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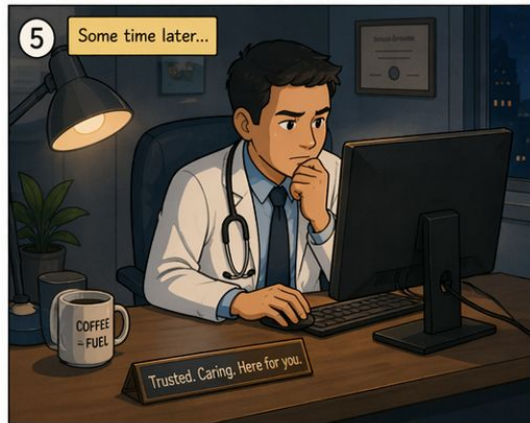
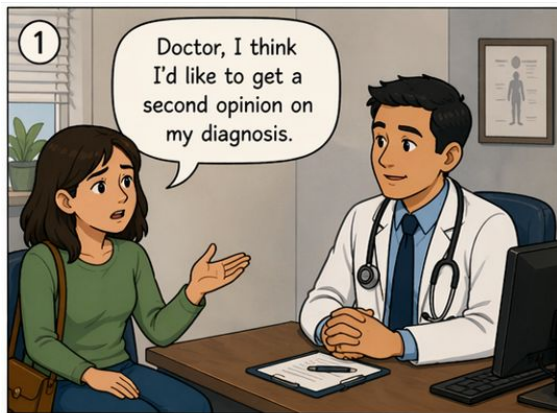


Bridging DPV and ODRL for Legally-Oriented Usage Control in Data Spaces

Beatriz Esteves, Harshvardhan J. Pandit



beatriz.esteves@ugent.be | w3id.org/people/besteves



Long-term Data Storage



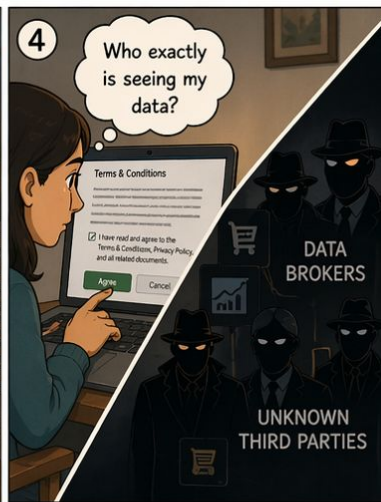
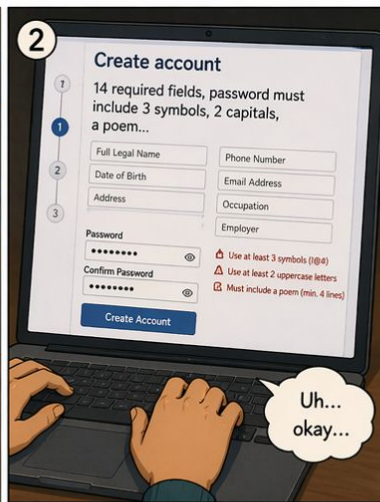
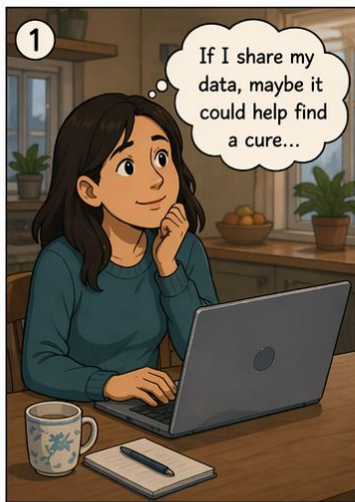
Logging of Performed Actions



Easy Access to Data

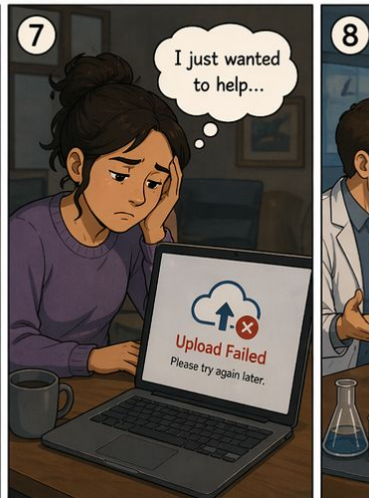
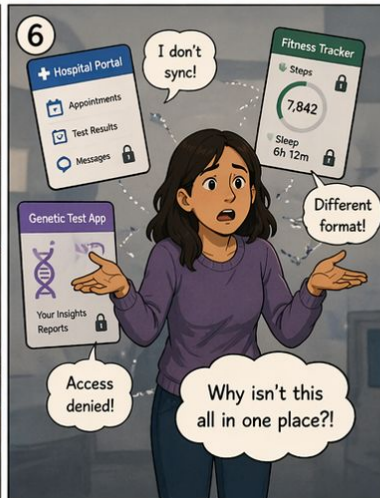


Fine-grained Data Access



❌ Share Data for Public Good Purposes

❌ Share Data for Personalised Services



❌ Interoperability of Data and Systems

❌ Compliance with Existing Legal Instruments



Consent management



Rights exercising



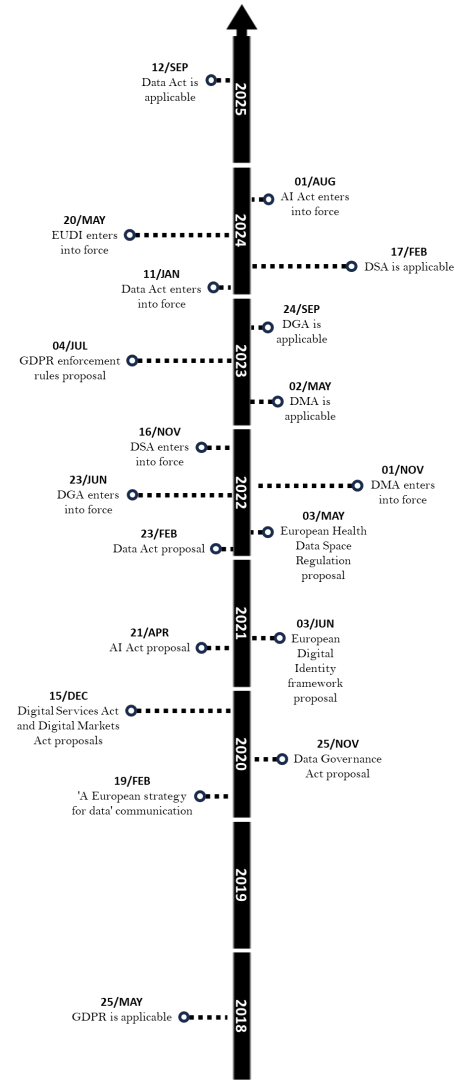
Management of user preferences



Automated data exchanges beyond consent



Making data available for secondary reuse





LAW AS CODE

**Translating EU data law
and case law into
machine-interpretable
semantic models**



CODE AS LAW

**Operationalising legal
knowledge into
reusable, policy-driven
mechanisms for
compliant data
exchange**



TRUSTFUL DATA EXCHANGES

**Enabling dynamic
negotiation and
generation of
legally-aligned data
exchange agreements**

Bridging DPV and ODRL for Legally-Oriented Usage Control in Data Spaces

Background & Related Work

Mapping from DPV to ODRL

Usage Guidelines

Conclusions & Future Work

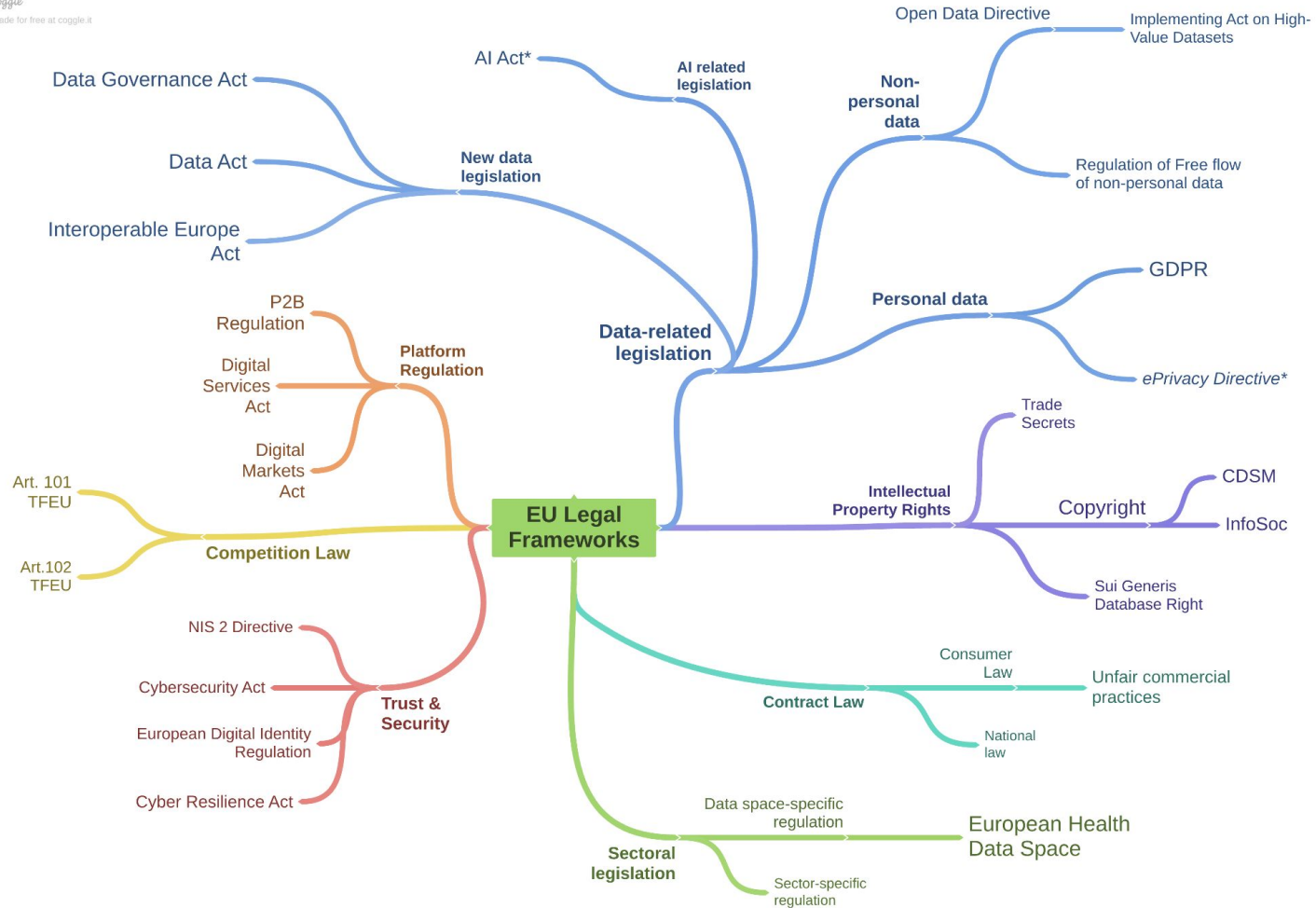
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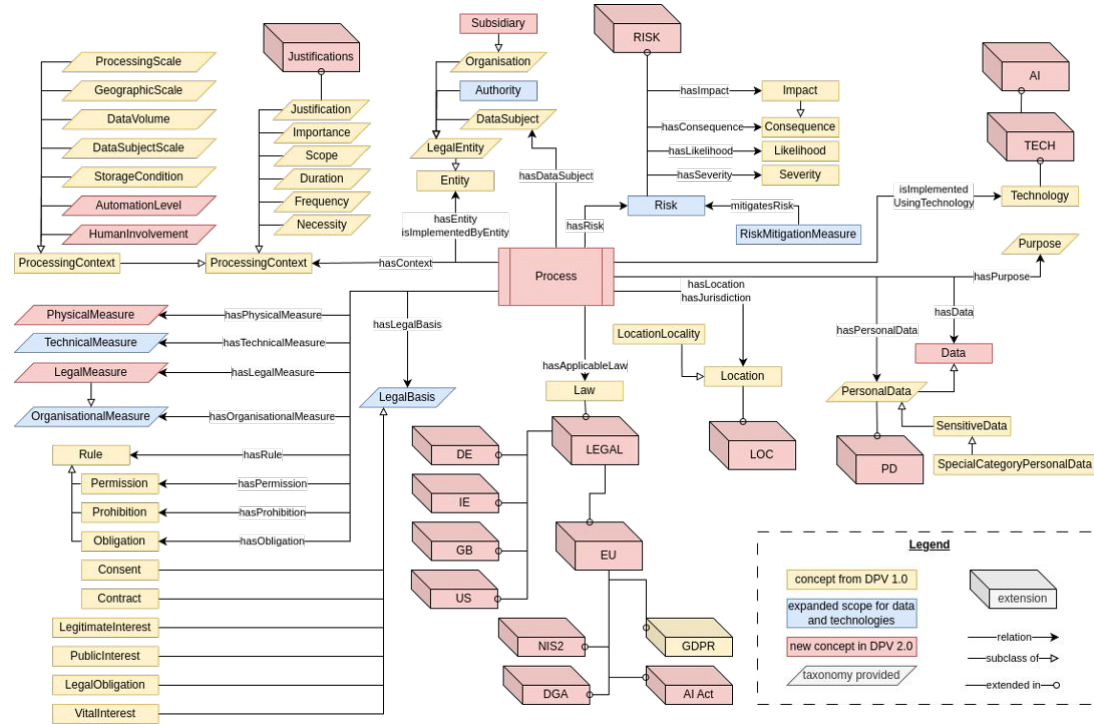


- Developed by the **W3C** Data Privacy Vocabularies and Controls Community Group (**DPVCG**)
- Defines a **jurisdiction-agnostic** ontology for expressing metadata about the processing of personal data
- Provides **hierarchical taxonomies**, from abstract to more specific concepts, to instantiate specific concepts in practical use-cases
- Has **law-specific extensions**

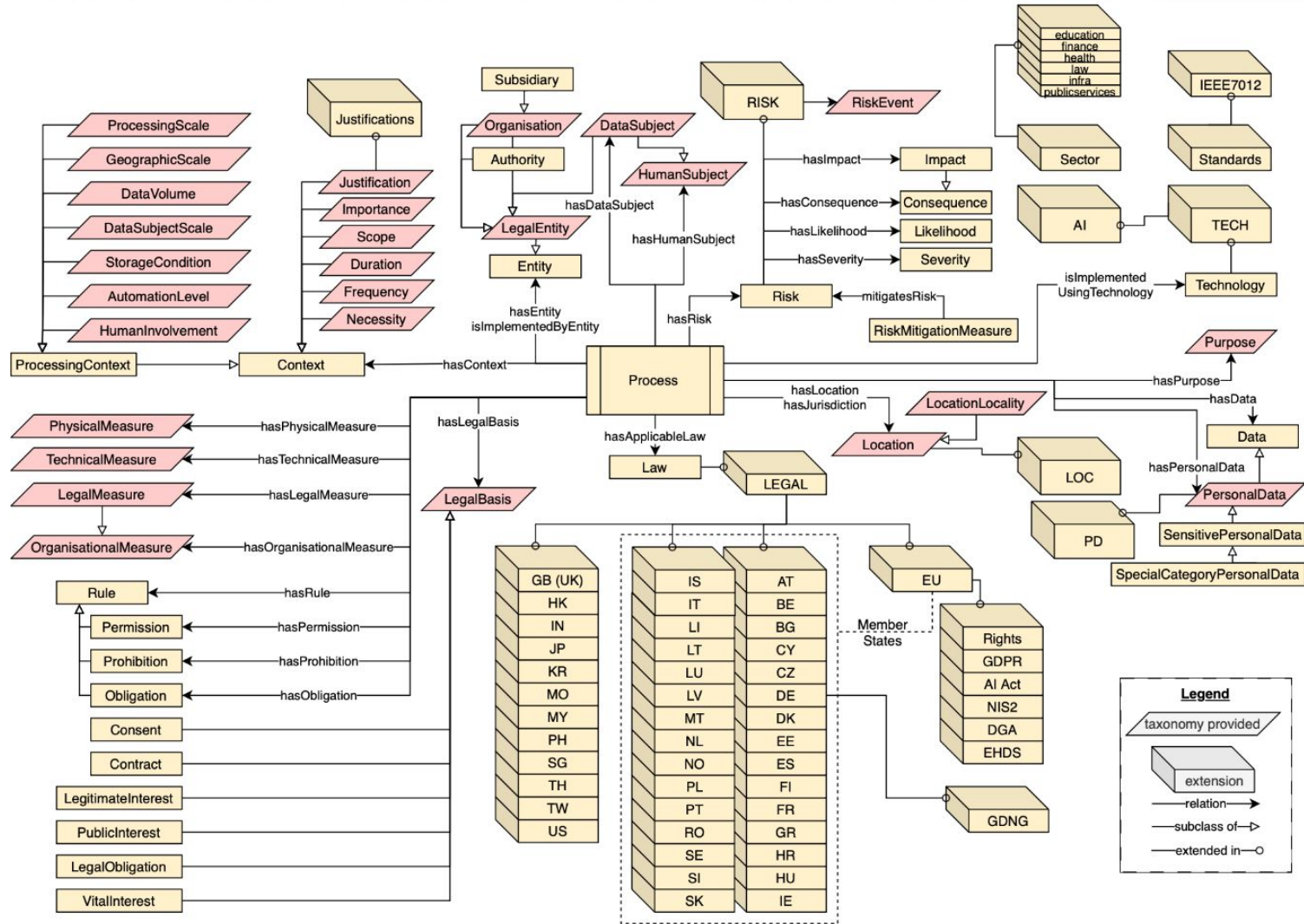
<https://w3id.org/dpv>

<https://w3id.org/dpv/primer>

Data Privacy Vocabulary (DPV)



Harshvardhan J. Pandit, Beatriz Esteves, Georg P. Krog, Paul Ryan, Delaram Golpayegani, and Julian Flake. **Data Privacy Vocabulary (DPV) – Version 2.0**. In *The Semantic Web – ISWC 2024*, pages 171–93. Cham: Springer Nature Switzerland, 2024. doi: [10.1007/978-3-031-77847-6_10](https://doi.org/10.1007/978-3-031-77847-6_10).



General Data Protection Regulation (GDPR)



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3.2 Special Category (Art.9)

3.3 Data Transfer (Art.45-49)

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5. Rights and Impact on Rights

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5.2 Rights Impacts

5.3 Mapping: Legal Basis x Rights

5.4 Justifications for Rights Exercise

6. Data Transfer Tools

7. DPV

EU General Data Protection Regulation (GDPR)

version 2.2

Final Community Group Report 01 August 2025

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<https://www.w3.org/community/reports/dpvcg/CG-FINAL-eu-gdpr-20250801/>

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[Georg P. Krog](#) (Signatu AS)

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[Paul Ryan](#) (Uniphar PLC)

Feedback:

[GitHub w3c/dpv](#) (pull requests, new issue, open issues)

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Previous Release

<https://w3id.org/dpv/2.1/legal/eu/gdpr>

Changelog

[Changelog for v2.2](#)

Key Publications

[Data Privacy Vocabulary \(DPV\) -- Version 2.0 \(2024\)](#)

<https://w3id.org/dpv/legal/eu/gdpr>

Rights management

W3C Community Group
Final Report

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 - 3.1.7 Contract Performance Necessity
 - 3.1.8 Prima Facie Inconclusive

Justifications Extension

version 2.2

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Changelog

[Changelog for v2.2](#)

W3C Community Group
Draft Report

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- 4. Recording rights being exercised
 - 4.1 Rights exercise activities
 - 4.2 Rights exercise records
- A. References
 - A.1 Informative references

Guide for using DPV for Rights Exercise and Management

Work in Progress

[Draft Community Group Report 16 January 2025](#)

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[Data Privacy Vocabulary \(DPV\) -- Version 2.0 \(2024\)](#)

Copyright © 2025 the Contributors to the Guide for using DPV for Rights Exercise and Management Specification, published by the Data Privacy Vocabularies and Controls Community Group under the [W3C Community Contributor License Agreement \(CLA\)](#). A human-readable summary is available.

Abstract

This document will provide a guide for using DPV for Rights Exercise and Management. Currently, it is a work in progress.

ISSUE 191: Create a guide for Machine-Actionable Rights    

<https://w3id.org/dpv/justifications>

<https://w3id.org/dpv/guides/rights>

Beatriz Esteves, Victor Rodriguez-Doncel, and Ricardo Longares. **Automating the Response to GDPR's Right of Access**. In *Legal Knowledge and Information Systems*, pages 170–175. IOS Press, 2022. doi: [10.3233/FAIA220462](https://doi.org/10.3233/FAIA220462).

Beatriz Esteves, Harshvardhan J. Pandit, Georg P. Krog, and Paul Ryan. **How to Manage My Data? With Machine-Interpretable GDPR Rights!** In *Legal Knowledge and Information Systems*, 269–74. IOS Press, 2024. doi: [10.3233/FAIA241254](https://doi.org/10.3233/FAIA241254).

Data Governance Act (DGA)

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EU Data Governance Act (DGA)

version 2.2

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[Changelog for v2.2](#)

Key Publications

[Data Privacy Vocabulary \(DPV\) -- Version 2.0 \(2024\)](#)

```
@prefix dpv:      <https://w3id.org/dpv#> .
@prefix ex:       <https://example.org/> .
@prefix odr1:     <http://www.w3.org/ns/odr1/2/> .
@prefix dpv-odr1: <https://w3id.org/dpv/mappings/odr1#> .
@prefix eu-gdpr:  <https://w3id.org/dpv/legal/eu/gdpr#> .
@prefix eu-dga:   <https://w3id.org/dpv/legal/eu/dga#> .
```

```
ex:read-dataset_location a odr1:Agreement ;
    odr1:uid ex:read-dataset_location ;
    odr1:profile dpv-odr1 ;
    odr1:permission [
        odr1:action dpv-odr1:Use ;
        odr1:target ex: dataset_location ;
        odr1:assigner ex:beatriz ;
        odr1:assignee [ a eu-dga:DataAltruismOrganisation ] ;
        odr1:constraint [
            odr1:leftOperand dpv-odr1:Purpose ;
            odr1:operator odr1:isAllOf ;
            odr1:rightOperand dpv:DataAltruism, dpv:ImproveTransportMobility ], [
            odr1:leftOperand dpv-odr1:LegalBasis ;
            odr1:operator odr1:eq ;
            odr1:rightOperand eu-gdpr:A6-1-a ] ] .
```

<https://w3id.org/dpv/legal/eu/dga>

Beatriz Esteves, Víctor Rodríguez-Doncel, Harshvardhan J. Pandit, and Dave Lewis. **Semantics for Implementing Data Reuse and Altruism Under EU's Data Governance Act**. In *Knowledge Graphs: Semantics, Machine Learning, and Languages*, pages 210–226. IOS Press, 2023. doi: [10.3233/SSW230015](https://doi.org/10.3233/SSW230015).

European Health Data Spaces (EHDS)

W3C Community Group
Draft Report

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EU European Health Data Spaces (EHDS)

version 2.2

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<https://w3id.org/dpv/2.2/legal/eu/ehds>

Key Publications

[Data Privacy Vocabulary \(DPV\) -- Version 2.0 \(2024\)](#)

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Contributors: (ordered alphabetically) [Arthit Suriyawongkul](#) (ADAPT Centre, Trinity College Dublin), [Beatriz](#)

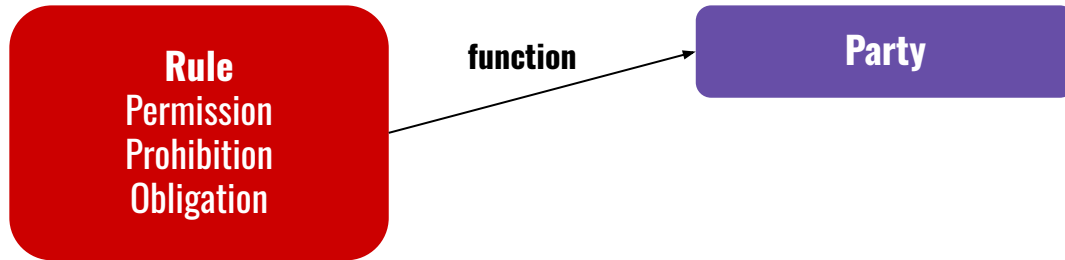
[Esteves](#) (IDLab, IMEC, Ghent University). NOTE: The affiliations are informative, do not represent formal endorsements, and may be outdated as this list is generated automatically from existing data.

<https://w3id.org/dpv/legal/eu/ehds>

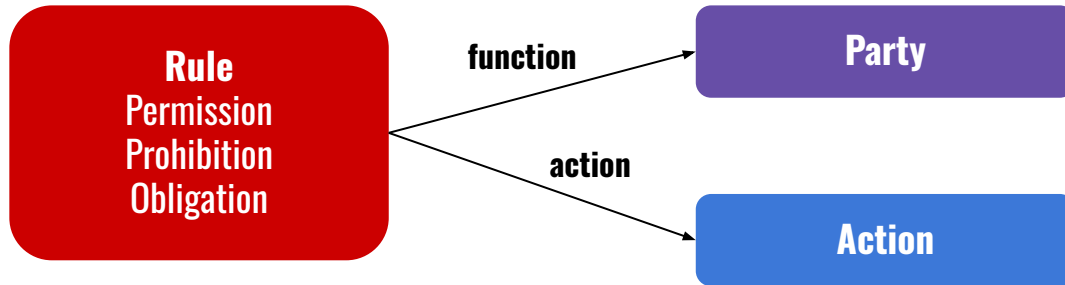
**Who [can|cannot|must] act what
in which resource how**

Rule
Permission
Prohibition
Obligation

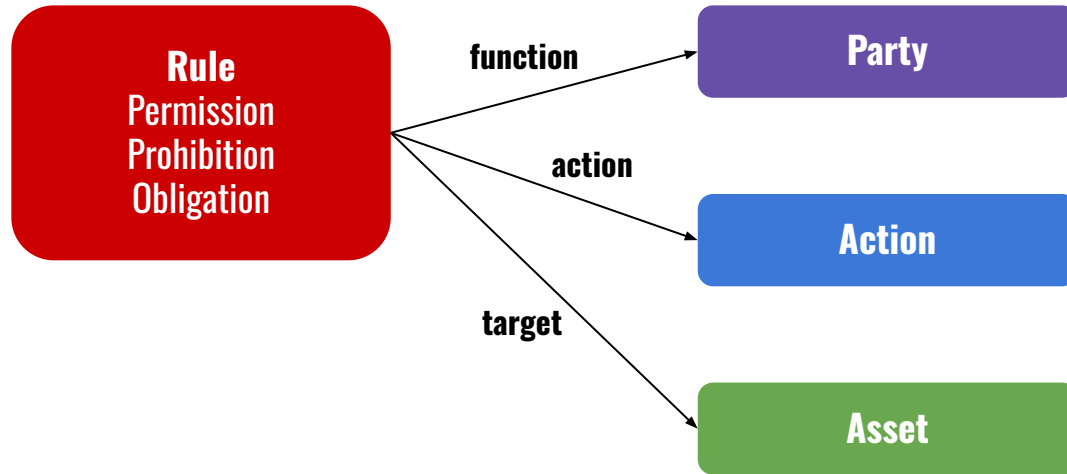
Who **[can|cannot|must]** act what in which resource how



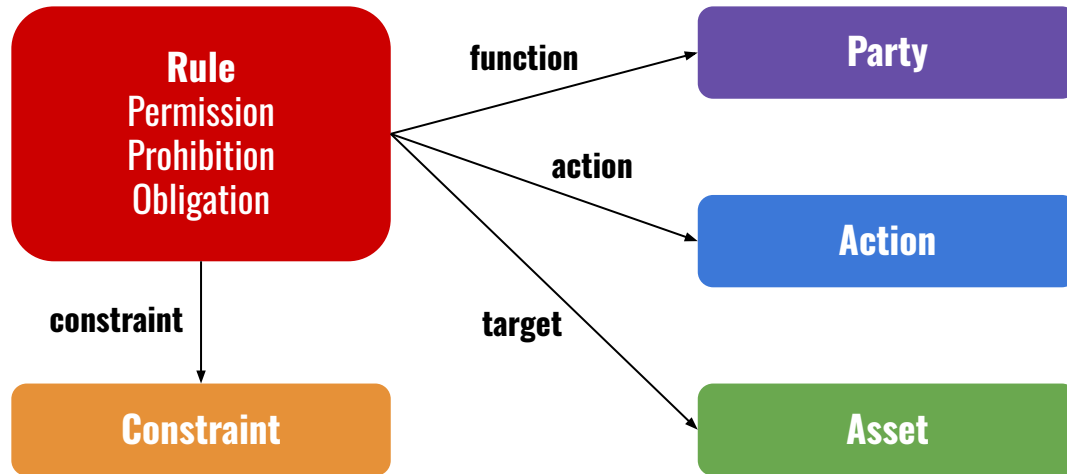
Who **[can|cannot|must]** **act what**
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Who [can|cannot|must] act what
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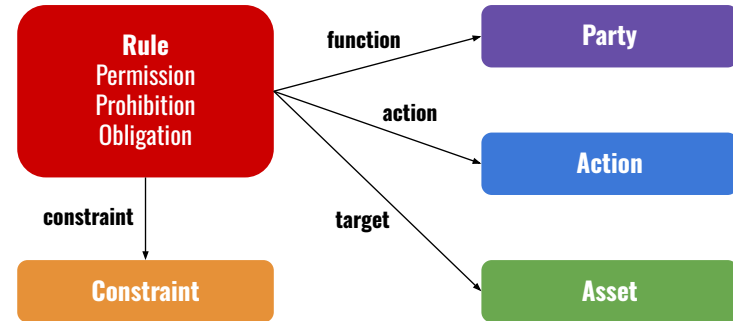


Who [can|cannot|must] act what in which resource how



Open Digital Rights Language (ODRL)

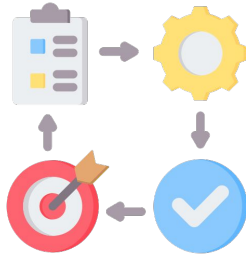
- Standard for the expression of policies
 - ODRL Information Model – W3C Recommendation
 - ODRL Core Vocabulary – W3C Recommendation
- Maintained by the W3C ODRL Community Group
- Composed by several other specifications
 - ODRL Implementation Best Practices
 - ODRL Profile Best Practices
 - ODRL Formal Semantics [Under development]
 - ODRL Community Vocabulary [Under development]
- Easily extendable through the use of ODRL profiles



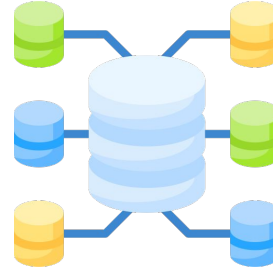
Health data sharing



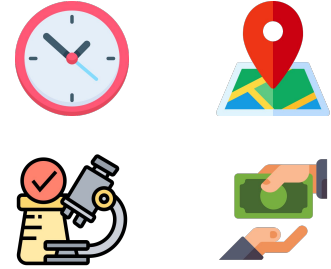
My GP



Read



**Blood Test
Results**



**During
consultation;
For clinical
diagnosis**

Bridging DPV and ODRL for Legally-Oriented Usage Control in Data Spaces

Background & Related Work

Mapping from DPV to ODRL

Usage Guidelines

Conclusions & Future Work

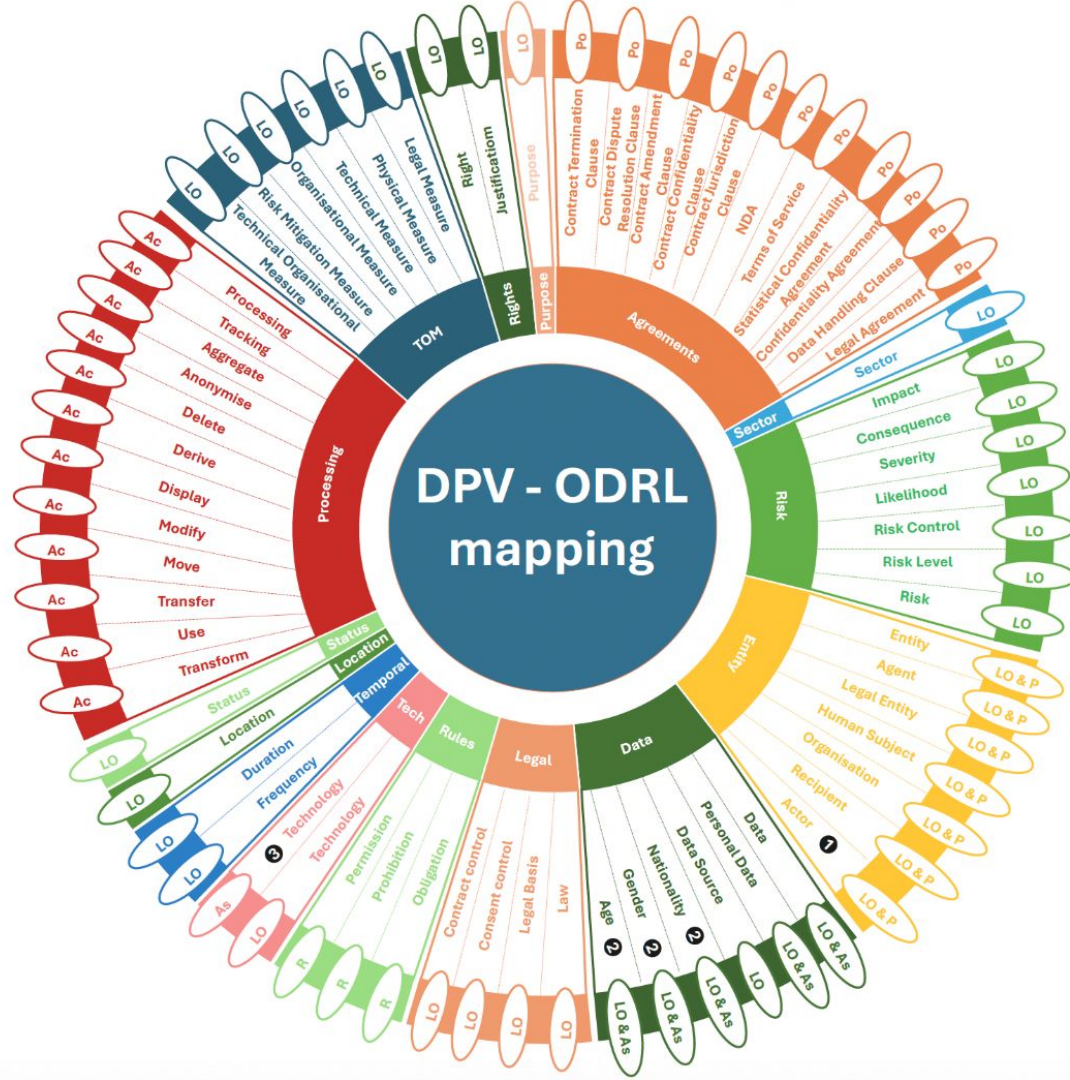
Methodology

Table 1

Mapping types of DPV and ODRL Concepts

Alignment	Mapping Relation	Example
Instantiation	<code>rdf:type</code>	<code>dpv-odrl:Entity rdf:type odrl:Party .</code>
Specialisation	<code>skos:broader</code>	<code>dpv-odrl:Recipient skos:broader odrl:recipient .</code>
Hierarchy	<code>rdfs:subClassOf</code>	<code>dpv-odrl:NDA rdfs:subClassOf odrl:Policy .</code>
Equivalence	<code>skos:exactMatch</code>	<code>dpv-odrl:Agent skos:exactMatch dpv:Agent .</code>
Approximation	<code>skos:closeMatch</code>	<code>dpv-odrl:Use skos:closeMatch odrl:use .</code>
Association	<code>skos:related</code>	<code>dpv-odrl:Duration skos:related odrl:elapsedTime .</code>
Disjointness	<code>owl:disjointWith</code>	<code>dpv-odrl:NDA owl:disjointWith (odrl:Offer, ...) .</code>

DPV-ODRL Profile



- 1 Tech extension
- 2 PD extension
- 3 AI extension

Ac - Action
As - Asset
LO - Left operand
P - Party
Po - Policy
R - Rule

DPV-ODRL Profile

```
@prefix dpv:      <https://w3id.org/dpv#> .
@prefix dpv-odrl: <https://w3id.org/dpv/mappings/odrl#> .
@prefix odrl:     <http://www.w3.org/ns/odrl/2/> .
@prefix skos:     <http://www.w3.org/2004/02/skos/core#> .

dpv-odrl:Use a odrl:Action, skos:Concept ;
  skos:exactMatch dpv:Use ;
  skos:closeMatch odrl:use .
```

```
@prefix dpv:      <https://w3id.org/dpv#> .
@prefix dpv-odrl: <https://w3id.org/dpv/mappings/odrl#> .
@prefix odrl:     <http://www.w3.org/ns/odrl/2/> .
@prefix skos:     <http://www.w3.org/2004/02/skos/core#> .

dpv-odrl:Recipient a odrl:Party, odrl:LeftOperand, skos:Concept ;
  skos:exactMatch dpv:Recipient ;
  skos:broader odrl:recipient .
```

```
@prefix dpv:      <https://w3id.org/dpv#> .
@prefix dpv-odrl: <https://w3id.org/dpv/mappings/odrl#> .
@prefix odrl:     <http://www.w3.org/ns/odrl/2/> .
@prefix skos:     <http://www.w3.org/2004/02/skos/core#> .

dpv-odrl:NDA a rdfs:Class, skos:Concept ;
  skos:exactMatch dpv:NDA ;
  rdfs:subClassOf odrl:Policy ;
  owl:disjointWith odrl:Agreement, odrl:Offer, odrl:Privacy, odrl:Request,
    odrl:Ticket, odrl:Assertion, dpv-odrl:ContractConfidentialityClause,
    dpv-odrl:ContractDisputeResolutionClause,
    dpv-odrl:ContractJurisdictionClause, dpv-odrl:ContractTerminationClause,
    dpv-odrl:TermsOfService, dpv-odrl:DataHandlingClause, dpv-odrl:LegalAgreement,
    dpv-odrl:ConfidentialityAgreement, dpv-odrl:StatisticalConfidentialityAgreement .
```

```
@prefix dpv:      <https://w3id.org/dpv#> .
@prefix dpv-odrl: <https://w3id.org/dpv/mappings/odrl#> .
@prefix odrl:     <http://www.w3.org/ns/odrl/2/> .
@prefix skos:     <http://www.w3.org/2004/02/skos/core#> .

dpv-odrl:Duration a odrl:LeftOperand, skos:Concept ;
  skos:exactMatch dpv:Duration ;
  skos:related odrl:elapsedTime, odrl:count .
```

Usage of ODRL operators

```
dpv-odrl:LegalBasis a odrl:LeftOperand, skos:Concept ;
skos:exactMatch dpv:LegalBasis ;
skos:example "A legal basis can be consent, legitimate interest, contract performance or
jurisdiction-specific legal basis such as the ones provided in GDPR Article 6."@en ;
skos:note ""Only the odrl:isA, odrl:eq and odrl:neq MUST be used. Example:
ex:legalBasisConstraint a odrl:Constraint ;
    odrl:leftOperand dpv-odrl:LegalBasis ;
    odrl:operator odrl:isA ;
    odrl:rightOperand dpv:Consent .
indicates that the legal basis for the processing should be an instance of dpv:Consent.""@en .
```

Bridging DPV and ODRL for Legally-Oriented Usage Control in Data Spaces

Background & Related Work

Mapping from DPV to ODRL

Usage Guidelines

Conclusions & Future Work

Examples of Usage

```
ex:policy-partycollection a odrl:Agreement ;
  odrl:uid ex:policy-partycollection ;
  odrl:profile dpv-odrl;;
  odrl:permission [
    odrl:assigner ex:data-holder ;
    odrl:assignee [
      a odrl:PartyCollection ;
      odrl:source ex:entities ;
      odrl:refinement [
        odrl:leftOperand dpv-odrl:Entity ;
        odrl:operator odrl:isA ;
        odrl:rightOperand dpv:AcademicScientificOrganisation ] ] ;
    odrl:target ex:research-dataset ;
    odrl:action dpv-odrl:Use ;
    odrl:constraint [
      odrl:leftOperand dpv-odrl:Purpose ;
      odrl:operator odrl:isA ;
      odrl:rightOperand dpv:ResearchAndDevelopment ] ] .
```

```
ex:policy-assetcollection a odrl:Policy ;
  odrl:uid ex:policy-assetcollection ;
  odrl:profile dpv-odrl;;
  odrl:permission [
    odrl:target [
      a odrl:AssetCollection ;
      odrl:source ex:data-catalog ;
      odrl:refinement [
        odrl:leftOperand dpv-odrl:PersonalData ;
        odrl:operator odrl:isA ;
        odrl:rightOperand pd:HealthRecord ] ] ;
    odrl:assigner ex:data-subject ;
    odrl:action dpv-odrl:Use ;
    odrl:constraint [
      odrl:leftOperand dpv-odrl:LegalBasis ;
      odrl:operator odrl:eq ;
      odrl:rightOperand eu-gdpr:A6-1-a ] ] .
```

SHACL for Constraint Validation

```
ex:ConstraintShapeTemplate a sh:NodeShape ;
  sh:targetClass odr1:Constraint ;
  sh:sparql [
    a sh:SPARQLConstraint ;
    sh:message "Invalid operator for given left operand." ;
    sh:prefixes odr1: ;
    sh:select """
      SELECT $this WHERE {
        $this odr1:leftOperand <LEFT_OPERAND> .
        $this odr1:operator ?op .
        FILTER(?op NOT IN (<ALLOWED_OPERATORS>))
      }
      """ ;
  ] .
```

Bridging DPV and ODRL for Legally-Oriented Usage Control in Data Spaces

Background & Related Work

Mapping from DPV to ODRL

Usage Guidelines

Conclusions & Future Work

Conclusions



<https://w3id.org/dpv/mappings/odrl>

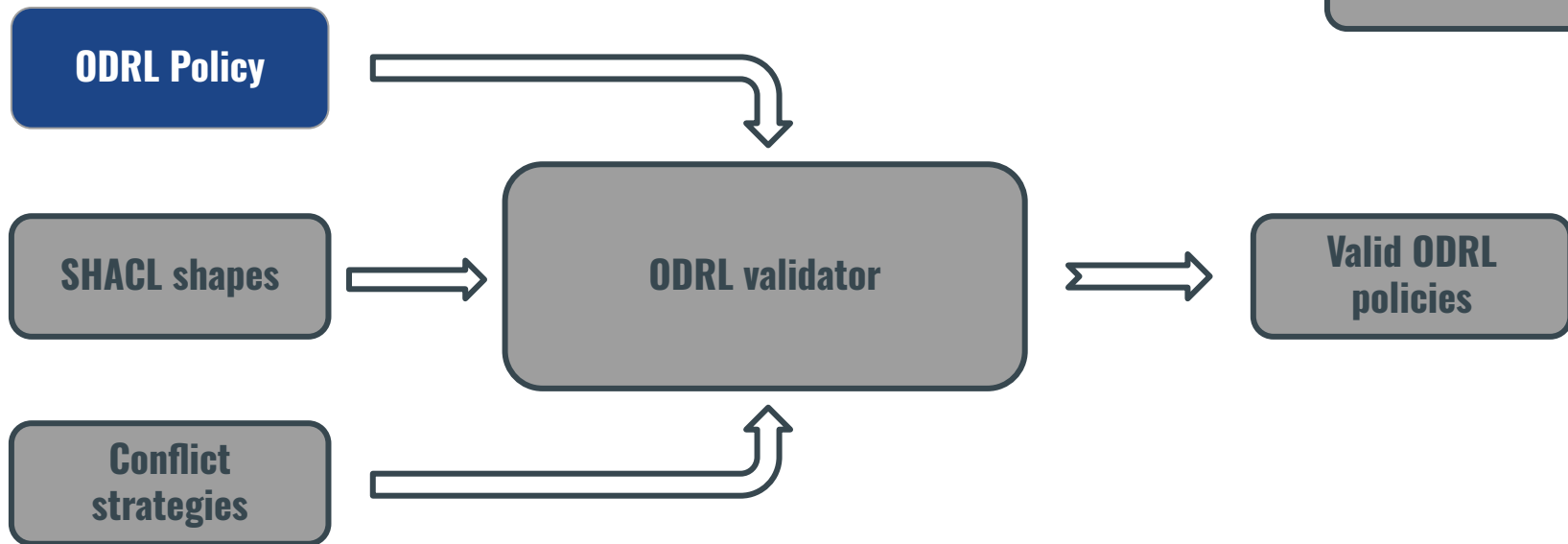


<https://w3id.org/dpv/guides/dpv-odrl>

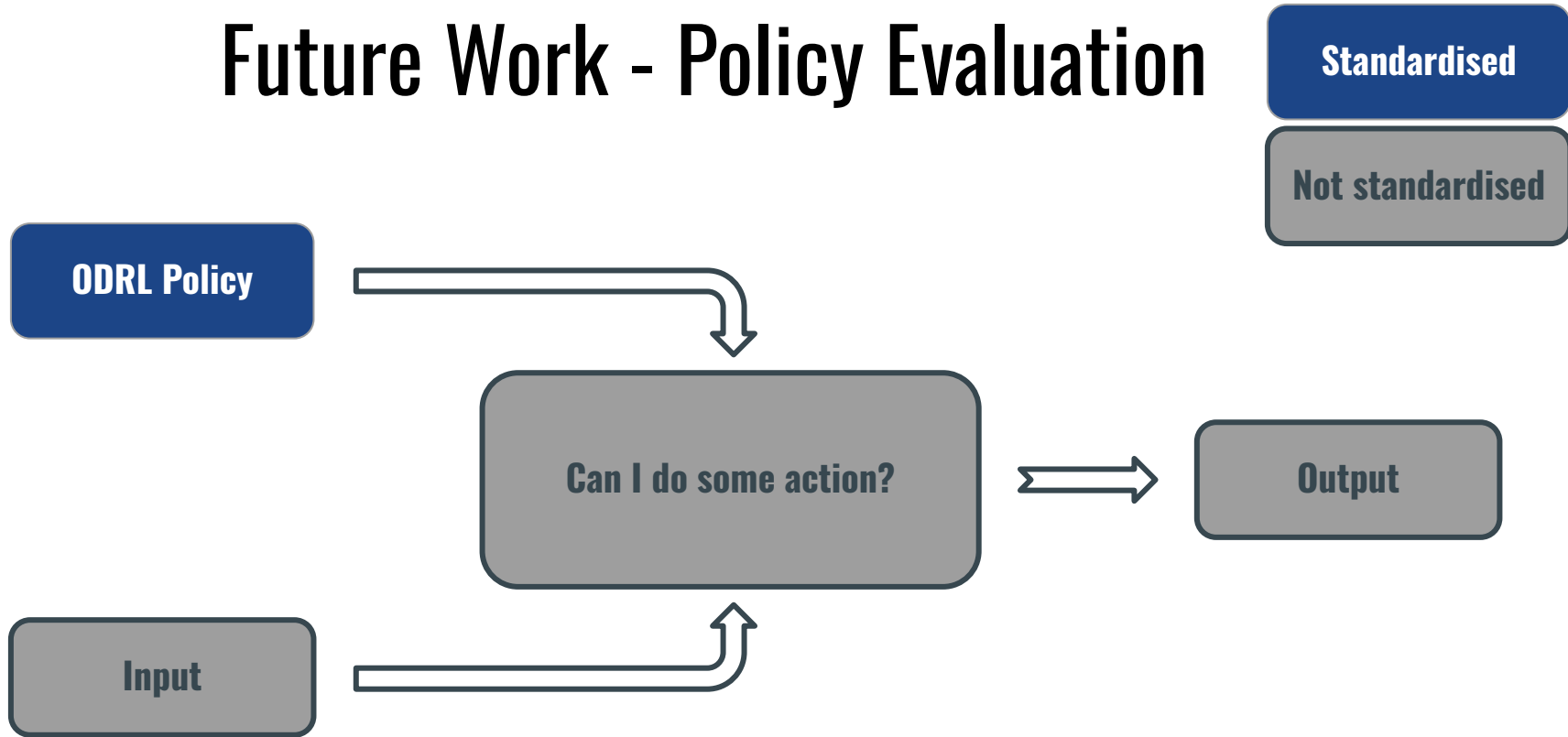
Future Work - Policy Validation

Standardised

WIP



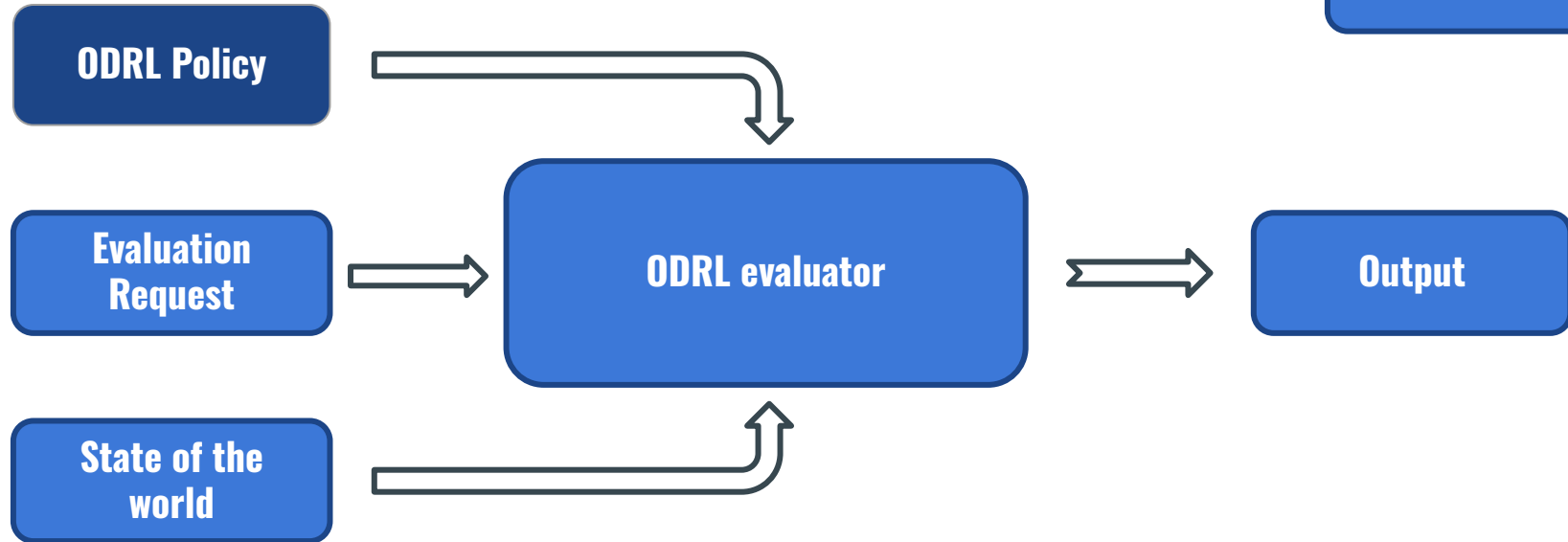
Future Work - Policy Evaluation



Future Work - Policy Evaluation

Standardised

Formalising



ODRL workshops

<https://opal-workshop.github.io/2026-2nd-edition/>

<https://www.w3.org/2026/ODRLWS/>



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