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## D4.3 - Specification of shared metadata description of semantic artefacts and their catalogues including common reference API

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Work Package	<b>WP 4, Metadata and Ontologies</b>
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## Table of Contents

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<b>1. Description of the Deliverable</b>	<b>6</b>
1.1 Role of the Deliverable	6
1.2 Means of Verification	7
<b>2. The Metadata for Ontology Description and Publication (MOD) Ontology</b>	<b>7</b>
2.1 MOD Previous Work	7
2.2 MOD	7
2.2.1 Version 3.0	7
2.2.2 Version 3.1 and 3.2	8
<b>3. The MOD API</b>	<b>10</b>
3.1 Introduction	10
3.2 The Endpoints	13
3.2.1 The Artefact Endpoints	13
3.2.2 The Catalogue Endpoint	14
3.2.3 The Record Endpoints	14
3.2.4 The Search Endpoints	15
<b>4. Conclusions and next steps</b>	<b>16</b>
<b>References</b>	<b>17</b>
<b>Appendices</b>	<b>18</b>
Diagram 4. JSON-LD Example of a SemanticArtefact	18
Diagram 5. TTL Example of a SemanticArtefact	27
Diagram 6. RDF/XML Example of a SemanticArtefact	31

### List of Diagrams

Diagram 1. The MOD (version 3.2) vocabulary with complete listing of the properties.	9
Diagram 2. MOD API Documentation screenshot	11
Diagram 3. An Example of the Information Provided for an Endpoint	12
Diagram 4. JSON-LD Example of a SemanticArtefact	18
Diagram 5. TTL Example of a SemanticArtefact	27
Diagram 6. RDF/XML Example of a SemanticArtefact	31

## TERMINOLOGY

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Terminology/Acronym	Description
API	Application Programming Interface
DCAT	Data Catalogue Vocabulary
EOSC	European Open Science Cloud
FAIR	Findable Accessible Interoperable and Reusable
RDA	Research Data Alliance
RDF	Resource Description Framework
LOT	Linked Open Terms
MOD	Metadata for Ontology Description and Publication
OWL	Web Ontology Language
SA	Semantic Artefact
SKOS	Simple Knowledge Organization System
SSSOM	Simple Standard for Sharing Ontology Mappings
TTL	Terse RDF Triple Language
VSSIG	Vocabulary and Semantic Services Interest Group
WP	Work Package

## Executive Summary

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Semantic artefacts (SA) –a broad term to include ontologies, terminologies, taxonomies, thesauri, vocabularies, metadata schemas and semantic standards– are key for the description of data and for making data FAIR. Plus, describing SAs is fundamental to make them FAIR themselves. The *Metadata for Ontology Description and Publication (MOD)* ontology was developed since 2017 within the RDA VSSIG and adopted by FAIR-IMPACT to provide a reference vocabulary<sup>5</sup> to semantically describe Semantic Artefacts. It was designed as an extension of the Data Catalogue Vocabulary (DCAT), the W3C Recommendation to describe datasets and resources that can be catalogued.

Within FAIR-IMPACT’s WP4 on ontologies and metadata, T4.2 aims to establish guidelines and community practices with respect to the lifecycle of FAIR semantic artefacts from creation (T4.2.1) to sharing and reuse via catalogues or repositories (T4.2.2). With work on MOD, the task also standardised the mechanisms to describe and serve semantic artefacts (T4.2.3) within EOSC. The task has previously released the milestone M4.3 (*Specification of semantic artefact description*) that contained the latest specification of the MOD (version 3), updated mappings for MOD properties<sup>6</sup> and added automatic profiles to check compliance with MOD.

This deliverable describes the latest changes of MOD, mostly done to encompass the description of Semantic Artefact Catalogues in addition to Semantic Artefacts (and their distributions). Then, the deliverable builds on the MOD vocabulary to provide the specification of an Application Programming Interface (API) for interoperability of Semantic Artefact Catalogues in the European Open Science Cloud (EOSC) ecosystem and beyond. This API is formalised by means of the OpenAPI specification and an OpenAPI template that shall guide for the implementation of a REST API. The objects returned by an implementation of the API shall all be standard semantic objects either from a W3C Recommendation (RDFS, OWL and SKOS) or MOD. We are expecting the MOD-API for Semantic Artefact Catalogues<sup>7</sup> to enable interoperability and unified access to their content, enabling seamless querying and use by stakeholders independent of domain. The API will be adopted by FAIR-IMPACT T4.2’s use case SA-catalogues (at least AgroPortal, EcoPortal, EarthPortal, and potentially LOV) and it is publicly available for other catalogues to implement. The implementation of this API will also be the topic of an upcoming FAIR-IMPACT Open Call for support.

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<sup>5</sup> <https://github.com/FAIR-IMPACT/MOD>

<sup>6</sup> <https://github.com/FAIR-IMPACT/MOD-mappings>

<sup>7</sup> <https://github.com/FAIR-IMPACT/MOD-API>

# 1. Description of the Deliverable

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This deliverable presents a specification for Semantic Artefacts descriptions, relying on a new version of the Metadata for Ontology Description and Publication Ontology (MOD) (version 3.2). It emphasises the importance of Semantic Artefacts descriptions in the context of producing data that follows the FAIR Principles, and presents an historical perspective of the evolution of the MOD vocabulary, which has been originally developed [1] in a convergence approach considering three aspects: by exploring existing vocabularies that are useful to describe SAs, by analysing existing SAs descriptions, and by studying the description properties offered by SA-catalogues.

Milestone M4.3 presented the new architecture of MOD (version 3) as well as the overall context and history of this work.<sup>8</sup> Reading the milestone is a prerequisite to understand the background of this deliverable. Here, we present MOD version 3.2, which was completed by the description of Semantic Artefact Catalogue.

The deliverable also includes the specification of an API for interacting with Semantic Artefacts and their catalogues.

There are other tasks and their milestones/deliverables within the FAIR-IMPACT project that are related to this work, as follows:

- M4.2 Processes and tools to engineer FAIR Semantic Artefacts [1];
- M4.3 Specification of semantic artefact description [2];
- M5.3 Semantic Artefact assessment methodology [3];
- M4.4 Review and analysis of Semantic Artefact Catalogues for serving FAIR semantic artefacts in EOSC [4];
- Upcoming D4.5 Guidelines and methodology to create, document and share mappings and crosswalks.

## 1.1 Role of the Deliverable

This deliverable has been driven by two objectives:

- i) to describe the latest version of the MOD vocabulary including the description of semantic artefact catalogues;
- ii) to describe a standard Application Programming Interface for semantic artefact catalogues.

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<sup>8</sup> <https://zenodo.org/doi/10.5281/zenodo.10725303>

## 1.2 Means of Verification

The required means of verification for this deliverable is the publication of this report together with the artefacts presented in the related GitHub repositories:

- i) MOD repository: <https://github.com/FAIR-IMPACT/MOD>
- ii) MOD API: <https://github.com/FAIR-IMPACT/MOD-API>

The deliverable goes along with releases of these products:

- <https://github.com/FAIR-IMPACT/MOD-API/releases/tag/1.0.0>
- <https://github.com/FAIR-IMPACT/MOD/releases/tag/v3.2>

## 2. The Metadata for Ontology Description and Publication (MOD) Ontology

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### 2.1 MOD Previous Work

Check out the milestone M4.3 - Specification of semantic artefact description (<https://zenodo.org/doi/10.5281/zenodo.10725303>) for this.

### 2.2 MOD

#### 2.2.1 Version 3.0

Version 3.0 of MOD was made available as part of milestone M4.3. This milestone includes detailed discussions about the design decisions for MOD 3.0. In the milestone, we described how the new version of MOD (version 3.0)<sup>9</sup> was designed and implemented, by formalising MOD relationship with the DCAT vocabulary for resource catalogues and clearly distinguishing between the elements that are part of the MOD vocabulary definition and additional terms from other ontologies that were mapped to MOD, in order to facilitate:

- i) the specification of a new version of the MOD vocabulary as an extension of the DCAT vocabulary by addressing outstanding design issues;
- ii) a clear identification between MOD elements and mappings to other vocabularies, by representing the mappings using the SSSOM standard;
- iii) present machine-actionable representations of MOD 3.0 profiles.

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<sup>9</sup>URI: <https://w3id.org/mod/3.0> and release notes: <https://github.com/FAIR-IMPACT/MOD/releases/tag/v3.0>

### 2.2.2 Version 3.1 and 3.2

Following on, MOD 3.0 has been updated to produce MOD 3.2.<sup>10</sup> Some changes are that a number of additional properties have now been assigned to the *mod:SemanticArtefactDistribution* class, this includes some that have been moved from the *mod:SemanticArtefact*. More generally, we have added the mechanism to assign MOD properties to any classes in MOD. Then we have assigned some of the original MOD properties (up to version 3.0) to the *mod:SemanticArtefactCatalog* class when the property was relevant. New properties have also been added to describe *mod:SemanticArtefactCatalog* mostly from Schema.org, DCAT, DCTERMS and ODRL or created in the MOD namespace.

In this version, we have also updated the metadata description of MOD itself with MOD properties. Additionally, a new versioning file organisation has been implemented, and multiple small changes and fixes have been applied to versions 3.0, 3.1, and 3.2.

Diagram 1 shows the MOD 3.2 schema and its relationship to DCAT. For the interest of clarity the properties have been left out of the DCAT classes. We only focus on listing the properties for the *mod:SemanticArtefact*, *mod:SemanticArtefactDistribution*, *mod:SemanticArtefactCatalogRecord* and finally the *mod:SemanticArtefactCatalog* class too. Each of these classes will be objects returned by the MOD-API described after.

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<sup>10</sup>URI: <https://w3id.org/mod/3.2> and release notes: <https://github.com/FAIR-IMPACT/MOD/releases/tag/v3.2>



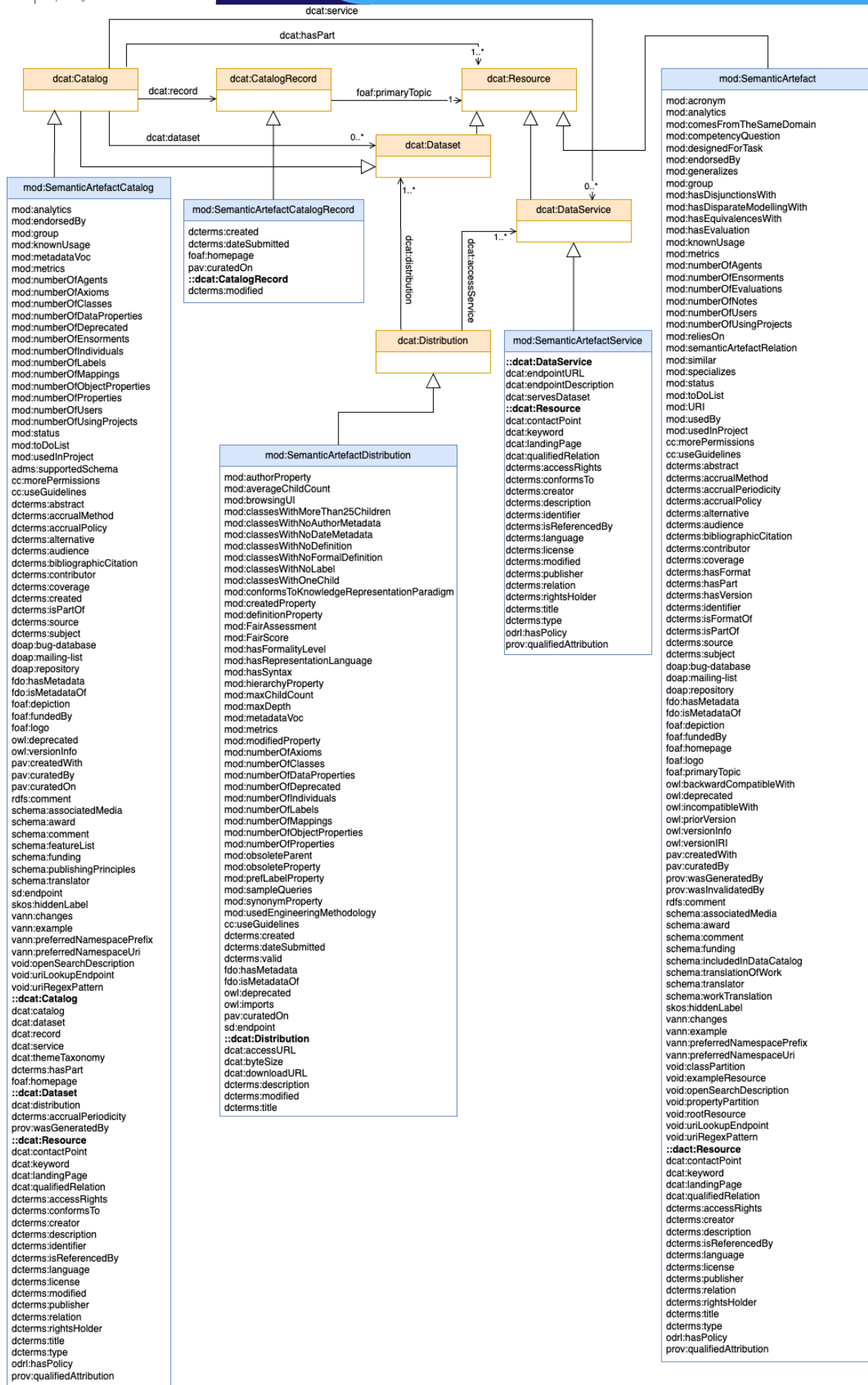


Diagram 1. The MOD (version 3.2) vocabulary with complete listing of the properties.

## 3. The MOD API

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### 3.1 Introduction

In order for tools and applications to interact with semantic artefact catalogues in a uniform way, we have produced a specification of an Application Programming Interface. The main purpose of this API is to specify the calls that a SA-catalogue shall support to serve the content and metadata of SA. The objects returned by an implementation of the API shall all be standard semantic objects, represented in RDF, either from a W3C Recommendation (RDFS, OWL and SKOS) or MOD. This API is formalised by means of an OpenAPI template that shall guide the implementation of Web REST API. We are suggesting to serialise the semantic objects in JSON-LD.

This MOD API has been defined in an Open API YAML file,<sup>11</sup> which has been used to generate the API documentation.<sup>12</sup> The reader is directed to this documentation for the full description of the API. The documentation includes details of the input parameters, along with the schema for the responses; please select the media type of *application/ld+json* to view the schema of the returned object. For the moment, the specification contains the MOD properties that can be possibly included only for the JSON-LD format.

A main purpose of this API is to retrieve content and metadata description of SAs stored in catalogues, i.e. a *SemanticArtefactCatalog* object (information about a catalogue) or a *SemanticArtefact* (metadata about an ontology, taxonomy or vocabulary). A brief overview of the API is presented in this deliverable.

The API endpoints (see Diagram 2) are grouped into:

- Catalogue - Get information about the semantic artefact catalogue. The “/” endpoint.
- Artefact - Get information about semantic artefacts. Endpoints starting with “/artefacts”. Endpoints under this root can return content of the catalogue as well as metadata.
- Distribution - Get information about the semantic artefact distributions. Endpoints starting with “/distributions”
- Record - Get information about semantic artefact catalogue records. Endpoints starting with “/records”

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<sup>11</sup>

[https://github.com/FAIR-IMPACT/MOD-API/blob/main/mod\\_api/static/mod\\_api/openAPI.yaml](https://github.com/FAIR-IMPACT/MOD-API/blob/main/mod_api/static/mod_api/openAPI.yaml)

<sup>12</sup> <https://fair-impact.github.io/MOD-API/>

- Search - Search either the metadata of SA, their content or both. Endpoints starting with “/search” shall return any of the types of objects returned by the other endpoints depending on the results of the search query expressed with a string parameter (q).

**Artefact** Get information about semantic artefact(s) (ontologies, terminologies, taxonomies, thesauri, vocabularies, metadata schemas and semantic standards) or their resources. ^

- GET /artefacts Get information about all semantic artefacts. v
- GET /artefacts/{artefactID} Get information about a semantic artefact. v
- GET /artefacts/{artefactID}/distributions Get information about a semantic artefact's distributions. v
- GET /artefacts/{artefactID}/distributions/{distributionID} Get information about a semantic artefact's distribution. v
- GET /artefacts/{artefactID}/distributions/latest/resources Get information about a semantic artefact's resources for the latest distribution. v
- GET /artefacts/{artefactID}/record Get information about a semantic artefact catalog record. v
- GET /artefacts/{artefactID}/resources Get a list of all the resources within an artefact. v
- GET /artefacts/{artefactID}/resources/{resourceID} Get a specific resources from within an artefact. v
- GET /artefacts/{artefactID}/resources/classes Get a list of all owl:Classes within an artefact. v
- GET /artefacts/{artefactID}/resources/concepts Get a list of all skos:Concept within an artefact. v
- GET /artefacts/{artefactID}/resources/properties Get a list of all the rdf:Property within an artefact. v
- GET /artefacts/{artefactID}/resources/individuals Get a list of all the instances (owl individuals) within an artefact. v
- GET /artefacts/{artefactID}/resources/schemes Get a list of all the skos:Scheme within an artefact. v
- GET /artefacts/{artefactID}/resources/collection Get a list of all the skos:Collection within an artefact. v
- GET /artefacts/{artefactID}/resources/labels Get a list of all the skos-xl:Label within an artefact. v

**Catalogue** Get information about the semantic artefact catalogue. ^

- GET / Get information about the semantic artefact catalogue v

**Record** Get semantic artefact catalogue records. ^

- GET /records Get information about all semantic artefact catalog records. v
- GET /records/{artefactID} Get information about a semantic artefact catalog record. v

**Search** Search the metadata and catalogue content. ^

- GET /search Search all of the metadata and content in a catalogue. v
- GET /search/content Search all of the content in a catalogue. v
- GET /search/metadata Search all of the metadata in a catalogue. v

**Diagram 2. MOD API Documentation screenshot**

The documentation provides information about each endpoint along with details about the schema, see Diagram 3.

**GET** /artefacts/{artefactID} Get information about a semantic artefact.

Retrieves information about a semantic artefact.

**Parameters** Try it out

Name	Description
<b>artefactID</b> <span style="color: red;">* required</span> string (path)	The ID of the artefact. <input type="text" value="artefactID"/>
display string (path)	The parameters to display. Default value : all <input type="text" value="all"/>
format string (query)	The response format. This will override any value of <b>Accept</b> in the request headers. Possible values are <b>html</b> , <b>json</b> , <b>ttr</b> and <b>xml</b> . The default value is <b>html</b> . Available values : html, json, ttl, xml Default value : html <input type="text" value="html"/>

**Responses**

Code	Description	Links
200	OK Media type <input type="text" value="application/ld+json"/> Controls <b>Accept</b> header. Example Value   Schema <pre>{   "prov": "http://www.w3.org/ns/prov#",   "rdf": "http://www.w3.org/1999/02/22-rdf-syntax-ns#",   "rdfs": "http://www.w3.org/2000/01/rdf-schema#",   "skos": "http://www.w3.org/2004/02/skos/core#",   "time": "http://www.w3.org/2006/time#",   "vcard": "http://www.w3.org/2006/vcard/ns#",   "xsd": "http://www.w3.org/2001/XMLSchema#", },   "id": "https://example.org/SemanticArtefact/SemanticArtefactID",   "type": [     "mod:SemanticArtefact"   ],   "dct:accessRights": {     "id": "https://example.org/RightsStatement/RightsStatementID",     "type": "dct:RightsStatement"   } },</pre>	No links
404	The provided parameters are incorrect. Media type <input type="text" value="text/html"/> Example Value   Schema <pre>string</pre>	No links

Diagram 3. An Example of the Information Provided for an Endpoint

## 3.2 The Endpoints

The endpoints should all implement content negotiation. There are two ways to specify that content format. Firstly use of the *Accept* field in the request headers, secondly use of the *format* parameter in the URL. A request for *HTML* should return the information in a human readable format, whereas *JSON-LD*, *TTL* and *XML* should return the information in a machine readable format.

The endpoints that return a list of objects should implement pagination. This is done via the URL parameters *page* and *pagesize*.

The URL parameter *display* should be used to indicate which fields are returned in the response. If this parameter is not provided the default list shall be returned (the default list is implementation dependent). With the parameter *display=all*, all fields should be explicitly returned.

### 3.2.1 The Artefact Endpoints

The *artefacts* endpoint gets information about all of the Semantic Artefacts in the catalogue. These endpoints support the use cases where a client wants to do something on all the artefacts based on a common metadata (e.g., list all the artefacts by name and URIs).

All of the other artefact endpoints include an *artefactID* and return information specific to the selected artefact. These endpoints shall allow a user either to get all the information available about a specific SA and even get the other objects linked to that SA. Examples of SA response objects are given in Appendix 1, the user documentation contains additional examples. The artefact endpoints are:

- */artefacts/{artefactID}* - returns a unique mod:SemanticArtefact object for the given artefact ID with an identifier system supported by the SA-catalogue (see Appendix 1 for example responses).
- */artefacts/{artefactID}/distributions* - returns a list of mod:SemanticArtefactDistribution objects for the given artefact ID corresponding to all the distributions currently available in the catalogue for this artefact.
- */artefacts/{artefactID}/distributions/{distributionID}* - returns a unique mod:SemanticArtefactDistribution object for the given artefact ID and distribution ID combination.
- */artefacts/{artefactID}/distributions/latest* - returns the latest (in the sense of a local metadata (e.g., date of submission)) unique mod:SemanticArtefactDistribution object available in the SA-catalogue for the given artefact ID.
- */artefacts/{artefactID}/record* - returns a mod:SemanticArtefactRecord object for the given artefact ID.

- */artefacts/{artefactID}/resources* - returns a list of resources (rdf:Resource) included in an artefact with a given artefact ID. Every object's content within a SA being of type rdf:Resource, this endpoint is therefore an iterator on the whole content of the SA. Specific types of resource can be obtained by prepending the resource type:
  - */artefacts/{artefactID}/resources/concepts* (skos:Concept)
  - */artefacts/{artefactID}/resources/classes* (owl:Class)
  - */artefacts/{artefactID}/resources/properties* (rdf:Property)
  - */artefacts/{artefactID}/resources/individuals* (owl:NamedIndividual)
  - */artefacts/{artefactID}/resources/schemes* (skos:Scheme)
  - */artefacts/{artefactID}/resources/collections* (skos:Collection)

### 3.2.2 The Catalogue Endpoint

There is only one catalogue endpoint and that is the root endpoint, *"/*. It gets information about the catalogue in the form of a *mod:SemanticArtefactCatalog* object. This endpoint supports the use cases where a client wants to get a description of the catalogue itself.

### 3.2.3 The Record Endpoints

We suppose the distribution mechanism shall allow a catalogue to store and serve (data and/or metadata only) the content of multiple distributions. However, catalogues could also use the unique object *SemanticArtefactCatalogRecord* to store specific information the catalogue needs about a SA. The records endpoints return *SemanticArtefactCatalogRecord* objects.

- */records* - returns all of the *SemanticArtefactCatalogRecord* objects
- */records/{artefactID}* - returns a *SemanticArtefactRecord* object for the given artefact ID. This is equivalent to */artefacts/{artefactID}/record*.

The *mod:SemanticArtefactCatalogRecord* is not specified by MOD (properties to use) to let every implementation decide on the ad-hoc characteristics to store at the level of the record. Hence, the records endpoint may be considered optional by implementations of the MOD-API.

### 3.2.4 The Search Endpoints

It is possible to search just the metadata or the content of semantic artefacts or both of them. The data returned by the search endpoints is dependent on the search. For example, a search could yield a *mod:SemanticArtefact* object that contains metadata about a SA, or it could return a list of *skos:Concept* depending on where it finds matches. In compliance with the rest of this API, the search endpoints shall only returns objects that are: *rdf:Resource*, *skos:Concept*, *owl:Class*, *rdf:Property*, *owl:NamedIndividual*, *skos:Scheme*, *skos:Collection* or *mod:SemanticArtefact*, *mod:semanticArtefactDistribution* and possibly *mod:SemanticArtefactCatalogRecord*.

Implementers of catalogues are responsible for what fields are indexed. The choices of the indices will influence the ranking of search results. Hence this document does not specify the order of the results from searches.

- */search* - search in the metadata and the content
- */search/content* - just search the content
- */search/metadata* - just search the metadata

## 4. Conclusions and next steps

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The milestone M4.3 was about a specification for describing semantic artefacts based on the MOD vocabulary. For this deliverable, we have refined the MOD specification, and produced an MOD-based Application Programming Interface for semantic artefact catalogues.

The main outcomes from this deliverable are:

- i) specifications of a new version of the MOD vocabulary,
- ii) an Application Programming Interface for semantic artefact catalogues.

Adoption of the MOD-API for Semantic Artefact Catalogues<sup>13</sup> will facilitate interoperability and unified access to their content, enabling seamless querying and use by stakeholders independent of domain e.g. possibly federated search. It will also allow for easier development of federated search services.

The API will be adopted by FAIR-IMPACT T4.2's use case SA-catalogues, at least AgroPortal,<sup>14</sup> EcoPortal,<sup>15</sup> EarthPortal,<sup>16</sup> while we will encourage others such as LOV<sup>17</sup> to adopt it too, and it is publicly available for other catalogues to implement.

The implementation of this API will also be the topic of an upcoming FAIR-IMPACT Open Call.

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<sup>13</sup> <https://github.com/FAIR-IMPACT/MOD-API>

<sup>14</sup> <https://agroportal.lirmm.fr>

<sup>15</sup> <https://ecportal.lifewatch.eu>

<sup>16</sup> <https://earthportal.eu>

<sup>17</sup> <https://lov.linkeddata.es/dataset/lov>





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## Appendices

**Diagram 4. JSON-LD Example of a SemanticArtefact**

```
{
  "@context": {
    "dc": "http://purl.org/dc/elements/1.1/",
    "dcat": "http://www.w3.org/ns/dcat#",
    "dct": "http://purl.org/dc/terms/",
    "dctype": "http://purl.org/dc/dcmitype/",
    "foaf": "http://xmlns.com/foaf/0.1/",
    "locn": "http://www.w3.org/ns/locn#",
    "mod": "https://w3id.org/mod#",
    "odrl": "http://www.w3.org/ns/odrl/2/",
    "owl": "http://www.w3.org/2002/07/owl#",
    "prov": "http://www.w3.org/ns/prov#",
    "rdf": "http://www.w3.org/1999/02/22-rdf-syntax-ns#",
    "rdfs": "http://www.w3.org/2000/01/rdf-schema#",
    "skos": "http://www.w3.org/2004/02/skos/core#",
    "time": "http://www.w3.org/2006/time#",
    "vcard": "http://www.w3.org/2006/vcard/ns#",
    "xsd": "http://www.w3.org/2001/XMLSchema#"
  },
  "@id": "https://example.org/SemanticArtefact/SemanticArtefactID",
  "@type": [
    "mod:SemanticArtefact"
  ],
  "dct:accessRights": {
    "@id": "https://example.org/RightsStatement/RightsStatementID",
    "@type": "dct:RightsStatement"
  },
  "dct:conformsTo": {
    "@id": "https://example.org/Standard/StandardID",
    "@type": "dct:Standard"
  },
  "dcat:contactPoint": {
    "@id": "https://example.org/vcardKind/vcardKindID",
    "@type": "vcard:Kind",
    "vcard:fn": "Corky Crystal",
    "vcard:nickname": "Corks"
  },
  "dct:creator": {
    "@id": "https://example.org/Agent/AgentID",
    "@type": "foaf:Agent"
  },
  "dct:description": {
    "@id": "https://example.org/identifier/identifierID",
    "@type": "dct:identifier"
  }
}
```

```
},
"odrl:hasPolicy": {
  "@id": "https://example.org/Policy/PolicyID",
  "@type": "odrl:Policy"
},
"dct:identifier": {
  "@id": "https://example.org/identifier/identifierID",
  "@type": "dct:identifier"
},
"dct:isReferencedBy": {
  "@id": "https://example.org/isReferencedBy/isReferencedByID",
  "@type": "dct:isReferencedBy"
},
"dct:issued": {
  "@id": "https://example.org/identifier/identifierID",
  "@type": "dct:identifier"
},
"dcat:keyword": {
  "@id": "https://example.org/identifier/identifierID",
  "@type": "dct:identifier"
},
"dcat:landingPage": {
  "@id": "https://example.org/Document/DocumentID",
  "@type": "foaf:Document"
},
"dct:language": {
  "@id": "https://example.org/LinguisticSystem/LinguisticSystemID",
  "@type": "dct:LinguisticSystem"
},
"dct:license": {
  "@id": "https://example.org/LicenseDocument/LicenseDocumentID",
  "@type": "dct:LicenseDocument"
},
"dct:modified": {
  "@id": "https://example.org/identifier/identifierID",
  "@type": "dct:identifier"
},
"dct:publisher": {
  "@id": "https://example.org/Agent/AgentID",
  "@type": "foaf:Agent"
},
"prov:qualifiedAttribution": {
  "@id": "https://example.org/Attribution/AttributionID",
  "@type": "prov:Attribution"
},
"dcat:qualifiedRelation": "string",
"dct:relation": {
  "@id": "https://exa
```

```
"@type": "dct:relation"
},
"dct:rights": {
  "@id": "https://example.org/RightsStatement/RightsStatementID",
  "@type": "dct:RightsStatement"
},
"dc:theme": {
  "@type": "skos:Concept",
  "skos:prefLabel": "cars"
},
"dct:title": {
  "@id": "https://example.org/identifier/identifierID",
  "@type": "dct:identifier"
},
"dct:type": {
  "@id": "https://example.org/Type/TypeID",
  "@type": "dct:type"
},
"mod:acronym": {
  "@type": "xsd:string",
  "@value": "Lorem ipsum"
},
"mod:analytics": {
  "@id": "https://example.org/Analytics/AnalyticsID",
  "@type": [
    "mod:Analytics"
  ]
},
"mod:competencyQuestion": {
  "@type": "xsd:string",
  "@value": "Lorem ipsum"
},
"mod:designedForTask": {
  "@id": "https://example.org/SemanticArtefactService/SemanticArtefactServiceID",
  "@type": [
    "mod:SemanticArtefactService"
  ]
},
"dct:accessRights": {
  "@id": "https://example.org/RightsStatement/RightsStatementID",
  "@type": "dct:RightsStatement"
},
"dct:conformsTo": {
  "@id": "https://example.org/Standard/StandardID",
  "@type": "dct:Standard"
},
"dc:contactPoint": {
  "@id": "https://example.org/vcardKind/vcardKindID",
  "@type": "vcard:Kind",
```

```
"vcard:fn": "Corky Crystal",
"vcard:nickname": "Corks"
},
"dct:creator": {
"@id": "https://example.org/Agent/AgentID",
"@type": "foaf:Agent"
},
"dct:description": {
"@id": "https://example.org/identifier/identifierID",
"@type": "dct:identifier"
},
"odrl:hasPolicy": {
"@id": "https://example.org/Policy/PolicyID",
"@type": "odrl:Policy"
},
"dct:identifier": {
"@id": "https://example.org/identifier/identifierID",
"@type": "dct:identifier"
},
"dct:isReferencedBy": {
"@id": "https://example.org/isReferencedBy/isReferencedByID",
"@type": "dct:isReferencedBy"
},
"dct:issued": {
"@id": "https://example.org/identifier/identifierID",
"@type": "dct:identifier"
},
"dcat:keyword": {
"@id": "https://example.org/identifier/identifierID",
"@type": "dct:identifier"
},
"dcat:landingPage": {
"@id": "https://example.org/Document/DocumentID",
"@type": "foaf:Document"
},
"dct:language": {
"@id": "https://example.org/LinguisticSystem/LinguisticSystemID",
"@type": "dct:LinguisticSystem"
},
"dct:license": {
"@id": "https://example.org/LicenseDocument/LicenseDocumentID",
"@type": "dct:LicenseDocument"
},
"dct:modified": {
"@id": "https://example.org/identifier/identifierID",
"@type": "dct:identifier"
},
"dct:publisher": {
```

```
"@id": "https://example.org/Agent/AgentID",
"@type": "foaf:Agent"
},
"prov:qualifiedAttribution": {
"@id": "https://example.org/Attribution/AttributionID",
"@type": "prov:Attribution"
},
"dcat:qualifiedRelation": "string",
"dct:relation": {
"@id": "https://example.org/relation/relationID",
"@type": "dct:relation"
},
"dct:rights": {
"@id": "https://example.org/RightsStatement/RightsStatementID",
"@type": "dct:RightsStatement"
},
"dcat:theme": {
"@type": "skos:Concept",
"skos:prefLabel": "cars"
},
"dct:title": {
"@id": "https://example.org/identifier/identifierID",
"@type": "dct:identifier"
},
"dct:type": {
"@id": "https://example.org/Type/TypeID",
"@type": "dt:type"
},
"dcat:endpointDescription": {
"@type": "rdfs:Resource"
},
"dcat:endpointURL": {
"@type": "rdfs:Resource"
},
"dcat:servesDataset": {
"dct:accessRights": {
"@id": "https://example.org/RightsStatement/RightsStatementID",
"@type": "dct:RightsStatement"
},
"dct:conformsTo": {
"@id": "https://example.org/Standard/StandardID",
"@type": "dct:Standard"
},
"dcat:contactPoint": {
"@id": "https://example.org/vcardKind/vcardKindID",
"@type": "vcard:Kind",
"vcard:fn": "Corky Crystal",
"vcard:nickname": "Corks"
}
```

```

},
"dct:creator": {
  "@id": "https://example.org/Agent/AgentID",
  "@type": "foaf:Agent"
},
"dct:description": {
  "@id": "https://example.org/identifier/identifierID",
  "@type": "dct:identifier"
},
"odrl:hasPolicy": {
  "@id": "https://example.org/Policy/PolicyID",
  "@type": "odrl:Policy"
},
"dct:identifier": {
  "@id": "https://example.org/identifier/identifierID",
  "@type": "dct:identifier"
},
"dct:isReferencedBy": {
  "@id": "https://example.org/isReferencedBy/isReferencedByID",
  "@type": "dct:isReferencedBy"
},
"dct:issued": {
  "@id": "https://example.org/identifier/identifierID",
  "@type": "dct:identifier"
},
"dcat:keyword": {
  "@id": "https://example.org/identifier/identifierID",
  "@type": "dct:identifier"
},
"dcat:landingPage": {
  "@id": "https://example.org/Document/DocumentID",
  "@type": "foaf:Document"
},
"dct:language": {
  "@id": "https://example.org/LinguisticSystem/LinguisticSystemID",
  "@type": "dct:LinguisticSystem"
},
"dct:license": {
  "@id": "https://example.org/LicenseDocument/LicenseDocumentID",
  "@type": "dct:LicenseDocument"
},
"dct:modified": {
  "@id": "https://example.org/identifier/identifierID",
  "@type": "dct:identifier"
},
"dct:publisher": {
  "@id": "https://example.org/Agent/AgentID",
  "@type": "foaf:Agent"

```

```
},
"prov:qualifiedAttribution": {
  "@id": "https://example.org/Attribution/AttributionID",
  "@type": "prov:Attribution"
},
"dc:relation": {
  "@id": "https://example.org/relation/relationID",
  "@type": "dct:relation"
},
"dct:rights": {
  "@id": "https://example.org/RightsStatement/RightsStatementID",
  "@type": "dct:RightsStatement"
},
"dc:theme": {
  "@type": "skos:Concept",
  "skos:prefLabel": "cars"
},
"dct:title": {
  "@id": "https://example.org/identifier/identifierID",
  "@type": "dct:identifier"
},
"dct:type": {
  "@id": "https://example.org/Type/TypeID",
  "@type": "dct:type"
},
"dct:accrualPeriodicity": {
  "@id": "https://example.org/Frequency/FrequencyID",
  "@type": "dct:Frequency"
},
"dc:accessRights": {
  "@id": "https://example.org/RightsStatement/RightsStatementID",
  "@type": "dct:RightsStatement"
},
"dc:accessURL": {
  "@type": "rdfs:Resource"
},
"dc:byteSize": {
  "@type": "xsd:decimal",
  "@value": 4
},
"dc:compressFormat": {
  "@id": "https://example.org/MediaType/MediaTypeID",
  "@type": "dct:MediaType"
},
"dct:conformsTo": {
```



```
"@id": "https://example.org/Standard/StandardID",
"@type": "dct:Standard"
},
"dct:description": {
"@type": "rdfs:Literal",
"@value": "Lorem ipsum"
},
"dcat:downloadURL": {
"@type": "rdfs:Resource"
},
"dct:format": {
"@id": "https://example.org/MediaTypeOrExtent/MediaTypeOrExtentID",
"@type": "dct:MediaTypeOrExtent"
},
"odrl:hasPolicy": {
"@id": "https://example.org/Policy/PolicyID",
"@type": "odrl:Policy"
},
"dct:issued": {
"@type": "rdfs:Literal",
"@value": "Lorem ipsum"
},
"dct:license": {
"@id": "https://example.org/LicenseDocument/LicenseDocumentID",
"@type": "dct:LicenseDocument"
},
"dcat:mediaType": {
"@id": "https://example.org/MediaType/MediaTypeID",
"@type": "dct:MediaType"
},
"dct:modified": {
"@type": "rdfs:Literal",
"@value": "Lorem ipsum"
},
"dcat:packageFormat": {
"@id": "https://example.org/MediaType/MediaTypeID",
"@type": "dct:MediaType"
},
"dct:rights": {
"@id": "https://example.org/RightsStatement/RightsStatementID",
"@type": "dct:RightsStatement"
},
"dcat:spatialResolutionInMeters": {
"@type": "xsd:decimal",
"@value": 4
},
"dcat:temporalResolution": {
"@type": "xsd:duration"
```

```
    },
    "dct:title": {
      "@type": "rdfs:Literal",
      "@value": "Lorem ipsum"
    }
  },
  "dct:spatial": {
    "@id": "https://example.org/Location/LocationID",
    "@type": "dct:Location"
  },
  "dcat:spatialResolutionInMeters": {
    "@type": "xsd:decimal",
    "@value": 4
  },
  "dct:temporal": {
    "@id": "https://example.org/PeriodOfTime/PeriodOfTimeID",
    "@type": "dct:PeriodOfTime"
  },
  "dcat:temporalResolution": {
    "@type": "xsd:duration"
  },
  "prov:wasGeneratedBy": {
    "@id": "https://example.org/Activity/ActivityID",
    "@type": "prov:Activity"
  }
}
},
"mod:endorsedBy": {
  "@id": "https://example.org/Agent/AgentID",
  "@type": "dct:Agent"
},
"mod:group": {
  "@id": "https://example.org/Group/GroupID",
  "@type": [
    "mod:Group"
  ]
},
"mod:hasEvaluation": {
  "@id": "https://example.org/Evaluation/EvaluationID",
  "@type": [
    "mod:Evaluation"
  ]
},
"mod:hasFormalityLevel": {
  "@type": "xsd:string",
  "@value": "Lorem ipsum"
},
"mod:knownUsage": {
```

```

"@type": "xsd:string",
"@value": "Lorem ipsum"
},
"mod:metrics": {
"@type": "xsd:nonNegativeInteger",
"@value": 5
},
"mod:numberOfEnserments": {
"@type": "xsd:nonNegativeInteger",
"@value": 5
},
"mod:numberOfEvaluations": {
"@type": "xsd:nonNegativeInteger",
"@value": 5
},
"mod:numberOfNotes": {
"@type": "xsd:nonNegativeInteger",
"@value": 5
},
"mod:numberOfUsingProjects": {
"@type": "xsd:nonNegativeInteger",
"@value": 5
},
"mod:semanticArtefactRelation": "string",
"mod:status": {
"@type": "xsd:string",
"@value": "Lorem ipsum"
},
"mod:URI": {
"@type": "xsd:anyURI",
"@value": "https://example.org"
},
"mod:usedInProject": {
"@id": "https://example.org/Project/ProjectID",
"@type": "foaf:Project"
}
}

```

**Diagram 5. TTL Example of a SemanticArtefact**

```

@prefix : < ://pur1.org/dc/terms/> .
@prefix : < ://www.w3.org/ns/dcat#> .
@prefix : < ://www.w3.org/2001/XMLSchema#> .

```



```

:           "string"^^      :string ;
:   "Lorem ipsum"^^      :string ;
:           <           ://example.org/Project/ProjectID> .

<           ://example.org/RightsStatement/RightsStatementID> a dc:RightsStatement
.
<           ://example.org/Standard/StandardID> a dc:Standard .
<           ://example.org/Agent/AgentID> a foaf:Agent, dc:Agent .
<           ://example.org/identifier/identifierID> a dc:identifier .
<           ://example.org/isReferencedBy/isReferencedByID> a dc:isReferencedBy .
<           ://example.org/LinguisticSystem/LinguisticSystemID> a
dc:LinguisticSystem .
<           ://example.org/LicenseDocument/LicenseDocumentID> a dc:LicenseDocument
.
<           ://example.org/relation/relationID> a dc:relation .
<           ://example.org/Type/TypeID> a <dt:type> .
<           ://example.org/vcardKind/vcardKindID>
:Kind ;
:   "Corky Crystal"^^      :string ;
:   "Corks"^^              :string .

<           ://example.org/Document/DocumentID> a foaf:Document .
<           ://example.org/Policy/PolicyID> a odr1:Policy .
<           ://example.org/Attribution/AttributionID> a prov:Attribution .
<           ://example.org/Analytics/AnalyticsID> a mod:Analytics .
<           ://example.org/SemanticArtefactService/SemanticArtefactServiceID>
:SemanticArtefactService ;
:           <           ://example.org/RightsStatement/RightsStatementID> ;
:           <           ://example.org/Standard/StandardID> ;
:           <           ://example.org/Agent/AgentID> ;
:           <           ://example.org/identifier/identifierID> ;
:           <           ://example.org/identifier/identifierID> ;
:           <           ://example.org/isReferencedBy/isReferencedByID> ;
:           <           ://example.org/identifier/identifierID> ;
:           <           ://example.org/LinguisticSystem/LinguisticSystemID> ;
:           <           ://example.org/LicenseDocument/LicenseDocumentID> ;
:           <           ://example.org/identifier/identifierID> ;
:           <           ://example.org/Agent/AgentID> ;
:           <           ://example.org/relation/relationID> ;
:           <           ://example.org/RightsStatement/RightsStatementID> ;
:           <           ://example.org/identifier/identifierID> ;
:           <           ://example.org/Type/TypeID> ;
:           <           ://example.org/vcardKind/vcardKindID> ;
:           [           :Resource ] ;
:           [           :Resource ] ;
:           <           ://example.org/identifier/identifierID> ;
:           <           ://example.org/Document/DocumentID> ;
:           "string"^^      :string ;
:           [
:           <           ://example.org/RightsStatement/RightsStatementID>
;
:           <           ://example.org/Frequency/FrequencyID> ;

```

```

:       <       ://example.org/Standard/StandardID> ;
:       <       ://example.org/Agent/AgentID> ;
:       <       ://example.org/identifier/identifierID> ;
:       <       ://example.org/identifier/identifierID> ;
:       <       ://example.org/isReferencedBy/isReferencedByID>
;
:       <       ://example.org/identifier/identifierID> ;
:       <       ://example.org/LinguisticSystem/LinguisticSystemID> ;
:       <       ://example.org/LicenseDocument/LicenseDocumentID> ;
:       <       ://example.org/identifier/identifierID> ;
:       <       ://example.org/Agent/AgentID> ;
:       <       ://example.org/relation/relationID> ;
:       <       ://example.org/RightsStatement/RightsStatementID> ;
:       <       ://example.org/Location/LocationID> ;
:       <       ://example.org/PeriodOfTime/PeriodOfTimeID> ;
:       <       ://example.org/identifier/identifierID> ;
:       <       ://example.org/Type/TypeID> ;
:       <       ://example.org/vcardKind/vcardKindID> ;
:       [
:
:
< ://example.org/RightsStatement/RightsStatementID> ;
:       <       ://example.org/Standard/StandardID> ;
:       "Lorem ipsum"^^ :Literal ;
:       <       ://example.org/MediaTypeOrExtent/MediaTypeOrExtentID>
;
:       "Lorem ipsum"^^ :Literal ;
:       <       ://example.org/LicenseDocument/LicenseDocumentID> ;
:       "Lorem ipsum"^^ :Literal ;
:       <       ://example.org/RightsStatement/RightsStatementID> ;
:       "Lorem ipsum"^^ :Literal ;
:       "string"^^ :string ;
:       [ :Resource ] ;
:       4.0 ;
:       <       ://example.org/MediaType/MediaTypeID> ;
:       [ :Resource ] ;
:       <       ://example.org/MediaType/MediaTypeID> ;
:       <       ://example.org/MediaType/MediaTypeID> ;
:           4.0 ;
:       [ : : ] ;
:       <       ://example.org/Policy/PolicyID>
] ;
:       <       ://example.org/identifier/identifierID> ;
:       <       ://example.org/Document/DocumentID> ;
:       "string"^^ :string ;
:           4.0 ;
:       [ : : ] ;
:       [
:           :Concept ;
:       "cars"^^ :string
] ;
:       <       ://example.org/Policy/PolicyID> ;
:

```

```

<
  ://example.org/Attribution/AttributionID> ;
  :
    <
      ://example.org/Activity/ActivityID>
    ] ;
  :
    [
      :Concept ;
      :
        "cars"^^ :string
    ] ;
  :
    <
      ://example.org/Policy/PolicyID> ;
  :
    <
      ://example.org/Attribution/AttributionID>
  .

<
  ://example.org/Frequency/FrequencyID> a dc:Frequency .
<
  ://example.org/Location/LocationID> a dc:Location .
<
  ://example.org/PeriodOfTime/PeriodOfTimeID> a dc:PeriodOfTime .
<
  ://example.org/MediaTypeOrExtent/MediaTypeOrExtentID> a
dc:MediaTypeOrExtent .
<
  ://example.org/MediaType/MediaTypeID> a dc:MediaType .
<
  ://example.org/Activity/ActivityID> a prov:Activity .
<
  ://example.org/Group/GroupID> a mod:Group .
<
  ://example.org/Evaluation/EvaluationID> a mod:Evaluation .
<
  ://example.org/Project/ProjectID> a foaf:Project .

```

**Diagram 6. RDF/XML Example of a SemanticArtefact**

```

<?
  = "1.0"
  = "utf-8" ?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:dc="http://purl.org/dc/terms/"
  xmlns:dcat="http://www.w3.org/ns/dcat#"
  xmlns:skos="http://www.w3.org/2004/02/skos/core#"
  xmlns:odrl="http://www.w3.org/ns/odrl/2/"
  xmlns:prov="http://www.w3.org/ns/prov#"
  xmlns:mod="https://w3id.org/mod#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
  xmlns:foaf="http://xmlns.com/foaf/0.1/"
  xmlns:vcard="http://www.w3.org/2006/vcard/ns#">

  <rdf:Description
  rdf:about="https://example.org/SemanticArtefact/SemanticArtefactID">
    <rdf:type rdf:resource="https://w3id.org/mod#SemanticArtefact"/>
    <dc:accessRights
  rdf:resource="https://example.org/RightsStatement/RightsStatementID"/>
    <dc:conformsTo rdf:resource="https://example.org/Standard/StandardID"/>
    <dc:creator rdf:resource="https://example.org/Agent/AgentID"/>
    <dc:description
  rdf:resource="https://example.org/identifier/identifierID"/>

```

```

    <dc:identifier
rdf:resource="https://example.org/identifier/identifierID"/>
    <dc:isReferencedBy
rdf:resource="https://example.org/isReferencedBy/isReferencedByID"/>
    <dc:issued rdf:resource="https://example.org/identifier/identifierID"/>
    <dc:language
rdf:resource="https://example.org/LinguisticSystem/LinguisticSystemID"/>
    <dc:license
rdf:resource="https://example.org/LicenseDocument/LicenseDocumentID"/>
    <dc:modified
rdf:resource="https://example.org/identifier/identifierID"/>
    <dc:publisher rdf:resource="https://example.org/Agent/AgentID"/>
    <dc:relation rdf:resource="https://example.org/relation/relationID"/>
    <dc:rights
rdf:resource="https://example.org/RightsStatement/RightsStatementID"/>
    <dc:title rdf:resource="https://example.org/identifier/identifierID"/>
    <dc:type rdf:resource="https://example.org/Type/TypeID"/>
    <dc:contactPoint
rdf:resource="https://example.org/vcardKind/vcardKindID"/>
    <dc:keyword
rdf:resource="https://example.org/identifier/identifierID"/>
    <dc:landingPage
rdf:resource="https://example.org/Document/DocumentID"/>
    <dc:qualifiedRelation
rdf:datatype="http://www.w3.org/2001/XMLSchema#string" </dc:qualifie
dRelation>
    <dc:theme>
    <skos:Concept>
    <skos:prefLabel
rdf:datatype="http://www.w3.org/2001/XMLSchema#string" </skos:prefLabel>
    </skos:Concept>
    </dc:theme>

    <odrl:hasPolicy rdf:resource="https://example.org/Policy/PolicyID"/>
    <prov:qualifiedAttribution
rdf:resource="https://example.org/Attribution/AttributionID"/>
    <mod:URI
rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI" </
mod:URI>
    <mod:acronym
rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
    </mod:acronym>
    <mod:analytics>
    <mod:Analytics rdf:about="https://example.org/Analytics/AnalyticsID">
    </mod:Analytics>
    </mod:analytics>

    <mod:competencyQuestion
rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
    </mod:competencyQuestion>
    <mod:designedForTask>
    <mod:SemanticArtefactService

```



```

rdf:about="https://example.org/SemanticArtefactService/SemanticArtefactServiceID">
  <dc:accessRights
rdf:resource="https://example.org/RightsStatement/RightsStatementID"/>
  <dc:conformsTo
rdf:resource="https://example.org/Standard/StandardID"/>
  <dc:creator rdf:resource="https://example.org/Agent/AgentID"/>
  <dc:description
rdf:resource="https://example.org/identifier/identifierID"/>
  <dc:identifier
rdf:resource="https://example.org/identifier/identifierID"/>
  <dc:isReferencedBy
rdf:resource="https://example.org/isReferencedBy/isReferencedByID"/>
  <dc:issued
rdf:resource="https://example.org/identifier/identifierID"/>
  <dc:language
rdf:resource="https://example.org/LinguisticSystem/LinguisticSystemID"/>
  <dc:license
rdf:resource="https://example.org/LicenseDocument/LicenseDocumentID"/>
  <dc:modified
rdf:resource="https://example.org/identifier/identifierID"/>
  <dc:publisher rdf:resource="https://example.org/Agent/AgentID"/>
  <dc:relation
rdf:resource="https://example.org/relation/relationID"/>
  <dc:rights
rdf:resource="https://example.org/RightsStatement/RightsStatementID"/>
  <dc:title
rdf:resource="https://example.org/identifier/identifierID"/>
  <dc:type rdf:resource="https://example.org/Type/TypeID"/>
  <dc:contactPoint
rdf:resource="https://example.org/vcardKind/vcardKindID"/>
  <dc:endpointDescription>
    <rdfs:Resource>
  </rdfs:Resource>
  </dc:endpointDescription>

  <dc:endpointURL>
    <rdfs:Resource>
  </rdfs:Resource>
  </dc:endpointURL>

  <dc:keyword
rdf:resource="https://example.org/identifier/identifierID"/>
  <dc:landingPage
rdf:resource="https://example.org/Document/DocumentID"/>
  <dc:qualifiedRelation
rdf:datatype="http://www.w3.org/2001/XMLSchema#string">      </dc:qualifie
dRelation>
  <dc:servesDataset>
    <rdf:Description>
      <dc:accessRights
rdf:resource="https://example.org/RightsStatement/RightsStatementID"/>

```

```

        <dc:accrualPeriodicity>
            <dc:Frequency
rdf:about="https://example.org/Frequency/FrequencyID">
            </dc:Frequency>
        </dc:accrualPeriodicity>

        <dc:conformsTo
rdf:resource="https://example.org/Standard/StandardID"/>
            <dc:creator rdf:resource="https://example.org/Agent/AgentID"/>
            <dc:description
rdf:resource="https://example.org/identifier/identifierID"/>
            <dc:identifier
rdf:resource="https://example.org/identifier/identifierID"/>
            <dc:isReferencedBy
rdf:resource="https://example.org/isReferencedBy/isReferencedByID"/>
            <dc:issued
rdf:resource="https://example.org/identifier/identifierID"/>
            <dc:language
rdf:resource="https://example.org/LinguisticSystem/LinguisticSystemID"/>
            <dc:license
rdf:resource="https://example.org/LicenseDocument/LicenseDocumentID"/>
            <dc:modified
rdf:resource="https://example.org/identifier/identifierID"/>
            <dc:publisher rdf:resource="https://example.org/Agent/AgentID"/>
            <dc:relation
rdf:resource="https://example.org/relation/relationID"/>
            <dc:rights
rdf:resource="https://example.org/RightsStatement/RightsStatementID"/>
            <dc:spatial>
                <dc:Location
rdf:about="https://example.org/Location/LocationID">
                </dc:Location>
            </dc:spatial>

            <dc:temporal>
                <dc:PeriodOfTime
rdf:about="https://example.org/PeriodOfTime/PeriodOfTimeID">
                </dc:PeriodOfTime>
            </dc:temporal>

            <dc:title
rdf:resource="https://example.org/identifier/identifierID"/>
            <dc:type rdf:resource="https://example.org/Type/TypeID"/>
            <dcat:contactPoint
rdf:resource="https://example.org/vcardKind/vcardKindID"/>
            <dcat:distribution>
                <rdf:Description>
                    <dc:accessRights
rdf:resource="https://example.org/RightsStatement/RightsStatementID"/>
                    <dc:conformsTo
rdf:resource="https://example.org/Standard/StandardID"/>
                    <dc:description

```

```
rdftype="http://www.w3.org/2000/01/rdf-schema#Literal">
  </dc:description>
    <dc:format>
      <dc:MediaTypeOrExtent
rdftype="https://example.org/MediaTypeOrExtent/MediaTypeOrExtentID">
      </dc:MediaTypeOrExtent>
    </dc:format>

    <dc:issued
rdftype="http://www.w3.org/2000/01/rdf-schema#Literal">
    </dc:issued>
      <dc:license
rdftype="https://example.org/LicenseDocument/LicenseDocumentID"/>
      <dc:modified
rdftype="http://www.w3.org/2000/01/rdf-schema#Literal">
      </dc:modified>
        <dc:rights
rdftype="https://example.org/RightsStatement/RightsStatementID"/>
        <dc:title
rdftype="http://www.w3.org/2000/01/rdf-schema#Literal">
        </dc:title>
          <dc:accessService
rdftype="http://www.w3.org/2001/XMLSchema#string">          </dc:accessSe
rvice>
            <dc:accessURL>
              <rdfs:Resource>
                </rdfs:Resource>
              </dc:accessURL>

            <dc:byteSize
rdftype="http://www.w3.org/2001/XMLSchema#decimal">          </dc:byteSize>
            <dc:compressFormat
rdftype="https://example.org/MediaType/MediaTypeID"/>
            <dc:downloadURL>
              <rdfs:Resource>
                </rdfs:Resource>
              </dc:downloadURL>

            <dc:mediaType
rdftype="https://example.org/MediaType/MediaTypeID"/>
            <dc:packageFormat
rdftype="https://example.org/MediaType/MediaTypeID"/>
            <dc:spatialResolutionInMeters
rdftype="http://www.w3.org/2001/XMLSchema#decimal">          </dc:spatialRes
olutionInMeters>
              <dc:temporalResolution>
                <xsd:duration>
                  </xsd:duration>
                </dc:temporalResolution>

              <odrl:hasPolicy
rdftype="https://example.org/Policy/PolicyID"/>
```

```

        </rdf:Description>
    </dcat:distribution>

    <dcat:keyword
rdf:resource="https://example.org/identifier/identifierID"/>
    <dcat:landingPage
rdf:resource="https://example.org/Document/DocumentID"/>
    <dcat:qualifiedRelation
rdf:datatype="http://www.w3.org/2001/XMLSchema#string" </dcat:qualifie
dRelation>
        <dcat:spatialResolutionInMeters
rdf:datatype="http://www.w3.org/2001/XMLSchema#decimal" </dcat:spatialRes
olutionInMeters>
        <dcat:temporalResolution>
            <xsd:duration>
            </xsd:duration>
        </dcat:temporalResolution>

        <dcat:theme>
            <skos:Concept>
                <skos:prefLabel
rdf:datatype="http://www.w3.org/2001/XMLSchema#string" </skos:prefLabel>
                </skos:Concept>
            </dcat:theme>

            <odrl:hasPolicy
rdf:resource="https://example.org/Policy/PolicyID"/>
            <prov:qualifiedAttribution
rdf:resource="https://example.org/Attribution/AttributionID"/>
            <prov:wasGeneratedBy>
                <prov:Activity
rdf:about="https://example.org/Activity/ActivityID">
                    </prov:Activity>
                </prov:wasGeneratedBy>

        </rdf:Description>
    </dcat:servesDataset>

    <dcat:theme>
        <skos:Concept>
            <skos:prefLabel
rdf:datatype="http://www.w3.org/2001/XMLSchema#string" </skos:prefLabel>
            </skos:Concept>
        </dcat:theme>

        <odrl:hasPolicy rdf:resource="https://example.org/Policy/PolicyID"/>
        <prov:qualifiedAttribution
rdf:resource="https://example.org/Attribution/AttributionID"/>
    </mod:SemanticArtefactService>
</mod:designedForTask>

<mod:endorsedBy rdf:resource="https://example.org/Agent/AgentID"/>

```

```
<mod:group>
  <mod:Group rdf:about="https://example.org/Group/GroupID">
  </mod:Group>
</mod:group>

<mod:hasEvaluation>
  <mod:Evaluation
rdf:about="https://example.org/Evaluation/EvaluationID">
  </mod:Evaluation>
</mod:hasEvaluation>

<mod:hasFormalityLevel
rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
  </mod:hasFormalityLevel>
<mod:knownUsage
rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
  </mod:knownUsage>
<mod:metrics
rdf:datatype="http://www.w3.org/2001/XMLSchema#nonNegativeInteger"> </mod:me
trics>
  <mod:numberOfEnsurments
rdf:datatype="http://www.w3.org/2001/XMLSchema#nonNegativeInteger"> </mod:nu
mberOfEnsurments>
  <mod:numberOfEvaluations
rdf:datatype="http://www.w3.org/2001/XMLSchema#nonNegativeInteger"> </mod:nu
mberOfEvaluations>
  <mod:numberOfNotes
rdf:datatype="http://www.w3.org/2001/XMLSchema#nonNegativeInteger"> </mod:nu
mberOfNotes>
  <mod:numberOfUsingProjects
rdf:datatype="http://www.w3.org/2001/XMLSchema#nonNegativeInteger"> </mod:nu
mberOfUsingProjects>
  <mod:semanticArtefactRelation
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"> </mod:semantica
rtefactRelation>
  <mod:status rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
  </mod:status>
  <mod:usedInProject>
  <foaf:Project rdf:about="https://example.org/Project/ProjectID">
  </foaf:Project>
  </mod:usedInProject>

</rdf:Description>

<dc:RightsStatement
rdf:about="https://example.org/RightsStatement/RightsStatementID">
</dc:RightsStatement>

<dc:Standard rdf:about="https://example.org/Standard/StandardID">
</dc:Standard>

<foaf:Agent rdf:about="https://example.org/Agent/AgentID">
```

```
<rdf:type rdf:resource="http://purl.org/dc/terms/Agent"/>
</foaf:Agent>

<dc:identifier rdf:about="https://example.org/identifier/identifierID">
</dc:identifier>

<dc:isReferencedBy
rdf:about="https://example.org/isReferencedBy/isReferencedByID">
</dc:isReferencedBy>

<dc:LinguisticSystem
rdf:about="https://example.org/LinguisticSystem/LinguisticSystemID">
</dc:LinguisticSystem>

<dc:LicenseDocument
rdf:about="https://example.org/LicenseDocument/LicenseDocumentID">
</dc:LicenseDocument>

<dc:relation rdf:about="https://example.org/relation/relationID">
</dc:relation>

<rdf:Description rdf:about="https://example.org/Type/TypeID">
  <rdf:type rdf:resource="dt:type"/>
</rdf:Description>

<vcard:Kind rdf:about="https://example.org/vcardKind/vcardKindID">
  <vcard:fn rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
    </vcard:fn>
  <vcard:nickname
rdf:datatype="http://www.w3.org/2001/XMLSchema#string">    </vcard:nickname
>
</vcard:Kind>

<foaf:Document rdf:about="https://example.org/Document/DocumentID">
</foaf:Document>

<odrl:Policy rdf:about="https://example.org/Policy/PolicyID">
</odrl:Policy>

<prov:Attribution
rdf:about="https://example.org/Attribution/AttributionID">
</prov:Attribution>

<dc:MediaType rdf:about="https://example.org/MediaType/MediaTypeID">
</dc:MediaType>

</rdf:RDF>
```