FRIS IT-Infrastructure

Service description

Date: 05/04/2019
Version: 1.10
## 1 Document history

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Author</th>
<th>Summary of changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>02/09/2014</td>
<td>Brian Plauborg</td>
<td>Initial version of document including basic structure, web service how-to’s and service descriptions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Atira)</td>
<td></td>
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<tr>
<td>1.1</td>
<td>08/10/2014</td>
<td>Brian Plauborg</td>
<td>Added journal service chapter.</td>
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<tr>
<td>1.1</td>
<td>08/10/2014</td>
<td>CdG</td>
<td>Added some comments on Journal Service + updated “content”</td>
</tr>
<tr>
<td>1.2</td>
<td>11/12/2014</td>
<td>Brian Plauborg</td>
<td>Added section on research output. Updated project &amp; journal sections.</td>
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<tr>
<td></td>
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<tr>
<td>1.3</td>
<td>19/05/2015</td>
<td>Brian Plauborg</td>
<td>Added FRIS XML versions of entity web services.</td>
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<tr>
<td></td>
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<td>1.4</td>
<td>09/07/2015</td>
<td>Brian Plauborg</td>
<td>Added chapter on classification scheme service.</td>
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<td></td>
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<td>1.5</td>
<td>12/07/2015</td>
<td>Brian Plauborg</td>
<td>Updated document with new bulk operation and new endpoints.</td>
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<td></td>
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<tr>
<td>1.6</td>
<td>15/07/2016</td>
<td>Brian Plauborg</td>
<td>Miscellaneous updates including changes service and funding code service.</td>
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<td>1.7</td>
<td>16/01/2018</td>
<td>CdG</td>
<td>PersonService afgeschermd voor privacy issues.</td>
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<td>1.8</td>
<td>15/03/2018</td>
<td>CdG</td>
<td>PersonService weer open na analyse van DPO.</td>
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<td>1.9</td>
<td>08/06/2018</td>
<td>Brian Plauborg</td>
<td>Added data model section.</td>
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<tr>
<td>1.10</td>
<td>28/06/2018</td>
<td>CdG (EWI)</td>
<td>Modified example GetRO with Journal info.</td>
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<tr>
<td>1.11</td>
<td>05/04/2019</td>
<td>Brian Plauborg</td>
<td>Updated service descriptions documentation. Added Portal REST descriptions.</td>
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<tr>
<td>1.12</td>
<td>21/05/2019</td>
<td>Yves Hellemans</td>
<td>Review SOAP documentatie</td>
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2 Accessing the FRIS web services

The set of FRIS web services is comprised of a secured ingestion service where all data modification is handled and a number of public entity centric web services where all data access is handled. The content returned from the public web services is restricted to entities and relations to entities that are not marked confidential or hidden. The entity centric web services are available in two versions, one that delivers a CERIF\(^1\) document and one that delivers a number of FRIS XML entities as response.

In addition to the SOAP/XML based web services targeted at general use we have a small number of REST/JSON services targeted at and restricted to the FRIS portal application.

The CERIF versions of the web services use version 1.5 of the standard with a significant number of FRIS specific extensions and interpretations. Please request a copy of the “Integration Guide FRIS R3” if you need to use the CERIF based services.

The FRIS XML versions of the web services deliver XML representations of the underlying FRIS domain model and will for most service users be easier to parse and understand. The FRIS domain model is documented in chapter XX

All of the web services are SOAP document literal services and the current WSDL for the services is always available at the endpoint root:

<table>
<thead>
<tr>
<th>Environment</th>
<th>Endpoint root</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staging</td>
<td><a href="https://stfrisr4.researchportal.be/ws/">https://stfrisr4.researchportal.be/ws/</a></td>
</tr>
<tr>
<td>Production</td>
<td><a href="https://frisr4.researchportal.be/ws/">https://frisr4.researchportal.be/ws/</a></td>
</tr>
</tbody>
</table>

All of the FRIS web services support the FastInfoSet XML protocol and it is strongly recommended that this be used due to its superior performance characteristics.

2.1 Entity Access Services

All of the self-contained entities will have a specific web service that allows data access for that entity. Each of these will have a basic search operation called getOrganisations, getPersons, etc. which accepts a criteria object with entity specific limitations. A sample request:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <ns1:getOrganisations xmlns:ns1="http://fris.ewi.be/">
      <organisationCriteria xmlns="http://fris.ewi.be/criteria">
        <window>
          <pageSize>10</pageSize>
          <pageNumber>0</pageNumber>
          <orderings>
            <order>
              <id>entity.created</id>
              <direction>DESCENDING</direction>
            </order>
          </orderings>
          <uuids>
            <uuid>c0669985-967c-47b7-8dfc-d8610bd36606</uuid>
            <uuid>1fc77569-3778-4828-8c38-195cb51584c6</uuid>
          </uuids>
        </window>
      </organisationCriteria>
    </ns1:getOrganisations>
  </soap:Body>
</soap:Envelope>
```

\(^1\) Common European Research Information Format
The window element is optional, but if omitted the service will default to a page size of 10 and start with page number 0 (page number is zero-indexed). Valid order id’s for a particular entity will be available on the relevant entity web service through a separate operation called getOrderings.

The result element from a search contains, besides the actual entities, information on the total number of results, the chosen page size and number. A sample response from a CERIF entity service:

```xml
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <ns1:getOrganisationsResponse xmlns:ns1="http://fris.ewi.be/">
      <queryResult xmlns="http://fris.ewi.be/response">
        <totalResults>4</totalResults>
        <pageSize>10</pageSize>
        <pageNumber>0</pageNumber>
        <CERIF xmlns="urn:xmlns:org:eurocris:cerif-1.5-1"
               release="1.5" date="2013-09-27+02:00" sourceDatabase="fris">
          ...
        </CERIF>
      </queryResult>
    </ns1:getOrganisationsResponse>
  </soap:Body>
</soap:Envelope>
```

The returned CERIF format is described in the “Integration Guide FRIS R3” document.

Each entity service also provides a number of operations designed to make it easy to discover which values are valid options in the associated criteria.
3 Ingestion service

The SOAP ingestion service is responsible for all data modification requests. All interaction with the ingestion services must be over https and all requests are authenticated through a published WS Security Policy.\(^2\)

The FRIS ingestion service supports the FastInfoSet XML protocol and it is strongly recommended that this be used due to its superior performance characteristics.

A detailed description of the ingestion service format is available in the “Integration Guide FRIS R3” document.

3.1 Current service status

<table>
<thead>
<tr>
<th>Environment</th>
<th>Endpoint WSDL</th>
</tr>
</thead>
</table>

3.2 Service operations

<table>
<thead>
<tr>
<th>Operation</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>ingest</td>
<td>ingest</td>
<td>ingestResponse</td>
</tr>
<tr>
<td>ingestBulk</td>
<td>ingestBulk</td>
<td>correlationId</td>
</tr>
<tr>
<td>getBulkResponse</td>
<td>getBulkResponse</td>
<td>ingestBulkResponse</td>
</tr>
<tr>
<td>deleteOrganisation</td>
<td>deleteOrganisation</td>
<td>deleteOrganisationResponse</td>
</tr>
<tr>
<td>deleteOrganisationByUuid</td>
<td>deleteOrganisationByUuid</td>
<td>deleteOrganisationByUuidResponse</td>
</tr>
<tr>
<td>deletePerson</td>
<td>deletePerson</td>
<td>deletePersonResponse</td>
</tr>
<tr>
<td>deletePersonByUuid</td>
<td>deletePersonByUuid</td>
<td>deletePersonByUuidResponse</td>
</tr>
<tr>
<td>deleteProject</td>
<td>deleteProject</td>
<td>deleteProjectResponse</td>
</tr>
<tr>
<td>deleteProjectByUuid</td>
<td>deleteProjectByUuid</td>
<td>deleteProjectByUuidResponse</td>
</tr>
<tr>
<td>deleteResearchOutput</td>
<td>deleteResearchOutput</td>
<td>deleteResearchOutputResponse</td>
</tr>
<tr>
<td>deleteResearchOutputByUuid</td>
<td>deleteResearchOutputByUuid</td>
<td>deleteResearchOutputByUuidResponse</td>
</tr>
</tbody>
</table>

The formal format specification is published as a part of the WSDL.

All response documents (except the correlationId) are of the IngestResultType and include operation status and error messages. The response format is described in more detail in chapter 3.2.8.

3.2.1 Operation: ingest

The “ingest” operation is used in an incremental update scenario to create or modify a managed entity as described in the “Integration Guide FRIS R3” document.

The “ingest” request document includes a CERIF representation of the entity to create or update.

\(^2\) [WS Policy](#), [WS Security Policy](#)
The “ingest” response documents details whether the operation succeeded and if not, the reasons for its failure.

3.2.2 Operation: ingestBulk
The “ingestBulk” operation is used in a bulk update scenario to initialise the entire set of data managed by this data provider. Any existing data is replaced or deleted depending on the incoming data set. Note that the use of this operation is restricted and will fail if not pre-approved by a FRIS administrator.

The “ingestBulk” request document includes a full CERIF representation of the entire managed data set.

The response from the “ingestBulk” operation is a correlation id that is to be used when polling the “getBulkResponse” operation for an ingestion result, please refer to the “Ingestion guide FRIS R3” document for a detailed description on this setup.

3.2.3 Operation: getBulkResponse
This operation returns the result for a scheduled bulk ingestion, until the ingestion processing has completed the response status of the document will be “ONGOING”.

When the processing has completed this status will change to either “FAILED” or “SUCCESS” and the document will detail any reasons for its failure if applicable.

3.2.4 Operation: deleteOrganisation(ByUUID)
The “deleteOrganisation**” operation is used in the incremental update scenario to delete a managed entity. The delete is performed with cascade semantics where associations on dependent entities will be removed. If this results in entities that cannot validate any longer, the delete will fail and validation messages detailing the blocking dependent objects will be returned.

The “deleteOrganisation” request document includes the local identifier of the organisation to be deleted. The “deleteOrganisationByUUID” request document includes the FRIS UUID of the organisation to be deleted.

The “deleteOrganisation**” response documents details whether the operation succeeded and if not, the reasons for its failure.

3.2.5 Operation: deletePerson(ByUUID)
The “deletePerson**” operation is used in the incremental update scenario to delete a managed entity. The delete is performed with cascade semantics where associations on dependent entities will be removed. If this results in entities that cannot validate any longer, the delete will fail and validation messages detailing the blocking dependent objects will be returned.

The “deletePerson” request document includes the local identifier of the person to be deleted. The “deletePersonByUUID” request document includes the FRIS UUID of the person to be deleted.

The “deletePerson**” response documents details whether the operation succeeded and if not, the reasons for its failure.

3.2.6 Operation: deleteProject(ByUUID)
The “deleteProject**” operation is used in the incremental update scenario to delete a managed entity. The delete is performed with cascade semantics where associations on dependent entities will be removed. If this results in entities that cannot validate any longer, the delete will fail and validation messages detailing the blocking dependent objects will be returned.

The “deleteProject” request document includes the local identifier of the project to be deleted. The “deleteProjectByUUID” request document includes the FRIS UUID of the project to be deleted.

The “deleteProject**” response documents details whether the operation succeeded and if not, the reasons for its failure.
3.2.7 Operation: deleteResearchOutput(ByUUID)
The “deleteResearchOutput*” operation is used in the incremental update scenario to delete a managed entity. The delete is performed with cascade semantics where associations on dependent entities will be removed. If this results in entities that cannot validate any longer, the delete will fail and validation messages detailing the blocking dependent objects will be returned.

The “deleteResearchOutput” request document includes the local identifier of the research output to be deleted. The “deleteResearchOutputByUUID” request document includes the FRIS UUID of the research output to be deleted.

The “deleteResearchOutput*” response documents details whether the operation succeeded and if not, the reasons for its failure.

3.2.8 IngestResultType response format
All operations in the ingestion service respond with an instance of a IngestResultType document.

The error messages can contain the following different types of messages:

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SECURITY</td>
<td>If the data provider could not be resolved based on the supplied user or if the data provider is not allowed to perform bulk ingestion. Authentication errors will result in a SOAP Fault.</td>
</tr>
<tr>
<td>XSD</td>
<td>The submitted CERIF is checked against the XSD for validity. All violations will be returned as discrete error messages.</td>
</tr>
<tr>
<td>REFERENTIAL</td>
<td>The submitted entity identifiers are checked for referential integrity. If referred entities do not exist either in the submitted set or in the existing FRIS entities (only for incremental) all violations will be returned as discrete error messages.</td>
</tr>
<tr>
<td>INTERNAL_CHECK</td>
<td>The submitted set is checked against the set of FRIS business rules. All violations will be returned as discrete error messages. These rules are checked internally in the FRIS system.</td>
</tr>
<tr>
<td>BUSINESS_RULE</td>
<td>The submitted set is checked against the set of FRIS business rules. All violations will be returned as discrete error messages. These rules are checked in DataFlux.</td>
</tr>
</tbody>
</table>

The different message types shown above all correspond to the action performed against the submitted document and is performed in the order shown in the table.

At each stage we will process the entire set, thus returning all pertinent messages at a given stage. But since there is a natural progression between the stages the processing will stop after any erroneous stage and the messages collected up until that point are returned in the response.

Security error example:

```
<messages>
  <source>SECURITY</source>
  <level>FATAL</level>
  <message>Could not resolve data-provider for the user</message>
</messages>
```

XSD error example:

```
<messages>
  <source>XSD</source>
  <level>ERROR</level>
  <message>line 0: string value 'X' is not a valid enumeration value for cfTrans__Type in namespace urn:xmlns:org:eurocris:cerif-1.5-1</message>
</messages>
```
The XSD error messages are taken directly from the XML processor.

Referential error example:

```xml
<messages>
  <source>REFERENTIAL</source>
  <level ERROR</level>
  <message>Organisation(Data provider ID: <local id>): Associated Organisation (Data provider ID:<unknown identifier>)(@relatedOrganisations.relatedTo) was unknown</message>
</messages>
```

Referential errors are when an entity is referred to for example in an embedded cfOrgUnitOrgUnit element but the supplied identifier was not present in the incoming set (bulk & incremental) or already present in the FRIS database (incremental only). The messages always start with the owner object and its identifier in the submitted set, after that the actual problem is stated; in this case that the organisation referred to was unknown. As a part of the message there is typically a section that describes the FRIS property path to the problem object (@?), this can be used to pinpoint exactly which relation is referred to in case there are multiple paths to the entity type.

Business rule error example:

```xml
<messages>
  <source>BUSINESS_RULE</source>
  <level ERROR</level>
  <message>Person (Data provider ID: <local id>): (@scienceDomains) Invalid number of elements in collection, expected min 1 element(s)</message>
</messages>
```

Example 2:

```xml
```

The business rule validation messages are very similar to the referential error messages in structure. In the above example the problem is that the specified person did not have at least one science domain code assigned.

### 3.3 Service security constraints

The formal security policy definition is (also included in the service WSDL):

```xml
<wsp:Policy wsu:Id="UP_policy"
   xmlns:sp="http://docs.oasis-open.org/ws-sx/ws-securitypolicy/200702"
   xmlns:wsp="http://www.w3.org/ns/ws-policy"
   xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-utility-1.0.xsd"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   <wsp:ExactlyOne>
     <wsp:All>
       <sp:TransportBinding xmlns:sp="http://docs.oasis-open.org/ws-sx/ws-securitypolicy/200702">
         <wsp:Policy>
```

Which amounts to a username/password authenticated scheme over HTTPS where the password is a SHA1 hash of the timestamp, nonce and password. The combination of SSL transport level security and the username/password authentication sufficiently ensures that a third party cannot intercept potentially confidential data, impersonate a data-provider or perform replay attacks against the FRIS systems.

With this policy in place a sample ingestion request would look like the following:

```xml
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
    xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
    xmlns:wsse="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-secext-1.0.xsd"
    xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-utility-1.0.xsd"
    soap:mustUnderstand="1">  
    <wsse:UsernameToken wsu:Id="UsernameToken-7">
        <wsse:Username>internalProvider</wsse:Username>
        <wsse:Password Type="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-username-token-profile-1.0#PasswordDigest">+vY88B2blyle7C45eN6hruHbmc=</wsse:Password>
        <wsse:Nonce EncodingType="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-soap-message-security-1.0#Base64Binary">MzAleXl/khsisVPZ483nFQ==</wsse:Nonce>
        <wsu:Created>2013-09-27T09:05:36.870Z</wsu:Created>
    </wsse:UsernameToken>
</wsse:Security>
```
And a sample delete organisation request:

```xml
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Header>
    <wsse:Security xmlns:wsse="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-secext-1.0.xsd"
                   xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-utility-1.0.xsd"
                   soap:mustUnderstand="1">
      <wsse:UsernameToken wsu:Id="UsernameToken-3">
        <wsse:Username>pureProvider</wsse:Username>
        <wsse:Password Type="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-username-token-profile-1.0#PasswordDigest">NV/qsZe8y5ij7rCC4DzrlUai7c=</wsse:Password>
        <wsse:Nonce EncodingType="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-soap-message-security-1.0#Base64Binary">/ZgogbYMk/bEP+21MIp3vQ==</wsse:Nonce>
        <wsu:Created>2013-11-28T14:45:44.111Z</wsu:Created>
      </wsse:UsernameToken>
    </wsse:Security>
  </soap:Header>
  <soap:Body>
    <ns1:deleteOrganisation xmlns:ns1="http://fris.ewi.be/">
      <ns1:identifier>81785c7c-17f7-4101-8350-49df035bcb825</ns1:identifier>
    </ns1:deleteOrganisation>
  </soap:Body>
</soap:Envelope>
```
4 Changes service

The FRIS R3 SOAP Changes Service is responsible for exposing the changes to entities in the FRIS system. The FRIS system only stores change events for two months, if you need to synchronise a data set that is older than that a full resynchronisation using the entity centric SOAP services will be needed.

The changes service is inspired by the OAI-PMH protocol; each response will provide a resumption token that should be used on the next request. In addition, each request is automatically paged with a page size of 10,000 change events per request.

4.1 Current service status

<table>
<thead>
<tr>
<th>Environment</th>
<th>Endpoint WSDL</th>
</tr>
</thead>
</table>

4.2 Service operations

<table>
<thead>
<tr>
<th>Operation</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>getChanges</td>
<td>getChanges</td>
<td>getChangesResponse</td>
</tr>
</tbody>
</table>

The formal format specification is published as a part of the WSDL.

4.2.1 Operation: getChanges request documentation

The getChanges operation retrieves changes in the FRIS data set based on the supplied request criteria. The following tables will detail the parameters of the request document. If no limit is specified it will start from the beginning of the stored changes.

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>resumeToken</td>
<td>string</td>
<td>The resumptionToken from the previous response</td>
</tr>
<tr>
<td>from</td>
<td>xs:dateTime</td>
<td>If no responseToken is supplied, a standard date time string can be supplied as the starting point for the first request</td>
</tr>
<tr>
<td>dataProviders</td>
<td>identifierList</td>
<td>Filter changes based on data provider names, can be negated</td>
</tr>
<tr>
<td>uuids</td>
<td>identifierList</td>
<td>Filter changes based on content UUID’s. can be negated</td>
</tr>
<tr>
<td>changeType</td>
<td>changeType</td>
<td>Filter changes based on change type, can be one of: CREATE, UPDATE, DELETE, DATA_SET_DISABLED, DATA_SET_ENABLED</td>
</tr>
<tr>
<td>entityType</td>
<td>entityType</td>
<td>Filter changes based on entity type, can be one of: ORGANISATION, PERSON, PROJECT, JOURNAL, RESEARCH_OUTPUT, FUNDING_CODE, CLASSIFICATION_SCHEME, DATA_PROVIDER</td>
</tr>
</tbody>
</table>

4.2.2 Operation: getChanges XML response documentation
The XML query response document will contain the following elements:

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>changesResponse/@resumptionToken</td>
<td>string</td>
<td>The resumption token</td>
</tr>
<tr>
<td>change/@id</td>
<td>int</td>
<td>The change id</td>
</tr>
<tr>
<td>change/occurredOn</td>
<td>xs:dateTime</td>
<td>The date and time the change occurred on.</td>
</tr>
<tr>
<td>change/changeType</td>
<td>enum</td>
<td>The type of change, can be: CREATE, UPDATE or DELETE</td>
</tr>
<tr>
<td>change/entityType</td>
<td>enum</td>
<td>The entity type, can be: ORGANISATION, PERSON, PROJECT, JOURNAL, RESEARCH_OUTPUT or CLASSIFICATION_SCHEME</td>
</tr>
<tr>
<td>change/identifier</td>
<td>string</td>
<td>The FRIS identifier of the entity</td>
</tr>
<tr>
<td>change/dataProvider</td>
<td>string</td>
<td>The FRIS data provider name that owns the entity</td>
</tr>
</tbody>
</table>

Sample response:

```xml
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
      <resp:changesResponse resumptionToken="76692931">
        <fris:change id="76660514">
          <fris:changeType>CREATE</fris:changeType>
          <fris:entityType>JOURNAL</fris:entityType>
          <fris:identifier>0aa7603b-defd-4633-8d5d-4b08652ad6c9</fris:identifier>
          <fris:dataProvider>test_NA1</fris:dataProvider>
        </fris:change>
      </resp:changesResponse>
    </fris:getChangesResponse>
  </soap:Body>
</soap:Envelope>
```
5 Organisation service

The FRIS R3 SOAP Organisation Services is responsible for exposing public organisation data from the FRIS system. The organisation service is publicly accessible and will not expose any entities that have not been marked as public or any relations to such entities.

The FRIS organisation service supports the FastInfoSet XML protocol and it is strongly recommended that this be used due to its superior performance characteristics.

5.1 Current service status

The organisation service is currently available at:

<table>
<thead>
<tr>
<th>Environment</th>
<th>Response</th>
<th>Endpoint WSDL</th>
</tr>
</thead>
</table>

5.2 Service operations

Both versions have identical operations and request documents.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>getOrganisations</td>
<td>getOrganisations</td>
<td>getOrganisationsResponse</td>
</tr>
<tr>
<td>getOrderings</td>
<td>getOrderings</td>
<td>getOrderingsResponse</td>
</tr>
<tr>
<td>getDataProviders</td>
<td>getDataProviders</td>
<td>getDataProvidersResponse</td>
</tr>
<tr>
<td>getOrganisationTypeClassifications</td>
<td>getOrganisationTypeClassifications</td>
<td>getOrganisationTypeClassificationsResponse</td>
</tr>
<tr>
<td>getOrganisationActivityTypeClassifications</td>
<td>getOrganisationActivityTypeClassifications</td>
<td>getOrganisationActivityTypeClassificationsResponse</td>
</tr>
<tr>
<td>getAuthorityClassifications</td>
<td>getAuthorityClassifications</td>
<td>getAuthorityClassificationsResponse</td>
</tr>
<tr>
<td>getDisciplineClassifications</td>
<td>getDisciplineClassifications</td>
<td>getDisciplineClassificationsResponse</td>
</tr>
<tr>
<td>getElectronicAddressTypeClassifications</td>
<td>getElectronicAddressTypeClassifications</td>
<td>getElectronicAddressTypeClassificationsResponse</td>
</tr>
<tr>
<td>getPhysicalAddressCountryClassifications</td>
<td>getPhysicalAddressCountryClassifications</td>
<td>getPhysicalAddressCountryClassificationsResponse</td>
</tr>
<tr>
<td>getSubjectAreaClassifications</td>
<td>getSubjectAreaClassifications</td>
<td>getSubjectAreaClassificationsResponse</td>
</tr>
<tr>
<td>getFlemishResearchDisciplineClassifications</td>
<td>getFlemishResearchDisciplineClassifications</td>
<td>getFlemishResearchDisciplineClassificationsResponse</td>
</tr>
</tbody>
</table>

The formal format specification is published as a part of the WSDL.

All other operations than "getOrganisations" will not be described in detail since they're trivial helper operations that do not accept any parameters.
5.2.1 Operation: getOrganisations request documentation

The getOrganisations operation retrieves organisations in the FRIS data set based on the supplied request criteria. The following tables will detail the parameters of the request document. An organisation must satisfy all specified limits to be returned, though if a single limit supports multiple values any match will satisfy that particular limit.

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>window/pageSize</td>
<td>int</td>
<td>The number of results returned, defaults to 10.</td>
</tr>
<tr>
<td>window/pageNumber</td>
<td>int</td>
<td>The zero-indexed page number, defaults to 0.</td>
</tr>
<tr>
<td>window/orderings/order</td>
<td>order</td>
<td>A number of orderings.</td>
</tr>
<tr>
<td>window/orderings/order/id</td>
<td>string</td>
<td>The ordering id. The getOrderings operation provides the valid order id values.</td>
</tr>
<tr>
<td>window/orderings/order/locale</td>
<td>locale</td>
<td>The ordering locale, only applicable for order on localised entity properties, like organisation title. Only &quot;nl_BE&quot; and &quot;en_GB&quot; values are allowed.</td>
</tr>
<tr>
<td>window/orderings/order/direction</td>
<td>enumeration</td>
<td>The order direction, either &quot;ASCENDING&quot; or &quot;DESCENDING&quot;, defaults to &quot;ASCENDING&quot;.</td>
</tr>
<tr>
<td>search.search</td>
<td>string</td>
<td>Free text search, accepts Lucene query syntax. Will search in Organisation name, acronym, data provider id and sources.</td>
</tr>
<tr>
<td>search.locale</td>
<td>locale</td>
<td>Optional locale, if no valid locale is supplied all localisations will be searched.</td>
</tr>
<tr>
<td>state</td>
<td>enumeration</td>
<td>Not applicable in the web service interface.</td>
</tr>
<tr>
<td>uuids</td>
<td>identifierList</td>
<td>A list of FRIS Organisation UUID values. Can be negated.</td>
</tr>
<tr>
<td>sources</td>
<td>sourceList</td>
<td>A number of authority/identifier limits against the entity external identifiers. The getAuthorityClassifications operation provides the valid authority values.</td>
</tr>
<tr>
<td>dataProviders</td>
<td>identifierList</td>
<td>A list of data provider names. Can be negated. The getDataProviders operation provides the valid data provider values.</td>
</tr>
<tr>
<td>dataProviderIds</td>
<td>IdentifierList</td>
<td>A list of data provider identifiers. Can be negated.</td>
</tr>
<tr>
<td>name</td>
<td>textSearchCriteria</td>
<td>Free text search in the Organisation name property.</td>
</tr>
<tr>
<td>Field</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-----------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>acronym</td>
<td>string</td>
<td>Exact acronym match.</td>
</tr>
<tr>
<td>associatedOrganisations</td>
<td>identifierList</td>
<td>A list of related FRIS Organisation UUID's. Can be negated.</td>
</tr>
<tr>
<td>typeClassification</td>
<td>classificationCriteria</td>
<td>One or more Organisation type terms. Scheme id is optional. Can be hierarchical. The getOrganisationTypeClassifications operation provides the valid type values.</td>
</tr>
<tr>
<td>activityTypeClassification</td>
<td>classificationCriteria</td>
<td>One or more Organisation Activity type terms. Scheme id is optional. Can be hierarchical. The getOrganisationActivityTypeClassifications operation provides the valid type values.</td>
</tr>
<tr>
<td>discipline</td>
<td>classificationCriteria</td>
<td>One or more discipline terms. Scheme id is optional. Can be hierarchical. The getDisciplineClassifications operation provides the valid discipline values.</td>
</tr>
<tr>
<td>subjectArea</td>
<td>classificationCriteria</td>
<td>One or more subject area terms. Scheme id is optional. Can be hierarchical. The getSubjectAreaClassifications operation provides the valid subject area values.</td>
</tr>
<tr>
<td>classified</td>
<td>classificationCriteria</td>
<td>One or more generic terms. Scheme id is required. Currently NACE codes and VKBO RechtsVorm classifications are supported.</td>
</tr>
<tr>
<td>electronicAddress/value</td>
<td>string</td>
<td>The exact electronic address value.</td>
</tr>
<tr>
<td>electronicAddress/electronicAddressType</td>
<td>classificationCriteria</td>
<td>One or more electronic address type terms. Scheme id is optional. Can be hierarchical. The getElectronicAddressTypeClassifications operation provides the valid electronic address type values.</td>
</tr>
<tr>
<td>physicalAddress/address</td>
<td>string</td>
<td>The exact street &amp; building number.</td>
</tr>
<tr>
<td>physicalAddress/city</td>
<td>string</td>
<td>The exact city.</td>
</tr>
<tr>
<td>physicalAddress/country</td>
<td>classificationCriteria</td>
<td>One or more country terms. Scheme id is optional. The getPhysicalAddressCountryClassifications operation provides the valid electronic address type values.</td>
</tr>
<tr>
<td>keywords/keyword</td>
<td>keywordCriteria</td>
<td>A number of keyword criteria.</td>
</tr>
</tbody>
</table>
5.2.2 Operation: getOrganisations CERIF response documentation

The CERIF XML query response document will contain the following elements:

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>queryResult/totalResults</td>
<td>int</td>
<td>The total number of matching entities.</td>
</tr>
<tr>
<td>queryResult/pageSize</td>
<td>int</td>
<td>The requested page size.</td>
</tr>
<tr>
<td>queryResult/pageNumber</td>
<td>int</td>
<td>The requested zero-indexed page number.</td>
</tr>
<tr>
<td>queryResult/cerif</td>
<td>CERIF</td>
<td>The requested window of matching entities represented as CERIF elements.</td>
</tr>
</tbody>
</table>

The organisation CERIF XML representation is documented in the “Integration Guide FRIS R3” document.

5.2.3 Operation: getOrganisations FRIS XML response documentation

The FRIS XML query response document will contain the following elements:

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>queryResult/@totalResults</td>
<td>int</td>
<td>The total number of matching entities.</td>
</tr>
<tr>
<td>queryResult/@pageSize</td>
<td>int</td>
<td>The requested page size.</td>
</tr>
<tr>
<td>queryResult/@pageNumber</td>
<td>int</td>
<td>The requested zero-indexed page number.</td>
</tr>
<tr>
<td>queryResult/organisation</td>
<td>FRIS XML</td>
<td>The requested window of matching entities represented as FRIS XML elements.</td>
</tr>
</tbody>
</table>

The FRIS XML format is documented in chapter 12.3. Sample response:

```xml
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
                                   xmlns:ns4="http://fris.ewi.be/criteria">
      <queryResult total="1735" page-size="1" page-number="0">
        <ns3:organisation uuid="a9162bad-19b3-434b-b18d-01659466ced4">
          <ns3:state>PUBLIC</ns3:state>
          <ns3:created>2014-08-09T14:30:35.113+02:00</ns3:created>
          <ns3:lastModified>2015-05-15T14:28:19.892+02:00</ns3:lastModified>
          <ns3:dataProviderId>provider-name</ns3:dataProviderId>
          <ns3:sources/>
        </ns3:organisation>
      </queryResult>
    </ns3:getOrganisationsResponse>
  </soap:Body>
</soap:Envelope>
```
<ns3:source authority-scheme="Identifier Authority Type" authority="DGC Id">source-id</ns3:source>

<ns3:sources>
<ns3:aliases/>
<ns3:name>
<ns3:texts>
<ns3:text locale="en">organisation name</ns3:text>
<ns3:text locale="nl">organisation name</ns3:text>
</ns3:texts>
</ns3:name>
<ns3:acronym>acronym</ns3:acronym>
<ns3:startDate>2014-10-09T14:27:59.424+02:00</ns3:startDate>
<ns3:endDate>2015-12-09T14:27:59.424+01:00</ns3:endDate>
<ns3:organisationType schemeId="Organisation Type" term="Office"/>
<ns3:organisationActivityTypes>
<ns3:type schemeId="Organisation Activity Type" term="Research"/>
</ns3:organisationActivityTypes>
<ns3:nameVariants>
<ns3:nameVariant>
<ns3:texts>
<ns3:text locale="en">name variant</ns3:text>
<ns3:text locale="nl">name variant</ns3:text>
</ns3:texts>
</ns3:nameVariant>
<ns3:nameVariant>
<ns3:texts>
<ns3:text locale="en">name variant</ns3:text>
<ns3:text locale="nl">name variant</ns3:text>
</ns3:texts>
</ns3:nameVariant>
<ns3:nameVariants>
<ns3:relatedOrganisations>
<ns3:organisationRelation>
<ns3:associationType schemeId="Organisation to Organisation Role" term="Child"/>
<ns3:organisation uuid="3a6ebf3d-e0f7-4925-b694-1351e6e13a4d">
<ns3:name>
<ns3:texts>
<ns3:text locale="en">parent-name</ns3:text>
<ns3:text locale="nl">parent-name</ns3:text>
</ns3:texts>
</ns3:name>
<ns3:organisation>
<ns3:startDate>2015-05-06T14:27:59.424+02:00</ns3:startDate>
<ns3:endDate>2015-11-27T14:27:59.424+01:00</ns3:endDate>
</ns3:organisationRelation>
</ns3:relatedOrganisations>
<ns3:physicalAddresses>
<ns3:addressAssociation>
<ns3:associationType schemeId="Physical Address to Organisation Role" term="Postal Address"/>
<ns3:physicalAddress>
<ns3:dataProvider>provider</ns3:dataProvider>
<ns3:getOrganisationsResponse>
</soap:Body>
</soap:Envelope>
6 Person service

The FRIS R3 SOAP Person Service is responsible for exposing public person data from the FRIS system. The person service is publicly accessible and will not expose any entities that have not been marked as public or any relations to such entities.

The FRIS person service supports the FastInfoSet XML protocol and it is strongly recommended that this be used due to its superior performance characteristics.

6.1 Current service status

The person service is currently available at:

<table>
<thead>
<tr>
<th>Environment</th>
<th>Response</th>
<th>Endpoint WSDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staging</td>
<td>CERIF</td>
<td><a href="https://stfrisr4.researchportal.be/ws/PersonService?wsdl">https://stfrisr4.researchportal.be/ws/PersonService?wsdl</a></td>
</tr>
<tr>
<td>Staging</td>
<td>FRIS XML</td>
<td><a href="https://stfrisr4.researchportal.be/ws/PersonServiceFRIS?wsdl">https://stfrisr4.researchportal.be/ws/PersonServiceFRIS?wsdl</a></td>
</tr>
<tr>
<td>Production</td>
<td>CERIF</td>
<td><a href="https://frisr4.researchportal.be/ws/PersonService?wsdl">https://frisr4.researchportal.be/ws/PersonService?wsdl</a></td>
</tr>
<tr>
<td>Production</td>
<td>FRIS XML</td>
<td><a href="https://frisr4.researchportal.be/ws/PersonServiceFRIS?wsdl">https://frisr4.researchportal.be/ws/PersonServiceFRIS?wsdl</a></td>
</tr>
</tbody>
</table>

6.2 Service operations

Both versions have identical operations and request documents.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>getPersons</td>
<td>getPersons</td>
<td>getPersonsResponse</td>
</tr>
<tr>
<td>getOrderings</td>
<td>getOrderings</td>
<td>getOrderings</td>
</tr>
<tr>
<td>getDataProviders</td>
<td>getDataProviders</td>
<td>getDataProvidersResponse</td>
</tr>
<tr>
<td>getAuthorityClassifications</td>
<td>getAuthorityClassifications</td>
<td>getAuthorityClassificationsRespon se</td>
</tr>
<tr>
<td>getScienceDomainClassifications</td>
<td>getScienceDomainClassifications</td>
<td>getScienceDomainClassifica tionsResponse</td>
</tr>
<tr>
<td>getElectronicAddressTypeClassifications</td>
<td>getElectronicAddressTypeClassifications</td>
<td>getElectronicAddressTypeClassificationsResponse</td>
</tr>
<tr>
<td>getPhysicalAddressCountryClassifications</td>
<td>getPhysicalAddressCountryClassifications</td>
<td>getPhysicalAddressCountryClassificationsResponse</td>
</tr>
<tr>
<td>getSubjectAreaClassifications</td>
<td>getSubjectAreaClassifications</td>
<td>getSubjectAreaClassificationsResponse</td>
</tr>
<tr>
<td>getFlemishResearchDiscipl ineClassifications</td>
<td>getFlemishResearchDiscipl ineClassifications</td>
<td>getFlemishResearchDisciplineClassifications</td>
</tr>
</tbody>
</table>

The formal format specification is published as a part of the WSDL.

All other operations than "getPersons" will not be described in detail since they're trivial helper operations that do not accept any parameters.

6.2.1 Operation: getPersons request

The getPersons operation retrieves persons in the FRIS data set based on the supplied request criteria. The following tables will detail the parameters of the request document. A person must satisfy all specified limits to be returned, though if a single limit supports multiple values any match will satisfy that particular limit.
<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>window/pageSize</td>
<td>int</td>
<td>The number of results returned, defaults to 10.</td>
</tr>
<tr>
<td>window/pageNumber</td>
<td>int</td>
<td>The zero-indexed page number, defaults to 0.</td>
</tr>
<tr>
<td>window/orderings/order</td>
<td>order</td>
<td>A number of orderings.</td>
</tr>
<tr>
<td>window/orderings/order/id</td>
<td>string</td>
<td>The ordering id.</td>
</tr>
<tr>
<td>window/orderings/order/locale</td>
<td>locale</td>
<td>The ordering locale.</td>
</tr>
<tr>
<td>window/orderings/order/direction</td>
<td>enumeration</td>
<td>The order direction, either &quot;ASCENDING&quot; or &quot;DESCENDING&quot;, defaults to &quot;ASCENDING&quot;.</td>
</tr>
<tr>
<td>search.search</td>
<td>string</td>
<td>Free text search, accepts Lucene query syntax. Will search in Person name, data provider id and sources.</td>
</tr>
<tr>
<td>search.locale</td>
<td>locale</td>
<td>Optional locale, if no valid locale is supplied all localisations will be searched.</td>
</tr>
<tr>
<td>state</td>
<td>enumeration</td>
<td>Not applicable in the web service interface.</td>
</tr>
<tr>
<td>uuids</td>
<td>identifierList</td>
<td>A list of FRIS Person UUID values. Can be negated.</td>
</tr>
<tr>
<td>sources</td>
<td>sourceList</td>
<td>A number of authority/identifier limits against the entity external identifiers. The getAuthorityClassifications operation provides the valid authority values.</td>
</tr>
<tr>
<td>dataProviders</td>
<td>identifierList</td>
<td>A list of data provider names. Can be negated. The getDataProviders operation provides the valid data provider values.</td>
</tr>
<tr>
<td>dataProviderIds</td>
<td>identifierList</td>
<td>A list of data provider identifiers. Can be negated.</td>
</tr>
<tr>
<td>name</td>
<td>textSearchCriteria</td>
<td>Free text search in the Person name property.</td>
</tr>
<tr>
<td>Property</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>gender</td>
<td>enumeration</td>
<td>Person gender. Note that not all data providers supply gender information, in which case it is set to &quot;UNKNOWN&quot;. Can be either of &quot;FEMALE&quot;, &quot;MALE&quot; or &quot;UNKNOWN&quot;.</td>
</tr>
<tr>
<td>associatedOrganisations</td>
<td>identifierList</td>
<td>A list of related FRIS Organisation UUID's. Can be negated.</td>
</tr>
<tr>
<td>associatedPersons</td>
<td>identifierList</td>
<td>A list of related FRIS Person UUID's. Can be negated.</td>
</tr>
<tr>
<td>scienceDomain</td>
<td>classificationCriteria</td>
<td>One or more science domain terms. Scheme id is optional. Can be hierarchical. The getScienceDomainClassifications operation provides the valid science domain values.</td>
</tr>
<tr>
<td>subjectArea</td>
<td>classificationCriteria</td>
<td>One or more subject area terms. Scheme id is optional. Can be hierarchical. The getSubjectAreaClassifications operation provides the valid subject area values.</td>
</tr>
<tr>
<td>classified</td>
<td>classificationCriteria</td>
<td>One or more generic terms. Scheme id is required. Currently there are no supported person classifications for this property.</td>
</tr>
<tr>
<td>electronicAddress/value</td>
<td>string</td>
<td>The exact electronic address value.</td>
</tr>
<tr>
<td>electronicAddress/electronicAddressType</td>
<td>classificationCriteria</td>
<td>One or more electronic address type terms. Scheme id is optional. Can be hierarchical. The getElectronicAddressTypeClassifications operation provides the valid electronic address type values.</td>
</tr>
<tr>
<td>physicalAddress/address</td>
<td>string</td>
<td>The exact street &amp; building number.</td>
</tr>
<tr>
<td>physicalAddress/city</td>
<td>string</td>
<td>The exact city.</td>
</tr>
<tr>
<td>physicalAddress/country</td>
<td>classificationCriteria</td>
<td>One or more country terms. Scheme id is optional. The getPhysicalAddressCountryClassifications operation provides the valid electronic address type values.</td>
</tr>
<tr>
<td>keyword</td>
<td>textSearchCriteria</td>
<td>Free text search in the Person keywords property.</td>
</tr>
</tbody>
</table>

### 6.2.2 Operation: getPersons CERIF response documentation

The CERIF XML query response document will contain the following elements:
The person CERIF XML representation is documented in the "Integration Guide FRIS R3" document.

### 6.2.3 Operation: getPersons FRIS XML response documentation

The FRIS XML query response document will contain the following elements:

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>queryResult/totalResults</td>
<td>int</td>
<td>The total number of matching entities.</td>
</tr>
<tr>
<td>queryResult/pageSize</td>
<td>int</td>
<td>The requested page size.</td>
</tr>
<tr>
<td>queryResult/pageNumber</td>
<td>int</td>
<td>The requested zero-indexed page number.</td>
</tr>
<tr>
<td>queryResult/cerif</td>
<td>CERIF</td>
<td>The requested window of matching entities represented as CERIF elements.</td>
</tr>
</tbody>
</table>

The FRIS XML format is documented in chapter 12.4. Sample response:

```xml
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
      <queryResult total="46" page-size="1" page-number="0">
        <ns3:person uuid="7a166f4f-d5b1-41a3-bac9-71cfa998821a">
          <ns3:state>PUBLIC</ns3:state>
          <ns3:created>2014-11-16T18:41:20.975+01:00</ns3:created>
          <ns3:lastModified>2015-05-15T14:28:21.822+02:00</ns3:lastModified>
          <ns3:dataProvider>provider</ns3:dataProvider>
          <ns3:dataProviderId>provider-id</ns3:dataProviderId>
          <ns3:sources>
            <ns3:source authority-scheme="Identifier Authority Type" authority="DGC Id">bbb77ba6-d7f1-4e36-a718-e07370cd8006</ns3:source>
            <ns3:source authority-scheme="Identifier Authority Type" authority="Research Gate">4c09ad7a-4b16-4154-86c0-9aab57ba29c4</ns3:source>
          </ns3:sources>
          <ns3:aliases/>
          <ns3:name>
            <ns3:firstName>Ian</ns3:firstName>
            <ns3:lastName>Weaver</ns3:lastName>
          </ns3:name>
          <ns3:nameVariants>
```
<ns3:nameVariant>
  <ns3:firstName>Ian</ns3:firstName>
  <ns3:lastName>Mathews</ns3:lastName>
</ns3:nameVariant>
<ns3:gender>MALE</ns3:gender>
<ns3:researchInterest>
  <ns3:texts>
    <ns3:text locale="en">research interest</ns3:text>
    <ns3:text locale="nl">research interest</ns3:text>
  </ns3:texts>
</ns3:researchInterest>
<ns3:researchExpertise>
  <ns3:texts>
    <ns3:text locale="en">research interest</ns3:text>
    <ns3:text locale="nl">research interest</ns3:text>
  </ns3:texts>
</ns3:researchExpertise>
<ns3:researchTechniques>
  <ns3:texts>
    <ns3:text locale="en">research techniques</ns3:text>
    <ns3:text locale="nl">research techniques</ns3:text>
  </ns3:texts>
</ns3:researchTechniques>
<ns3:relatedPersons/>
<ns3:personOrganisations>
  <ns3:personOrganisation>
    <ns3:associationType schemeId="Assignment Role" term="Member"/>
    <ns3:organisation uuid="0c56841b-cf50-440c-b1bc-487a8f090626">
      <ns3:name>
        <ns3:texts>
          <ns3:text locale="nl">organisation name</ns3:text>
          <ns3:text locale="en">organisation name</ns3:text>
        </ns3:texts>
      </ns3:name>
    </ns3:organisation>
    <ns3:startDate>2014-08-16T14:27:59.424+02:00</ns3:startDate>
    <ns3:person uuid="7a166f4f-d5b1-41a3-bac9-71cfa998821a">
      <ns3:name>
        <ns3:firstName>Ian</ns3:firstName>
        <ns3:lastName>Weaver</ns3:lastName>
      </ns3:name>
    </ns3:person>
  </ns3:personOrganisation>
  <ns3:personOrganisation>
    <ns3:associationType schemeId="Assignment Role" term="Responsible"/>
    <ns3:organisation uuid="8f01c989-879b-4f40-a131-0025b01ab65f">
      <ns3:name>
        <ns3:dataProvider>provider</ns3:dataProvider>
        <ns3:dataProviderId>provider-id</ns3:dataProviderId>
      </ns3:name>
    </ns3:organisation>
  </ns3:personOrganisation>
</ns3:personOrganisations>
<ns3:organisation name locale="nl">organisation name</ns3:organisation>
<ns3:organisation name locale="en">organisation name</ns3:organisation>
</ns3:organisation>
<ns3:startDate>2014-09-03T14:27:59.424+02:00</ns3:startDate>

<ns3:person uuid="7a166f4f-d5b1-41a3-bac9-71cfa998821a">
<ns3:name>
<ns3:firstName>Ian</ns3:firstName>
<ns3:lastName>Weaver</ns3:lastName>
</ns3:name>
</ns3:person>
<ns3:dataProvider>provider</ns3:dataProvider>
<ns3:dataProviderId>provider-id</ns3:dataProviderId>
</ns3:personOrganisation>
<ns3:scienceDomains>
<ns3:scienceDomain schemeId="Science Domain Code" term="151"/>
<ns3:scienceDomain schemeId="Science Domain Code" term="131"/>
</ns3:scienceDomains>
<ns3:physicalAddresses>
<ns3:addressAssociation>
<ns3:associationType schemeId="Physical Address to Person Role" term="Work Address"/>
<ns3:physicalAddress>
<ns3:dataProvider>porovider</ns3:dataProvider>
<ns3:dataProviderId>provider-id</ns3:dataProviderId>
<ns3:addressLine3>549 Merrimac Circle</ns3:addressLine3>
<ns3:city>Braselton</ns3:city>
<ns3:postalCode>73034</ns3:postalCode>
<ns3:country schemeId="ISO 3166-1 alpha 2 Country Code" term="NL"/>
</ns3:physicalAddress>
</ns3:addressAssociation>
</ns3:physicalAddresses>
<ns3:electronicAddresses>
<ns3:addressAssociation>
<ns3:associationType schemeId="Electronic Address to Person Role" term="Work Address"/>
<ns3:electronicAddress>
<ns3:addressType schemeId="Telephone" term="Telephone"/>
<ns3:value>astone@mailbox.com</ns3:value>
</ns3:electronicAddress>
<ns3:addressAssociation>
<ns3:electronicAddress>
<ns3:addressType schemeId="Electronic Address Type" term="Telephone"/>
<ns3:value>astone@mailbox.com</ns3:value>
</ns3:electronicAddress>
</ns3:electronicAddresses>
<ns3:classifications/>
7 Project service

The FRIS R3 SOAP Project service is responsible for exposing public project data from the FRIS system. The project service is publicly accessible and will not expose any entities that have not been marked as public or any relations to such entities.

The FRIS project service supports the FastInfoSet XML protocol and it is strongly recommended that this be used due to its superior performance characteristics.

7.1 Current service status

The project service is currently available at:

<table>
<thead>
<tr>
<th>Environment</th>
<th>Response</th>
<th>Endpoint WSDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staging</td>
<td>CERIF</td>
<td><a href="https://stfrisr4.researchportal.be/ws/ProjectService?wsdl">https://stfrisr4.researchportal.be/ws/ProjectService?wsdl</a></td>
</tr>
<tr>
<td>Production</td>
<td>CERIF</td>
<td><a href="https://frisr4.researchportal.be/ws/ProjectService?wsdl">https://frisr4.researchportal.be/ws/ProjectService?wsdl</a></td>
</tr>
<tr>
<td>Production</td>
<td>FRIS XML</td>
<td><a href="https://frisr4.researchportal.be/ws/ProjectServiceFRIS?wsdl">https://frisr4.researchportal.be/ws/ProjectServiceFRIS?wsdl</a></td>
</tr>
</tbody>
</table>

7.2 Service operations

Both versions have identical operations and request documents.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>getProjects</td>
<td>getProjects</td>
<td>getProjectsResponse</td>
</tr>
<tr>
<td>getOrderings</td>
<td>getOrderings</td>
<td>getOrderings</td>
</tr>
<tr>
<td>getDataProviders</td>
<td>getDataProviders</td>
<td>getDataProvidersResponse</td>
</tr>
<tr>
<td>getAuthorityClassifications</td>
<td>getAuthorityClassifications</td>
<td>getAuthorityClassificationsResponse</td>
</tr>
<tr>
<td>getProjectTypeClassifications</td>
<td>getProjectTypeClassifications</td>
<td>getProjectTypeClassificationsResponse</td>
</tr>
<tr>
<td>getScienceDomainClassifications</td>
<td>getScienceDomainClassifications</td>
<td>getScienceDomainClassificationsResponse</td>
</tr>
<tr>
<td>getDisciplineClassifications</td>
<td>getDisciplineClassifications</td>
<td>getDisciplineClassificationsResponse</td>
</tr>
<tr>
<td>getApplicationCodeClassifications</td>
<td>getApplicationCodeClassifications</td>
<td>getApplicationCodeClassificationsResponse</td>
</tr>
<tr>
<td>getTechnologyCodeClassifications</td>
<td>getTechnologyCodeClassifications</td>
<td>getTechnologyCodeClassificationsResponse</td>
</tr>
<tr>
<td>getFundingCodeClassifications</td>
<td>getFundingCodeClassifications</td>
<td>getFundingCodeClassificationsResponse</td>
</tr>
<tr>
<td>getSubjectAreaClassifications</td>
<td>getSubjectAreaClassifications</td>
<td>getSubjectAreaClassificationsResponse</td>
</tr>
<tr>
<td>getFlemishResearchDisciplineClasses</td>
<td>getFlemishResearchDisciplineClassifications</td>
<td>getFlemishResearchDisciplineClassificationsResponse</td>
</tr>
</tbody>
</table>

The formal format specification is published as a part of the WSDL.
All other operations than "getProjects" will not be described in detail since they’re trivial helper operations that do not accept any parameters.

### 7.2.1 Operation: getProjects

The getProjects operation retrieves projects in the FRIS data set based on the supplied request criteria. The following tables will detail the parameters of the request document. A project must satisfy all specified limits to be returned, though if a single limit supports multiple values any match will satisfy that particular limit.

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>window/pageSize</td>
<td>int</td>
<td>The number of results returned, defaults to 10.</td>
</tr>
<tr>
<td>window/pageNumber</td>
<td>int</td>
<td>The zero-indexed page number, defaults to 0.</td>
</tr>
<tr>
<td>window/orderings/order</td>
<td>order</td>
<td>A number of orderings.</td>
</tr>
<tr>
<td>window/orderings/order/id</td>
<td>string</td>
<td>The ordering id.</td>
</tr>
<tr>
<td>window/orderings/order/locale</td>
<td>locale</td>
<td>The ordering locale. Only applicable for order on localised entity properties, currently only the &quot;project.name&quot; ordering requires a locale. Only &quot;nl_BE&quot; and &quot;en_GB&quot; values are allowed.</td>
</tr>
<tr>
<td>window/orderings/order/direction</td>
<td>enumeration</td>
<td>The order direction, either &quot;ASCENDING&quot; or &quot;DESCENDING&quot;, defaults to &quot;ASCENDING&quot;.</td>
</tr>
<tr>
<td>search/search</td>
<td>string</td>
<td>Free text search, accepts Lucene query syntax. Will search in Project name, data provider id and sources.</td>
</tr>
<tr>
<td>search.locale</td>
<td>locale</td>
<td>Optional locale, if no valid locale is supplied all localisations will be searched.</td>
</tr>
<tr>
<td>state</td>
<td>enumeration</td>
<td>Not applicable in the web service interface.</td>
</tr>
<tr>
<td>uuids</td>
<td>identifierList</td>
<td>A list of FRIS Project UUID values. Can be negated.</td>
</tr>
<tr>
<td>sources</td>
<td>sourceList</td>
<td>A number of authority/identifier limits against the entity external identifiers. The getAuthorityClassifications operation provides the valid authority values.</td>
</tr>
<tr>
<td>dataProviders</td>
<td>identifierList</td>
<td>A list of data provider names. Can be negated. The getDataProviders operation provides the valid data provider values.</td>
</tr>
<tr>
<td>dataProviderIds</td>
<td>identifierList</td>
<td>A list of data provider identifiers. Can</td>
</tr>
<tr>
<td>Field</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------</td>
<td>----------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>name</td>
<td>textSearchCriteria</td>
<td>Free text search in the Project name property.</td>
</tr>
<tr>
<td>acronym</td>
<td>string</td>
<td>The exact project acronym.</td>
</tr>
<tr>
<td>associatedOrganisations</td>
<td>identifierList</td>
<td>A list of related FRIS Organisation UUID's. Can be negated.</td>
</tr>
<tr>
<td>associatedPersons</td>
<td>identifierList</td>
<td>A list of related FRIS Person UUID's, will match against both external and internal person associations. Can be negated.</td>
</tr>
<tr>
<td>associatedProjects</td>
<td>identifierList</td>
<td>A list of related FRIS Project UUID's. Can be negated.</td>
</tr>
<tr>
<td>applicationCode</td>
<td>classificationCriteria</td>
<td>One or more application codes. Scheme id is optional. Can be hierarchical. The getApplicationCodeClassifications operation provides the valid application codes.</td>
</tr>
<tr>
<td>technologyCode</td>
<td>classificationCriteria</td>
<td>One or more technology codes. Scheme id is optional. The getTechnologyCodeClassifications operation provides the valid technology codes.</td>
</tr>
<tr>
<td>discipline</td>
<td>classificationCriteria</td>
<td>One or more discipline terms. Scheme id is optional. Can be hierarchical. The getDisciplineClassifications operation provides the valid discipline values.</td>
</tr>
<tr>
<td>subjectArea</td>
<td>classificationCriteria</td>
<td>One or more subject area terms. Scheme id is optional. Can be hierarchical. The getSubjectAreaClassifications operation provides the valid subject area values.</td>
</tr>
<tr>
<td>fundingCode</td>
<td>classificationCriteria</td>
<td>One or more funding code terms. Scheme id is optional. Can be hierarchical. The getFundingCodeClassifications operation provides the valid funding code values.</td>
</tr>
<tr>
<td>keyword</td>
<td>textSearchCriteria</td>
<td>Free text search in the Project keywords property.</td>
</tr>
</tbody>
</table>
### 7.2.2 Operation: getProjects CERIF response documentation

The CERIF XML query response document will contain the following elements:

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>queryResult/totalResults</td>
<td>int</td>
<td>The total number of matching entities.</td>
</tr>
<tr>
<td>queryResult/pageSize</td>
<td>int</td>
<td>The requested page size.</td>
</tr>
<tr>
<td>queryResult/pageNumber</td>
<td>int</td>
<td>The requested zero-indexed page number.</td>
</tr>
<tr>
<td>queryResult/cerif</td>
<td>CERIF</td>
<td>The requested window of matching entities represented as CERIF elements.</td>
</tr>
</tbody>
</table>

The person CERIF XML representation is documented in the “Integration Guide FRIS R3” document.

### 7.2.3 Operation: getProjects FRIS XML response documentation

The FRIS XML query response document will contain the following elements:

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>queryResult/@totalResults</td>
<td>int</td>
<td>The total number of matching entities.</td>
</tr>
<tr>
<td>queryResult/@pageSize</td>
<td>int</td>
<td>The requested page size.</td>
</tr>
<tr>
<td>queryResult/@pageNumber</td>
<td>int</td>
<td>The requested zero-indexed page number.</td>
</tr>
<tr>
<td>queryResult/project</td>
<td>FRIS XML</td>
<td>The requested window of matching entities represented as FRIS XML elements.</td>
</tr>
</tbody>
</table>

The FRIS XML format is documented in chapter 12.5. Sample response:

```xml
 xmlns:ns4="http://fris.ewi.be/criteria">
  <ns3:getProjectsResponse queryResult total="50" page-size="1" page-number="0">
    <ns3:project uuid="24ecd2c0-e111-43f1-9c8b-30c6f2f31353">
      <ns3:state>PUBLIC</ns3:state>
      <ns3:created>2015-02-05T17:09:00.149+01:00</ns3:created>
      <ns3:lastModified>2015-05-18T10:50:24.908+02:00</ns3:lastModified>
      <ns3:dataProvider>provider</ns3:dataProvider>
      <ns3:dataProviderId>provider-id</ns3:dataProviderId>
      <ns3:sources>
        <ns3:source authority-scheme="Identifier Authority Type" authority="VABB">c448d04e-2fc5-4f36-ada9-27c938097563</ns3:source>
      </ns3:sources>
      <ns3:aliases/>
      <ns3:name>
        <ns3:texts>
          <ns3:text locale="nl">project name</ns3:text>
          <ns3:text locale="en">project name</ns3:text>
        </ns3:texts>
      </ns3:name>
    </ns3:project>
  </ns3:getProjectsResponse>
</soap:Envelope>
```
<queryResult>
</ns3:getProjectsResponse>
</soap:Body>
</soap:Envelope>
8 Research output service

The FRIS R3 SOAP Research output service is responsible for exposing public research output data from the FRIS system. The research output service is publicly accessible and will not expose any entities that have not been marked as public or any relations to such entities.

The FRIS research output service supports the FastInfoSet XML protocol and it is strongly recommended that this be used due to its superior performance characteristics.

8.1 Current service status

The project service is currently available at:

<table>
<thead>
<tr>
<th>Environment</th>
<th>Response</th>
<th>Endpoint WSDL</th>
</tr>
</thead>
</table>

8.2 Service operations

<table>
<thead>
<tr>
<th>Operation</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>getResearchOutput</td>
<td>getResearchOutput</td>
<td>getResearchOutputResponse</td>
</tr>
<tr>
<td>getOrderings</td>
<td>getOrderings</td>
<td>getOrderings</td>
</tr>
<tr>
<td>getDataProviders</td>
<td>getDataProviders</td>
<td>getDataProvidersResponse</td>
</tr>
<tr>
<td>getAuthorityClassifications</td>
<td>getAuthorityClassifications</td>
<td>getAuthorityClassificationsResponse</td>
</tr>
<tr>
<td>getResearchOutputTypeClassifications</td>
<td>getResearchOutputTypeClassifications</td>
<td>getResearchOutputTypeClassificationsResponse</td>
</tr>
<tr>
<td>getDisciplineClassifications</td>
<td>getDisciplineClassifications</td>
<td>getDisciplineClassificationsResponse</td>
</tr>
<tr>
<td>getEvaluationPanelClassifications</td>
<td>getEvaluationPanelClassifications</td>
<td>getEvaluationPanelClassificationsResponse</td>
</tr>
<tr>
<td>getRefereeTypeClassifications</td>
<td>getRefereeTypeClassifications</td>
<td>getRefereeTypeClassificationsResponse</td>
</tr>
<tr>
<td>getSubjectAreaClassifications</td>
<td>getSubjectAreaClassifications</td>
<td>getSubjectAreaClassificationsResponse</td>
</tr>
</tbody>
</table>

The formal format specification is published as a part of the WSDL.

All other operations than "getResearchOutput" will not be described in detail since they're trivial helper operations that do not accept any parameters.

8.2.1 Operation: getResearchOutput

The getResearchOutput operation retrieves projects in the FRIS data set based on the supplied request criteria. The following tables will detail the parameters of the request document. A research
output must satisfy all specified limits to be returned, though if a single limit supports multiple values any match will satisfy that particular limit.

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>window/pageSize</td>
<td>int</td>
<td>The number of results returned, defaults to 10.</td>
</tr>
<tr>
<td>window/pageNumber</td>
<td>int</td>
<td>The zero-indexed page number, defaults to 0.</td>
</tr>
<tr>
<td>window/orderings/order</td>
<td>order</td>
<td>A number of orderings.</td>
</tr>
<tr>
<td>window/orderings/order/id</td>
<td>string</td>
<td>The ordering id.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The getOrderings operation provides the valid order id values.</td>
</tr>
<tr>
<td>window/orderings/order/locale</td>
<td>locale</td>
<td>The ordering locale.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Only applicable for order on localised entity properties, currently only the &quot;researchOutput.title&quot; ordering requires a locale. Only &quot;nl_BE&quot; and &quot;en_GB&quot; values are allowed.</td>
</tr>
<tr>
<td>window/orderings/order/direction</td>
<td>enumeration</td>
<td>The order direction, either &quot;ASCENDING&quot; or &quot;DESCENDING&quot;, defaults to &quot;ASCENDING&quot;.</td>
</tr>
<tr>
<td>search.search</td>
<td>string</td>
<td>Free text search, accepts Lucene query syntax. Will search in research output title, data provider id and sources.</td>
</tr>
<tr>
<td>search.locale</td>
<td>locale</td>
<td>Optional locale, if no valid locale is supplied all localisations will be searched.</td>
</tr>
<tr>
<td>state</td>
<td>enumeration</td>
<td>Not applicable in the web service interface.</td>
</tr>
<tr>
<td>uuids</td>
<td>identifierList</td>
<td>A list of FRIS Research output UUID values. Can be negated.</td>
</tr>
<tr>
<td>sources</td>
<td>sourceList</td>
<td>A number of authority/identifier limits against the entity external identifiers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The getAuthorityClassifications operation provides the valid authority values.</td>
</tr>
<tr>
<td>dataProviders</td>
<td>identifierList</td>
<td>A list of data provider names. Can be negated.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The getDataProviders operation provides the valid data provider values.</td>
</tr>
<tr>
<td>dataProviderIds</td>
<td>identifierList</td>
<td>A list of data provider identifiers. Can be negated.</td>
</tr>
<tr>
<td>title</td>
<td>textSearchCriteria</td>
<td>Free text search in the Research output title property.</td>
</tr>
<tr>
<td>type</td>
<td>classificationCriteria</td>
<td>One or more research output taxonomy type terms. Scheme id is optional. Can be hierarchical. The getResearchOutputTypeClassifications operation provides the valid research output type values.</td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>associatedOrganisations</td>
<td>identifierList</td>
<td>A list of related FRIS Organisation UUID's. Can be negated.</td>
</tr>
<tr>
<td>associatedPersons</td>
<td>identifierList</td>
<td>A list of related FRIS Person UUID's, will match against both external and internal person associations. Can be negated.</td>
</tr>
<tr>
<td>associatedProjects</td>
<td>identifierList</td>
<td>A list of related FRIS Project UUID's. Can be negated.</td>
</tr>
<tr>
<td>discipline</td>
<td>classificationCriteria</td>
<td>One or more discipline terms. Scheme id is optional. Can be hierarchical. The getDisciplineClassifications operation provides the valid discipline values.</td>
</tr>
<tr>
<td>subjectArea</td>
<td>classificationCriteria</td>
<td>One or more subject area terms. Scheme id is optional. Can be hierarchical. The getSubjectAreaClassifications operation provides the valid subject area values.</td>
</tr>
<tr>
<td>evaluationPanel</td>
<td>classificationCriteria</td>
<td>One or more evaluation panel terms. Scheme id is optional. Can be hierarchical. The getEvaluationPanelClassifications operation provides the valid discipline values.</td>
</tr>
<tr>
<td>refereeType</td>
<td>classificationCriteria</td>
<td>One or more referee type terms. Scheme id is optional. The getRefereeTypeClassifications operation provides the valid discipline values.</td>
</tr>
<tr>
<td>artistic</td>
<td>Xs:boolean</td>
<td>Whether the research output is marked artistic or not</td>
</tr>
<tr>
<td>keyword</td>
<td>textSearchCriteria</td>
<td>Free text search in the research output keywords property.</td>
</tr>
</tbody>
</table>

### 8.2.2 Operation: getResearchOutput CERIF response documentation
The CERIF XML query response document will contain the following elements:

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>queryResult/totalResults</td>
<td>int</td>
<td>The total number of matching entities.</td>
</tr>
<tr>
<td>Element path</td>
<td>Type</td>
<td>Notes</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>queryResult/@totalResults</td>
<td>int</td>
<td>The total number of matching entities.</td>
</tr>
<tr>
<td>queryResult/@pageSize</td>
<td>int</td>
<td>The requested page size.</td>
</tr>
<tr>
<td>queryResult/@pageNumber</td>
<td>int</td>
<td>The requested zero-indexed page number.</td>
</tr>
<tr>
<td>queryResult/book</td>
<td>FRIS XML</td>
<td>The requested window of matching entities represented as FRIS XML elements.</td>
</tr>
<tr>
<td>queryResult/book-contribution</td>
<td></td>
<td>Note that each research output type has a separated element name and structure.</td>
</tr>
<tr>
<td>queryResult/journal-contribution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>queryResult/non-written</td>
<td></td>
<td></td>
</tr>
<tr>
<td>queryResult/patent</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The research output CERIF XML representation is documented in the “Integration Guide FRIS R3” document.

8.2.3 Operation: getResearchOutput FRIS XML response documentation

The FRIS XML query response document will contain the following elements:

The FRIS XML format is documented in chapter 12.7. Sample journal contribution response (not showing the other research output types):

```xml
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
   xmlns:fris="http://fris.ewi.be/"
   xmlns:crit="http://fris.ewi.be/criteria"
   xmlns:resp="http://fris.ewi.be/response">
   <fris:getResearchOutputResponse>
       <queryResult total="2" pageSize="10" pageNumber="0">
         <fris:journalContribution uuid="9ea21f94-1078-4083-b440-9593d9b6c14c">
           <fris:rootOrganisationUuid>759d71ae-a160-45ba-80a7-2328d2c00ff9</fris:rootOrganisationUuid>
           <fris:state>PUBLIC</fris:state>
           <fris:external>false</fris:external>
           <fris:lastModified>2018-01-29T08:24:05Z</fris:lastModified>
           <fris:hidden>false</fris:hidden>
           <fris:dataProvider>UGent</fris:dataProvider>
           <fris:dataProviderId>872f15a0-08a7-11e7-8947-0000000002ae</fris:dataProviderId>
           <fris:sources>
```
Cost effectiveness of atorvastatin in patients with type 2 diabetes mellitus: a pharmacoeconomic analysis of the collaborative Atorvastatin diabetes study in the Belgian population
</fris:person>
</fris:participant>
<fris:participant id="94535826">
<fris:associationType id="4016" schemeId="Written Output Person Participant Role" schemeIdentifier="WO_PERSON_PARTICIPANT_ROLE" term="Author"/>
<fris:person uuid="9bb484da-3943-45fe-8b7d-4d273cf0898e">
<fris:external>true</fris:external>
<fris:hidden>false</fris:hidden>
<fris:dataProvider>UGent</fris:dataProvider>
<fris:dataProviderId>873f6951-08a7-11e7-8947-0000000002ae</fris:dataProviderId>
<fris:/sources/>
<fris:aliases/>
<fris:firstName>Luc</fris:firstName>
<fris:lastName>Van Gaal</fris:lastName>
</fris:person>
</fris:participant>
<fris:participant id="94535827">
Background and Objective: Patients with type 2 diabetes mellitus have a high risk of developing cardiovascular (CV) disease. The clinical benefit of use of statins in patients with type 2 diabetes has been demonstrated in several randomized, controlled trials, including the CARDs clinical trial. Based on the clinical CARDs data, the favourable cost effectiveness of atorvastatin 10mg in patients with type 2 diabetes has been demonstrated in countries such as the UK and France. This study aimed to estimate the cost effectiveness in the Belgian setting of atorvastatin 10 mg compared with no treatment for the primary prevention of CV events in type 2 diabetes patients without a history of CV disease. Methods: A Markov
model with 1-year cycles was developed to simulate the CV event and death risk according to the therapeutic approach initiated. The transition probabilities for CV events in the no statin treatment group were derived from the risk equations reported from the large UKPDS. Risk reductions from the CARDS clinical trial were used to adjust these CV event probabilities in the atorvastatin 10 mg treatment group. The characteristics of type 2 diabetes patients without a CV history were derived from the Belgian OCAPI survey. The public healthcare payers' perspective was taken into account for costing. The direct medical costs of CV events were based on the Public Health Authorities' hospital database for acute care costs and on the literature for the follow-up costs. The impact on the reimbursement system of generic entry to the market was considered in the drug cost. Costs were valued as at year 2009; costs and outcomes were discounted at 3% and 1.5%, respectively.

Results: Based on a 5-year time horizon, atorvastatin was demonstrated to be cost effective with an incremental costquality-adjusted life-year (QALY) of 16 681. Over a lifetime horizon (25 years), atorvastatin was demonstrated to be a cost-saving therapeutic intervention. At a threshold of 30 000/QALY, atorvastatin had a 98.8% probability of being cost effective. Conclusion: Compared with no treatment, use of atorvastatin 10 mg as a primary prevention intervention in Belgian type 2 diabetes patients not only improves CV outcomes, but also appears to be cost saving over a lifetime horizon.
Cost effectiveness of atorvastatin in patients with type 2 diabetes mellitus: a pharmacoeconomic analysis of the collaborative atorvastatin diabetes study in the Belgian population.
Laboratory Experimental Medicine and Pediatrics (LEMP)
Background and Objective: Patients with type 2 diabetes mellitus have a high risk of developing cardiovascular (CV) disease. The clinical benefit of use of statins in patients with type 2 diabetes has been demonstrated in several randomized, controlled trials, including the CARDS clinical trial. Based on the clinical CARDS data, the favourable cost effectiveness of atorvastatin 10 mg in patients with type 2 diabetes has been demonstrated in countries such as the UK and France. This study aimed to estimate the cost effectiveness in the Belgian setting of atorvastatin 10 mg compared with no treatment for the primary prevention of CV events in type 2 diabetes patients without a history of CV disease. Methods: A Markov model with 1-year cycles was developed to simulate the CV event and death risk according to the therapeutic approach initiated. The transition probabilities for CV events in the no statin treatment group...
were derived from the risk equations reported from the large UKPDS. Risk reductions from the CARDS clinical trial were used to adjust these CV event probabilities in the atorvastatin 10 mg treatment group. The characteristics of type 2 diabetes patients without a CV history were derived from the Belgian OCAPI survey. The public healthcare payers’ perspective was taken into account for costing. The direct medical costs of CV events were based on the Public Health Authorities’ hospital database for acute care costs and on the literature for the follow-up costs. The impact on the reimbursement system of generic entry to the market was considered in the drug cost. Costs were valued as at year 2009; costs and outcomes were discounted at 3% and 1.5%, respectively.

Results: Based on a 5-year time horizon, atorvastatin was demonstrated to be cost effective with an incremental cost/quality-adjusted life-year (QALY) of [Euro sign]16 681. Over a lifetime horizon (25 years), atorvastatin was demonstrated to be a cost-saving therapeutic intervention. At a threshold of [Euro sign]30 000/QALY, atorvastatin had a 98.8% probability of being cost effective. Conclusion: Compared with no treatment, use of atorvastatin 10 mg as a primary prevention intervention in Belgian type 2 diabetes patients not only improves CV outcomes, but also appears to be cost saving over a lifetime horizon.

Conclusion: Compared with ‘no treatment’, use of atorvastatin 10 mg as a primary prevention intervention in Belgian type 2 diabetes patients not only improves CV outcomes, but also appears to be cost saving over a lifetime horizon.
9 Journal Service

The FRIS R3 SOAP Journal service is responsible for exposing journal data from the FRIS system.

The Journal service is not publicly accessible and usage of the Journal master data requires approval by EWI since it includes licensed and copyrighted information from a number of sources. All interaction with the journal service must be over https and all requests are authenticated through a published WS Security Policy. See chapter 3.3 for details on the service security constraints.

We have a publicly accessible version of the journal service that serves a very limited journal representation.

The FRIS journal service supports the FastInfoSet XML protocol and it is strongly recommended that this be used due to its superior performance characteristics.

As the journal service will deliver a FRIS XML representation the response format will be documented in this chapter.

As with the other entity centric web services there are two versions of the journal service, but since the actual journal representation is identical the only difference is the format of the helper method response documents.

9.1 Current service status

The journal service is currently available at:

<table>
<thead>
<tr>
<th>Environment</th>
<th>Response</th>
<th>Endpoint WSDL</th>
</tr>
</thead>
</table>

The public journal service is available at:

<table>
<thead>
<tr>
<th>Environment</th>
<th>Response</th>
<th>Endpoint WSDL</th>
</tr>
</thead>
</table>

9.2 Service operations

<table>
<thead>
<tr>
<th>Operation</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>getJournals</td>
<td>getJournals</td>
<td>getJournalsResponse</td>
</tr>
<tr>
<td>getOrderings</td>
<td>getOrderings</td>
<td>getOrderingsResponse</td>
</tr>
<tr>
<td>getDataProviders</td>
<td>getDataProviders</td>
<td>getDataProvidersResponse</td>
</tr>
<tr>
<td>getAuthorityClassifications</td>
<td>getAuthorityClassifications</td>
<td>getAuthorityClassificationsResponse</td>
</tr>
<tr>
<td>getAsjcClassifications</td>
<td>getAsjcClassifications</td>
<td>getAsjcClassificationsResponse</td>
</tr>
</tbody>
</table>

3 [WS Policy](#), [WS Security Policy](#)
The formal format specification is published as a part of the WSDL.

All other operations than "getJournals" will not be described in detail since they're trivial helper operations that do not accept any parameters.

### 9.2.1 Operation: getJournals

The getJournals operation retrieves journals in the FRIS data set based on the supplied request criteria. The following tables will detail the parameters of the request document. A journal must satisfy all specified limits to be returned, though if a single limit supports multiple values any match will satisfy that particular limit.

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>window/pageSize</td>
<td>int</td>
<td>The number of results returned, defaults to 10.</td>
</tr>
<tr>
<td>window/pageNumber</td>
<td>int</td>
<td>The zero-indexed page number, defaults to 0.</td>
</tr>
<tr>
<td>window/orderings/order</td>
<td>order</td>
<td>A number of orderings.</td>
</tr>
<tr>
<td>window/orderings/order/id</td>
<td>string</td>
<td>The ordering id.</td>
</tr>
<tr>
<td>window/orderings/order/locale</td>
<td>locale</td>
<td>The ordering locale.</td>
</tr>
<tr>
<td>window/orderings/order/direction</td>
<td>enumeration</td>
<td>The order direction, either &quot;ASCENDING&quot; or &quot;DESCENDING&quot;, defaults to &quot;ASCENDING&quot;.</td>
</tr>
<tr>
<td>search.search</td>
<td>string</td>
<td>Search, accepts Lucene query syntax. Will search in journal title, alternate title, ISSN, electronic ISSN, publisher, data provider id and sources.</td>
</tr>
<tr>
<td>search.locale</td>
<td>locale</td>
<td>Optional locale.</td>
</tr>
<tr>
<td>state</td>
<td>enumeration</td>
<td>Not applicable since journal has no localised index properties.</td>
</tr>
<tr>
<td>uuids</td>
<td>identifierList</td>
<td>A list of FRIS Journal UUID values. Can be negated.</td>
</tr>
<tr>
<td>sources</td>
<td>sourceList</td>
<td>A number of authority/identifier limits against the entity external identifiers. The getAuthorityClassifications operation provides the valid authority values.</td>
</tr>
<tr>
<td>title</td>
<td>textSearchCriteria</td>
<td>Free text search in the Journal title and alternate title property.</td>
</tr>
<tr>
<td>issn</td>
<td>identifierList</td>
<td>A list of ISSN values, will be matched</td>
</tr>
<tr>
<td>Element path</td>
<td>Type</td>
<td>Notes</td>
</tr>
<tr>
<td>----------------------------</td>
<td>--------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>queryResult/totalResults</td>
<td>int</td>
<td>The total number of matching entities.</td>
</tr>
<tr>
<td>queryResult/pageSize</td>
<td>int</td>
<td>The requested page size.</td>
</tr>
<tr>
<td>queryResult/pageNumber</td>
<td>int</td>
<td>The requested zero-indexed page number.</td>
</tr>
<tr>
<td>queryResult/journals</td>
<td>Journal</td>
<td>The requested window of matching entities represented as FRIS Journal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>XML elements. See subsequent chapter for detailed information.</td>
</tr>
</tbody>
</table>

### 9.2.2 GetJournals response

Since the CERIF standard does not support a comprehensive journal representation we've chosen to return an XML representation that is based directly on the internal FRIS Journal model. The XSD is available as part of the Journal service WSDL.

An example of the full non-public format:

```xml
<journal xmlns="http://fris.ewi.be/" uuid="1c4adf33-c223-47fd-989e-fb32d556f2ec">
  <state>ACTIVE</state>
  <external>false</external>
  <created>2014-01-27T12:19:59.320+01:00</created>
  <lastModified>2014-07-26T12:19:59.320+02:00</lastModified>
  <dataProvider>orbi</dataProvider>
</journal>
```
<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>@uuid</td>
<td>string</td>
<td>The FRIS UUID of the journal.</td>
</tr>
<tr>
<td>state</td>
<td>enumeration</td>
<td>Will always be active for the journals returned from the journal service.</td>
</tr>
<tr>
<td>external</td>
<td>boolean</td>
<td>Will always be true for journals returned from the journal service.</td>
</tr>
<tr>
<td>created</td>
<td>dateTime</td>
<td>The date and time the entry was created in the FRIS system.</td>
</tr>
<tr>
<td>lastModified</td>
<td>dateTime</td>
<td>The date and time the entry was last updated in the FRIS system.</td>
</tr>
<tr>
<td>dataProvider</td>
<td>string</td>
<td>The data-provider responsible for this entry.</td>
</tr>
<tr>
<td>dataProviderId</td>
<td>string</td>
<td>The data-provider identifier for this entry.</td>
</tr>
<tr>
<td>sources</td>
<td>sequence</td>
<td>A number of secondary sources for this entry (the primary source being the dataProvider/dataProviderId).</td>
</tr>
<tr>
<td>sources/source/@authority</td>
<td>string</td>
<td>The authority of this source (federated identifier).</td>
</tr>
<tr>
<td>sources/source/@type</td>
<td>enumeration</td>
<td>The type of this source, may be &quot;IDENTIFIER&quot;, &quot;URL&quot; or other.</td>
</tr>
<tr>
<td>sources/source</td>
<td>string</td>
<td>The identifier of this source.</td>
</tr>
<tr>
<td>aliases/alias</td>
<td>sequence</td>
<td>Any number of FRIS journal UUID’s that can be considered aliases of this entry.</td>
</tr>
<tr>
<td>title</td>
<td>string</td>
<td>The official title of the journal.</td>
</tr>
<tr>
<td>alternateTitle</td>
<td>string</td>
<td>An abbreviated or alternate title of the journal.</td>
</tr>
<tr>
<td>issn</td>
<td>string</td>
<td>The ISSN of the journal.</td>
</tr>
<tr>
<td>electronicIssn</td>
<td>string</td>
<td>The electronic ISSN of the journal if applicable.</td>
</tr>
<tr>
<td>journalHomepage</td>
<td>string</td>
<td>The URL to the journal homepage if applicable.</td>
</tr>
<tr>
<td>publisher</td>
<td>string</td>
<td>The name of the publisher</td>
</tr>
<tr>
<td>publicationLocation</td>
<td>string</td>
<td>The location this journal is published.</td>
</tr>
<tr>
<td>publicationCountry</td>
<td>classification</td>
<td>The country this journal is published.</td>
</tr>
<tr>
<td>startYear</td>
<td>int</td>
<td>The year that this journal started publishing, if available.</td>
</tr>
<tr>
<td>endYear</td>
<td>int</td>
<td>The year that this journal stopped publishing, if available.</td>
</tr>
<tr>
<td>sherpaRoMEO</td>
<td></td>
<td>The Sherpa RoMEO information of this journal.</td>
</tr>
<tr>
<td>//color</td>
<td>classification</td>
<td>The Sherpa RoMEO color.</td>
</tr>
<tr>
<td>//preprintArchiving</td>
<td>string</td>
<td>The pre-print archiving information for this journal.</td>
</tr>
<tr>
<td>Field</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>---------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>//preprintRestrictions</code></td>
<td>string</td>
<td>The pre-print restrictions information for this journal.</td>
</tr>
<tr>
<td><code>//postprintArchiving</code></td>
<td>string</td>
<td>The post-print archiving information for this journal.</td>
</tr>
<tr>
<td><code>//postprintRestrictions</code></td>
<td>string</td>
<td>The post-print restrictions information for this journal.</td>
</tr>
<tr>
<td><code>//postprintConditions</code></td>
<td>string</td>
<td>The post-print conditions information for this journal.</td>
</tr>
<tr>
<td><code>//postprintCopyright</code></td>
<td>string</td>
<td>The post-print copyright information for this journal.</td>
</tr>
<tr>
<td><code>peerReviewed</code></td>
<td>classification</td>
<td>Peer reviewed type.</td>
</tr>
<tr>
<td><code>openAccess</code></td>
<td>classification</td>
<td>Open access type.</td>
</tr>
<tr>
<td><code>creativeCommonsLicense</code></td>
<td>classification</td>
<td>The Creative Commons license if applicable.</td>
</tr>
<tr>
<td><code>asjcCodes/asjc</code></td>
<td>classification</td>
<td>A number of Scopus ASJC codes describing the subject areas of the journal.</td>
</tr>
<tr>
<td><code>localized-keywords</code></td>
<td>string</td>
<td>A number of free keywords describing the subject areas of the journal.</td>
</tr>
<tr>
<td><code>localized-keywords/locale</code></td>
<td>string</td>
<td>The locale for which the keywords are applicable.</td>
</tr>
<tr>
<td><code>metrics</code></td>
<td>decimal-metric or integer-metric</td>
<td>Any number of metric values, value is either a decimal or integer</td>
</tr>
<tr>
<td><code>metric/type</code></td>
<td>classification</td>
<td>The metric type classification term for this metric value</td>
</tr>
<tr>
<td><code>metric/year</code></td>
<td>int</td>
<td>The year this metric is applicable to</td>
</tr>
</tbody>
</table>
10 Classification Scheme Service

The FRIS R3 SOAP Classification Scheme service is responsible for exposing classification data from the FRIS system. There are two versions of the Classification Scheme service, the difference being what format the response is delivered in, either CERIF XML or FRIS XML.

The FRIS Classification Scheme service supports the FastInfoSet XML protocol and it is strongly recommended that this be used due to its superior performance characteristics.

10.1 Current service status

The classification scheme service is currently feature complete and deployed to the staging environment.

<table>
<thead>
<tr>
<th>Environment</th>
<th>Response</th>
<th>Endpoint WSDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staging</td>
<td>CERIF</td>
<td><a href="https://stfrisr4.researchportal.be/ws/ClassificationSchemeService?wsdl">https://stfrisr4.researchportal.be/ws/ClassificationSchemeService?wsdl</a></td>
</tr>
<tr>
<td>Staging</td>
<td>FRIS XML</td>
<td><a href="https://stfrisr4.researchportal.be/ws/ClassificationSchemeServiceFRIS?wsdl">https://stfrisr4.researchportal.be/ws/ClassificationSchemeServiceFRIS?wsdl</a></td>
</tr>
<tr>
<td>Production</td>
<td>CERIF</td>
<td><a href="https://frisr4.researchportal.be/ws/ClassificationSchemeService?wsdl">https://frisr4.researchportal.be/ws/ClassificationSchemeService?wsdl</a></td>
</tr>
<tr>
<td>Production</td>
<td>FRIS XML</td>
<td><a href="https://frisr4.researchportal.be/ws/ClassificationSchemeServiceFRIS?wsdl">https://frisr4.researchportal.be/ws/ClassificationSchemeServiceFRIS?wsdl</a></td>
</tr>
</tbody>
</table>

10.2 Service operations

<table>
<thead>
<tr>
<th>Operation</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>getClassificationSchemes</td>
<td>getClassificationSchemes</td>
<td>getClassificationSchemesResponse</td>
</tr>
<tr>
<td>getAllClassificationSchemes</td>
<td>getAllClassificationSchemes</td>
<td>getAllClassificationSchemesResponse</td>
</tr>
<tr>
<td>getOrderings</td>
<td>getOrderings</td>
<td>getOrderingsResponse</td>
</tr>
</tbody>
</table>

The formal format specification is published as a part of the WSDL.

In the subsequent chapters we will only detail the getClassificationSchemes operation since the other two are trivial.

10.2.1 Operation: getClassificationSchemes FRIS XML response documentation

The FRIS getClassificationSchemes operation retrieves classification scheme information based on the supplied request criteria. The following tables will detail the parameters of the request document. A classification scheme must satisfy all specified limits to be returned, though if a single limit supports multiple values any match will satisfy that particular limit.

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>window/pageSize</td>
<td>int</td>
<td>The number of results returned, defaults to 10.</td>
</tr>
<tr>
<td>window/pageNumber</td>
<td>int</td>
<td>The zero-indexed page number, defaults to 0.</td>
</tr>
<tr>
<td>window/orderings/order</td>
<td>order</td>
<td>A number of orderings.</td>
</tr>
<tr>
<td>window/orderings/order/id</td>
<td>string</td>
<td>The ordering id. The getOrderings operation provides</td>
</tr>
</tbody>
</table>
The valid order id values.

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>window/orderings/order/locale</td>
<td>locale</td>
<td>The ordering locale. Not applicable for any classification scheme ordering.</td>
</tr>
<tr>
<td>window/orderings/order/direction</td>
<td>enumeration</td>
<td>The order direction, either &quot;ASCENDING&quot; or &quot;DESCENDING&quot;, defaults to &quot;ASCENDING&quot;.</td>
</tr>
<tr>
<td>schemeld</td>
<td>string</td>
<td>Any classification scheme with the specified schemeld.</td>
</tr>
<tr>
<td>term</td>
<td>string</td>
<td>Any classification scheme that contains a classification with the specified term.</td>
</tr>
</tbody>
</table>

The query response document will contain the following elements:

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>queryResult/totalResults</td>
<td>int</td>
<td>The total number of matching entities.</td>
</tr>
<tr>
<td>queryResult/pageSize</td>
<td>int</td>
<td>The requested page size.</td>
</tr>
<tr>
<td>queryResult/pageNumber</td>
<td>int</td>
<td>The requested zero-indexed page number.</td>
</tr>
<tr>
<td>queryResult/classificationScheme</td>
<td>ClassificationScheme</td>
<td>The requested window of matching entities represented as FRIS Classification Scheme XML elements. See subsequent chapter for detailed information.</td>
</tr>
</tbody>
</table>

The FRIS Classification Scheme XSD is available as part of the Classification Scheme service WSDL. An example of the format:

```xml
<classificationScheme targetNamespace="http://fris.ewi.be/">
  <description>
    <texts>
      <text locale="en">Scheme description text</text>
      <text locale="nl">Scheme description text</text>
    </texts>
  </description>
  <schemeId>External scheme identifier</schemeId>
  <containedClassifications>
    <classification term="parent term">
      <description>
        <texts>
          <text locale="nl">Parent description text</text>
          <text locale="en">Parent description text</text>
        </texts>
      </description>
    </classification>
    <classification term="child term">
      <description>
        <texts>
          <text locale="nl">Child description text</text>
          <text locale="en">Child description text</text>
        </texts>
      </description>
    </classification>
  </containedClassifications>
</classificationScheme>```
### Element path

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>schemeld</td>
<td>string</td>
<td>The external scheme identifier of the classification scheme.</td>
</tr>
<tr>
<td>description/texts/text/@locale</td>
<td>string</td>
<td>The locale for which the classification scheme description text is applicable.</td>
</tr>
<tr>
<td>description/texts/text</td>
<td>string</td>
<td>The classification scheme description text.</td>
</tr>
<tr>
<td>containedClassifications</td>
<td></td>
<td>The contained classifications for the classification scheme.</td>
</tr>
<tr>
<td>containedClassifications/classification/@term</td>
<td>string</td>
<td>The contained classification term.</td>
</tr>
<tr>
<td>containedClassifications/classification/parent</td>
<td>string</td>
<td>The contained classification parent term.</td>
</tr>
<tr>
<td>containedClassifications/classification/description/texts/text/@locale</td>
<td>string</td>
<td>The locale for which the contained classification description text is applicable.</td>
</tr>
<tr>
<td>containedClassifications/classification/description/texts/text</td>
<td>string</td>
<td>The contained classification description text.</td>
</tr>
</tbody>
</table>

#### 10.2.2 Operation: getClassificationSchemes CERIF XML response documentation

The CERIF getClassificationSchemes operation retrieves classification scheme information based on the supplied request criteria. The following tables will detail the parameters of the request.
A classification scheme must satisfy all specified limits to be returned, though if a single limit supports multiple values any match will satisfy that particular limit.

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>window/pageSize</td>
<td>int</td>
<td>The number of results returned, defaults to 10.</td>
</tr>
<tr>
<td>window/pageNumber</td>
<td>int</td>
<td>The zero-indexed page number, defaults to 0.</td>
</tr>
<tr>
<td>window/orderings/order</td>
<td>order</td>
<td>A number of orderings.</td>
</tr>
<tr>
<td>window/orderings/order/id</td>
<td>string</td>
<td>The ordering id. The getOrderings operation provides the valid order id values.</td>
</tr>
<tr>
<td>window/orderings/order/locale</td>
<td>locale</td>
<td>The ordering locale. Not applicable for any classification scheme ordering.</td>
</tr>
<tr>
<td>window/orderings/order/direction</td>
<td>enumeration</td>
<td>The order direction, either &quot;ASCENDING&quot; or &quot;DESCENDING&quot;, defaults to &quot;ASCENDING&quot;.</td>
</tr>
<tr>
<td>schemelm</td>
<td>string</td>
<td>Any classification scheme with the specified schemeId.</td>
</tr>
<tr>
<td>term</td>
<td>string</td>
<td>Any classification scheme that contains a classification with the specified term.</td>
</tr>
</tbody>
</table>

The query response document will contain the following elements:

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>queryResult/totalResults</td>
<td>int</td>
<td>The total number of matching entities.</td>
</tr>
<tr>
<td>queryResult/pageSize</td>
<td>int</td>
<td>The requested page size.</td>
</tr>
<tr>
<td>queryResult/pageNumber</td>
<td>int</td>
<td>The requested zero-indexed page number.</td>
</tr>
<tr>
<td>queryResult/CERIF</td>
<td>CERIF</td>
<td>The requested window of matching entities represented as CERIF cfClassScheme XML elements.</td>
</tr>
</tbody>
</table>

The FRIS Classification Scheme XSD is available as part of the Classification Scheme service WSDL. An example of the format:

```xml
<CERIF release="1.5" date="2015-07-09+02:00" sourceDatabase="fris" targetNamespace="urn:xmins:org:eurocris:cerif-1.5-1-FRIS">
  <cfClassScheme>
    <cfClassSchemeId>External scheme identifier</cfClassSchemeId>
    <cfDescr cfTrans="o" cfLangCode="en">Scheme description text</cfDescr>
    <cfDescr cfTrans="o" cfLangCode="nl">Scheme description text</cfDescr>
    <cfClass>
      <cfClassId>parent term</cfClassId>
      <cfDescr cfTrans="o" cfLangCode="nl">Contained parent classification description text</cfDescr>
    </cfClass>
  </cfClassScheme>
</CERIF>
```
<cfDescr cfTrans="o" cfLangCode="en">Contained parent classification description text</cfDescr>
</cfClass>
<cfClass>
  <cfClassId>child term</cfClassId>
  <cfDescr cfTrans="o" cfLangCode="nl">Contained child classification description text</cfDescr>
  <cfDescr cfTrans="o" cfLangCode="en">Contained child classification description text</cfDescr>
  <cfClass_Class>
    <cfClassId2>parent term</cfClassId2>
    <cfClassSchemeId2>External scheme identifier</cfClassSchemeId2>
    <cfClassId>child term</cfClassId>
    <cfClassSchemeId1>External scheme identifier</cfClassSchemeId1>
    <cfClassId>broaden</cfClassId>
    <cfClassSchemeId>iso25964-1</cfClassSchemeId>
  </cfClass_Class>
  <cfClass>
  </cfClass>
</cfClassScheme>
</CERIF>

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>cfClassSchemeld</td>
<td>string</td>
<td>The schemeld of the classification scheme.</td>
</tr>
<tr>
<td>cfDescr/@cfLangCode</td>
<td>string</td>
<td>The locale for which the classification scheme description text is applicable.</td>
</tr>
<tr>
<td>cfDescr</td>
<td>string</td>
<td>The classification scheme description text.</td>
</tr>
<tr>
<td>cfClass</td>
<td></td>
<td>The contained classifications for the classification scheme.</td>
</tr>
<tr>
<td>cfClass/cfClassId</td>
<td>string</td>
<td>The contained classification term.</td>
</tr>
<tr>
<td>cfClass/cfDescr/@cfLangcode</td>
<td>string</td>
<td>The locale for which the contained classification description text is applicable.</td>
</tr>
<tr>
<td>cfClass/cfDescr/</td>
<td>string</td>
<td>The contained classification description text.</td>
</tr>
<tr>
<td>cfClass/cfClass_Class/cfClassId2</td>
<td>string</td>
<td>The contained classification parent term.</td>
</tr>
</tbody>
</table>
11 Funding code service

The FRIS R3 SOAP Funding Code service is responsible for exposing funding code data from the FRIS system. There is only one version of the funding code service delivering FRIS XML.

The FRIS Funding code service supports the FastInfoSet XML protocol and it is strongly recommended that this be used due to its superior performance characteristics.

11.1 Current service status

The funding code service is currently feature complete and deployed to the staging and production environment.

<table>
<thead>
<tr>
<th>Environment</th>
<th>Response</th>
<th>Endpoint WSDL</th>
</tr>
</thead>
</table>

11.2 Service operations

<table>
<thead>
<tr>
<th>Operation</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>getFundingCodes</td>
<td>getFundingCodes</td>
<td>getFundingCodesResponse</td>
</tr>
<tr>
<td>getOrderings</td>
<td>getOrderings</td>
<td>getOrderingsResponse</td>
</tr>
</tbody>
</table>

The formal format specification is published as a part of the WSDL.

11.2.1 Operation: getFundingCodes FRIS XML request documentation

The FRIS getClassificationSchemes operation retrieves classification scheme information based on the supplied request criteria. The following tables will detail the parameters of the request document. A classification scheme must satisfy all specified limits to be returned, though if a single limit supports multiple values any match will satisfy that particular limit.

<table>
<thead>
<tr>
<th>Element path</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>window/pageSize</td>
<td>int</td>
<td>The number of results returned, defaults to 10.</td>
</tr>
<tr>
<td>window/pageNumber</td>
<td>int</td>
<td>The zero-indexed page number, defaults to 0.</td>
</tr>
<tr>
<td>window/orderings/order</td>
<td>order</td>
<td>A number of orderings.</td>
</tr>
<tr>
<td>window/orderings/order/id</td>
<td>string</td>
<td>The ordering id.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The getOrderings operation provides the valid id values.</td>
</tr>
<tr>
<td>window/orderings/order/locale</td>
<td>locale</td>
<td>The ordering locale.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not applicable for any funding code ordering.</td>
</tr>
<tr>
<td>window/orderings/order/direction</td>
<td>enumeration</td>
<td>The order direction, either &quot;ASCENDING&quot; or &quot;DESCENDING&quot;, defaults to &quot;ASCENDING&quot;.</td>
</tr>
<tr>
<td>search</td>
<td></td>
<td>Free text search, accepts Lucene query syntax. Will search in funding code, acronym, description, definition</td>
</tr>
</tbody>
</table>
The FRIS Funding Code XSD is available as part of the Funding Code service WSDL. An example of the format:

```xml
<fris:fundingCode code="114578">
  <fris:description id="73023560">
    <fris:texts>
      <fris:text locale="en">PhD Fellowship</fris:text>
      <fris:text locale="nl">Aspirant</fris:text>
    </fris:texts>
  </fris:description>
  <fris:definition>The PhD fellowship is a grant (*) subject to the National Social Security system by virtue of Art. 15, paragraph 2 of the Royal Decree of 28 November 1969, exempt from income tax pursuant to Art. 90, paragraph 2 of the Income Tax Code 1992 (**) with a duration of two years, renewable once for two years. The aim of the PhD fellowship is to carry out a research project under the direct supervision of an academic supervisor with the aim to obtain a PhD degree. Link</fris:definition>
  <fris:example>SCK-CEN, VITO, L'Oreal-Unesco</fris:example>
  <fris:deprecatedDate>9999-12-02</fris:deprecatedDate>
  <fris:allowedValue>true</fris:allowedValue>
  <fris:moneyStreamCode id="73023555" schemeId="Funding Money Stream" term="Second Money Stream"/>
  <fris:fundingOrganisationAssociations>
    <fris:fundingOrganisationAssociation id="73023565">
      <fris:associationType id="73021130" schemeId="Funding Organisation Role" term="Legal Party"/>
      <fris:organisation uuid="58f0d6d9-48e6-4cf6-a1e5-69a57c3fb0a1">
        <fris:dataProvider>fris</fris:dataProvider>
        <fris:dataProviderId>Research Foundation Flanders</fris:dataProviderId>
        <fris:name>
          <fris:texts>
            <fris:text locale="nl">Research Foundation</fris:text>
          </fris:texts>
        </fris:name>
      </fris:organisation>
    </fris:fundingOrganisationAssociation>
  </fris:fundingOrganisationAssociations>
</fris:fundingCode>
```
12 FRIS Data Model

12.1 Introduction

In order to document the resulting model in a clear and expressive manner we use a UML Class diagram as the primary data model documentation. Using an object-oriented modelling approach enables us to describe a model that reflects the real-world entities more accurately and less verbose than the existing CERIF data models.

One of the main considerations in the current research domain in Flanders is the existence of data silos, each research organisation is ultimately responsible for the scope and quality of the data that they submit to the FRIS system. When considering these relatively isolated data sets in a region wide context it follows that we have a number of scenarios in how the broader relationships between entities are expressed. There are basically five scenarios:

1. Relations between entities from the same data-provider.
2. A logical unique entity that is managed by multiple data-providers, for example a researcher that is or has been associated with multiple data-providers will be present with multiple representations even though they’re logically the same person.
3. Relations to entities that are managed by another data-provider.
4. Entities and relations to entities that are not part of the domain of a data-provider but are otherwise known. For example, a relation to a collaborating researcher from a foreign university.
5. Entities and relations to entities that are not part of the domain of a data-provider. For example, a relation to a collaborating researcher that is only expressed as a name reference.

In the first scenario it is trivial to determine which entities are referred in a given relation, assuming of-course that the identities are consistent within the set supplied by the data-provider.

In the second scenario we view each entity representation as a valid facet of the logical entity and link these representations as aliases of each other. This approach is similar to the owl:sameAs concept from the “OWL Web Ontology Language”. It is up to the service user to handle this situation appropriately.

In the third scenario we cannot assume that we can uniquely resolve a referred entity based on its natural properties, this means that any meaningful relations to externally managed entities have to come from the data-provider.

In the fourth and fifth scenario we have representations of “known” and “unknown” entities, in both cases the entity is not part of the dataset managed by the data-provider, for example a collaborating author from a foreign university. The amount of information known about these unmanaged entities is typically much less than the equivalent managed representation.

External entities (scenarios 3, 4 & 5) will use the same model structure as their internal counterparts, whether an entity is external or not will be expressed through the “external” Boolean attribute.

In the FRIS system have four main entities that are managed; organisations, persons, projects and research output.

In addition, we have associated entities that are managed individually, but are not the main focus of the system; classifications, journals and funding codes.
The model entities make extensive use of classification instances, service users can easily look up...
the full set of valid classification values using the classification scheme web service and the scheme identifiers listed in the data dictionary tables.

In order to facilitate unambiguous integration, the FRIS model is designed to avoid circular and bi-directional relation paths. This means that inter-entity relations are unidirectional and always refer to entities higher in the hierarchy.

Each of the shown entity types contains all of the associated information needed to describe that entity, as opposed to the more fragmented CERIF representations.

In the following chapters we will describe the model for the main entity concepts. Note that the shown UML Class diagrams are extracted directly from the Java model and not all properties are available in the XML representation. The data dictionary tables will document the available properties.
12.2 Abstract Entity

The AbstractEntity class contains all attributes that are common to all main entities and any system-attributes that are necessary.

![AbstractEntity UML class diagram](image)

Abstract entity attributes, i.e. common to all “first-level” entities:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>uuid</td>
<td>128-bit level 4 UUID</td>
<td>All FRIS entities are assigned an UUID when first created in the system</td>
</tr>
<tr>
<td>created</td>
<td>Timestamp</td>
<td>Entity creation timestamp (for reporting/auditing purposes)</td>
</tr>
<tr>
<td>lastModified</td>
<td>Timestamp</td>
<td>Entity last modification timestamp (for reporting/auditing purposes)</td>
</tr>
<tr>
<td>state</td>
<td>Enumeration</td>
<td>ACTIVE – An entity is public</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CONFIDENTIAL – An entity is confidential and is not discoverable by the public or other data-providers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BACKEND_ONLY – An entity is not discoverable by the public</td>
</tr>
<tr>
<td>dataProvider</td>
<td>A DataProvider reference</td>
<td>A reference to the data-provider responsible for this entity (see chapter)!</td>
</tr>
<tr>
<td>dataProviderId</td>
<td>String</td>
<td>The local, data-provider identifier</td>
</tr>
<tr>
<td>Property</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>external</td>
<td>Boolean</td>
<td>Whether this entity representation is to be regarded as an externally managed entity for this data-provider</td>
</tr>
<tr>
<td>hidden</td>
<td>Boolean</td>
<td>Whether an entity has been hidden by a FRIS administrator</td>
</tr>
<tr>
<td>aliases</td>
<td>List of UUID’s</td>
<td>List of UUID’s that are aliases to this entity, assumed to be of the same entity type</td>
</tr>
<tr>
<td>sources</td>
<td>List of Source references</td>
<td>The sources attribute is a collection of identity authority – identity mappings, including the authority (often the data provider), an identifier type and the identifier value. All local identifiers and aliases are persisted in this attribute. (see chapter 12.11)</td>
</tr>
</tbody>
</table>

Table 1 Abstract entity properties
12.3 Organisation

In the following diagram we’ve shown the UML class diagram for the classes that encapsulate the organisation concept. See chapter 12.2 for detailed information on the abstract entity class.

Figure 2 Organisation UML class diagram

The Organisation concept consists of the “Organisation” class and its “RelatedOrganisationAssociation”, “OrganisationPhysicalAddressAssociation” and “OrganisationElectronicAddressAssociation” association objects which are detailed below:
The Organisation implementation attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>LocalizedString</td>
<td>The primary, localized name of the organisation</td>
</tr>
<tr>
<td>acronym</td>
<td>String</td>
<td>The organisation acronym is intended as a short organisation specific abbreviation</td>
</tr>
<tr>
<td>organisationType</td>
<td>Classification</td>
<td>The organisation type, mapped to ORGANISATION_TYPE scheme</td>
</tr>
<tr>
<td>organisationActivityTypes</td>
<td>List of Classification</td>
<td>Any number of organisation activity types, mapped to the ORGANISATION_ACTIVITY_TYPE scheme</td>
</tr>
<tr>
<td>startDate</td>
<td>Timestamp</td>
<td>Organisation lifecycle start date</td>
</tr>
<tr>
<td>endDate</td>
<td>Timestamp</td>
<td>Organisation lifecycle end date</td>
</tr>
<tr>
<td>classifications</td>
<td>List of Classification</td>
<td>This is a generic store of classification relations intended for purely descriptive classifications, like NACE codes</td>
</tr>
<tr>
<td>researchActivity</td>
<td>LocalizedString</td>
<td>A localized, free-text description of the research activity of the organisation</td>
</tr>
<tr>
<td>disciplines</td>
<td>List of Classification</td>
<td>Any number of discipline codes, mapped to the DISCIENCE scheme.</td>
</tr>
<tr>
<td>subjectArea</td>
<td>List of Classification</td>
<td>Any number of subject area codes, mapped to the SUBJECT_AREA scheme.</td>
</tr>
<tr>
<td>flemishDisciplines</td>
<td>List of Classification</td>
<td>Any number of Flemish discipline codes, mapped to the FLEMISH_rDISCIPLINE scheme.</td>
</tr>
<tr>
<td>keywords</td>
<td>List of LocalizedKeywords</td>
<td>Any number of free keywords (see chapter 12.12)</td>
</tr>
<tr>
<td>physicalAddresses</td>
<td>List of PhysicalAddressAssociation</td>
<td>An organisation may have any number of physical address associations (see chapter 12.9)</td>
</tr>
<tr>
<td>electronicAddresses</td>
<td>List of ElectronicAddressAssociation</td>
<td>An organisation may have any number of electronic address associations (see chapter 12.10)</td>
</tr>
<tr>
<td>relatedOrganisations</td>
<td>List of RelatedOrganisationAssociation</td>
<td>An organisation may have any number of related organisations</td>
</tr>
</tbody>
</table>

Table 2 Organisation properties

There are a number of ways organisations might relate to each other:

1. Formal hierarchical organisation structure (parent-child)
2. “Virtual” cross-cutting hierarchies for specific science areas
3. “Taken over by” if an organisation is merged into another

These relations are expressed through the related organisations association, the semantics of the relation being specified by the associated classification.

The “RelatedOrganisationAssociation” implementation properties:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>relatedTo</td>
<td>Organisation</td>
<td>The related organisation</td>
</tr>
<tr>
<td>associationType</td>
<td>Classification</td>
<td>The association type, mapped to the ORGANISATION_RELATION scheme</td>
</tr>
<tr>
<td>startDate</td>
<td>Timestamp</td>
<td>The association lifecycle start date</td>
</tr>
<tr>
<td>endDate</td>
<td>Timestamp</td>
<td>The association lifecycle end date</td>
</tr>
</tbody>
</table>

Table 3 Related organisation association properties

An organisation may have any number of physical and electronic addresses.

The “ OrganisationPhysicalAddressAssociation” implementation properties:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>relatedTo</td>
<td>PhysicalAddress</td>
<td>The related physical address</td>
</tr>
<tr>
<td>associationType</td>
<td>Classification</td>
<td>The association type, mapped to the ORGANISATION_PHYSICAL_ADDRESS_ASSOCIATION scheme</td>
</tr>
<tr>
<td>startDate</td>
<td>Timestamp</td>
<td>The association lifecycle start date</td>
</tr>
<tr>
<td>endDate</td>
<td>Timestamp</td>
<td>The association lifecycle end date</td>
</tr>
</tbody>
</table>

Table 4 Organisation physical address association properties

The “ OrganisationElectronicAddressAssociation” implementation properties:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>relatedTo</td>
<td>ElectronicAddress</td>
<td>The related electronic address</td>
</tr>
<tr>
<td>associationType</td>
<td>Classification</td>
<td>The association type, mapped to the ORGANISATION ELECTRONIC_ADDRESS_ASSOCIATION scheme</td>
</tr>
</tbody>
</table>

Table 5 Organisation electronic address association properties
<table>
<thead>
<tr>
<th>startDate</th>
<th>Timestamp</th>
<th>The association lifecycle start date</th>
</tr>
</thead>
<tbody>
<tr>
<td>endDate</td>
<td>Timestamp</td>
<td>The association lifecycle end date</td>
</tr>
</tbody>
</table>

Table 5 Organisation electronic address association properties
12.4 Person

In the following diagram we’ve shown the UML class diagram for the classes that encapsulate the person concept. See chapter 12.2 for detailed information on the abstract entity class.

Figure 3 Person UML class diagram

The Person concept consists of the “Person” class and its “RelatedPersonAssociation”, “PersonOrganisationAssociation”, “PersonPhysicalAddressAssociation” and “PersonElectronicAddressAssociation” association objects which are detailed below:

The Person implementation properties:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Name</td>
<td>The name of the person</td>
</tr>
<tr>
<td>nameVariants</td>
<td>List of Name</td>
<td>Any alternate names of the person. The intention is that name variants are</td>
</tr>
<tr>
<td></td>
<td></td>
<td>primarily used when querying against the data set for example through the</td>
</tr>
</tbody>
</table>
A person may have any number of physical address associations (see chapter 12.9)

A person may have any number of electronic address associations (see chapter 12.10)

Table 6 Person properties

The relation between organisation and person is represented by a PersonOrganisationAssociation object in order to capture all the applicable relation attributes. Person-organisation associations, also known as assignments are a bit special in that they as the only association type object that are expected to have a persistent identifier in the data provider systems.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>relatedTo</td>
<td>Organisation</td>
<td>The related organisation</td>
</tr>
<tr>
<td>associationType</td>
<td>Classification</td>
<td>The association type, mapped to the PERSON_ORGANISATION_RELATION scheme</td>
</tr>
<tr>
<td>dataProvider</td>
<td>ADataProvider reference</td>
<td>A reference to the data-provider responsible for this entity</td>
</tr>
<tr>
<td>dataProviderId</td>
<td>String</td>
<td>The local, data-provider identifier</td>
</tr>
</tbody>
</table>
Table 7 Person organisation association properties

The person-to-person relation is intended to capture direct relationships like “supervisor-of/student-of” and the like. The leader-of relation is expressed indirectly, through which person is classified as an organisation leader on the PersonOrganisationAssociation.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>relatedTo</td>
<td>Person</td>
<td>The related person</td>
</tr>
<tr>
<td>associationType</td>
<td>Classification</td>
<td>The association type, mapped to the PERSON_RELATION scheme</td>
</tr>
<tr>
<td>startDate</td>
<td>Timestamp</td>
<td>The association lifecycle start date</td>
</tr>
<tr>
<td>endDate</td>
<td>Timestamp</td>
<td>The association lifecycle end date</td>
</tr>
</tbody>
</table>

Table 8 Related person association properties

A person may have any number of physical and electronic addresses.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>relatedTo</td>
<td>PhysicalAddress</td>
<td>The related physical address</td>
</tr>
<tr>
<td>associationType</td>
<td>Classification</td>
<td>The association type, mapped to the PERSON_PHYSICAL_ADDRESS_ASSOCIATION scheme</td>
</tr>
<tr>
<td>startDate</td>
<td>Timestamp</td>
<td>The association lifecycle start date</td>
</tr>
<tr>
<td>endDate</td>
<td>Timestamp</td>
<td>The association lifecycle end date</td>
</tr>
</tbody>
</table>

Table 9 Person physical address association properties

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>relatedTo</td>
<td>ElectronicAddress</td>
<td>The related electronic address</td>
</tr>
<tr>
<td>associationType</td>
<td>Classification</td>
<td>The association type, mapped to the PERSON_ELECTRONIC_ADDRESS_ASSOCIATION scheme</td>
</tr>
<tr>
<td>startDate</td>
<td>Timestamp</td>
<td>The association lifecycle start date</td>
</tr>
<tr>
<td>endDate</td>
<td>Timestamp</td>
<td>The association lifecycle end date</td>
</tr>
<tr>
<td>Table 10 Person electronic address association properties</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12.5 Project

In the following diagram we’ve shown the UML class diagram for the classes that encapsulate the project concept. See chapter 12.2 for detailed information on the abstract entity class.

![Figure 4 Project UML class diagram](image)
The Project concept consists of the “Project” class, the “Projectfunding” and “ProjectFundingBudgetLine” classes and its “RelatedProjectAssociation”, “ProjectOrganisationAssociation” and “ProjectParticipant” association objects which are detailed below:

The project implementation properties:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>LocalizedString</td>
<td>The localized name of the project</td>
</tr>
<tr>
<td>acronym</td>
<td>String</td>
<td>The acronym of the project</td>
</tr>
<tr>
<td>startDate</td>
<td>Timestamp</td>
<td>The project lifecycle start date</td>
</tr>
<tr>
<td>endDate</td>
<td>Timestamp</td>
<td>The project lifecycle end date</td>
</tr>
<tr>
<td>projectTypes</td>
<td>List of Classification</td>
<td>Any number of project type classifications, mapped to the PROJECT_TYPE scheme</td>
</tr>
<tr>
<td>projectAbstract</td>
<td>LocalizedString</td>
<td>The localized project abstract</td>
</tr>
<tr>
<td>homepage</td>
<td>String</td>
<td>The project homepage</td>
</tr>
<tr>
<td>applicationCodes</td>
<td>List of Classification</td>
<td>Any number of IWETO application code classifications relevant for the project, mapped to the APPLICATION_CODE scheme</td>
</tr>
<tr>
<td>technologyCodes</td>
<td>List of Classification</td>
<td>Any number of IWT technology code classifications relevant for the project, mapped to the TECHNOLOGY_CODE scheme</td>
</tr>
<tr>
<td>disciplines</td>
<td>List of Classification</td>
<td>Any number of discipline codes relevant for the project, mapped to the DISCIPLINE scheme</td>
</tr>
<tr>
<td>fwoDisciplines</td>
<td>List of Classification</td>
<td>Any number of FWO discipline codes, mapped to the FWO_DISCIPLINE scheme</td>
</tr>
<tr>
<td>keywords</td>
<td>List of LocalizedKeywords</td>
<td>Any number of free keywords (see chapter 12.12)</td>
</tr>
<tr>
<td>projectOrganisations</td>
<td>List of ProjectOrganisationAssociation</td>
<td>Any number of project organisation associations</td>
</tr>
<tr>
<td>relatedProjects</td>
<td>List of RelatedProjectAssociation</td>
<td>Any number of related project associations</td>
</tr>
<tr>
<td>participants</td>
<td>List of ProjectParticipant</td>
<td>Any number of project participants</td>
</tr>
<tr>
<td>projectFunding</td>
<td>List of ProjectFunding</td>
<td>Any number of project funding associations</td>
</tr>
</tbody>
</table>
fundingIdentifiers | List of Source | Any number of funding identifiers (f.ex. FWO contract id), see chapter 12.11 for details. Source authority is mapped to the FUNDING_IDENTIFIER_TYPE scheme

Table 11 Project properties

The project-to-project relation is represented by a RelatedProjectAssociation object in order to capture all the applicable relation attributes.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>relatedTo</td>
<td>Project</td>
<td>The related project</td>
</tr>
<tr>
<td>associationType</td>
<td>Classification</td>
<td>The association type, mapped to the PROJECT_RELATION scheme</td>
</tr>
<tr>
<td>startDate</td>
<td>Timestamp</td>
<td>The association lifecycle start date</td>
</tr>
<tr>
<td>endDate</td>
<td>Timestamp</td>
<td>The association lifecycle end date</td>
</tr>
</tbody>
</table>

Table 12 Related project association properties

The project-to-organisation relation is represented by a ProjectOrganisationAssociation object in order to capture all the applicable relation attributes.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>relatedTo</td>
<td>Organisation</td>
<td>The related organisation</td>
</tr>
<tr>
<td>associationType</td>
<td>Classification</td>
<td>The association type, mapped to the PROJECT_ORGANISATION_ROLE scheme</td>
</tr>
</tbody>
</table>

Table 13 Project organisation association properties

The project participant relation captures both internal participants (i.e. managed directly by the data provider) and external participants (i.e. persons from other organisations). Note that “assignment”, “person” and “organisation” are mutually exclusive.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>assignment</td>
<td>PersonOrganisationAssociation</td>
<td>Internal person relation to &quot;assignment&quot; enabling un-ambiguous organisation &amp; person attribution.</td>
</tr>
<tr>
<td>person</td>
<td>Person</td>
<td>Person relation directly to person instance, only person will be attributable.</td>
</tr>
<tr>
<td>organisation</td>
<td>Organisation</td>
<td>Organisation relation directly to organisation instance, only organisation will be attributable.</td>
</tr>
<tr>
<td>associationType</td>
<td>Classification</td>
<td>The association type, mapped to the PROJECT_PARTICIPATION_ROLE scheme</td>
</tr>
</tbody>
</table>
The association lifecycle start date

The association lifecycle end date

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>fundingCode</td>
<td>FundingCode</td>
<td>The funding code, see chapter XXX</td>
</tr>
<tr>
<td>fundingRole</td>
<td>Classification</td>
<td>The funding role, mapped to the FUNDING_ROLE scheme</td>
</tr>
<tr>
<td>startDate</td>
<td>Timestamp</td>
<td>The funding/budget period start date</td>
</tr>
<tr>
<td>endDate</td>
<td>Timestamp</td>
<td>The funding/budget period end date</td>
</tr>
</tbody>
</table>

### Table 14 Project participant properties

The project funding relations capture information on funding.

### Table 15 Project funding properties

12.6 Journal

In the following diagram we’ve shown the UML class diagram for the classes that encapsulate the journal concept. See chapter 12.2 for detailed information on the abstract entity class.
Figure 5 Journal UML class diagram
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Pub</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>title</td>
<td>String</td>
<td>Y</td>
<td>The title of the journal in its original language</td>
</tr>
<tr>
<td>alternateTitle</td>
<td>String</td>
<td>Y</td>
<td>The alternate title of the journal in its original language</td>
</tr>
<tr>
<td>issn</td>
<td>String</td>
<td>Y</td>
<td>The print ISSN of the journal</td>
</tr>
<tr>
<td>electronicIssn</td>
<td>String</td>
<td>Y</td>
<td>The electronic ISSN of the journal</td>
</tr>
<tr>
<td>journalHomepage</td>
<td>String</td>
<td>Y</td>
<td>The journal homepage URL</td>
</tr>
<tr>
<td>publisher</td>
<td>String</td>
<td>Y</td>
<td>The journal publisher</td>
</tr>
<tr>
<td>publicationLocation</td>
<td>String</td>
<td>Y</td>
<td>The publication location, typically a city</td>
</tr>
<tr>
<td>publicationCountry</td>
<td>Classification</td>
<td>Y</td>
<td>The publication country, mapped to COUNTRY scheme</td>
</tr>
<tr>
<td>startYear</td>
<td>Integer</td>
<td>Y</td>
<td>The start year of the journal taken from DOAJ journal representation</td>
</tr>
<tr>
<td>endYear</td>
<td>Integer</td>
<td>Y</td>
<td>The end year of the journal (not populated)</td>
</tr>
<tr>
<td>peerReviewed</td>
<td>Classification</td>
<td>Y</td>
<td>The peer review status of the journal if known, mapped by the REFEREE_TYPE scheme</td>
</tr>
<tr>
<td>openAccess</td>
<td>Classification</td>
<td>Y</td>
<td>The open access status of the journal if known, mapped by the OPEN_ACCESS scheme</td>
</tr>
<tr>
<td>creativeCommonsLicense</td>
<td>Classification</td>
<td>Y</td>
<td>The creative commons license of the journal if known, mapped by the CREATIVE_COMMONS_LICENSE scheme</td>
</tr>
<tr>
<td>asjc</td>
<td>List of Classification</td>
<td>Y</td>
<td>A number of subjects relevant for the journal, mapped to the ASJC scheme</td>
</tr>
<tr>
<td>keywords</td>
<td>List of LocalizedKeywords</td>
<td>Y</td>
<td>Any number of free keywords (see chapter 12.12)</td>
</tr>
<tr>
<td>sherpaRomeo</td>
<td>SherpaRoMEO</td>
<td>Y</td>
<td>Sherpa RoMEO information, see below for details on attributes</td>
</tr>
<tr>
<td>metrics</td>
<td>List of MetricValue</td>
<td>Y</td>
<td>Any number of MetricValue instances, see below</td>
</tr>
</tbody>
</table>

Table 16 Journal properties

The Sherpa RoMEO properties are encapsulated in their own object:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
</table>


<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>type</strong></td>
<td>Classification</td>
<td>The metric type, these classifications follow the same pattern as authority i.e. they express both authority and provenance in one scheme. Mapped to the METRICS_TYPE scheme</td>
</tr>
<tr>
<td><strong>lastUpdated</strong></td>
<td>Timestamp</td>
<td>Stores when this value was last updated</td>
</tr>
<tr>
<td><strong>year</strong></td>
<td>Integer</td>
<td>The year for which this metric value is relevant</td>
</tr>
<tr>
<td><strong>value</strong></td>
<td>Integer or BigDecimal</td>
<td>The actual metric value, data type depends on implementation</td>
</tr>
</tbody>
</table>

Table 18 MetricValue properties
12.7 Research output
Figure 6 Research output UML class diagram

The research output model in FRIS contains five research output types; book, book contribution, journal contribution, patent and non-written output even only the three first are really used at the moment. The two last are already defined but not used yet (except for testing purposes).

The base properties that all research output instances contain are expressed in the “ResearchOutput” class which is also a super-class to all research output implementations.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>title</td>
<td>LocalizedString</td>
<td>The localized title of the output</td>
</tr>
<tr>
<td>researchOutputType</td>
<td>Classification</td>
<td>The research output type taxonomy classification, mapped to the RESEARCH_OUTPUT_TYPE scheme. This is expected to be a hierarchical scheme with potentially a sub-tree for each individual type.</td>
</tr>
<tr>
<td>refereeType</td>
<td>Classification</td>
<td>The referee type, mapped to the REFEREE_TYPE scheme</td>
</tr>
<tr>
<td>artisticAndDesign</td>
<td>boolean</td>
<td>Whether the research output can be designated a artistic or design output</td>
</tr>
<tr>
<td>keywords</td>
<td>List of LocalizedKeywords</td>
<td>Any number of free keywords</td>
</tr>
<tr>
<td>researchOutputProjects</td>
<td>List of ResearchOutputProjectAssociation</td>
<td>Any number of related project associations</td>
</tr>
<tr>
<td>participants</td>
<td>List of ResearchOutputParticipant</td>
<td>Any number of research output participants</td>
</tr>
<tr>
<td>relatedResearchOutputs</td>
<td>List of RelatedResearchOutputAssociation</td>
<td>Any number of related research output associations</td>
</tr>
<tr>
<td>disciplines</td>
<td>List of Classification</td>
<td>Any number of discipline codes</td>
</tr>
</tbody>
</table>

Table 19 Research output properties

A ResearchOutputProjectAssociation typically expresses relations to any projects that resulted in this output.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>relatedTo</td>
<td>Project</td>
<td>The related project</td>
</tr>
<tr>
<td>associationType</td>
<td>Classification</td>
<td>The association type, mapped to the RESEARCH_OUTPUT_PROJECT_RELATION scheme</td>
</tr>
</tbody>
</table>

Table 20 Research output project association properties
The research participant relation captures both internal participants (i.e. managed directly by the data provider) and external participants (i.e. persons from other organisations).

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>assignment</td>
<td>PersonOrganisationAssociation</td>
<td>Internal person relation to &quot;assignment&quot; enabling un-ambiguous organisation &amp; person attribution.</td>
</tr>
<tr>
<td>person</td>
<td>Person</td>
<td>Person relation directly to person instance, only person will be attributable.</td>
</tr>
<tr>
<td>organisation</td>
<td>Organisation</td>
<td>Organisation relation directly to organisation instance, only organisation will be attributable.</td>
</tr>
<tr>
<td>groupAuthor</td>
<td>String</td>
<td>Group author or consortium</td>
</tr>
<tr>
<td>associationType</td>
<td>Classification</td>
<td>The association type, mapped to the RESEARCH_OUTPUT_PARTICIPATION_ROLE scheme</td>
</tr>
</tbody>
</table>

Table 21 Research Output participant properties

A RelatedResearchOutputAssociation expresses a relation between two research output instances, for example a book contribution is "part of" a book.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>relatedTo</td>
<td>ResearchOutput</td>
<td>The related research output</td>
</tr>
<tr>
<td>associationType</td>
<td>Classification</td>
<td>The association type, mapped to the RESEARCH_OUTPUT_RELATION_TYPE scheme</td>
</tr>
</tbody>
</table>

Table 22 Related research output association properties

The WrittenOutput specialisation is the super-class for all of the traditional published scholarly output, namely Book, BookContribution, JournalContribution and Patent.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>alternateTitle</td>
<td>LocalizedString</td>
<td>The localized alternate or sub title of the output</td>
</tr>
<tr>
<td>originalLanguage</td>
<td>Classification</td>
<td>The original language of the output, mapped to the LANGUAGE scheme</td>
</tr>
<tr>
<td>researchAbstract</td>
<td>LocalizedString</td>
<td>The localized abstract or description of the output</td>
</tr>
</tbody>
</table>

Table 23 Written Output properties
The AssociatesBook and its super-type BookInformation encapsulate properties that are particular to a book (BookInformation) or book reference (AssociatesBook).

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bookVolume</td>
<td>String</td>
<td>The volume of the book or referred book</td>
</tr>
<tr>
<td>bookSeriesName</td>
<td>String</td>
<td>The series name of the book or referred book</td>
</tr>
<tr>
<td>bookTitle</td>
<td>String</td>
<td>The title of the referred book (only applicable for AssociatesBook)</td>
</tr>
</tbody>
</table>

Table 24 Associates book and book information properties

The AssociatesEvent interface encapsulates properties that pertain to an event association.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>events</td>
<td>List of Event</td>
<td>Any number of associated Events</td>
</tr>
</tbody>
</table>

Table 25 Associates event property

The Event properties are:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>String</td>
<td>The name of the event</td>
</tr>
<tr>
<td>eventType</td>
<td>Classification</td>
<td>The type of event</td>
</tr>
<tr>
<td>location</td>
<td>String</td>
<td>The location or city of the event, mapped to the EVENT_TYPE scheme</td>
</tr>
<tr>
<td>country</td>
<td>Classification</td>
<td>The country classification of the event, mapped to the COUNTRY scheme</td>
</tr>
<tr>
<td>startDate</td>
<td>Date</td>
<td>The start date of the event</td>
</tr>
<tr>
<td>endDate</td>
<td>Date</td>
<td>The end date of the event</td>
</tr>
</tbody>
</table>

Table 26 Event properties

The AssociatesJournal interface encapsulates properties that pertain to a contribution to a journal association.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
</table>
Table 27 Associates journal properties

The AssociatesPublisher interface encapsulates properties that pertain to the publisher of a published work (specifically properties needed for a correct output reference).

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>publisher</td>
<td>String</td>
<td>The name of the publisher</td>
</tr>
<tr>
<td>publicationLocation</td>
<td>String</td>
<td>The location or city where this work was published</td>
</tr>
<tr>
<td>publicationCountry</td>
<td>Classification</td>
<td>The country classification of the country where this work was published, mapped to the COUNTRY scheme</td>
</tr>
</tbody>
</table>

Table 28 Associates publisher properties

The Pages interface encapsulates paging information for a contribution.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>pages</td>
<td>String</td>
<td>The pages where the contribution can be found, note that this may not be contiguous or numeric, hence the generic pages field instead of a start/end page field</td>
</tr>
<tr>
<td>pageCount</td>
<td>Integer</td>
<td>The number of pages contributed</td>
</tr>
</tbody>
</table>

Table 29 Pages properties

The PublicationLifecycle interface contains a couple of properties relating to the lifecycle of a published work.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>publicationDate</td>
<td>Date</td>
<td>The date a work was published</td>
</tr>
<tr>
<td>publicationState</td>
<td>Classification</td>
<td>The publication state of a work, for example &quot;In press&quot; or &quot;Published&quot;. mapped to the PUBLICATION_STATUS scheme</td>
</tr>
</tbody>
</table>

Table 30 Publication lifecycle properties

The EvaluationPanel interface contains a single property.
Table 31 Evaluation panel property

The evaluation panel of an output, mapped to the EVALUATION_PANEL scheme

Table 32 Peer reviewed property

The peer review or referee status of an output, mapped to the REFEREE_TYPE scheme

Table 33 Research output type compositions

One or more of the preceding concepts composes each of the research output types; this composition is outlined in the table below for each type:

<table>
<thead>
<tr>
<th>Output type composition</th>
<th>Book</th>
<th>Book Contribution</th>
<th>Journal Contribution</th>
<th>Patent</th>
<th>Non Written Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research output (Table 19)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Written Output (Table 23)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Book information (Table 24)</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associates book (Table 24)</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associates event (Table 25 &amp; Table 26)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Associates journal (Table 27)</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associates publisher (Table 28)</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pages (Table 29)</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Publication lifecycle (Table 30)</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation panel (Table 31)</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer reviewed (Table 32)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

The Patent type has a number of properties that are particular to the type (in addition to the properties inherited the traits listed in Table 33):
### Table 34 Patent type properties

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>filingDate</td>
<td>Date</td>
<td>The date the patent was filed at the patent office</td>
</tr>
<tr>
<td>approvalDate</td>
<td>Date</td>
<td>The date the patent was approved</td>
</tr>
<tr>
<td>patentNumber</td>
<td>String</td>
<td>The patent number</td>
</tr>
<tr>
<td>patentCountry</td>
<td>Classification</td>
<td>The country classification of the country of the patent office, mapped to the COUNTRY scheme</td>
</tr>
</tbody>
</table>

The NonWrittenOutput class contains the following properties (in addition to the properties inherited the traits listed in Table 33):

### Table 35 NonWrittenOutput properties

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>disseminationDate</td>
<td>Date</td>
<td>The date this output was disseminated</td>
</tr>
<tr>
<td>description</td>
<td>LocalizedString</td>
<td>A localized description of the output</td>
</tr>
<tr>
<td>technicalInformation</td>
<td>LocalizedString</td>
<td>A localized technical information description</td>
</tr>
<tr>
<td>review</td>
<td>ImpactReview</td>
<td>The impact review of this output</td>
</tr>
<tr>
<td>externalReferences</td>
<td>List of Source</td>
<td>The external references of this output. The source authority is mapped to the EXTERNAL_REFERENCE_AUTHORITY scheme</td>
</tr>
</tbody>
</table>

### Table 36 ImpactReview properties

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>impactDescription</td>
<td>LocalizedString</td>
<td>A localized impact description</td>
</tr>
<tr>
<td>researchContext</td>
<td>LocalizedString</td>
<td>A localized description of the research context</td>
</tr>
<tr>
<td>impactReferences</td>
<td>List of Source</td>
<td>The impact references of this output. The source authority is mapped to the IMPACT_REFERENCE_AUTHORITY scheme</td>
</tr>
</tbody>
</table>
12.8 Classification Scheme & Classification

Each classification scheme consists of a number of associated hierarchically classified classifications. We've chosen to model classifications as inherently hierarchical since this is a fairly common usage and using classifications to describe this behaviour is very inefficient even though the recursive nature is appealing from a modelling perspective.

We've chosen a simple representation of classifications and schemes; the main reason for this is that any additional information from classifying both classifications and schemes is not needed in the FRIS system, even though that information makes sense in a modelling environment.

A classification scheme is equivalent to a SKOS\(^4\) ConceptScheme and is a container for a collection of related classifications. Both entities have a surrogate identifier in order to allow changes in the natural identifiers without upsetting any object references.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>String</td>
<td>The classification scheme id, for all of the expected schemes this is identical to the scheme mapping name, i.e. COUNTRY, PROJECT_TYPE, etc.</td>
</tr>
<tr>
<td>dataProvider</td>
<td>DataProvider</td>
<td>A reference to the data-provider responsible for this entity</td>
</tr>
<tr>
<td>dataProviderId</td>
<td>String</td>
<td>The local, data-provider identifier</td>
</tr>
<tr>
<td>schemeld</td>
<td>String</td>
<td>The classification scheme id is a contextual scheme identifier, for example “iwDisciplineCode” in the case of the IWETO discipline code classification scheme.</td>
</tr>
<tr>
<td>description</td>
<td>LocalizedString</td>
<td>The scheme description is a short textual description of the meaning of the classification scheme, similar to the SKOS definition element.</td>
</tr>
</tbody>
</table>

\(^4\) [http://www.w3.org/2004/02/skos/](http://www.w3.org/2004/02/skos/) Simple Knowledge Organisation System
A classification is equivalent to a SKOS Concept and typically expresses some form of formal categorisation.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>Integer</td>
<td>The managed entity id</td>
</tr>
<tr>
<td>dataProvider</td>
<td>DataProvider</td>
<td>A reference to the data-provider responsible for this entity</td>
</tr>
<tr>
<td>dataProviderId</td>
<td>String</td>
<td>The local, data-provider identifier</td>
</tr>
<tr>
<td>term</td>
<td>String</td>
<td>Classification term is a contextual meaningful identifier that is unique within the scope of the classification scheme; this identifier may be equivalent to a SKOS notation or a single word label. For example “B001” in the case of the “General biomedical sciences” IWETO discipline code.</td>
</tr>
<tr>
<td>description</td>
<td>LocalizedString</td>
<td>Classification description is a short description of the classification, for example “General biomedical sciences”.</td>
</tr>
<tr>
<td>scheme</td>
<td>ClassificationScheme</td>
<td>The scheme that this classification is part of</td>
</tr>
<tr>
<td>parent</td>
<td>Classification</td>
<td>The parent classification</td>
</tr>
<tr>
<td>attributable</td>
<td>Boolean</td>
<td>Specifies whether a particular classification is attributable/ selectable.</td>
</tr>
</tbody>
</table>

Table 38 Classification attributes

### 12.9 Physical Address

Physical address entities may be created and managed independently of the entity relating to the physical address, though only via the web service ingestion service.

![Physical Address UML class diagram](image)

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>Integer</td>
<td>The managed entity id</td>
</tr>
</tbody>
</table>

Figure 8 Physical address UML class diagram
12.10 Electronic Address

Electronic address entities are solely created and managed as part of the owning entity.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>Integer</td>
<td>The managed entity id</td>
</tr>
<tr>
<td>addressType</td>
<td>Classification</td>
<td>The address type, mapped to the ELECTRONIC_ADDRESS scheme</td>
</tr>
<tr>
<td>value</td>
<td>String</td>
<td>The electronic address value</td>
</tr>
</tbody>
</table>

Table 39 Physical address attributes

12.11 Source

The source concept encapsulates an alternate identity or representation of the entity.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>identifier</td>
<td>String</td>
<td></td>
</tr>
<tr>
<td>authorityScheme</td>
<td>String</td>
<td></td>
</tr>
<tr>
<td>authorityTerm</td>
<td>String</td>
<td></td>
</tr>
<tr>
<td>externallyManaged</td>
<td>boolean</td>
<td></td>
</tr>
<tr>
<td>authority</td>
<td>Classification</td>
<td></td>
</tr>
</tbody>
</table>

Figure 10 Source UML class diagram
Table 41 Source attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>Integer</td>
<td>The managed entity id</td>
</tr>
<tr>
<td>authority</td>
<td>Classification</td>
<td>The authority classification that signifies this data-provider, mapped to the AUTHORITY scheme (unless overridden)</td>
</tr>
<tr>
<td>identifier</td>
<td>String</td>
<td>The external identifier</td>
</tr>
<tr>
<td>externallyManaged</td>
<td>Boolean</td>
<td>Whether a source instance is managed directly by a data-provider (true) or added by the FRIS system (false)</td>
</tr>
</tbody>
</table>

12.12 Localized Keywords

Figure 11 LocalizedKeywords UML class diagram

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Data-type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>Integer</td>
<td>The managed entity id</td>
</tr>
<tr>
<td>locale</td>
<td>Locale</td>
<td>The locale for which the keywords are applicable</td>
</tr>
<tr>
<td>keywords</td>
<td>List of String</td>
<td>A list of free keywords</td>
</tr>
</tbody>
</table>