Workshop on Ontology Design Patterns 2018
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Engaging Content
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Using Ontology Design Patterns To Define SHACL Shapes

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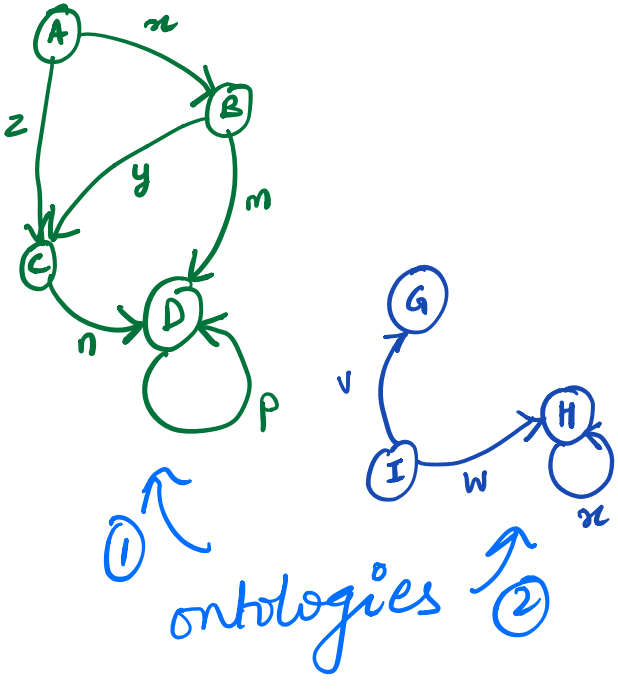
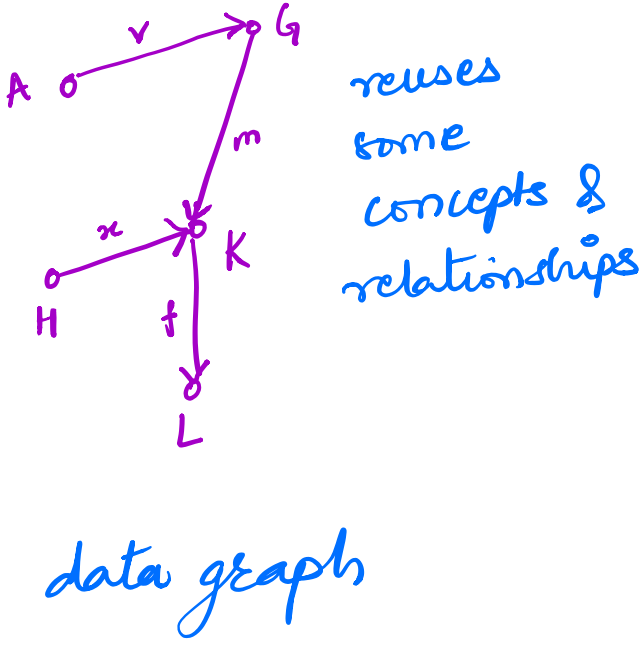
HOW TO VALIDATE???





OWL-based Validation

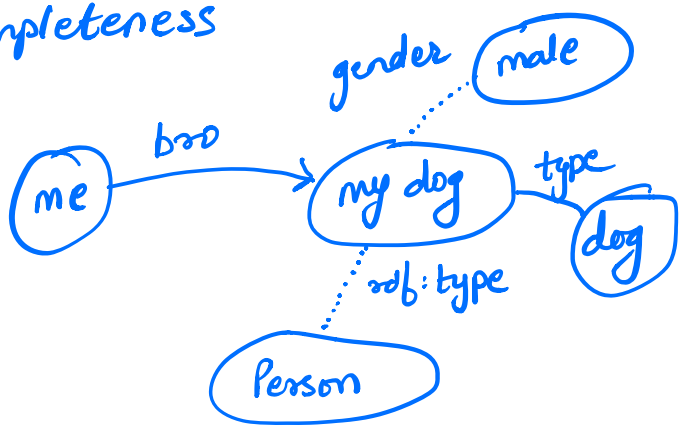
1. Assumption: Open vs Closed
2. Inference
3. Existence

declare vs undeclared

completeness

can lead to surprising results

If I don't use a concept, do I care about its existence?



Axioms

- Define a model for data & relationships → AXIOMS
- Define constraints → restrictions
- Define 'correctness' ? → by following constraints
- Provide validation ? → by testing against constraints & assessing correctness

Restrictions

Axioms may not be applicable because:

- Not all concepts / relations from ontology are being used in a data graph
- Concepts / relations are used, but their semantic meaning has changed

Enter the ODP

- ODP is more generic than an ontology
  i.e. abstraction
- ODP can be more specific to the use-case
  i.e. domain / context specific
- ODP contains only needed axioms
  i.e. only covering required concepts / relationships
- ODP is modular
  i.e. can be combined or used individually

Benefits

1. Fits model of data graph → how data is populated in context
2. Modular → reuse! specialise! abstraction!
3. Easier to integrate → into larger patterns & ontologies

Okay… But still how to validate?

SHACL
Shapes and Constraints Language
W3C Recommendation, 20 July 2017
https://www.w3.org/TR/shacl/

"SHACL - CORE"

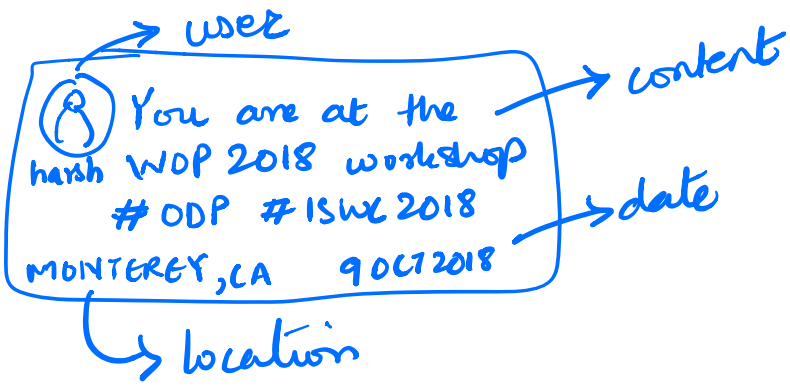
- closed-world
- defined using RDF
- selectors
- report generation
- like ShEx

Approach

- Aim: Automate validation from data model i.e. ODP → SHACL
- Step1: Identify relevant OWL statements within constraint
- Step2: Generate Corresponding SHACL Shape

Requires: Mapping OWL → SHACL

Example



ex: TweetValidator
a sh: NodeShape
targetClass ex: Tweet .

SHACL SHAPE

Tweet has

- exactly 1 user → min: 1 max: 1, type: User
- exactly 1 content → type: Text
- exactly 1 date → type: Timestamp
- 0 or 1 location → max: 1, type: GPS co-ordinates

Can this be extended to an Ontology?

Yes.

But the aim here is to validate the data graph that uses many ontologies, and where only some concepts/relationships are used.

Therefore, if SHACL shapes are generated from an ontology, they will have the same limitation as using the OWL axioms itself.

argument : Generate an ontology for data graph

vs

Generate ODPs for data graph

Another advantage with ODP

- Coherence
- If all constraints (shapes) are satisfied
  then the data can be said to be validated, and this information can be incorporated back into the data graph
- Validations can thus be ‘layered’ on top of each other
- Can the ODPs also be thus ‘layered’ or combined in this manner to create an ontology for representing the data model of the graph?

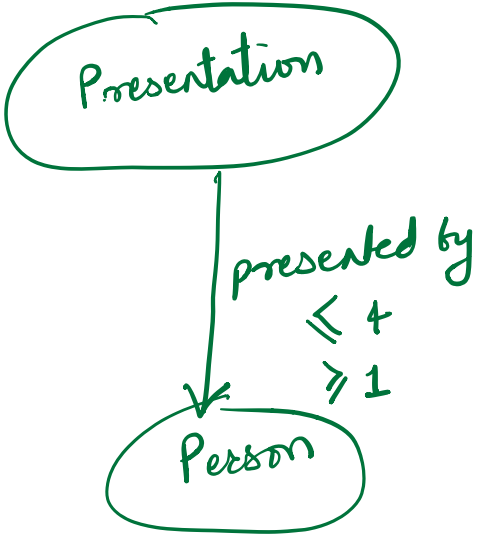
↑ open question!

Converse Application

Use the ODP to visualise SHACL Shapes

```
ex: PresentationShape
    a sh:NodeShape
    targetClass ex:Presentation

    sh:Property [
        sh:Path ex:presenter
        sh:Class ex:Person
        sh:minCount 1
        sh:maxCount 4
    ].
```



Future Work

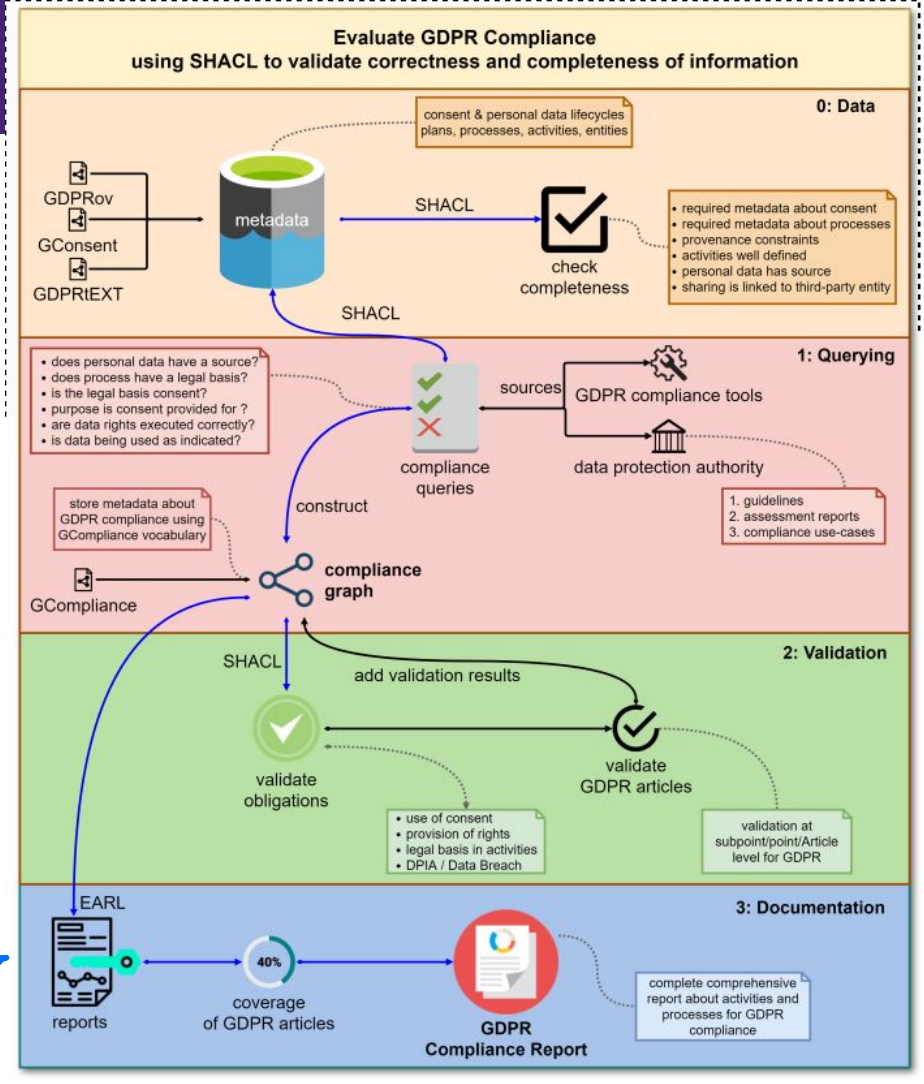
1. SHACL-SPARQL
2. OWL2SPARQL
3. Recursive Constraints

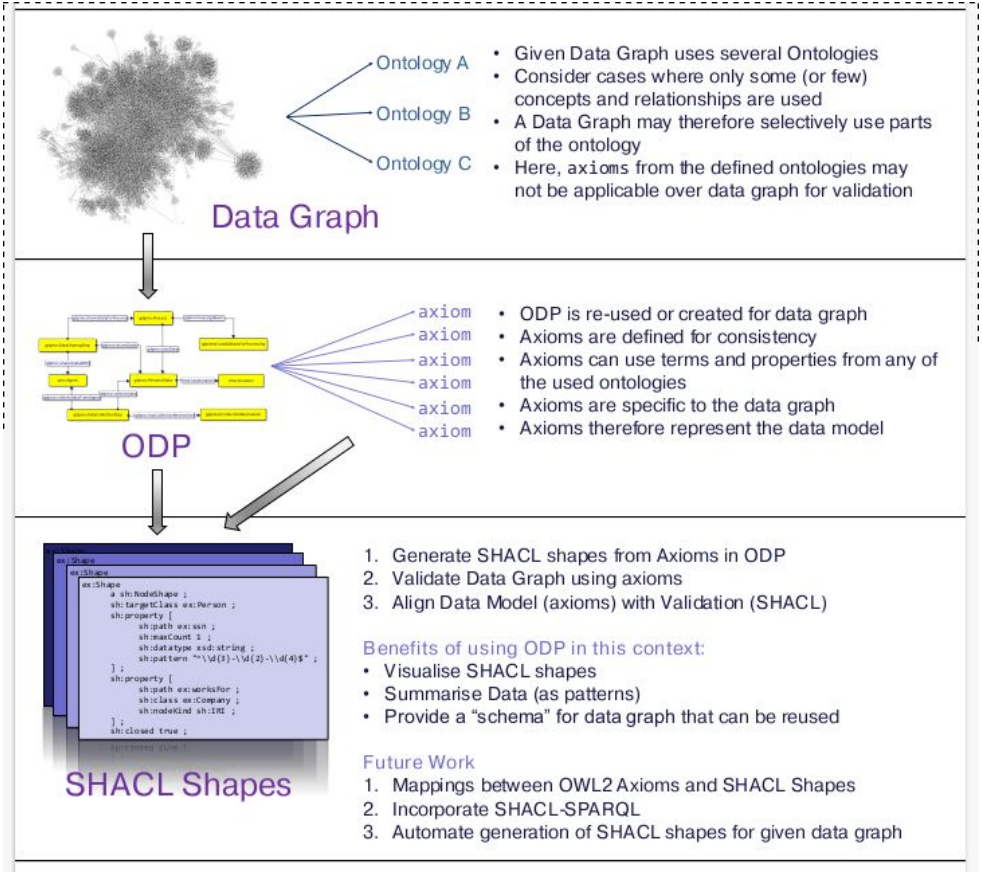
Target Application:
GDPR Compliance → my PhD topic

Modular Obligations → ODP

ODP → validate using SHACL

poster presented at SEMANTiCS 2018 →



End of Presentation

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