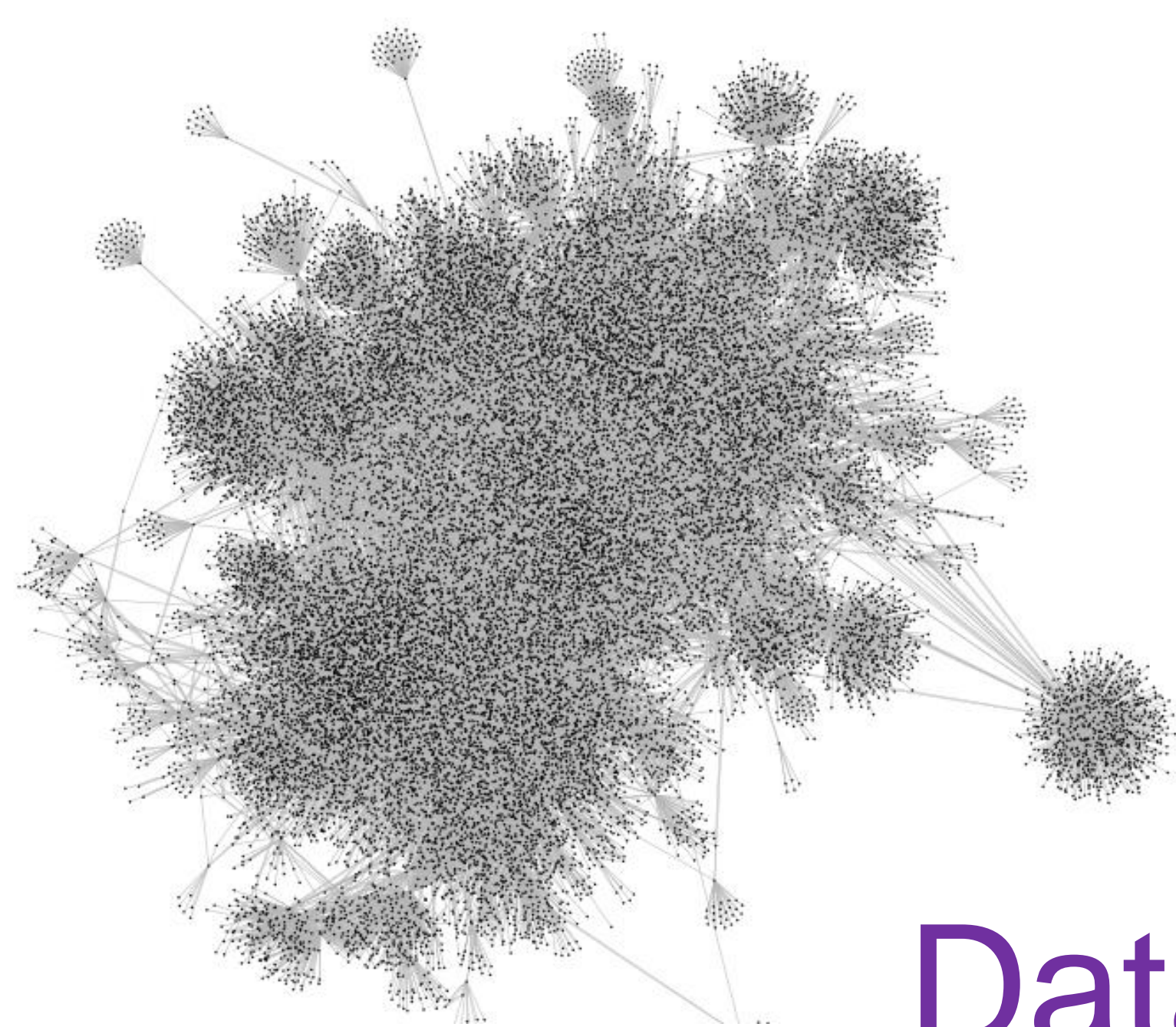# Using Ontology Design Patterns To Define SHACL Shapes

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Ontology A

Ontology B

Ontology C

Data Graph

- Given Data Graph uses several Ontologies
- Consider cases where only some (or few) concepts and relationships are used
- A Data Graph may therefore selectively use parts of the ontology
- Here, `axioms` from the defined ontologies may not be applicable over data graph for validation
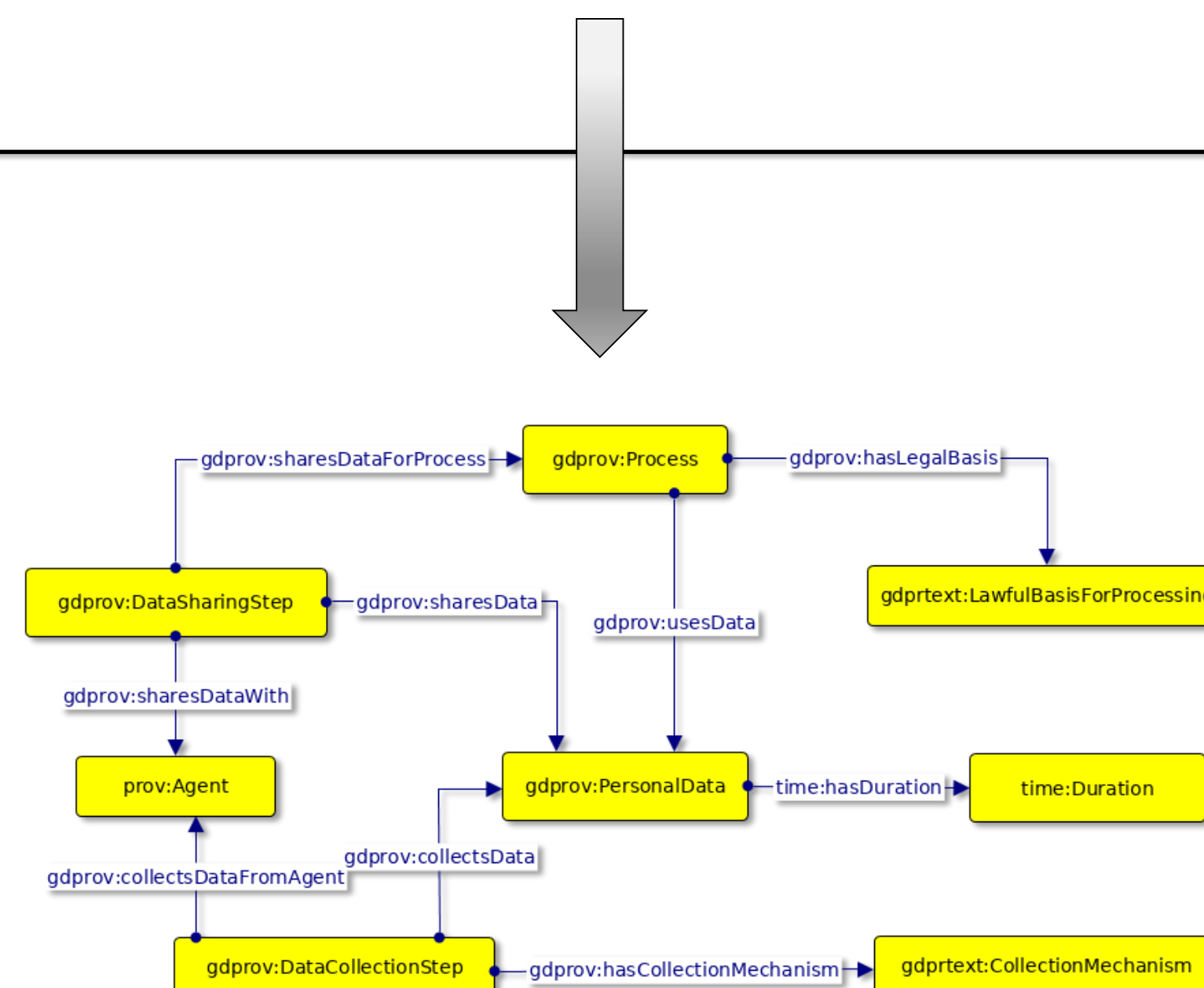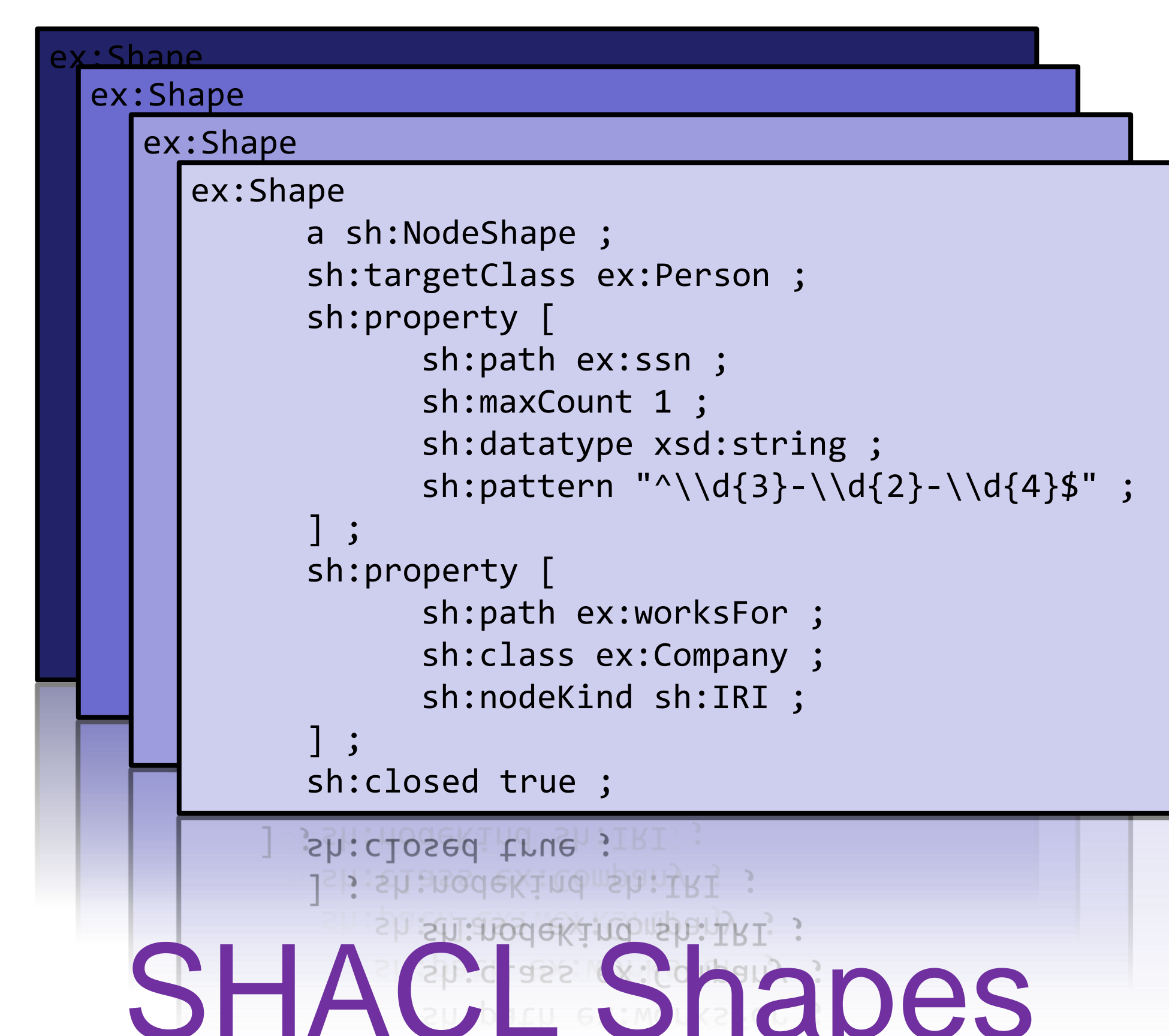

ODP

axiom
axiom
axiom
axiom
axiom
axiom

- ODP is re-used or created for data graph
- Axioms are defined for consistency
- Axioms can use terms and properties from any of the used ontologies
- Axioms are specific to the data graph
- Axioms therefore represent the *data model*

```
ex:Shape
ex:Shape
ex:Shape
ex:Shape
        a sh:NodeShape ;
        sh:targetClass ex:Person ;
        sh:property [
                sh:path ex:ssn ;
                sh:maxCount 1 ;
                sh:datatype xsd:string ;
                sh:pattern "^\\d{3}-\\d{2}-\\d{4}$" ;
        ] ;
        sh:property [
                sh:path ex:worksFor ;
                sh:class ex:Company ;
                sh:nodeKind sh:IRI ;
        ] ;
        sh:closed true ;
```

SHACL Shapes

1. *Generate SHACL shapes from Axioms in ODP*
2. *Validate Data Graph using axioms*
3. *Align Data Model (axioms) with Validation (SHACL)*

Benefits of using ODP in this context:
- Visualise SHACL shapes
- Summarise Data (as patterns)
- Provide a "schema" for data graph that can be reused

Future Work
1. Mappings between OWL2 Axioms and SHACL Shapes
2. Incorporate SHACL-SPARQL
3. Automate generation of SHACL shapes for given data graph

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