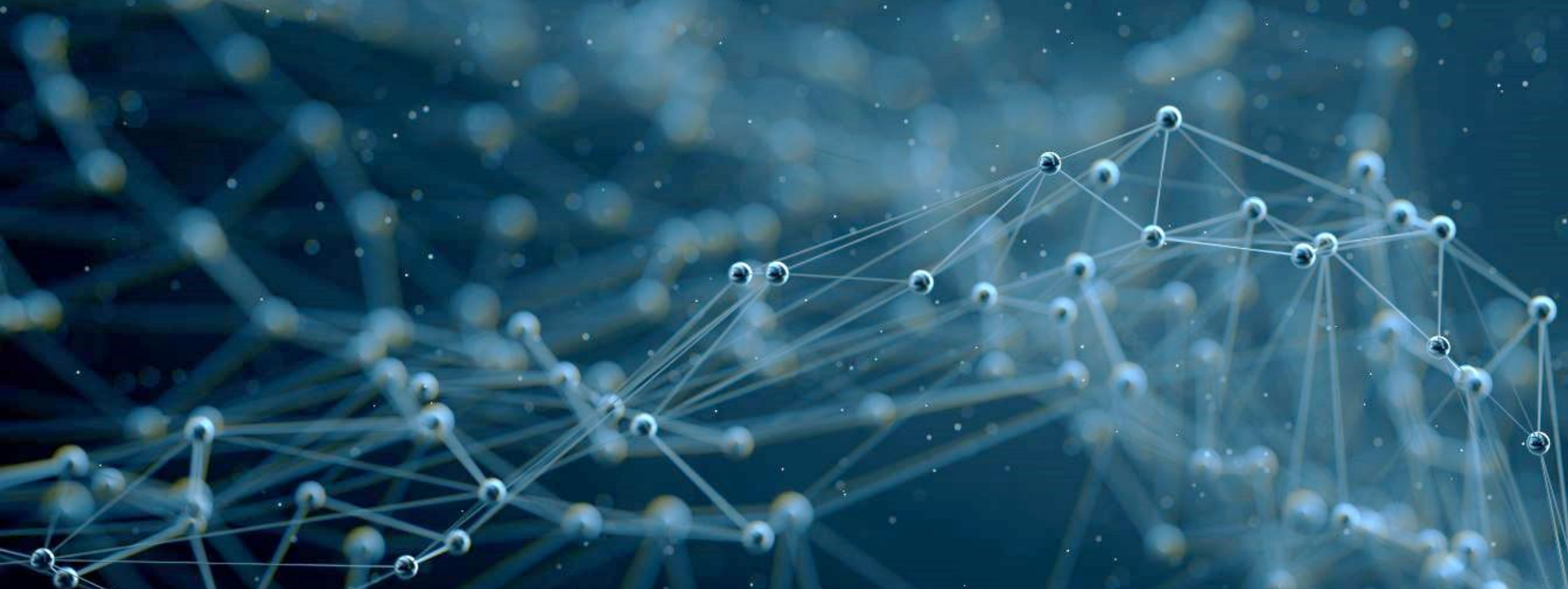*Vrandečić, "Ontology Evaluation." in Handbook on Ontologies*

Ideas of Measuring

Gold-Standard	Corpus-Based
Application Based	Structural Based

Measuring
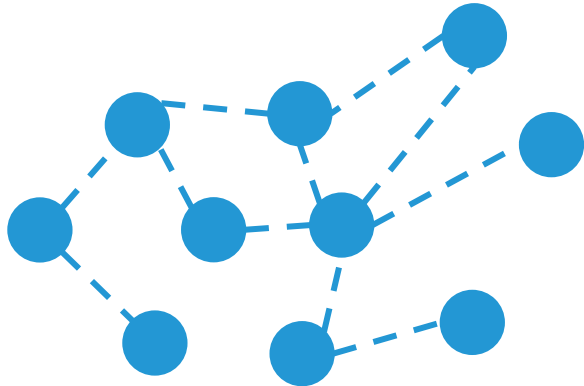
Structural Evaluation

*Using the structural attributes of the graph as the evaluation*

SHACL

Validating Data with the Shape Constraint Language

SHACL – Constraining Data Using Shapes


```
ex:PersonShape
    a sh:NodeShape ;
    sh:targetClass ex:Person ;
    sh:property [
        sh:path ex:name ;
        sh:datatype xsd:string ;
        sh:minCount 1 ;
        sh:maxCount 1 ;
    ] ;
    sh:property [
        sh:path ex:age ;
        sh:datatype xsd:integer ;
        sh:minCount 1 ;
        sh:maxCount 1 ;
    ] ;
    sh:property [
        sh:path ex:parent ;
        sh:nodeKind ex:Person ;
        sh:minCount 0 ;
        sh:maxCount 2 ;
    ].
```

SHACL – Constraining Data Using Shapes

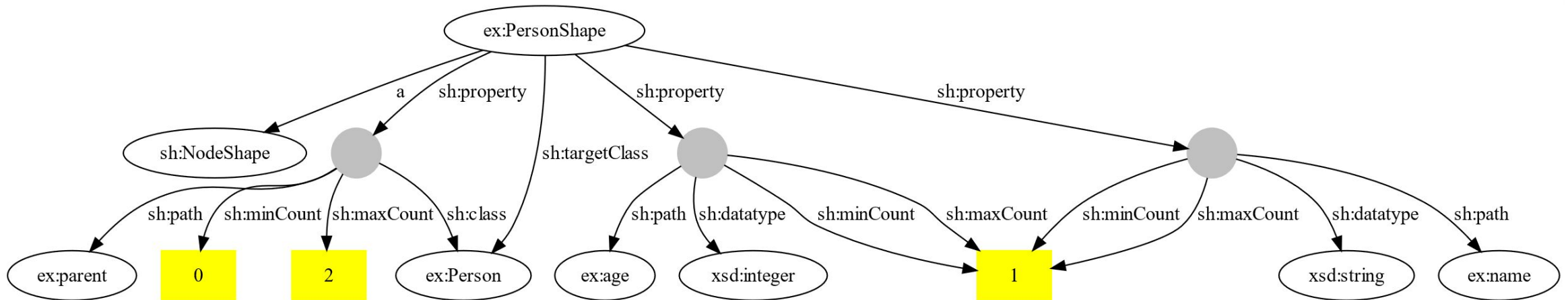

```
ex:PersonShape
    a sh:NodeShape ;
    sh:targetClass ex:Person ;
    sh:property [
        sh:path ex:name ;
        sh:datatype xsd:string ;
        sh:minCount 1 ;
        sh:maxCount 1 ;
    ] ;
    sh:property [
        sh:path ex:age ;
        sh:datatype xsd:integer ;
        sh:minCount 1 ;
        sh:maxCount 1 ;
    ] ;
    sh:property [
        sh:path ex:parent ;
        sh:nodeKind ex:Person ;
        sh:minCount 0 ;
        sh:maxCount 2 ;
    ].
```
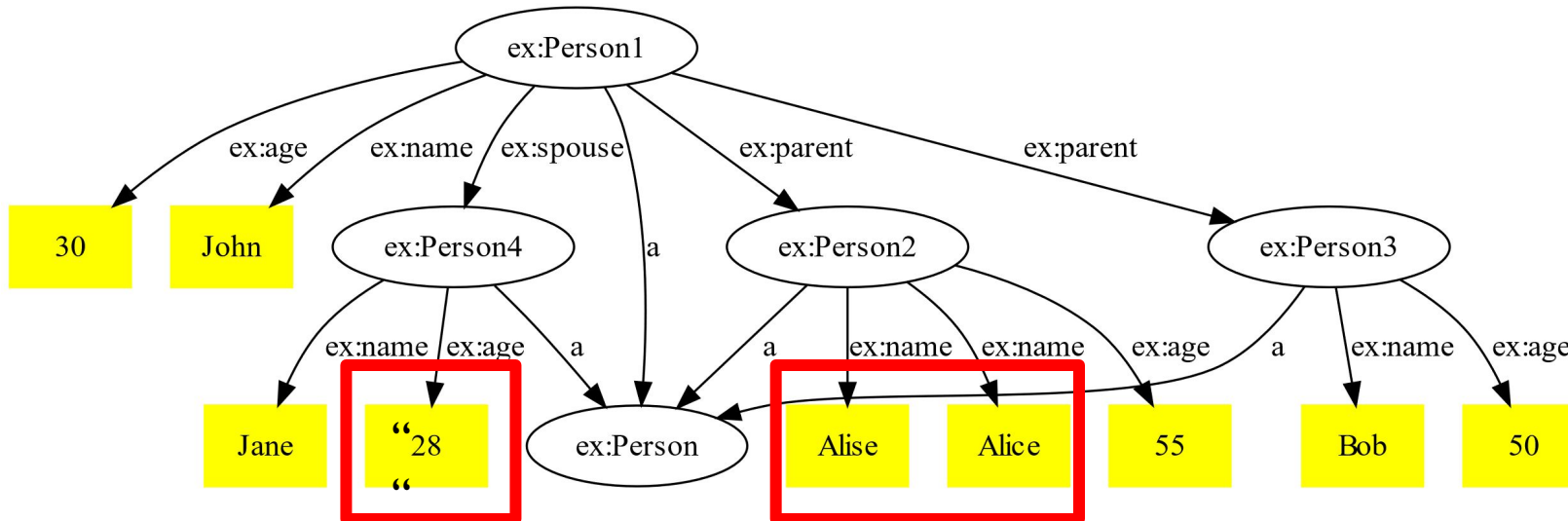
SHACL –
Constraining Data Using Shapes

SHACL – Constraining Data Using Shapes

```
@prefix ex: <http://example.org/> .

ex:Person1 a ex:Person ;
    ex:name "John" ;
    ex:age 30 ;
    ex:parent ex:Person2, ex:Person3 ;
    ex:spouse ex:Person4 .

ex:Person2 a ex:Person ;
    ex:name "Alice" ;
    ex:age 55 .

ex:Person3 a ex:Person ;
    ex:name "Bob" ;
    ex:age 50 .

ex:Person4 a ex:Person ;
    ex:name "Jane" ;
    ex:age "28" .
```
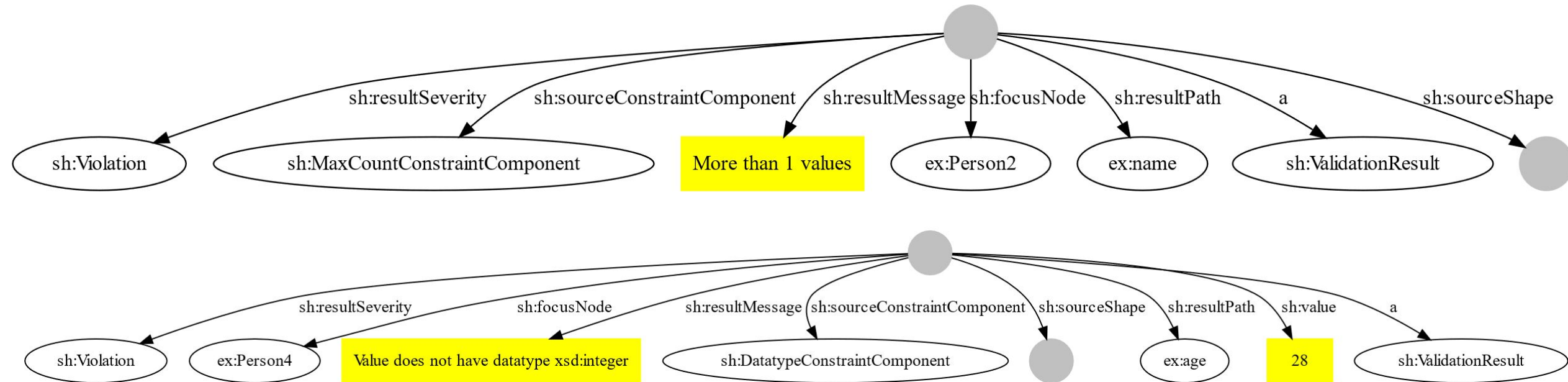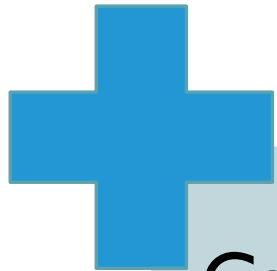
```
ex:PersonShape
    a sh:NodeShape ;
    sh:targetClass ex:Person ;
    sh:property [
        sh:path ex:name ;
        sh:datatype xsd:string ;
        sh:minCount 1 ;
        sh:maxCount 1 ;
    ] ;
    sh:property [
        sh:path ex:age ;
        sh:datatype xsd:integer ;
        sh:minCount 1 ;
        sh:maxCount 1 ;
    ] ;
    sh:property [
        sh:path ex:parent ;
        sh:nodeKind ex:Person ;
        sh:minCount 0 ;
        sh:maxCount 2 ;
    ].
```

Validation Result

SHACL – Wrap up

Can Do

- Setting a data schema in the Graph
- Validation of Data Instances
- Enforce that data conforms to rules

Can't Do

- Evaluate the Schema
- Birds eye perspective
- Understand whether data quality goals are met

Evaluation != Validation

Good Enough?

Connecting data strategy and execution

Measuring what matters.

Going Back to the Start

🔍 Accuracy

🦎 Adaptability

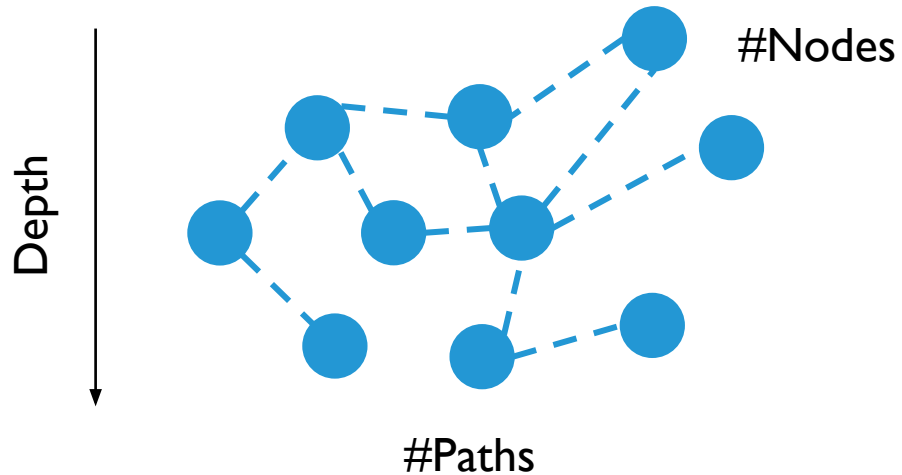👁️ Clarity

📖 Completness

🧱 Organizational Fitness

What do we want?

What attributes are linked to it?

Vrandečić, "Ontology Evaluation." in Handbook on Ontologies

Finding KPIs That Matter

neonto

Depth

#Nodes

#Paths

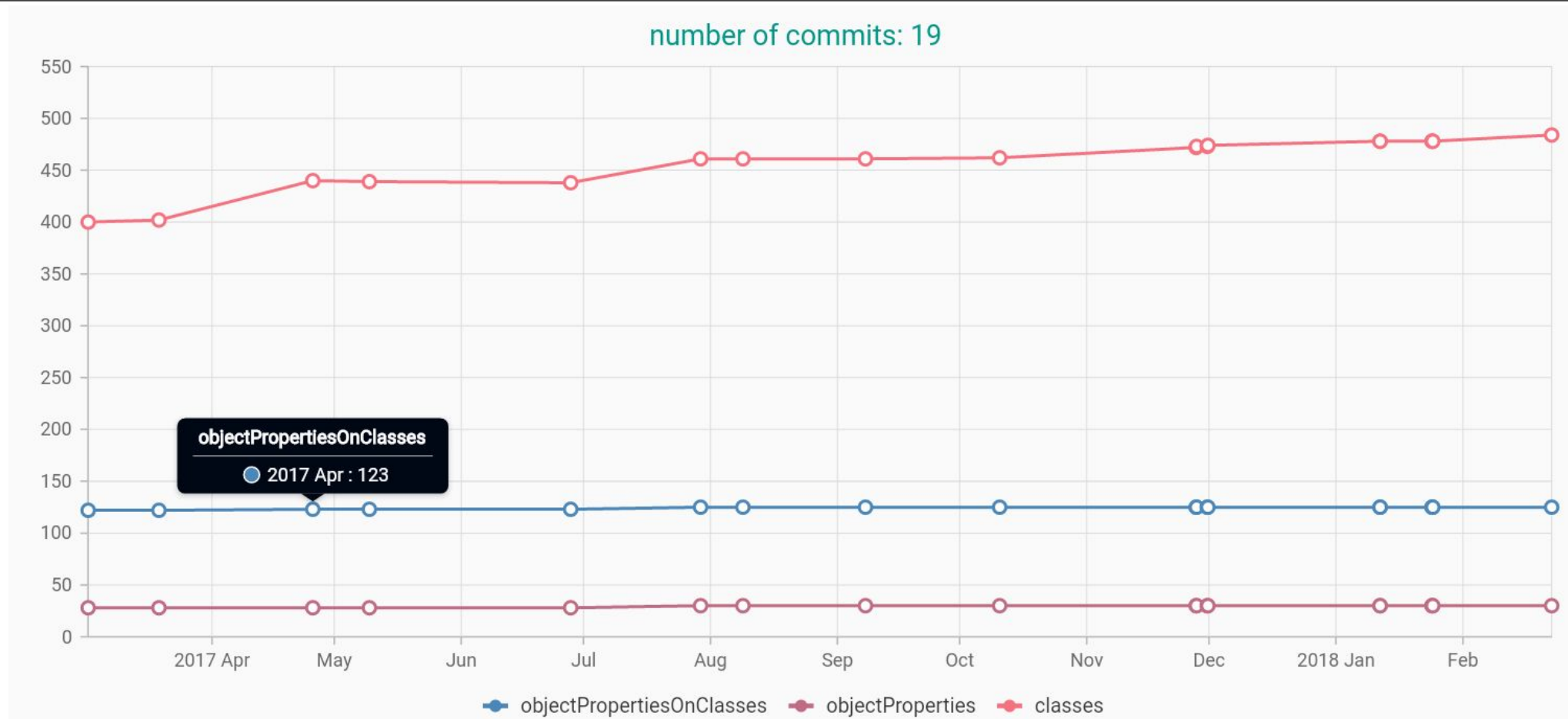Countless things to evaluate…

 # SKOS prefLabel statements

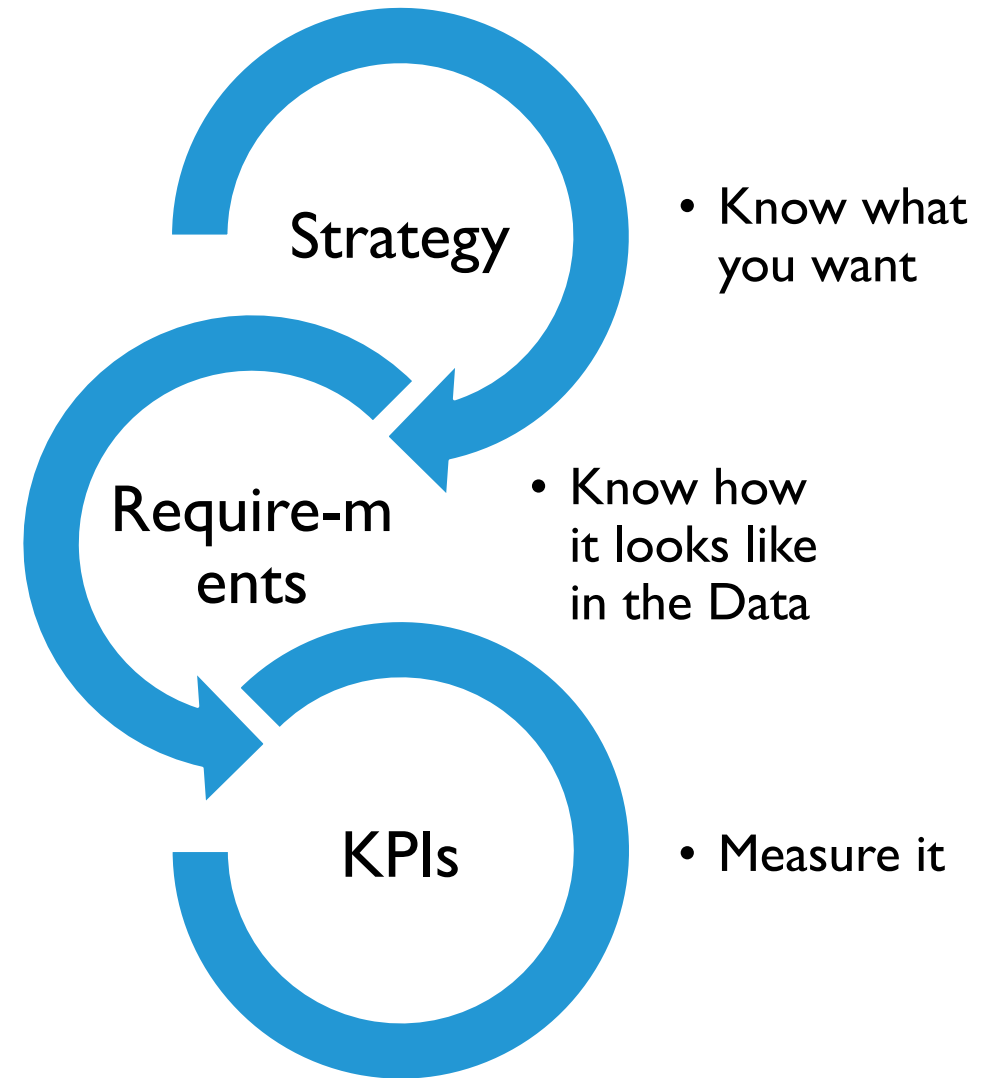*# SHACL Constraints that have sh:messages*

 # Individuals indirectly restricted by SHACL shapes

 # Object Properties / Object Properties w. Dom. & Range

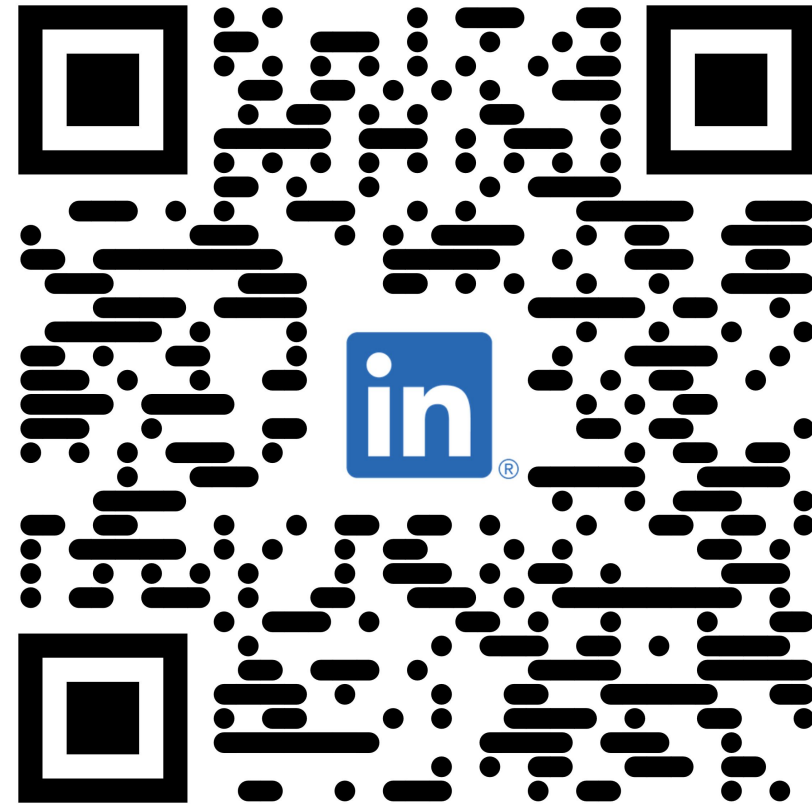# Example: Goal: Increase Ontology Size

Wrap up

Strategy
- Know what you want

Require-ments
- Know how it looks like in the Data

KPIs
- Measure it

neonto

Knowledge Graphs.
empirically better.

neonto.de

Achim Reiz

📞 +49 176 57818521

@ achim.reiz@neonto.de