



Semantic Treehouse helps pilots implement
Transversal Use Case 1 (TUC 1)

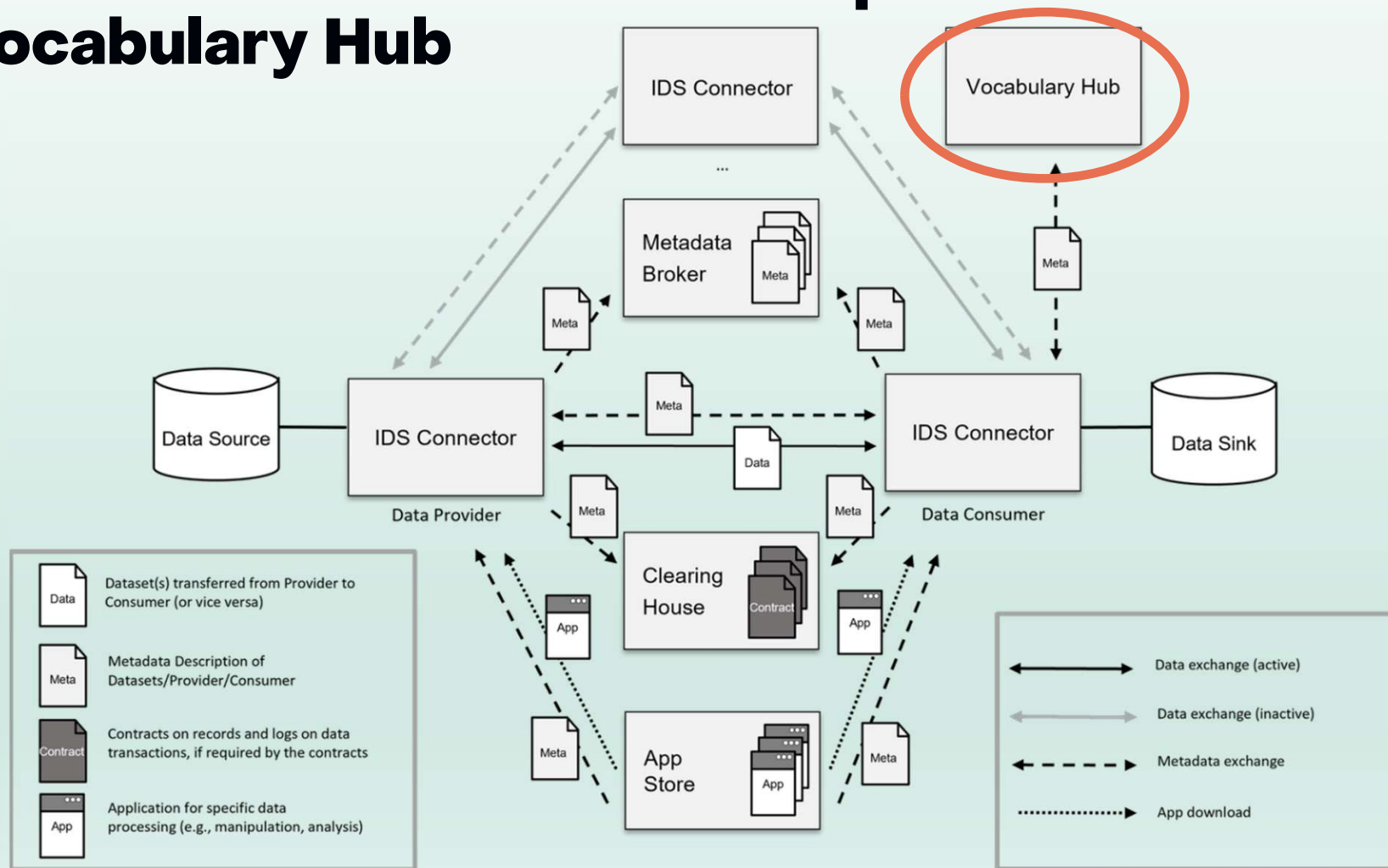


**Semantic
Treehouse**

**Roderick van der Weerd &
Wouter van den Berg**

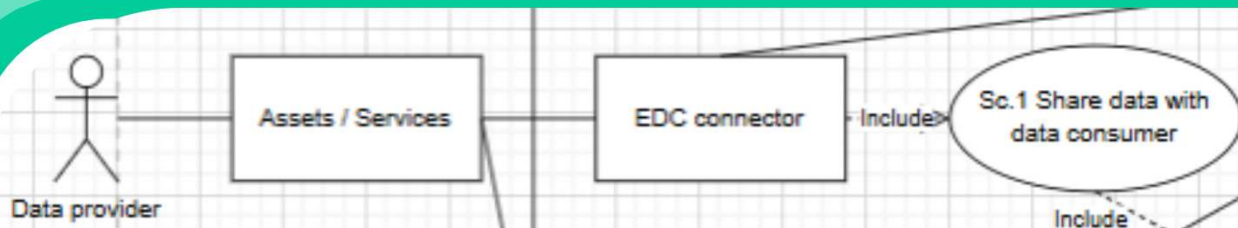
TNO innovation
for life

Semantic Treehouse is an implementation of a Vocabulary Hub



Original image taken from: D3.1 HEDGE-IoT Interfaces and Tools for Interoperability

Sc. 1



This scenario describes how a data provider makes its dataset or service available within the dataspace.

- The provider prepares the asset, **defines the associated metadata** and access policies, and publishes it through its local EDC connector.
- **The asset becomes discoverable** by other parties via the federated catalog, allowing compliant and secure access negotiations.

Scenario

Scenario								
Scenario name:		Use of the Dataspace by a Data Provider						
Step No.	Event	Name of process/activity	Description of process/activity	Service	Information producer (actor)	Information receiver (actor)	Information Exchanged (IDs)	Requirement, R-IDs
1	New data available	Create data asset	The data provider creates or selects a dataset or service output intended for external sharing.	CREATE	Data Provider	Data Provider	Inf.01	DE.3
2	Asset identified	Define metadata	The provider defines metadata describing the asset (format, structure, purpose, etc.).	CREATE	Data Provider	Data Provider	Inf.02	MD.5
3	Access control needed	Configure access policy	The provider defines access policies such as allowed consumers, usage rights, and expiration terms.	CREATE	Data Provider	Data Provider	Inf.03	MD.1
4	Asset ready to publish	Register asset in connector	The data asset and metadata are registered in the local EDC connector catalog.	REPORT		EDC Connector	Inf.04	MD.6
5	Publication triggered	Publish asset to dataspace	The asset becomes discoverable in the federated dataspace via the connector's catalog endpoint.	REPORT		Federation Catalog	Inf.05	MD.3
6	Idle	Await request from consumer	No further action until another actor (consumer) discovers and requests the asset.	TIMER	Data Provider	Data Provider	--	--

Facilitated by Vocabulary Hub service provided by Hedge T4.3

Sc. 2



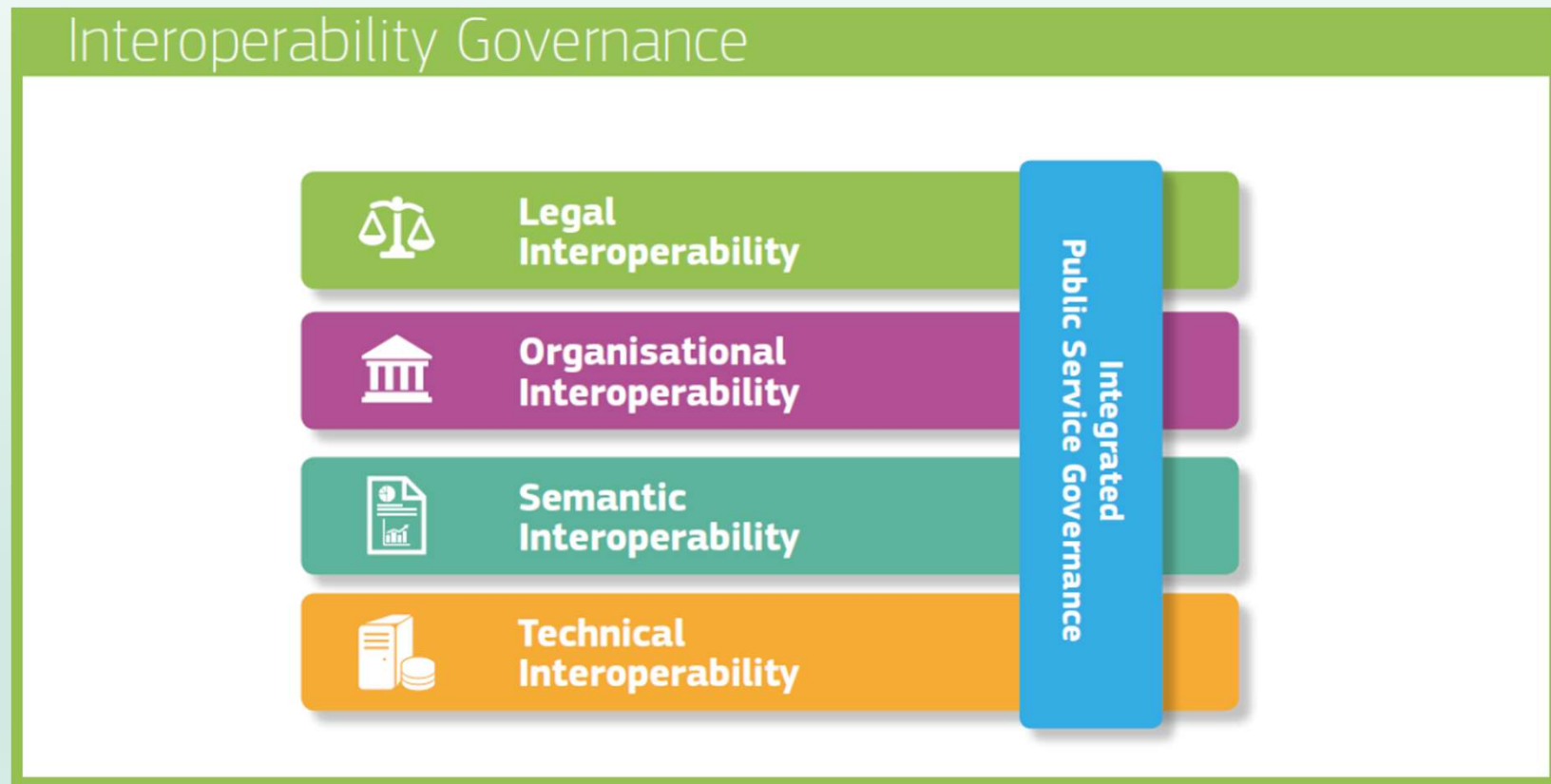
In this scenario, a data consumer interacts with the dataspace to discover and access data assets shared by other parties.

- The consumer queries the catalog, evaluates metadata and policy terms, and initiates a contract negotiation through its EDC connector.
- Upon agreement, the data is securely transferred according to the defined usage rules.

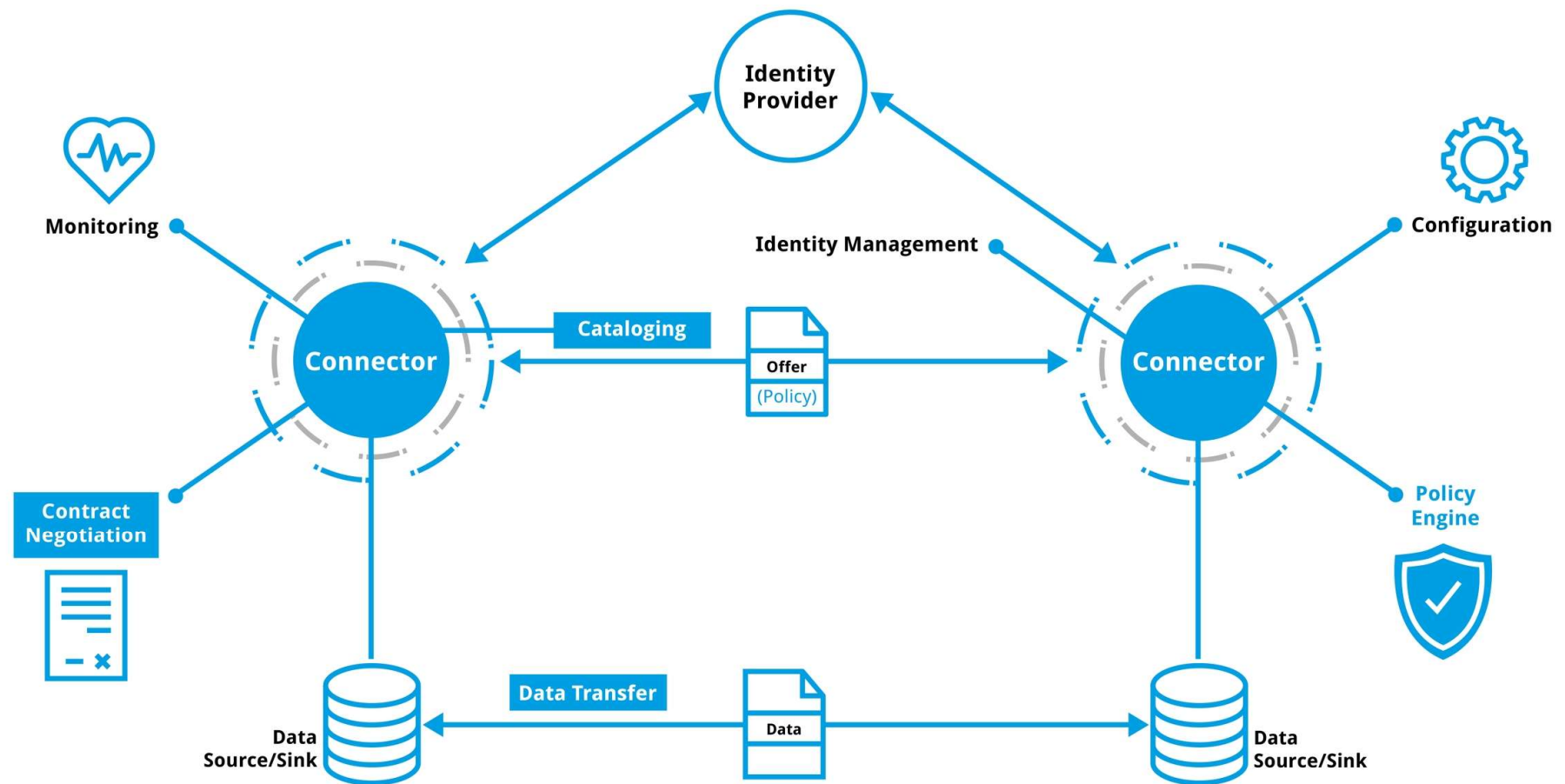
Scenario

Scenario name:		Use of the Dataspace by a Data Consumer						
Step No.	Event	Name of process/activity	Description of process/activity	Service	Information producer (actor)	Information receiver (actor)	Information Exchanged (IDs)	Requirement, R-IDs
1	Need for external data arises	Discover data asset	The consumer searches the dataspace catalog for relevant data assets.	GET	Catalog	Data Consumer	Inf.06	MD.6
2	Matching asset found	Request asset access	The consumer selects a dataset and initiates a data usage request through its EDC connector.	EXECUTE	Data Consumer	Data Provider	Inf.07	DE.3
3	Negotiation starts	Negotiate contract	The EDC connectors negotiate a usage agreement (contract offer, response, confirmation).	EXECUTE	EDC Connector	EDC Connector	Inf.08	DE.1
4	Contract accepted	Authorize access	Access is granted according to policy and contract terms.	REPORT	EDC Connector	Data Consumer	Inf.09	CR.3
5	Transfer initialized	Retrieve data	The data is securely transferred from the provider to the consumer.	GET	Data Provider	Data Consumer	Inf.10	DE.3
6	Data received	Confirm transaction	The consumer confirms successful receipt and logs the transaction outcome.	REPORT	Data Consumer	EDC Connector	Inf.11	CR.2

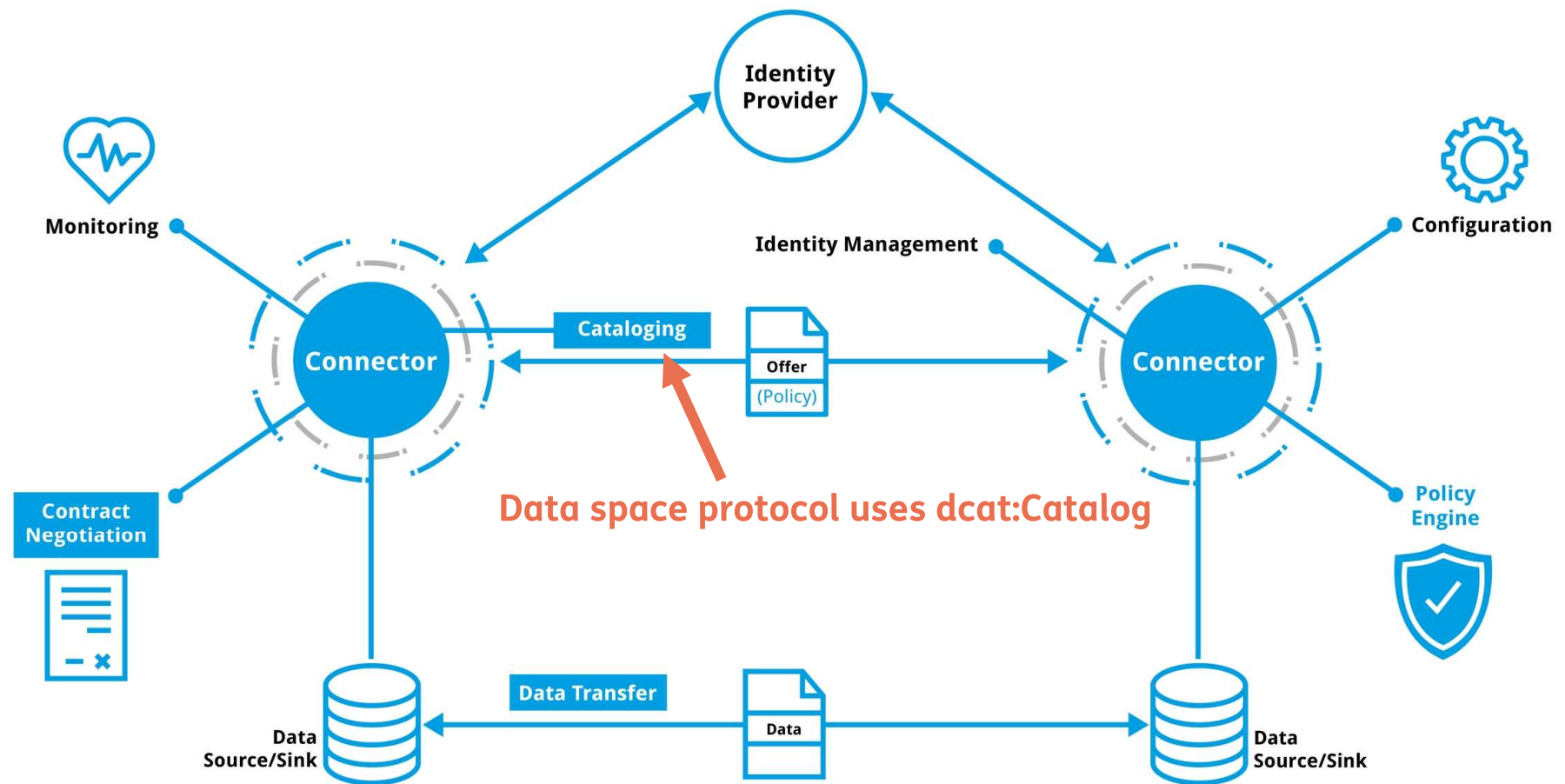
European Interoperability Framework (EIF)



Dataspace Protocol



Dataspace Protocol



What is a DCAT?

DCAT is an RDF vocabulary designed to facilitate interoperability between data catalogs published on the Web.

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6.4.10	Property: publisher
6.4.11	Property: identifier
6.4.12	Property: theme/category
6.4.13	Property: type/genre

Data Catalog Vocabulary (DCAT) - Version 3



W3C Recommendation 22 August 2024

▼ More details about this document

This version:

<https://www.w3.org/TR/2024/REC-vocab-dcat-3-20240822/>

Latest published version:

<https://www.w3.org/TR/vocab-dcat-3/>

Latest editor's draft:

<https://w3c.github.io/dxwg/dcat/>

History:

<https://www.w3.org/standards/history/vocab-dcat-3/>

[Commit history](#)

Implementation report:

<https://w3c.github.io/dxwg/dcat3-implementation-report/>

Previous Recommendation:

<https://www.w3.org/TR/2020/REC-vocab-dcat-2-20200204/>

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[Errata exists.](#)

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See also [translations](#).

This document is also available in these non-normative formats: [Turtle](#), [RDF/XML](#), and [JSON-LD](#)

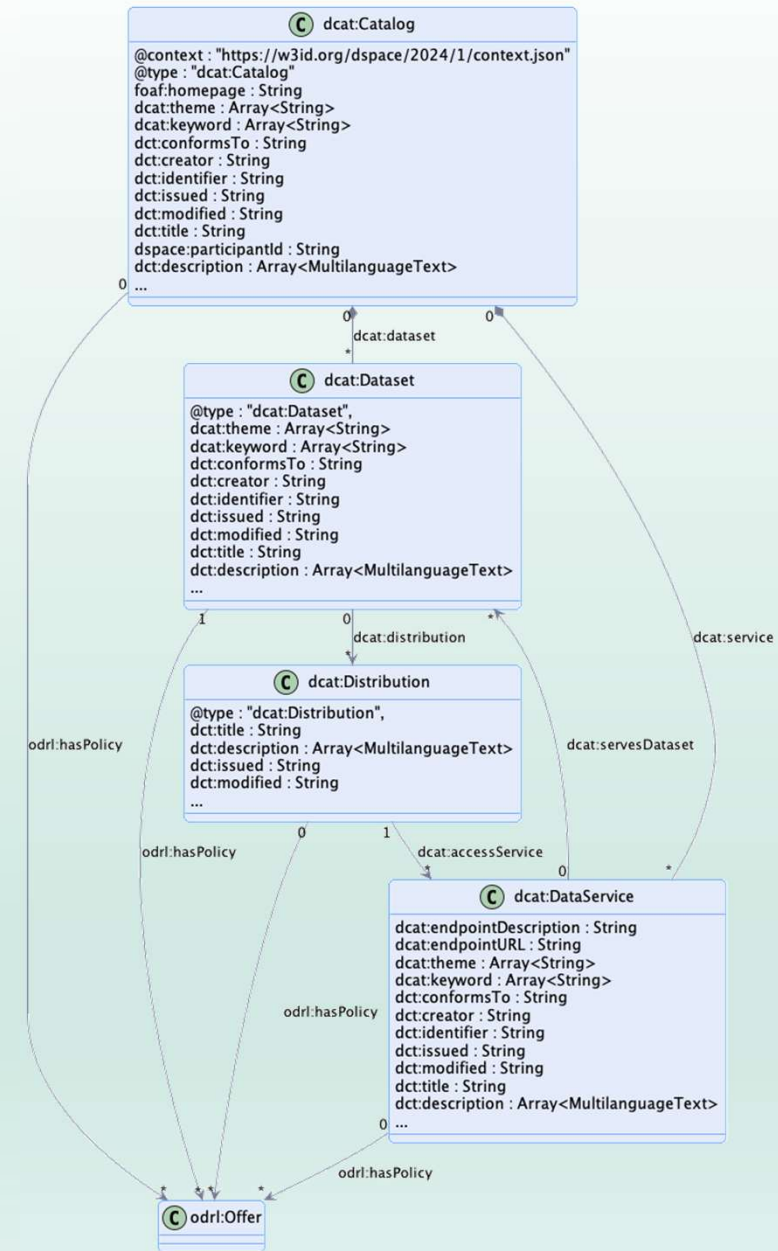
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NOTE

DCAT 3 supersedes DCAT 2 [VOCAB-DCAT-2], but it does not make it obsolete. DCAT 3 maintains the DCAT namespace as its terms preserve backward compatibility with DCAT 2. DCAT 3 relaxes constraints and adds new classes and properties, but these changes do not break the definition of previous terms.

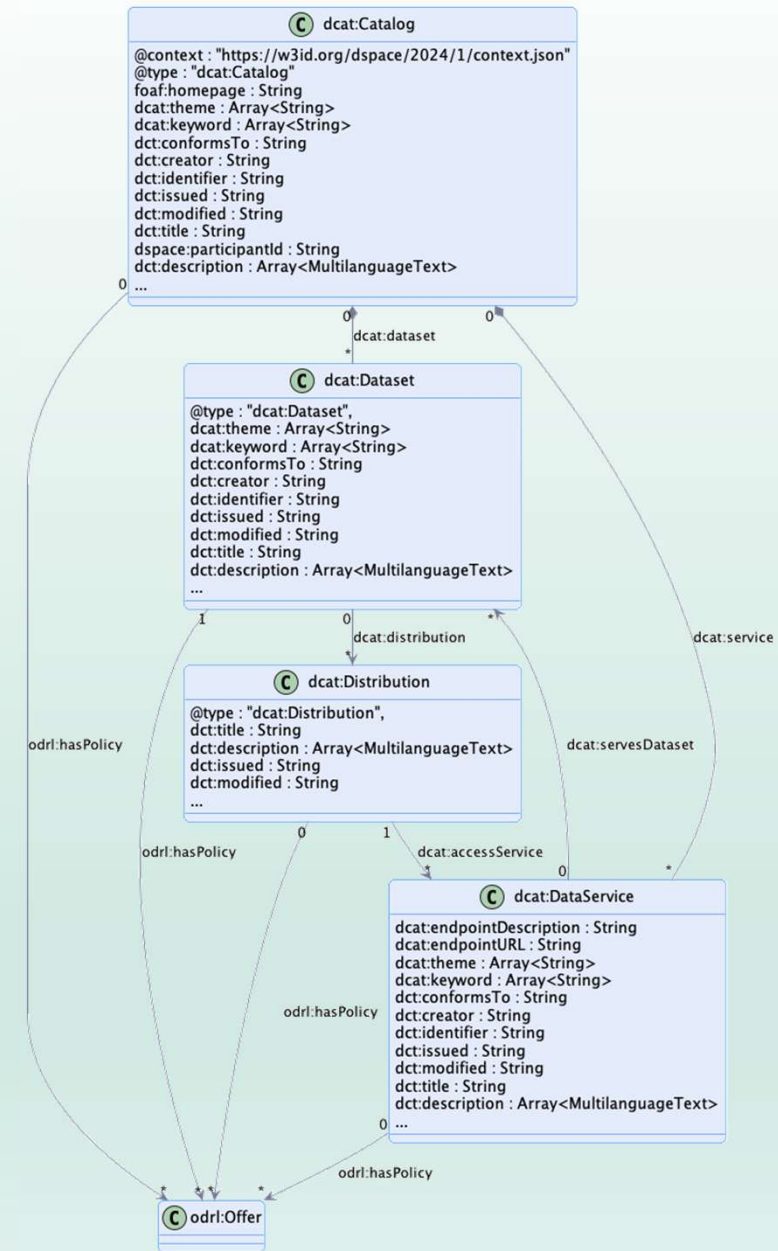
What is a dcat:Catalog?

```
{
  "@context": "https://w3id.org/dspace/2024/1/context.json",
  "@id": "urn:uuid:3afeadd8-ed2d-569e-d634-8394a8836d57",
  "@type": "dcat:Catalog",
  "dct:title": "Data Provider A Catalog",
  "dct:description": [{
    "@value": "A catalog of measurement data"
  }],
  "dspace:participantId": "urn:example:DataProviderA",
  "dcat:service": [{
    "@id": "urn:uuid:4aa2dcc8-4d2d-569e-d634-8394a8834d77",
    "@type": "dcat:DataService",
    "dcat:endpointDescription": "dspace:connector",
    "dcat:endpointURL": "https://provider-a.com/connector"
  }],
  "dcat:dataset": [ ... ]
}
```



What is a dcat:Dataset?

```
{
  "@context": "https://w3id.org/dspace/2024/1/context.json",
  "@id": "urn:uuid:3afeadd8-ed2d-569e-d634-8394a8836d57",
  "@type": "dcat:Catalog",
  "dct:title": "Data Provider A Catalog",
  "dct:description": [{
    "@value": "A catalog of measurement data"
  }],
  "dSPACE:participantId": "urn:example:DataProviderA",
  "dcat:service": [{
    "@id": "urn:uuid:4aa2dcc8-4d2d-569e-d634-8394a8834d77",
    "@type": "dcat:DataService",
    "dcat:endpointDescription": "dSPACE:connector",
    "dcat:endpointURL": "https://provider-a.com/connector"
  }],
  "dcat:dataset": [{
    "@id": "urn:uuid:3dd1add8-4d2d-569e-d634-8394a8836a88",
    "@type": "dcat:Dataset",
    "dct:title": "Energy consumption measurement data",
    "dct:description": [{
      "@value": "Energy consumption measurement data sample extract",
      "@language": "en"
    }],
    "dcat:keyword": "energy consumption",
    "dcat:distribution": [{
      "@type": "dcat:Distribution",
      "dct:format": "dSPACE:s3+push",
      "dcat:accessService": [{
        "@id": "urn:uuid:4aa2dcc8-4d2d-569e-d634-8394a8834d77",
        "@type": "dcat:DataService",
        "dcat:endpointURL": "https://provider-a.com/connector"
      }]
    }]
  }]
}]
```




```
{
  "@context": "https://w3id.org/dspace/2024/1/context.json",
  "@id": "urn:uuid:3afeadd8-ed2d-569e-d634-8394a8836d57",
  "@type": "dcat:Catalog",
  "dct:title": "Data Provider A Catalog",
  "dct:description": [{
    "@value": "A catalog of measurement data"
  }],
  "dSPACE:participantId": "urn:example:DataProviderA",
  "dcat:service": [{
    "@id": "urn:uuid:4aa2dcc8-4d2d-569e-d634-8394a8834d77",
    "@type": "dcat:DataService",
    "dcat:endpointDescription": "dSPACE:connector",
    "dcat:endpointURL": "https://provider-a.com/connector"
  }],
  "dcat:dataset": [{
    "dct:conformsTo": "https://energy.vocabulary-hub.eu/message-model89cdf...",
    "@id": "urn:uuid:3dd1add8-4d2d-569e-d634-8394a8836a88",
    "@type": "dcat:Dataset",
    "dct:title": "Energy consumption measurement data",
    "dct:description": [{
      "@value": "Energy consumption measurement data sample extract",
      "@language": "en"
    }],
    "dcat:keyword": "energy consumption",
    "dcat:distribution": [{
      "@type": "dcat:Distribution",
      "dct:format": "dSPACE:s3+push",
      "dcat:accessService": [{
        "@id": "urn:uuid:4aa2dcc8-4d2d-569e-d634-8394a8834d77",
        "@type": "dcat:DataService",
        "dcat:endpointURL": "https://provider-a.com/connector"
      }]
    }]
  }]
}
```

```

classDiagram
    class dcat_Catalog {
        @context : "https://w3id.org/dspace/2024/1/context.json"
        @type : "dcat:Catalog"
        foaf:homepage : String
        dcat:theme : Array<String>
        dcat:keyword : Array<String>
        dct:conformsTo : String
        dct:creator : String
        dct:identifier : String
        dct:issued : String
        dct:modified : String
        dct:title : String
        dspace:participantId : String
        dcat:description : Array<MultilingualText>
        ...
    }
    class dcat_Dataset {
        @type : "dcat:Dataset",
        dcat:theme : Array<String>
        dcat:keyword : Array<String>
        dct:conformsTo : String
        dct:creator : String
        dct:identifier : String
        dct:issued : String
        dct:modified : String
        dct:title : String
        dcat:description : Array<MultilingualText>
        ...
    }
    class dcat_Distribution {
        @type : "dcat:Distribution",
        dct:title : String
        dct:description : Array<MultilingualText>
        dct:issued : String
        dct:modified : String
        ...
    }
    class dcat_DataService {
        dcat:endpointDescription : String
        dcat:endpointURL : String
        dcat:theme : Array<String>
        dcat:keyword : Array<String>
        dct:conformsTo : String
        dct:creator : String
        dct:identifier : String
        dct:issued : String
        dct:modified : String
        dct:title : String
        dcat:description : Array<MultilingualText>
        ...
    }
    class odr_Offer {
        ...
    }

    dcat_Catalog "0" -- "*" dcat_Dataset : dcat:dataset
    dcat_Dataset "0" -- "1" dcat_Distribution : dcat:distribution
    dcat_Distribution "0" -- "1" dcat_DataService : dcat:accessService
    dcat_DataService "0" -- "*" odr_Offer : odr:hasPolicy
    dcat_Catalog "0" -- "*" odr_Offer : odr:hasPolicy
    dcat_Distribution "1" -- "*" odr_Offer : odr:hasPolicy
    dcat_Dataset "0" -- "*" odr_Offer : odr:hasPolicy
    dcat_DataService "0" -- "*" odr_Offer : odr:hasPolicy
    dcat_Catalog "0" -- "*" dcat_DataService : dcat:servesDataset
  
```

The diagram illustrates the relationships between five classes: **dcat:Catalog**, **dcat:Dataset**, **dcat:Distribution**, **dcat:DataService**, and **odr:Offer**. Each class is represented by a box containing its properties and their types. Relationships are shown as directed arrows with roles and multiplicities.

- dcat:Catalog** (properties: @context, @type, foaf:homepage, dcat:theme, dcat:keyword, dct:conformsTo, dct:creator, dct:identifier, dct:issued, dct:modified, dct:title, dspace:participantId, dcat:description, ...)
- dcat:Dataset** (properties: @type, dcat:theme, dcat:keyword, dct:conformsTo, dct:creator, dct:identifier, dct:issued, dct:modified, dct:title, dcat:description, ...)
- dcat:Distribution** (properties: @type, dct:title, dct:description, dct:issued, dct:modified, ...)
- dcat:DataService** (properties: dcat:endpointDescription, dcat:endpointURL, dcat:theme, dcat:keyword, dct:conformsTo, dct:creator, dct:identifier, dct:issued, dct:modified, dct:title, dcat:description, ...)
- odr:Offer** (properties: ...)

Relationships:

- dcat:Catalog** to **dcat:Dataset**: role `dcat:dataset`, multiplicity 0 to *
- dcat:Dataset** to **dcat:Distribution**: role `dcat:distribution`, multiplicity 0 to 1
- dcat:Distribution** to **dcat:DataService**: role `dcat:accessService`, multiplicity 0 to 1
- dcat:DataService** to **odr:Offer**: role `odr:hasPolicy`, multiplicity 0 to *
- dcat:Catalog** to **odr:Offer**: role `odr:hasPolicy`, multiplicity 0 to *
- dcat:Distribution** to **odr:Offer**: role `odr:hasPolicy`, multiplicity 1 to *
- dcat:Dataset** to **odr:Offer**: role `odr:hasPolicy`, multiplicity 0 to *
- dcat:DataService** to **odr:Offer**: role `odr:hasPolicy`, multiplicity 0 to *
- dcat:Catalog** to **dcat:DataService**: role `dcat:servesDataset`, multiplicity 0 to *

What is dct:conformsTo?

```
{  "@context": "https://w3id.org/dspace/2024/1/context.json",
  "@id": "urn:uuid:3afeadd8-ed2d-569e-d634-8394a",
  "@type": "dcat:Catalog",
  "dct:title": "Data Provider A Catalog",
  "dct:description": [{
    "@value": "A catalog of measurement data"
  }],
  "dspace:participantId": "urn:example:DataProvider",
  "dcat:service": [{
    "@id": "urn:uuid:4aa2dcc8-4d2d-569e-d634-8394a",
    "@type": "dcat:DataService",
    "dcat:endpointDescription": "dspace:connector",
    "dcat:endpointURL": "https://provider-a.com/connector"
  }],
  "dcat:dataset": [{
    "dct:conformsTo": "https://energy.vocabulary-hub.eu/specification/energy-vocabulary-3.0",
    "@id": "urn:uuid:3dd1add8-4d2d-569e-d634-8394a",
    "@type": "dcat:Dataset",
    "dct:title": "Energy consumption measurement data",
    "dct:description": [{
      "@value": "Energy consumption measurement data",
      "@language": "en"
    }],
    "dcat:keyword": "energy consumption",
    "dcat:distribution": [{
      "@type": "dcat:Distribution",
      "dct:format": "dspace:s3+push",
      "dcat:accessService": [{
        "@id": "urn:uuid:4aa2dcc8-4d2d-569e-d634-8394a",
        "@type": "dcat:DataService",
        "dcat:endpointURL": "https://provider-a.com/connector"
      }]
    }]
  }]
}
```

```
dcat:Catalog
@context : "https://w3id.org/dspace/2024/1/context.json"
@type : "dcat:Catalog"
foaf:homepage : String
dcat:theme : Array<String>
dcat:keyword : Array<String>
dct:conformsTo : String
dct:creator : String
dct:identifier : String
dct:issued : String
```

}}}}}}



STH demo