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FRIS IT-Infrastructure

Service description

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1 Document history

Version	Date	Author	Summary of changes
1.0	02/09/2014	Brian Plauborg (Atira)	Initial version of document including basic structure, web service how-to's and service descriptions.
1.1	08/10/2014	Brian Plauborg (Atira)	Added journal service chapter.
1.1	3/11/2014	CdG	Added some comments on Journal Service + updated "content"
1.2	11/12/2014	Brian Plauborg (Atira)	Added section on research output. Updated project & journal sections.
1.3	19/05/2015	Brian Plauborg (Elsevier)	Added FRIS XML versions of entity web services.
1.4	09/07/2015	Brian Plauborg (Elsevier)	Added chapter on classification scheme service.
1.5	17/07/2015	Brian Plauborg (Elsevier)	Updated document with new bulk operation and new endpoints.
1.6	15/07/2016	Brian Plauborg (Elsevier)	Miscellaneous updates including changes service and funding code service.
1.7	16/01/2018	CdG	PersonService afgeschermd voor privacy issues
1.8	15/03/2018	CdG	PersonService weer open na analyse van DPO
1.9	08/06/2018	Brian Plauborg (Elsevier)	Added data model section.
1.10	28/06/2018	CdG (EWI)	Modified example GetRO with Journal info
1.11	05/04/2019	Brian Plauborg (Elsevier)	Updated service descriptions documentation. Added Portal REST descriptions.
1.12	21/05/2019	Yves Hellemans	Review SOAP documentatie

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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 targetd 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:

Environment	Endpoint root
Staging	https://stfrisr4.researchportal.be/ws/
Production	https://frisr4.researchportal.be/ws/

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>
                </window>
                <uuids>
                    <uuid>c0669985-967c-47b7-8dfc-d8610bd36606</uuid>
                    <uuid>1fc77569-3778-4828-8c38-195cb51584c6</uuid>
                </uuids>
```

[1] Common European Research Information Format

```
            </organisationCriteria>
        </ns1:getOrganisations>
    </soap:Body>
</soap:Envelope>
```

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:

```
<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

Environment	Endpoint WSDL
Staging	https://stfrisr4.researchportal.be/ws/IngestionService?wsdl
Production	https://frisr4.researchportal.be/ws/IngestionService?wsdl

3.2 Service operations

Operation	Input	Output
ingest	ingest	ingestResponse
ingestBulk	ingestBulk	correlationId
getBulkResponse	getBulkResponse	ingestBulkresponse
deleteOrganisation	deleteOrganisation	deleteOrganisationResponse
deleteOrganisationByUuid	deleteOrganisationByUuid	deleteOrganisationByUuidResponse
deletePerson	deletePerson	deletePersonResponse
deletePersonByUuid	deletePersonByUuid	deletePersonByUuidResponse
deleteProject	deleteProject	deleteProjectResponse
deleteProjectByUuid	deleteProjectByUuid	deleteProjectByUuidResponse
deleteResearchOutput	deleteResearchOutput	deleteResearchOutputResponse
deleteResearchOutputByUuid	deleteResearchOutputByUuid	deleteResearchOutputByUuidResponse

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:

Type	Description
SECURITY	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.
XSD	The submitted CERIF is checked against the XSD for validity. All violations will be returned as discrete error messages.
REFERENTIAL	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.
INTERNAL_CHECK	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.
BUSINESS_RULE	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.

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:

```
<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:

```
<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:

```
<res:ingestionResponse xmlns:res="http://fris.ewi.be/response" operation-status="FAILED" operation="INCREMENTAL" ingestionDate="2019-05-14T20:00:39.536Z"> <res:success> false </res:success> <res:messages entity-type="PROJECT" entity-id="51435279"> <res:source> BUSINESS_RULE </res:source> <res:level> ERROR </res:level> <res:message> Project heeft geen subject area code </res:message> </res:messages>
```

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):

```
<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"
     xsi:schemaLocation="http://docs.oasis-open.org/ws-sx/ws-securitypolicy/200702 http://docs.oasis-open.org/ws-sx/ws-securitypolicy/v1.2/errata01/os/schemas/ws-securitypolicy-1.2.xsd">
    <wsp:ExactlyOne>
        <wsp:All>
            <sp:TransportBinding xmlns:sp="http://docs.oasis-open.org/ws-sx/ws-securitypolicy/200702">
                <wsp:Policy>
```

```
                    <sp:TransportToken>
                        <wsp:Policy>
                            <sp:HttpsToken>
                                <wsp:Policy/>
                            </sp:HttpsToken>
                        </wsp:Policy>
                    </sp:TransportToken>
                    <sp:AlgorithmSuite>
                        <wsp:Policy>
                            <sp:Basic256/>
                        </wsp:Policy>
                    </sp:AlgorithmSuite>
                    <sp:Layout>
                        <wsp:Policy>
                            <sp:Lax/>
                        </wsp:Policy>
                    </sp:Layout>
                </wsp:Policy>
            </sp:TransportBinding>
            <sp:SupportingTokens>
                <wsp:Policy>
                    <sp:UsernameToken sp:IncludeToken="http://docs.oasis-
open.org/ws-sx/ws-securitypolicy/200702/IncludeToken/AlwaysToRecipient">
                        <wsp:Policy>
                            <sp:HashPassword/>
                        </wsp:Policy>
                    </sp:UsernameToken>
                </wsp:Policy>
            </sp:SupportingTokens>
        </wsp:All>
    </wsp:ExactlyOne>
</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:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
    <SOAP-ENV:Header xmlns:SOAP-
ENV="http://schemas.xmlsoap.org/soap/envelope/">
        <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-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">+vY88B2b1yle7C45eN6nhruHbmc=</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>
```

```
    </SOAP-ENV:Header>
    <soap:Body>
        <ns1:ingestBulk xmlns:ns1="http://fris.ewi.be/">
            <CERIF xmlns="urn:xmlns:org:eurocris:cerif-1.5-1" date="2013-
09-27+02:00" release="1.5" sourceDatabase="ignored">
                ...
            </CERIF>
        </ns1:ingestBulk>
    </soap:Body>
</soap:Envelope>
```

And a sample delete organisation request:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <SOAP-ENV:Header xmlns:SOAP-
ENV="http://schemas.xmlsoap.org/soap/envelope/">
    <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/qsZe8Y5ijt7rCC4DZrlUai7c=</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-ENV:Header>
  <soap:Body>
    <ns1:deleteOrganisation xmlns:ns1="http://fris.ewi.be/">
      <ns1:identifier>81785c7c-17f7-4101-8350-
49df035bc825</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

Environment	Endpoint WSDL
Staging	https://stfrisr4.researchportal.be/ws/ChangesService?wsdl
Production	https://frisr4.researchportal.be/ws/ChangesService?wsdl

4.2 Service operations

Operation	Input	Output
getChanges	getChanges	getChangesResponse

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.

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

4.2.2 Operation: getChanges XML response documentation

The XML query response document will contain the following elements:

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

Sample response:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
   <soap:Body>
      <fris:getChangesResponse xmlns:crit="http://fris.ewi.be/criteria"
xmlns:resp="http://fris.ewi.be/response"
xmlns:fris="http://fris.ewi.be/">
         <resp:changesResponse resumptionToken="76692931">
            <fris:change id="76660514">
               <fris:occurredOn>2016-06-
10T07:35:21.212Z</fris:occurredOn>
               <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:

Environment	Response	Endpoint WSDL
Staging	CERIF	https://stfrisr4.researchportal.be/ws/OrganisationService?wsdl
Staging	FRIS XML	https://stfrisr4.researchportal.be/ws/OrganisationServiceFRIS?wsdl
Production	CERIF	https://frisr4.researchportal.be/ws/OrganisationService?wsdl
Production	FRIS XML	https://frisr4.researchportal.be/ws/OrganisationServiceFRIS?wsdl

5.2 Service operations

Both versions have identical operations and request documents.

Operation	Input	Output
getOrganisations	getOrganisations	getOrganisationsResponse
getOrderings	getOrderings	getOrderings
getDataProviders	getDataProviders	getDataProvidersResponse
getOrganisationTypeClassifications	getOrganisationTypeClassifications	getOrganisationTypeClassificationsResponse
getOrganisationActivityTypeClassifications	getOrganisationActivityTypeClassifications	getOrganisationActivityTypeClassificationsResponse
getAuthorityClassifications	getAuthorityClassifications	getAuthorityClassificationsResponse
getDisciplineClassifications	getDisciplineClassifications	getDisciplineClassificationsResponse
getElectronicAddressTypeClassifications	getElectronicAddressTypeClassifications	getElectronicAddressTypeClassificationsResponse
getPhysicalAddressCountryClassifications	getPhysicalAddressCountryClassifications	getPhysicalAddressCountryClassificationsResponse
getSubjectAreaClassifications	getSubjectAreaClassifications	getSubjectAreaClassificationsResponse
getFlemishResearchDisciplineClassifications	getFlemishResearchDisciplineClassifications	getFlemishResearchDisciplineClassificationsResponse

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.

Element path	Type	Notes
window/pageSize	int	The number of results returned, defaults to 10.
window/pageNumber	int	The zero-indexed page number, defaults to 0.
window/orderings/order	order	A number of orderings.
window/orderings/order/id	string	The ordering id. The getOrderings operation provides the valid order id values.
window/orderings/order/locale	locale	The ordering locale, only applicable for order on localised entity properties, like organisation title. Only "nl_BE" and "en_GB" values are allowed.
window/orderings/order/direction	enumeration	The order direction, either "ASCENDING" or "DESCENDING", defaults to "ASCENDING".
search.search	string	Free text search, accepts Lucene query syntax. Will search in Organisation name, acronym, data provider id and sources.
search.locale	locale	Optional locale, if no valid locale is supplied all localisations will be searched.
state	enumeration	Not applicable in the web service interface.
uuids	identifierList	A list of FRIS Organisation UUID values. Can be negated.
sources	sourceList	A number of authority/identifier limits against the entity external identifiers. The getAuthorityClassifications operation provides the valid authority values.
dataProviders	identifierList	A list of data provider names. Can be negated. The getDataProviders operation provides the valid data provider values.
dataProviderIds	identifierList	A list of data provider identifiers. Can be negated.
name	textSearchCriteria	Free text search in the Organisation name property.

acronym	string	Exact acronym match.
associatedOrganisations	identifierList	A list of related FRIS Organisation UUID's. Can be negated.
typeClassification	classificationCriteria	One or more Organisation type terms. Scheme id is optional. Can be hierarchical. The getOrganisationTypeClassifications operation provides the valid type values.
activityTypeClassification	classificationCriteria	One or more Organisation Activity type terms. Scheme id is optional. Can be hierarchical. The getOrganisationActivityTypeClassifications operation provides the valid type values.
discipline	classificationCriteria	One or more discipline terms. Scheme id is optional. Can be hierarchical. The getDisciplineClassifications operation provides the valid discipline values.
subjectArea	classificationCriteria	One or more subject area terms. Scheme id is optional. Can be hierarchical. The getSubjectAreaClassifications operation provides the valid subject area values.
classified	classificationCriteria	One or more generic terms. Scheme id is required. Currently NACE codes and VKBO RechtsVorm classifications are supported.
electronicAddress/value	string	The exact electronic address value.
electronicAddress/ electronicAddressType	classificationCriteria	One or more electronic address type terms. Scheme id is optional. Can be hierarchical. The getElectronicAddressTypeClassifications operation provides the valid electronic address type values.
physicalAddress/address	string	The exact street & building number.
physicalAddress/city	string	The exact city.
physicalAddress/country	classificationCriteria	One or more country terms. Scheme id is optional. The getPhysicalAddressCountryClassifications operation provides the valid electronic address type values.
keywords/keyword	keywordCriteria	A number of keyword criteria.

keyword	textSearchCriteria	Free text search in the Organisation keywords property.

5.2.2 Operation: getOrganisations CERIF response documentation

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

Element path	Type	Notes
queryResult/totalResults	int	The total number of matching entities.
queryResult/pageSize	int	The requested page size.
queryResult/pageNumber	int	The requested zero-indexed page number.
queryResult/cerif	CERIF	The requested window of matching entities represented as CERIF elements.

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:

Element path	Type	Notes
queryResult/@totalResults	int	The total number of matching entities.
queryResult/@pageSize	int	The requested page size.
queryResult/@pageNumber	int	The requested zero-indexed page number.
queryResult/organisation	FRIS XML	The requested window of matching entities represented as FRIS XML elements.

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

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
   <soap:Body>
      <ns3:getOrganisationsResponse
xmlns:ns2="http://fris.ewi.be/response" xmlns:ns3="http://fris.ewi.be/"
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:dataProvider>provider-name</ns3:dataProvider>
               <ns3:dataProviderId>provider-id</ns3:dataProviderId>
               <ns3:sources>
```

```
                  <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:dataProviderId>provider-
id</ns3:dataProviderId>
                        <ns3:addressLine2>Apt #10036</ns3:addressLine2>
                        <ns3:addressLine3>1216 Highland
Park</ns3:addressLine3>
                        <ns3:city>Needmore</ns3:city>
                        <ns3:postalCode>48560</ns3:postalCode>
                        <ns3:country schemeId="ISO 3166-1 alpha 2 Country
Code" term="NL"/>
                     </ns3:physicalAddress>
                     <ns3:startDate>2014-12-
29T14:27:59.424+01:00</ns3:startDate>
                     <ns3:endDate>2015-02-
04T14:27:59.424+01:00</ns3:endDate>
                  </ns3:addressAssociation>
               </ns3:physicalAddresses>
               <ns3:electronicAddresses>
                  <ns3:addressAssociation>
                     <ns3:associationType schemeId="Electronic Address to
Organisation Role" term="Contact Address"/>
                     <ns3:electronicAddress>
                        <ns3:addressType schemeId="Electronic Address
Type" term="Skype"/>
                        <ns3:value>diedisland@somemall.co.uk</ns3:value>
                     </ns3:electronicAddress>
                     <ns3:startDate>2014-08-
27T14:27:59.424+02:00</ns3:startDate>
                     <ns3:endDate>2015-03-
25T14:27:59.424+01:00</ns3:endDate>
                  </ns3:addressAssociation>
               </ns3:electronicAddresses>
               <ns3:classifications/>
               <ns3:researchActivity>
                  <ns3:texts>
                     <ns3:text locale="en">research activity</ns3:text>
                     <ns3:text locale="nl">research activity</ns3:text>
                  </ns3:texts>
               </ns3:researchActivity>
               <ns3:disciplines>
                  <ns3:discipline schemeId="Science Discipline Code"
term="B140"/>
                  <ns3:discipline schemeId="Science Discipline Code"
term="B100"/>
               </ns3:disciplines>
               <ns3:flemishDisciplines>
                  <ns3:flemishDiscipline schemeId="Flemish Research
Disciplines" term="01010101"/>
                  <ns3:flemishDiscipline schemeId="Flemish Research
Disciplines" term="01010102"/>
               </ns3:flemishDisciplines>
               <ns3:keywords>
                  <ns3:keyword locale="nl">from</ns3:keyword>
                  <ns3:keyword locale="nl">computer</ns3:keyword>
                  <ns3:keyword locale="nl">cold</ns3:keyword>
                  <ns3:keyword locale="en">days</ns3:keyword>
                  <ns3:keyword locale="en">came</ns3:keyword>
               </ns3:keywords>
            </ns3:organisation>
         </queryResult>
```

```
      </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:

Environment	Response	Endpoint WSDL
Staging	CERIF	https://stfrisr4.researchportal.be/ws/PersonService?wsdl
Staging	FRIS XML	https://stfrisr4.researchportal.be/ws/PersonServiceFRIS?wsdl
Production	CERIF	https://frisr4.researchportal.be/ws/PersonService?wsdl
Production	FRIS XML	https://frisr4.researchportal.be/ws/PersonServiceFRIS?wsdl

6.2 Service operations

Both versions have identical operations and request documents.

Operation	Input	Output
getPersons	getPersons	getPersonsResponse
getOrderings	getOrderings	getOrderings
getDataProviders	getDataProviders	getDataProvidersResponse
getAuthorityClassifications	getAuthorityClassifications	getAuthorityClassificationsResponse
getScienceDomainClassifications	getScienceDomainClassifications	getScienceDomainClassificationsResponse
getElectronicAddressTypeClassifications	getElectronicAddressTypeClassifications	getElectronicAddressTypeClassificationsResponse
getPhysicalAddressCountryClassifications	getPhysicalAddressCountryClassifications	getPhysicalAddressCountryClassificationsResponse
getSubjectAreaClassifications	getSubjectAreaClassifications	getSubjectAreaClassificationsResponse
getFlemishResearchDisciplineClassifications	getFlemishResearchDisciplineClassifications	getFlemishResearchDisciplineClassifications

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.

Element path	Type	Notes
window/pageSize	int	The number of results returned, defaults to 10.
window/pageNumber	int	The zero-indexed page number, defaults to 0.
window/orderings/order	order	A number of orderings.
window/orderings/order/id	string	The ordering id. The getOrderings operation provides the valid order id values.
window/orderings/order/locale	locale	The ordering locale. Only applicable for order on localised entity properties, currently no person orderings require a locale. Only "nl_BE" and "en_GB" values are allowed.
window/orderings/order/direction	enumeration	The order direction, either "ASCENDING" or "DESCENDING", defaults to "ASCENDING".
search.search	string	Free text search, accepts Lucene query syntax. Will search in Person name, data provider id and sources.
search.locale	locale	Optional locale, if no valid locale is supplied all localisations will be searched.
state	enumeration	Not applicable in the web service interface.
uuids	identifierList	A list of FRIS Person UUID values. Can be negated.
sources	sourceList	A number of authority/identifier limits against the entity external identifiers. The getAuthorityClassifications operation provides the valid authority values.
dataProviders	identifierList	A list of data provider names. Can be negated. The getDataProviders operation provides the valid data provider values.
dataProviderIds	identifierList	A list of data provider identifiers. Can be negated.
name	textSearchCriteria	Free text search in the Person name property.

gender	enumeration	Person gender. Note that not all data providers supply gender information, in which case it is set to "UNKNOWN". Can be either of "FEMALE", "MALE" or "UNKNOWN".
associatedOrganisations	identifierList	A list of related FRIS Organisation UUID's. Can be negated.
associatedPersons	identifierList	A list of related FRIS Person UUID's. Can be negated.
scienceDomain	classificationCriteria	One or more science domain terms. Scheme id is optional. Can be hierarchical. The getScienceDomainClassifications operation provides the valid science domain values.
subjectArea	classificationCriteria	One or more subject area terms. Scheme id is optional. Can be hierarchical. The getSubjectAreaClassifications operation provides the valid subject area values.
classified	classificationCriteria	One or more generic terms. Scheme id is required. Currently there are no supported person classifications for this property.
electronicAddress/value	string	The exact electronic address value.
electronicAddress/ electronicAddressType	classificationCriteria	One or more electronic address type terms. Scheme id is optional. Can be hierarchical. The getElectronicAddressTypeClassifications operation provides the valid electronic address type values.
physicalAddress/address	string	The exact street & building number.
physicalAddress/city	string	The exact city.
physicalAddress/country	classificationCriteria	One or more country terms. Scheme id is optional. The getPhysicalAddressCountryClassifications operation provides the valid electronic address type values.
keyword	textSearchCriteria	Free text search in the Person keywords property.

6.2.2 Operation: getPersons CERIF response documentation

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

Element path	Type	Notes
queryResult/totalResults	int	The total number of matching entities.
queryResult/pageSize	int	The requested page size.
queryResult/pageNumber	int	The requested zero-indexed page number.
queryResult/cerif	CERIF	The requested window of matching entities represented as CERIF 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:

Element path	Type	Notes
queryResult/@totalResults	int	The total number of matching entities.
queryResult/@pageSize	int	The requested page size.
queryResult/@pageNumber	int	The requested zero-indexed page number.
queryResult/person	FRIS XML	The requested window of matching entities represented as FRIS XML elements.

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


```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
   <soap:Body>
      <ns3:getPersonsResponse xmlns:ns2="http://fris.ewi.be/response"
xmlns:ns3="http://fris.ewi.be/" xmlns:ns4="http://fris.ewi.be/criteria">
         <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:nameVariants>
               <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:dataProvider>provider</ns3:dataProvider>
                     <ns3:dataProviderId>provider-id</ns3:dataProviderId>
                  </ns3:personOrganisation>
                  <ns3:personOrganisation>
                     <ns3:associationType schemeId="Assignment Role"
term="Responsible"/>
                     <ns3:organisation uuid="8f01c989-879b-4f40-a131-
0025b01ab65f">
                        <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>2014-09-
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:personOrganisations>
               <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:startDate>2014-07-
27T14:27:59.424+02:00</ns3:startDate>
                  </ns3:addressAssociation>
               </ns3:physicalAddresses>
               <ns3:electronicAddresses>
                  <ns3:addressAssociation>
                     <ns3:associationType schemeId="Electronic Address to
Person Role" term="Work Address"/>
                     <ns3:electronicAddress>
                        <ns3:addressType schemeId="Electronic Address
Type" term="Telephone"/>
                        <ns3:value>astone@ma1lbox.com</ns3:value>
                     </ns3:electronicAddress>
                     <ns3:startDate>2014-08-
12T14:27:59.424+02:00</ns3:startDate>
                  </ns3:addressAssociation>
               </ns3:electronicAddresses>
               <ns3:classifications/>
```

```
               <ns3:disciplines>
                  <ns3:discipline schemeId="Science Discipline Code"
term="B140"/>
               </ns3:disciplines>
               <ns3:flemishDisciplines>
                  <ns3:flemishDiscipline schemeId="Flemish Research
Disciplines" term="01010101"/>
                  <ns3:flemishDiscipline schemeId="Flemish Research
Disciplines" term="01010102"/>
               </ns3:flemishDisciplines>
               <ns3:keywords>
                  <ns3:keyword locale="nl">asked</ns3:keyword>
                  <ns3:keyword locale="nl">world</ns3:keyword>
                  <ns3:keyword locale="en">captain</ns3:keyword>
                  <ns3:keyword locale="en">moved</ns3:keyword>
               </ns3:keywords>
            </ns3:person>
         </queryResult>
      </ns3:getPersonsResponse>
   </soap:Body>
</soap:Envelope>
```

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:

Environment	Response	Endpoint WSDL
Staging	CERIF	https://stfrisr4.researchportal.be/ws/ProjectService?wsdl
Staging	FRIS XML	https://stfrisr4.researchportal.be/ws/ProjectServiceFRIS?wsdl
Production	CERIF	https://frisr4.researchportal.be/ws/ProjectService?wsdl
Production	FRIS XML	https://frisr4.researchportal.be/ws/ProjectServiceFRIS?wsdl

7.2 Service operations

Both versions have identical operations and request documents.

Operation	Input	Output
getProjects	getProjects	getProjectsResponse
getOrderings	getOrderings	getOrderings
getDataProviders	getDataProviders	getDataProvidersResponse
getAuthorityClassifications	getAuthorityClassifications	getAuthorityClassificationsResponse
getProjectTypeClassifications	getProjectTypeClassifications	getProjectTypeClassificationsResponse
getScienceDomainClassifications	getScienceDomainClassifications	getScienceDomainClassificationsResponse
getDisciplineClassifications	getDisciplineClassifications	getDisciplineClassificationsResponse
getApplicationCodeClassifications	getApplicationCodeClassifications	getApplicationCodeClassificationsResponse
getTechnologyCodeclassifications	getTechnologyCodeclassifications	getTechnologyCodeclassificationsResponse
getFundingCodeClassifications	getFundingCodeClassifications	getFundingCodeClassificationsResponse
getSubjectAreaClassifications	getSubjectAreaClassifications	getSubjectAreaClassificationsResponse
getFlemishResearchDisciplineClassifications	getFlemishResearchDisciplineClassifications	getFlemishResearchDisciplineClassificationsResponse

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.

Element path	Type	Notes
window/pageSize	int	The number of results returned, defaults to 10.
window/pageNumber	int	The zero-indexed page number, defaults to 0.
window/orderings/order	order	A number of orderings.
window/orderings/order/id	string	The ordering id. The getOrderings operation provides the valid order id values.
window/orderings/order/locale	locale	The ordering locale. Only applicable for order on localised entity properties, currently only the "project.name" ordering requires a locale. Only "nl_BE" and "en_GB" values are allowed.
window/orderings/order/direction	enumeration	The order direction, either "ASCENDING" or "DESCENDING", defaults to "ASCENDING".
search.search	string	Free text search, accepts Lucene query syntax. Will search in Project name, data provider id and sources.
search.locale	locale	Optional locale, if no valid locale is supplied all localisations will be searched.
state	enumeration	Not applicable in the web service interface.
uuids	identifierList	A list of FRIS Project UUID values. Can be negated.
sources	sourceList	A number of authority/identifier limits against the entity external identifiers. The getAuthorityClassifications operation provides the valid authority values.
dataProviders	identifierList	A list of data provider names. Can be negated. The getDataProviders operation provides the valid data provider values.
dataProviderIds	identifierList	A list of data provider identifiers. Can

		be negated.
name	textSearchCriteria	Free text search in the Project name property.
acronym	string	The exact project acronym.
associatedOrganisations	identifierList	A list of related FRIS Organisation UUID's. Can be negated.
associatedPersons	identifierList	A list of related FRIS Person UUID's, will match against both external and internal person associations. Can be negated.
associatedProjects	identifierList	A list of related FRIS Project UUID's. Can be negated.
applicationCode	classificationCriteria	One or more application codes. Scheme id is optional. Can be hierarchical. The getApplicationCodeClassifications operation provides the valid application codes.
technologyCode	classificationCriteria	One or more technology codes. Scheme id is optional. The getTechnologyCodeClassifications operation provides the valid technology codes.
discipline	classificationCriteria	One or more discipline terms. Scheme id is optional. Can be hierarchical. The getDisciplineClassifications operation provides the valid discipline values.
subjectArea	classificationCriteria	One or more subject area terms. Scheme id is optional. Can be hierarchical. The getSubjectAreaClassifications operation provides the valid subject area values.
fundingCode	classificationCriteria	One or more funding code terms. Scheme id is optional. Can be hierarchical. The getFundingCodeClassifications operation provides the valid funding code values.
keyword	textSearchCriteria	Free text search in the Project keywords property.

7.2.2 Operation: getProjects CERIF response documentation

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

Element path	Type	Notes
queryResult/totalResults	int	The total number of matching entities.
queryResult/pageSize	int	The requested page size.
queryResult/pageNumber	int	The requested zero-indexed page number.
queryResult/cerif	CERIF	The requested window of matching entities represented as CERIF elements.

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:

Element path	Type	Notes
queryResult/@totalResults	int	The total number of matching entities.
queryResult/@pageSize	int	The requested page size.
queryResult/@pageNumber	int	The requested zero-indexed page number.
queryResult/project	FRIS XML	The requested window of matching entities represented as FRIS XML elements.

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


```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
   <soap:Body>
      <ns3:getProjectsResponse xmlns:ns2="http://fris.ewi.be/response"
xmlns:ns3="http://fris.ewi.be/" xmlns:ns4="http://fris.ewi.be/criteria">
         <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:acronym>acronym</ns3:acronym>
```

```
               <ns3:homepage>http://Wrightsville-
Industries.us</ns3:homepage>
               <ns3:startDate>2014-12-
07T10:47:32.260+01:00</ns3:startDate>
               <ns3:endDate>2016-04-09T10:47:32.260+02:00</ns3:endDate>
               <ns3:projectTypes>
                  <ns3:type schemeId="Project Type"
term="Collaboration"/>
               </ns3:projectTypes>
               <ns3:projectAbstract>
                  <ns3:texts>
                     <ns3:text locale="nl">project abstract</ns3:text>
                     <ns3:text locale="en">project abstract</ns3:text>
                  </ns3:texts>
               </ns3:projectAbstract>
               <ns3:flemishDisciplines>
                  <ns3:flemishDiscipline schemeId="Flemish Research
Disciplines" term="01010101"/>
                  <ns3:flemishDiscipline schemeId="Flemish Research
Disciplines" term="01010102"/>
               </ns3:flemishDisciplines>
               <ns3:disciplines>
                  <ns3:discipline schemeId="Science Discipline Code"
term="B110"/>
                  <ns3:discipline schemeId="Science Discipline Code"
term="B110"/>
               </ns3:disciplines>
               <ns3:fwoDisciplines>
                  <ns3:fwoDiscipline schemeId="FWODisciplineCode"
term="FWO-1"/>
               </ns3:fwoDisciplines>
               <ns3:applicationCodes>
                  <ns3:applicationCode schemeId="Application Code"
term="O530"/>
               </ns3:applicationCodes>
               <ns3:technologyCodes>
                  <ns3:technologyCode schemeId="Technology Code"
term="12"/>
               </ns3:technologyCodes>
               <ns3:projectOrganisations>
                  <ns3:projectOrganisation>
                     <ns3:associationType
schemeId="ProjectOrganisationRole" term="Owner"/>
                     <ns3:organisation uuid="b2f105ca-647c-42e9-b192-
1dfa80a172e8">
                        <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:projectOrganisation>
               </ns3:projectOrganisations>
               <ns3:relatedProjects/>
               <ns3:participants>
                  <ns3:participant>
```

```
                    <ns3:associationType schemeId="Assignment to Project
Role" term="Co-promotor"/>
                    <ns3:assignment>
                       <ns3:associationType schemeId="Assignment Role"
term="Member"/>
                       <ns3:organisation uuid="9f02475b-eeae-4208-9ea1-
81ef99236a03">
                          <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>2014-09-
28T10:47:32.260+02:00</ns3:startDate>
                       <ns3:person uuid="0d28067d-8ac2-44de-9ce4-
19464ec961d5">
                          <ns3:name>
                             <ns3:firstName>Sarah</ns3:firstName>
                             <ns3:lastName>Snyder</ns3:lastName>
                          </ns3:name>
                       </ns3:person>
                       <ns3:dataProvider>provider</ns3:dataProvider>
                       <ns3:dataProviderId>provider-
id</ns3:dataProviderId>
                    </ns3:assignment>
                    <ns3:startDate>2014-12-
12T10:47:32.260+01:00</ns3:startDate>
                    <ns3:endDate>2016-01-
23T10:47:32.260+01:00</ns3:endDate>
                 </ns3:participant>
              </ns3:participants>
              <ns3:projectFunding>
                 <ns3:projectFunding>
                    <ns3:fundingCode schemeId="Funding Source Code"
term="4254"/>
                    <ns3:fundingRole schemeId="Funding Source to Project
Role" term="Principal Funding"/>
                    <ns3:startDate>2015-01-
02T10:47:32.260+01:00</ns3:startDate>
                    <ns3:endDate>2015-10-
15T10:47:32.260+02:00</ns3:endDate>
                 </ns3:projectFunding>
              </ns3:projectFunding>
              <ns3:funding-identifiers>
                 <ns3:funding-identifier authority-scheme="Funder
Identifier Type" authority="AIO Contract Id">4903731a-3848-42bb-922e-
8fd9f9f8d12c</ns3:funding-identifier>
              </ns3:funding-identifiers>
              <ns3:keywords>
                 <ns3:keyword locale="nl">died</ns3:keyword>
                 <ns3:keyword locale="nl">world</ns3:keyword>
                 <ns3:keyword locale="en">dreams</ns3:keyword>
                 <ns3:keyword locale="en">handled</ns3:keyword>
              </ns3:keywords>
           </ns3:project>
```

```
        </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:

Environment	Response	Endpoint WSDL
Staging	CERIF	https://stfrisr4.researchportal.be/ws/ResearchOutputService?wsdl
Staging	FRIS XML	https://stfrisr4.researchportal.be/ws/ResearchOutputServiceFRIS?wsdl
Production	CERIF	https://frisr4.researchportal.be/ws/ResearchOutputService?wsdl
Production	FRIS XML	https://frisr4.researchportal.be/ws/ResearchOutputServiceFRIS?wsdl

8.2 Service operations

Operation	Input	Output
getResearchOutput	getResearchOutput	getResearchOutputResponse
getOrderings	getOrderings	getOrderings
getDataProviders	getDataProviders	getDataProvidersResponse
getAuthorityClassifications	getAuthorityClassifications	getAuthorityClassificationsResponse
get ResearchOutputTypeClassifications	getResearchOutputTypeClassifications	getResearchOutputTypeClassificationsResponse
getDisciplineClassifications	getDisciplineClassifications	getDisciplineClassificationsResponse
getEvaluationPanelClassifications	getEvaluationPanelClassifications	getEvaluationPanelClassificationsResponse
getRefereeTypeClassifications	getRefereeTypeClassifications	getRefereeTypeClassificationsResponse
getSubjectAreaClassifications	getSubjectAreaClassifications	getSubjectAreaClassificationsResponse

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.

Element path	Type	Notes
window/pageSize	int	The number of results returned, defaults to 10.
window/pageNumber	int	The zero-indexed page number, defaults to 0.
window/orderings/order	order	A number of orderings.
window/orderings/order/id	string	The ordering id. The getOrderings operation provides the valid order id values.
window/orderings/order/locale	locale	The ordering locale. Only applicable for order on localised entity properties, currently only the "researchOutput.title" ordering requires a locale. Only "nl_BE" and "en_GB" values are allowed.
window/orderings/order/direction	enumeration	The order direction, either "ASCENDING" or "DESCENDING", defaults to "ASCENDING".
search.search	string	Free text search, accepts Lucene query syntax. Will search in research output title, data provider id and sources.
search.locale	locale	Optional locale, if no valid locale is supplied all localisations will be searched.
state	enumeration	Not applicable in the web service interface.
uuids	identifierList	A list of FRIS Research output UUID values. Can be negated.
sources	sourceList	A number of authority/identifier limits against the entity external identifiers. The getAuthorityClassifications operation provides the valid authority values.
dataProviders	identifierList	A list of data provider names. Can be negated. The getDataProviders operation provides the valid data provider values.
dataProviderIds	identifierList	A list of data provider identifiers. Can be negated.
title	textSearchCriteria	Free text search in the Research output title property.

type	classificationCriteria	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.
associatedOrganisations	identifierList	A list of related FRIS Organisation UUID's. Can be negated.
associatedPersons	identifierList	A list of related FRIS Person UUID's, will match against both external and internal person associations. Can be negated.
associatedProjects	identifierList	A list of related FRIS Project UUID's. Can be negated.
discipline	classificationCriteria	One or more discipline terms. Scheme id is optional. Can be hierarchical. The getDisciplineClassifications operation provides the valid discipline values.
subjectArea	classificationCriteria	One or more subject area terms. Scheme id is optional. Can be hierarchical. The getSubjectAreaClassifications operation provides the valid subject area values.
evaluationPanel	classificationCriteria	One or more evaluation panel terms. Scheme id is optional. Can be hierarchical. The getEvaluationPanelClassifications operation provides the valid discipline values.
refereeType	classificationCriteria	One or more referee type terms. Scheme id is optional. The getRefereeTypeClassifications operation provides the valid discipline values.
artistic	Xs:boolean	Whether the research output is marked artistic or not
keyword	textSearchCriteria	Free text search in the research output keywords property.

8.2.2 Operation: getResearchOutput CERIF response documentation

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

Element path	Type	Notes
queryResult/totalResults	int	The total number of matching entities.

queryResult/pageSize	int	The requested page size.
queryResult/pageNumber	int	The requested zero-indexed page number.
queryResult/cerif	CERIF	The requested window of matching entities represented as CERIF elements.

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:

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

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

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
   <soap:Body>
      <fris:getResearchOutputResponse
xmlns:crit="http://fris.ewi.be/criteria"
xmlns:resp="http://fris.ewi.be/response"
xmlns:fris="http://fris.ewi.be/">
         <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:created>2017-05-18T08:21:28Z</fris:created>
               <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>
```

```
                  <fris:source id="94535818" authorityScheme="Identifier
Authority Type" authority="Handle">http://hdl.handle.net/1854/LU-
1105574</fris:source>
                  <fris:source id="94535817" authorityScheme="Identifier
Authority Type" authority="VABB Id">c:vabb:303875</fris:source>
                  <fris:source id="94535816" authorityScheme="Identifier
Authority Type" authority="WoS Id">000274641200006</fris:source>
               </fris:sources>
               <fris:aliases>
                  <fris:alias id="113496190"
dataProvider="UAntwerpen">62dcf09e-1746-4fc1-b1ed-
b3e6635f11ab</fris:alias>
               </fris:aliases>
               <fris:title id="94535814">
                  <fris:texts>
                     <fris:text locale="un">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:text>
                  </fris:texts>
               </fris:title>
               <fris:disciplines/>
               <fris:participants>
                  <fris:participant id="94535822">
                     <fris:associationType id="4016" schemeId="Written
Output Person Participant Role"
schemeIdentifier="WO_PERSON_PARTICIPANT_ROLE" term="Author"/>
                     <fris:assignment id="78067323">
                        <fris:associationType id="3952"
schemeId="Assignment Role"
schemeIdentifier="PERSON_ORGANISATION_ASSOCIATION" term="Member"/>
                        <fris:organisation uuid="1ea85960-3513-4622-ac13-
e406e9c136bf">
                           <fris:external>false</fris:external>
                           <fris:hidden>false</fris:hidden>
                           <fris:dataProvider>UGent</fris:dataProvider>
                           <fris:dataProviderId>b97c1910-3709-11e6-a43e-
000000000144</fris:dataProviderId>
                           <fris:sources/>
                           <fris:aliases/>
                           <fris:name>
                              <fris:texts>
                                 <fris:text locale="en">Department of
Public health</fris:text>
                                 <fris:text locale="nl">Vakgroep
Maatschappelijke Gezondheidkunde</fris:text>
                              </fris:texts>
                           </fris:name>
                           <fris:organisationActivityTypes/>
                           <fris:nameVariants/>
                           <fris:relatedOrganisations/>
                           <fris:physicalAddresses/>
                           <fris:electronicAddresses/>
                           <fris:classifications/>
                           <fris:disciplines/>
                           <fris:subjectAreas/>
                        </fris:organisation>
                        <fris:startDate>2002-01-
01T00:00:00Z</fris:startDate>
```

```
                        <fris:endDate>9999-12-31T23:59:59Z</fris:endDate>
                        <fris:person uuid="c5f21180-5bd5-45ee-a5f1-
9564853c6f70">
                           <fris:external>false</fris:external>
                           <fris:hidden>false</fris:hidden>
                           <fris:dataProvider>UGent</fris:dataProvider>
                           <fris:dataProviderId>512531c2-378c-11e6-b517-
000000000144</fris:dataProviderId>
                           <fris:sources/>
                           <fris:aliases/>
                           <fris:name>
                              <fris:firstName>Lieven</fris:firstName>
                              <fris:lastName>Annemans</fris:lastName>
                           </fris:name>
                           <fris:nameVariants/>
                           <fris:relatedPersons/>
                           <fris:personOrganisations/>
                           <fris:scienceDomains/>
                           <fris:physicalAddresses/>
                           <fris:electronicAddresses/>
                           <fris:classifications/>
                           <fris:disciplines/>
                           <fris:subjectAreas/>
                        </fris:person>
                        <fris:dataProvider>UGent</fris:dataProvider>
                        <fris:dataProviderId>Member:6c4d36f0-04b9-11e7-
a85c-0000000002ae</fris:dataProviderId>
                     </fris:assignment>
                     <fris:name id="94535823">
                        <fris:firstName>Lieven</fris:firstName>
                        <fris:lastName>Annemans</fris:lastName>
                     </fris:name>
                  </fris:participant>
                  <fris:participant id="94535824">
                     <fris:associationType id="4016" schemeId="Written
Output Person Participant Role"
schemeIdentifier="WO_PERSON_PARTICIPANT_ROLE" term="Author"/>
                     <fris:person uuid="f1f6d9d1-f52d-49e3-911b-
118fe68035d9">
                        <fris:external>true</fris:external>
                        <fris:hidden>false</fris:hidden>
                        <fris:dataProvider>UGent</fris:dataProvider>
                        <fris:dataProviderId>873ef420-08a7-11e7-8947-
0000000002ae</fris:dataProviderId>
                        <fris:sources/>
                        <fris:aliases/>
                        <fris:name>
                           <fris:firstName>S</fris:firstName>
                           <fris:lastName>Marbaix</fris:lastName>
                        </fris:name>
                        <fris:nameVariants/>
                        <fris:relatedPersons/>
                        <fris:personOrganisations/>
                        <fris:scienceDomains/>
                        <fris:physicalAddresses/>
                        <fris:electronicAddresses/>
                        <fris:classifications/>
                        <fris:disciplines/>
                        <fris:subjectAreas/>
```

```
                    </fris:person>
                 </fris:participant>
                 <fris:participant id="94535825">
                    <fris:associationType id="4016" schemeId="Written
Output Person Participant Role"
schemeIdentifier="WO_PERSON_PARTICIPANT_ROLE" term="Author"/>
                    <fris:person uuid="e5408111-51fe-41ea-8300-
bc974eafdd13">
                       <fris:external>true</fris:external>
                       <fris:hidden>false</fris:hidden>
                       <fris:dataProvider>UGent</fris:dataProvider>
                       <fris:dataProviderId>873f4240-08a7-11e7-8947-
0000000002ae</fris:dataProviderId>
                       <fris:sources/>
                       <fris:aliases/>
                       <fris:name>
                          <fris:firstName>K</fris:firstName>
                          <fris:lastName>Webb</fris:lastName>
                       </fris:name>
                       <fris:nameVariants/>
                       <fris:relatedPersons/>
                       <fris:personOrganisations/>
                       <fris:scienceDomains/>
                       <fris:physicalAddresses/>
                       <fris:electronicAddresses/>
                       <fris:classifications/>
                       <fris:disciplines/>
                       <fris:subjectAreas/>
                    </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:name>
                          <fris:firstName>Luc</fris:firstName>
                          <fris:lastName>Van Gaal</fris:lastName>
                       </fris:name>
                       <fris:nameVariants/>
                       <fris:relatedPersons/>
                       <fris:personOrganisations/>
                       <fris:scienceDomains/>
                       <fris:physicalAddresses/>
                       <fris:electronicAddresses/>
                       <fris:classifications/>
                       <fris:disciplines/>
                       <fris:subjectAreas/>
                    </fris:person>
                 </fris:participant>
                 <fris:participant id="94535827">
```

```
                    <fris:associationType id="4016" schemeId="Written
Output Person Participant Role"
schemeIdentifier="WO_PERSON_PARTICIPANT_ROLE" term="Author"/>
                    <fris:person uuid="699086bf-8935-42d8-b5a4-
39e0de5c810e">
                       <fris:external>true</fris:external>
                       <fris:hidden>false</fris:hidden>
                       <fris:dataProvider>UGent</fris:dataProvider>
                       <fris:dataProviderId>87400590-08a7-11e7-8947-
0000000002ae</fris:dataProviderId>
                       <fris:sources/>
                       <fris:aliases/>
                       <fris:name>
                          <fris:firstName>A</fris:firstName>
                          <fris:lastName>Scheen</fris:lastName>
                       </fris:name>
                       <fris:nameVariants/>
                       <fris:relatedPersons/>
                       <fris:personOrganisations/>
                       <fris:scienceDomains/>
                       <fris:physicalAddresses/>
                       <fris:electronicAddresses/>
                       <fris:classifications/>
                       <fris:disciplines/>
                       <fris:subjectAreas/>
                    </fris:person>
                 </fris:participant>
              </fris:participants>
              <fris:relatedResearchOutputs/>
              <fris:researchOutputProjects/>
              <fris:researchOutputType id="4065" schemeId="Research
Output Taxonomy Type" schemeIdentifier="RESEARCH_OUTPUT_TYPE"
term="Journal Article"/>
              <fris:subjectAreas/>
              <fris:keywords>
                 <fris:keyword locale="un">PRIMARY
PREVENTION</fris:keyword>
                 <fris:keyword locale="un">CARDS</fris:keyword>
                 <fris:keyword locale="un">CARDIOVASCULAR-
DISEASE</fris:keyword>
                 <fris:keyword locale="un">CORONARY-HEART-
DISEASE</fris:keyword>
                 <fris:keyword locale="un">GUIDELINES</fris:keyword>
                 <fris:keyword locale="un">EVENTS</fris:keyword>
                 <fris:keyword locale="un">RISK ENGINE</fris:keyword>
              </fris:keywords>
              <fris:researchAbstract id="94535815">
                 <fris:texts>
                    <fris:text locale="un"><![CDATA[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 cost/quality-adjusted life-year (QALY) of (sic)16 681. Over a lifetime horizon (25 years), atorvastatin was demonstrated to be a cost-saving therapeutic intervention. At a threshold of (sic)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.]]></fris:text>
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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 &#39;no statin treatment&#39; 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.]]></fris:text>
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               <fris:pages>133 - 142</fris:pages>
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               <fris:publicationYear>2010</fris:publicationYear>
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         </queryResult>
      </fris:getResearchOutputResponse>
   </soap:Body>
</soap:Envelope>

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[3]. 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:

Environment	Response	Endpoint WSDL
Staging	CERIF	https://stfrisr4.researchportal.be/ws/JournalService?wsdl
Staging	FRIS XML	https://stfrisr4.researchportal.be/ws/JournalServiceFRIS?wsdl
Production	CERIF	https://frisr4.researchportal.be/ws/JournalService?wsdl
Production	FRIS XML	https://frisr4.researchportal.be/ws/JournalServiceFRIS?wsdl

The public journal service is available at:

Environment	Response	Endpoint WSDL
Staging	FRIS XML	https://stfrisr4.researchportal.be/ws/JournalServicePublicService?wsdl
Production	FRIS XML	https://frisr4.researchportal.be/ws/JournalServicePublicService?wsdl

9.2 Service operations

Operation	Input	Output
getJournals	getJournals	getJournalsResponse
getOrderings	getOrderings	getOrderings
getDataProviders	getDataProviders	getDataProvidersResponse
getAuthorityClassifications	getAuthorityClassifications	getAuthorityClassificationsResponse
getAsjcClassifications	getAsjcClassifications	getAsjcClassificationsResponse

[3] WS Policy, WS Security Policy

getCountryClassifications	getCountryClassifications	getCountryClassificationsResponse

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.

Element path	Type	Notes
window/pageSize	int	The number of results returned, defaults to 10.
window/pageNumber	int	The zero-indexed page number, defaults to 0.
window/orderings/order	order	A number of orderings.
window/orderings/order/id	string	The ordering id. The getOrderings operation provides the valid order id values.
window/orderings/order/locale	locale	The ordering locale. Not applicable for any journal ordering.
window/orderings/order/direction	enumeration	The order direction, either "ASCENDING" or "DESCENDING", defaults to "ASCENDING".
search.search	string	Free text search, accepts Lucene query syntax. Will search in journal title, alternate title, ISSN, electronic ISSN, publisher, data provider id and sources.
search.locale	locale	Optional locale. Not applicable since journal has no localised index properties.
state	enumeration	Not applicable in the web service interface.
uuids	identifierList	A list of FRIS Journal UUID values. Can be negated.
sources	sourceList	A number of authority/identifier limits against the entity external identifiers. The getAuthorityClassifications operation provides the valid authority values.
title	textSearchCriteria	Free text search in the Journal title and alternate title property.
issn	identifierList	A list of ISSN values, will be matched

		against ISSN and electronic ISSN property. Can be negated.
openAccess	classificationCriteria	One or more open access terms. Scheme id is optional. The getOpenAccessClassifications operation provides the valid open access types.
peerReviewed	classificationCriteria	One or more referee type terms. Scheme id is optional. The getPeerReviewedClassifications operation provides the valid peer review types.
asjc	classificationCriteria	One or more ASJC terms. Scheme id is optional. Can be hierarchical. The getAsjcClassifications operation provides the valid discipline values.
publicationCountry	classificationCriteria	One or more country terms. Scheme id is optional. The getCountryClassifications operation provides the valid country values.
keyword	textSearchCriteria	Free text search in the Journal keywords property.

The query response document will contain the following elements:

Element path	Type	Notes
queryResult/totalResults	int	The total number of matching entities.
queryResult/pageSize	int	The requested page size.
queryResult/pageNumber	int	The requested zero-indexed page number.
queryResult/journals	Journal	The requested window of matching entities represented as FRIS Journal XML elements. See subsequent chapter for detailed information.

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:

```
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fb32d556f2ec">
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    <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>
```

```
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id</source>
        <source authority="doaj" type="IDENTIFIER">journal DOAJ
id</source>
    </sources>
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    </aliases>
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    <issn>6619-8831</issn>
    <electronicIssn>7109-3641</electronicIssn>
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    </sherpaRoMEO>
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        </keywords>
        <keywords locale="en_GB">
            <keyword>code</keyword>
            <keyword>numbers</keyword>
        </keywords>
    </localized-keywords>
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        </decimal-metric>
        <decimal-metric type="ipp" year="2014">
            <value>0.000</value>
        </decimal-metric>
        <decimal-metric type="sjr" year="2014">
```

```
            <value>0.100</value>
        </decimal-metric>
        <integer-metric type="vabb-code" year="2014">
            <value>1</value>
        </integer-metric>
    </metrics>
</journal>
```

Element path	Type	Notes
@uuid	string	The FRIS UUID of the journal.
state	enumeration	Will always be active for the journals returned from the journal service.
external	boolean	Will always be true for journals returned from the journal service.
created	dateTime	The date and time the entry was created in the FRIS system.
lastModified	dateTime	The date and time the entry was last updated in the FRIS system.
dataProvider	string	The data-provider responsible for this entry.
dataProviderId	string	The data-provider identifier for this entry.
sources	sequence	A number of secondary sources for this entry (the primary source being the dataProvider/dataProviderId).
sources/source/@authority	string	The authority of this source (federated identifier).
sources/source/@type	enumeration	The type of this source, may be "IDENTIFIER", "URL" or other.
sources/source	string	The identifier of this source.
aliases/alias	sequence	Any number of FRIS journal UUID's that can be considered aliases of this entry.
title	string	The official title of the journal.
alternateTitle	string	An abbreviated or alternate title of the journal.
issn	string	The ISSN of the journal.
electronicIssn	string	The electronic ISSN of the journal if applicable.
journalHomepage	string	The URL to the journal homepage if applicable.
publisher	string	The name of the publisher
publicationLocation	string	The location this journal is published.
publicationCountry	classification	The country this journal is published.
startYear	int	The year that this journal started publishing, if available.
endYear	int	The year that this journal stopped publishing, if available.
sherpaRoMEO		The Sherpa RoMEO information of this journal.
//**color**	classification	The Sherpa RoMEO color.
//**preprintArchiving**	string	The pre-print archiving information for this journal.

//**preprintRestrictions**	string	The pre-print restrictions information for this journal.
//**postprintArchiving**	string	The post-print archiving information for this journal.
//**postprintRestrictions**	string	The post-print restrictions information for this journal.
//**postprintConditions**	string	The post-print conditions information for this journal.
//**postprintCopyright**	string	The post-print copyright information for this journal.
peerReviewed	classification	Peer reviewed type.
openAccess	classification	Open access type.
creativeCommonsLicense	classification	The Creative Commons license if applicable.
asjcCodes/asjc	classification	A number of Scopus ASJC codes describing the subject areas of the journal.
localized-keywords /keywords/keyword	string	A number of free keywords describing the subject areas of the journal.
localized-keywords /keywords/@locale	string	The locale for which the keywords are applicable.
metrics	decimal-metric or integer-metric	Any number of metric values, value is either a decimal or integer
metric/@type	classification	The metric type classification term for this metric value
metric/@year	int	The year this metric is applicable to

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.

Environment	Response	Endpoint WSDL
Staging	CERIF	https://stfrisr4.researchportal.be/ws/ClassificationSchemeService?wsdl
Staging	FRIS XML	https://stfrisr4.researchportal.be/ws/ClassificationSchemeServiceFRIS?wsdl
Production	CERIF	https://frisr4.researchportal.be/ws/ClassificationSchemeService?wsdl
Production	FRIS XML	https://frisr4.researchportal.be/ws/ClassificationSchemeServiceFRIS?wsdl

10.2 Service operations

Operation	Input	Output
getClassificationSchemes	getClassificationSchemes	getClassificationSchemesResponse
getAllClassificationSchemes	getAllClassificationSchemes	getAllClassificationSchemesResponse
getOrderings	getOrderings	getOrderingsResponse

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.

Element path	Type	Notes
window/pageSize	int	The number of results returned, defaults to 10.
window/pageNumber	int	The zero-indexed page number, defaults to 0.
window/orderings/order	order	A number of orderings.
window/orderings/order/id	string	The ordering id. The getOrderings operation provides

		the valid order id values.
window/orderings/order/locale	locale	The ordering locale. Not applicable for any classification scheme ordering.
window/orderings/order/direction	enumeration	The order direction, either "ASCENDING" or "DESCENDING", defaults to "ASCENDING".
schemeId	string	Any classification scheme with the specified schemeId.
term	string	Any classification scheme that contains a classification with the specified term.

The query response document will contain the following elements:

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

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

```
<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>
            <parent>parent term</parent>
        </classification>
    </containedClassifications>
</classificationScheme>
```

Element path	Type	Notes
schemeId	string	The external scheme identifier of the classification scheme.
description/texts/text/@locale	string	The locale for which the classification scheme description text is applicable.
description/texts/text	string	The classification scheme description text.
containedClassifications		The contained classifications for the classification scheme.
containedClassifications/classification/@term	string	The contained classification term.
containedClassifications/classification/parent	string	The contained classification parent term.
containedClassifications/classification/description/texts/text/@locale	string	The locale for which the contained classification description text is applicable.
containedClassifications/classification/description/texts/text/	string	The contained classification description text.

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

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.

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

The query response document will contain the following elements:

Element path	Type	Notes
queryResult/totalResults	int	The total number of matching entities.
queryResult/pageSize	int	The requested page size.
queryResult/pageNumber	int	The requested zero-indexed page number.
queryResult/CERIF	CERIF	The requested window of matching entities represented as CERIF cfClassScheme XML elements.

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

```
<CERIF release="1.5" date="2015-07-09+02:00" sourceDatabase="fris"
targetNamespace="urn:xmlns: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>
```

```
            <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>
                <cfClassId1>child term</cfClassId1>
                <cfClassSchemeId1>External scheme
identifier</cfClassSchemeId1>
                <cfClassId>broader</cfClassId>
                <cfClassSchemeId>iso25964-1</cfClassSchemeId>
            </cfClass_Class>
        </cfClass>
    </cfClassScheme>
</CERIF>
```

Element path	Type	Notes
cfClassSchemeId	string	The schemeId of the classification scheme.
cfDescr /@cfLangCode	string	The locale for which the classification scheme description text is applicable.
cfDescr	string	The classification scheme description text.
cfClass		The contained classifications for the classification scheme.
cfClass/cfClassId	string	The contained classification term.
cfClass/cfDescr/@cfLangcode	string	The locale for which the contained classification description text is applicable.
cfClass/cfDescr/	string	The contained classification description text.
cfClass/cfClass_Class/cfClassId2	string	The contained classification parent term.

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.

Environment	Response	Endpoint WSDL
Staging	FRIS XML	https://stfrisr4.researchportal.be/ws/FundingCodeServiceFRIS?wsdl
Production	FRIS XML	https://frisr4.researchportal.be/ws/FundingCodeServiceFRIS?wsdl

11.2 Service operations

Operation	Input	Output
getFundingCodes	getFundingCodes	getFundingCodesResponse
getOrderings	getOrderings	getOrderingsResponse

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.

Element path	Type	Notes
window/pageSize	int	The number of results returned, defaults to 10.
window/pageNumber	int	The zero-indexed page number, defaults to 0.
window/orderings/order	order	A number of orderings.
window/orderings/order/id	string	The ordering id. The getOrderings operation provides the valid order id values.
window/orderings/order/locale	locale	The ordering locale. Not applicable for any funding code ordering.
window/orderings/order/direction	enumeration	The order direction, either "ASCENDING" or "DESCENDING", defaults to "ASCENDING".
search		Free text search, accepts Lucene query syntax. Will search in funding code, acronym, description, definition

		and example.
codes/identifier	string	A list of funding codes. Can be negated.
associatedOrganisations/identifier	string	A list of associated FRIS Organisation UUID's. Can be negated.

The query response document will contain the following elements:

Element path	Type	Notes
@total	int	The total number of matching entities.
@pageSize	int	The requested page size.
@pageNumber	int	The requested zero-indexed page number.
fundingCode	FundingCode	The requested window of matching entities represented as FRIS Funding Code XML elements. See subsequent chapter for detailed information.

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

```
<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
superivsor 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
```

```
Flanders</fris:text>
                        <fris:text locale="en">Research Foundation
Flanders</fris:text>
                    </fris:texts>
                </fris:name>
            </fris:organisation>
        </fris:fundingOrganisationAssociation>
    </fris:fundingOrganisationAssociations>
    <fris:policyLevels>
        <fris:policyLevel id="73023557" schemeId="Funding Policy Level"
term="Flemish"/>
    </fris:policyLevels>
    <fris:researchTypes>
        <fris:researchType id="73020823" schemeId="Funding Research Type"
term="Directed Research"/>
    </fris:researchTypes>
</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 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.

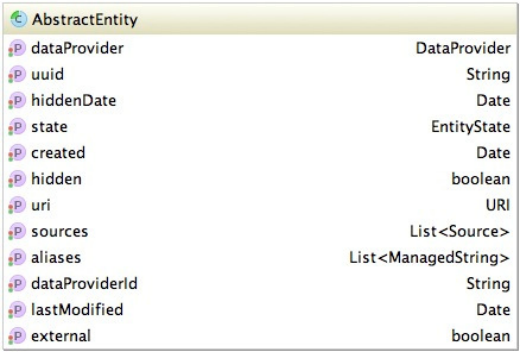

Figure 1 AbstractEntity UML class diagram

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

Attribute	Data-type	Description
uuid	128-bit level 4 UUID	All FRIS entities are assigned an UUID when first created in the system
created	Timestamp	Entity creation timestamp (for reporting/auditing purposes)
lastModified	Timestamp	Entity last modification timestamp (for reporting/auditing purposes)
state	Enumeration	ACTIVE – An entity is public CONFIDENTIAL – An entity is confidential and is not discoverable by the public or other data-providers BACKEND_ONLY – An entity is not discoverable by the public
dataProvider	A DataProvider reference	A reference to the data-provider responsible for this entity (see chapter**Fout! Verwijzingsbron niet gevonden.**)
dataProviderId	String	The local, data-provider identifier

external	Boolean	Whether this entity representation is to be regarded as an externally managed entity for this data-provider
hidden	Boolean	Whether an entity has been hidden by a FRIS administrator
aliases	List of UUID's	List of UUID's that are aliases to this entity, assumed to be of the same entity type
sources	List of Source references	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)

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.

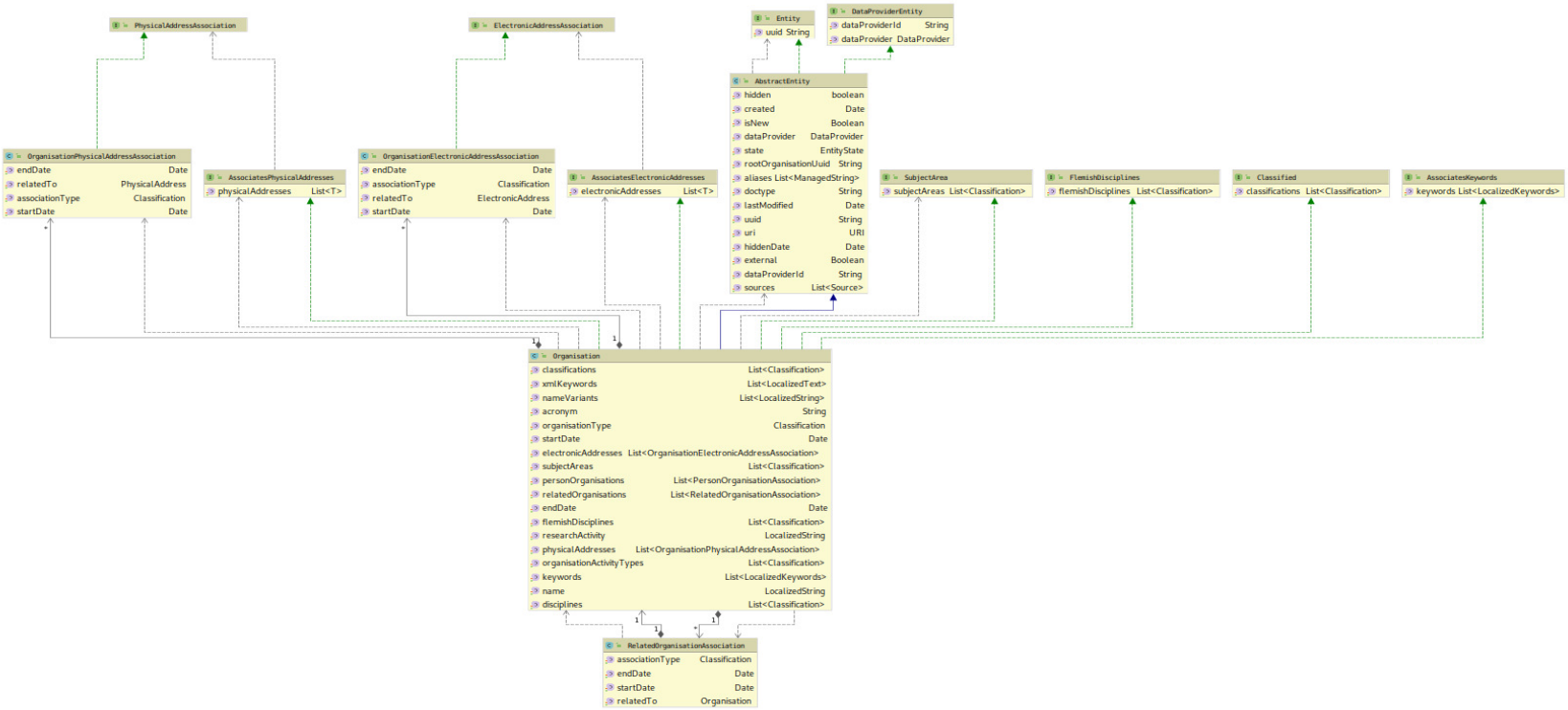

Figure 2 Organisation UML class diagram

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

The Organisation implementation attributes:

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

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:

Attribute	Data-type	Description
relatedTo	Organisation	The related organisation
associationType	Classification	The association type, mapped to the ORGANISATION_RELATION scheme
startDate	Timestamp	The association lifecycle start date
endDate	Timestamp	The association lifecycle end date

Table 3 Related organisation association properties

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

The “OrganisationPhysicalAddressAssociation” implementation properties:

Attribute	Data-type	Description
relatedTo	PhysicalAddress	The related physical address
associationType	Classification	The association type, mapped to the ORGANISATION_PHYSICAL_ADDRESS_ASSOCIATION scheme
startDate	Timestamp	The association lifecycle start date
endDate	Timestamp	The association lifecycle end date

Table 4 Organisation physical address association properties

The “OrganisationElectronicAddressAssociation” implementation properties:

Attribute	Data-type	Description
relatedTo	ElectronicAddress	The related electronic address
associationType	Classification	The association type, mapped to the ORGANISATION_ELECTRONIC_ADDRESS_ASSOCIATION scheme

startDate	Timestamp	The association lifecycle start date
endDate	Timestamp	The association lifecycle end date

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.

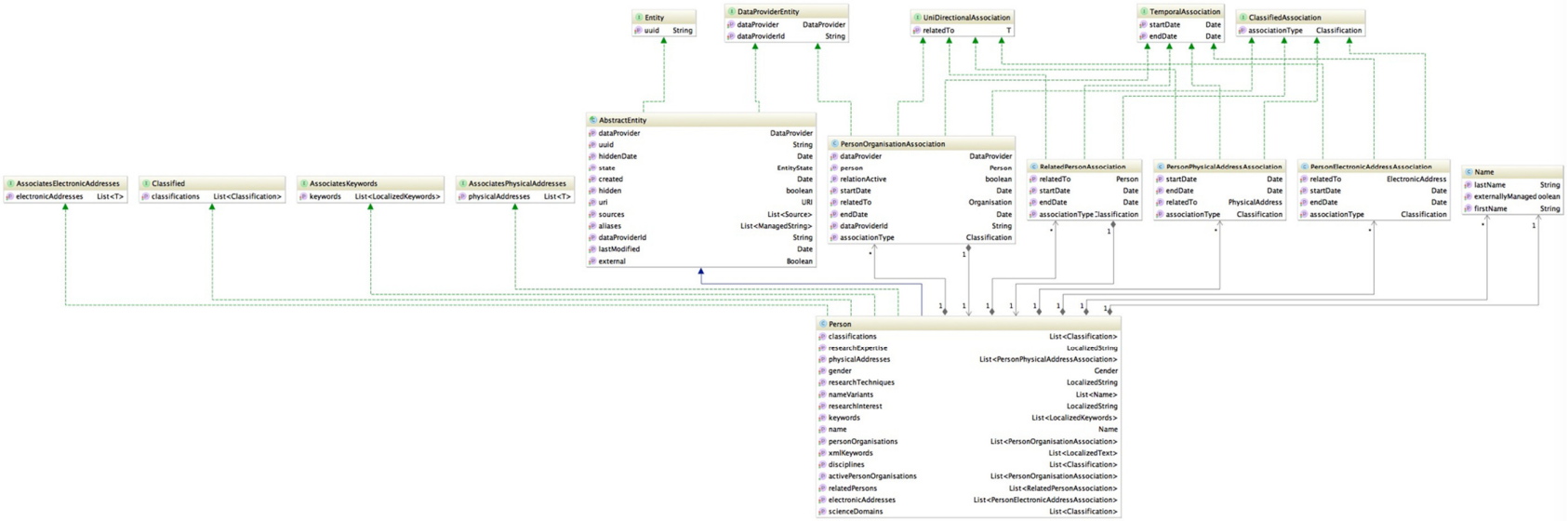

Figure 3 Person UML class diagram

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:

Attribute	Data-type	Description
name	Name	The name of the person
nameVariants	List of Name	Any alternate names of the person. The intention is that name variants are primarily used when querying against the data set for example through the

		person web service or when ingesting person data.
gender	Enumeration	“MALE”, “FEMALE” or “UNKNOWN”
researchInterest	LocalizedString	A localized, free description of the person research interests
researchExpertise	LocalizedString	A localized, free description of the person research expertise
researchTechniques	LocalizedString	A localized, free description of the person research techniques
scienceDomains	List of Classification	Any number of IWETO science code classifications relevant for the person, mapped to the SCIENCE_DOMAIN scheme
disciplines	List of Classification	Any number of discipline codes, mapped to the DISCIPLINE scheme
keywords	List of LocalizedKeywords	Any number of free keywords (see chapter 12.12)
personOrganisations	List of PersonOrganisationAssociation	Any number of person organisation associations (assignments)
relatedPersons	List of RelatedPersonAssociation	Any number of related person associations
physicalAddresses	List of PhysicalAddressAssociation	A person may have any number of physical address associations (see chapter 12.9)
electronicAddresses	List of ElectronicAddressAssociation	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.

Attribute	Data-type	Description
relatedTo	Organisation	The related organisation
associationType	Classification	The association type, mapped to the PERSON_ORGANISATION_RELATION scheme
dataProvider	A DataProvider reference	A reference to the data-provider responsible for this entity
dataProviderId	String	The local, data-provider identifier

startDate	Timestamp	The association lifecycle start date
endDate	Timestamp	The association lifecycle end date

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.

Attribute	Data-type	Description
relatedTo	Person	The related person
associationType	Classification	The association type, mapped to the PERSON_RELATION scheme
startDate	Timestamp	The association lifecycle start date
endDate	Timestamp	The association lifecycle end date

Table 8 Related person association properties

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

Attribute	Data-type	Description
relatedTo	PhysicalAddress	The related physical address
associationType	Classification	The association type, mapped to the PERSON_PHYSICAL_ADDRESS_ASSOCIATION scheme
startDate	Timestamp	The association lifecycle start date
endDate	Timestamp	The association lifecycle end date

Table 9 Person physical address association properties

Attribute	Data-type	Description
relatedTo	ElectronicAddress	The related electronic address
associationType	Classification	The association type, mapped to the PERSON_ELECTRONIC_ADDRESS_ASSOCIATION scheme
startDate	Timestamp	The association lifecycle start date
endDate	Timestamp	The association lifecycle end date

Table 10 Person electronic address association properties

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.

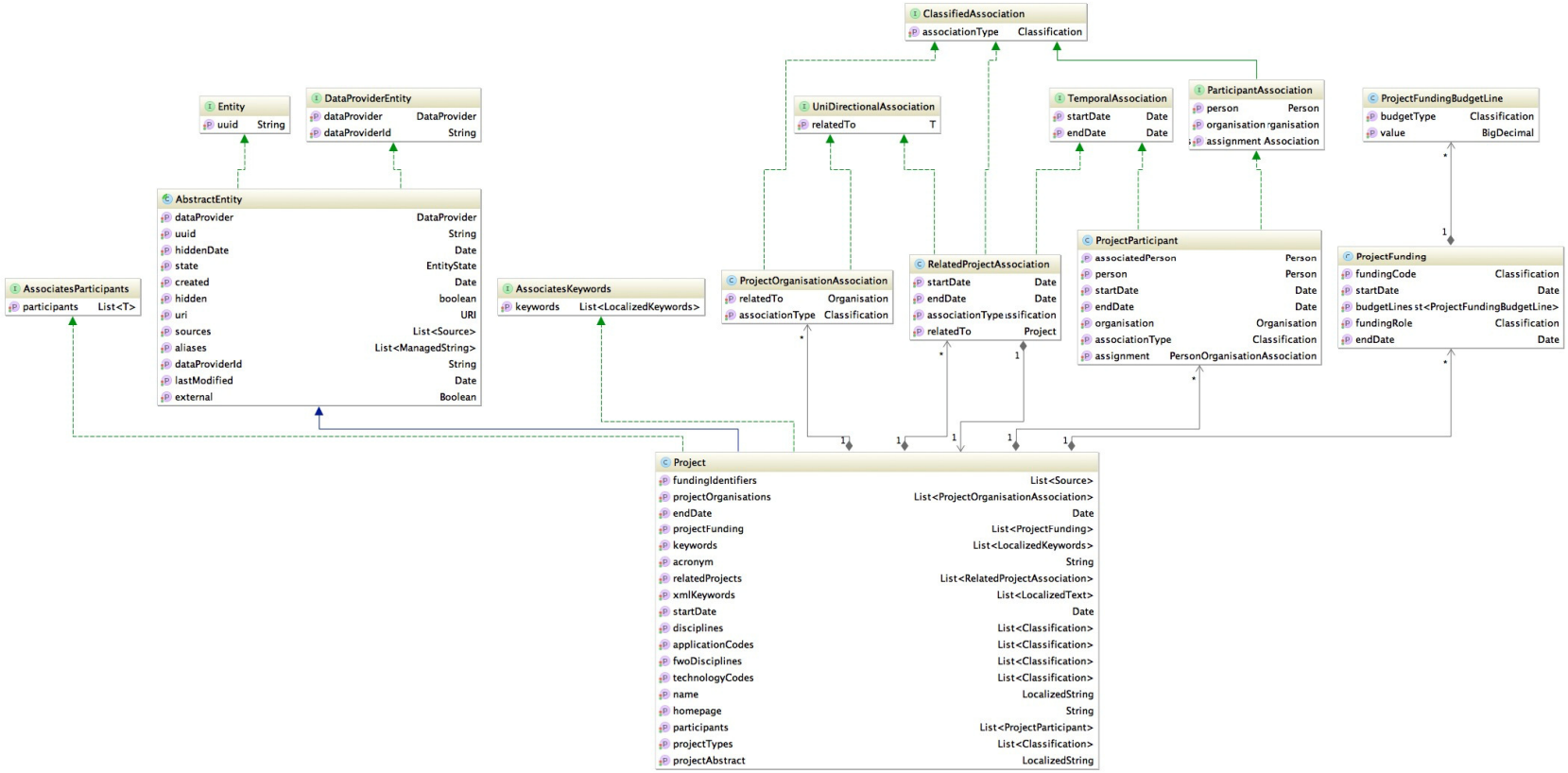

Figure 4 Project UML class diagram

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:

Attribute	Data-type	Description
name	LocalizedString	The localized name of the project
acronym	String	The acronym of the project
startDate	Timestamp	The project lifecycle start date
endDate	Timestamp	The project lifecycle end date
projectTypes	List of Classification	Any number of project type classifications, mapped to the PROJECT_TYPE scheme
projectAbstract	LocalizedString	The localized project abstract
homepage	String	The project homepage
applicationCodes	List of Classification	Any number of IWETO application code classifications relevant for the project, mapped to the APPLICATION_CODE scheme
technologyCodes	List of Classification	Any number of IWT technology code classifications relevant for the project, mapped to the TECHNOLOGY_CODE scheme
disciplines	List of Classification	Any number of discipline codes relevant for the project, mapped to the DISCIPLINE scheme
fwoDisciplines	List of Classification	Any number of FWO discipline codes, mapped to the FWO_DISCIPLINE scheme
keywords	List of LocalizedKeywords	Any number of free keywords (see chapter 12.12)
projectOrganisations	List of ProjectOrganisationAssociation	Any number of project organisation associations
relatedProjects	List of RelatedProjectAssociation	Any number of related project associations
participants	List of ProjectParticipant	Any number of project participants
projectFunding	List of ProjectFunding	Any number of project funding associations

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.

Attribute	Data-type	Description
relatedTo	Project	The related project
associationType	Classification	The association type, mapped to the PROJECT_RELATION scheme
startDate	Timestamp	The association lifecycle start date
endDate	Timestamp	The association lifecycle end date

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.

Attribute	Data-type	Description
relatedTo	Organisation	The related organisation
associationType	Classification	The association type, mapped to the PROJECT_ORGANISATION_ROLE scheme

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.

Attribute	Data-type	Description
assignment	PersonOrganisationAssociation	Internal person relation to "assignment" enabling un-ambiguous organisation & person attribution.
person	Person	Person relation directly to person instance, only person will be attributable.
organisation	Organisation	Organisation relation directly to organisation instance, only organisation will be attributable
associationType	Classification	The association type, mapped to the PROJECT_PARTICIPATION_ROLE

		scheme
startDate	Timestamp	The association lifecycle start date
endDate	Timestamp	The association lifecycle end date

Table 14 Project participant properties

The project funding relations capture information on funding.

Attribute	Data-type	Description
fundingCode	FundingCode	The funding code, see chapter XXX
fundingRole	Classification	The funding role, mapped to the FUNDING_ROLE scheme
startDate	Timestamp	The funding/budget period start date
endDate	Timestamp	The funding/budget period end date

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.

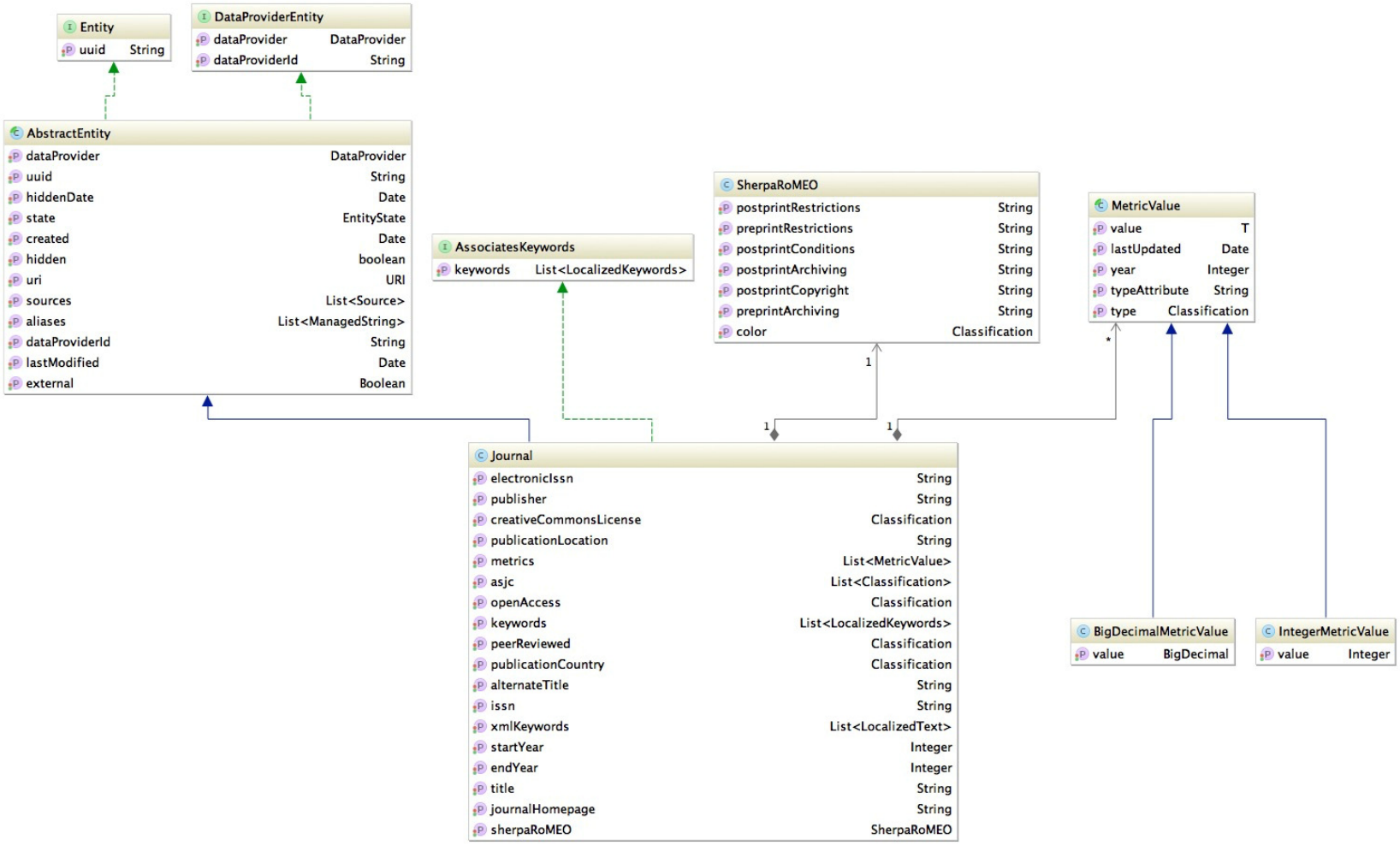

Figure 5 Journal UML class diagram

Attribute	Data-type	Pub	Description
title	String	Y	The title of the journal in its original language
alternateTitle	String	Y	The alternate title of the journal in its original language
issn	String	Y	The print ISSN of the journal
electronicIssn	String	Y	The electronic ISSN of the journal
journalHomepage	String	Y	The journal homepage URL
publisher	String	Y	The journal publisher
publicationLocation	String	Y	The publication location, typically a city
publicationCountry	Classification	Y	The publication country, mapped to COUNTRY scheme
startYear	Integer	Y	The start year of the journal taken from DOAJ journal representation
endYear	Integer	Y	The end year of the journal (not populated)
peerReviewed	Classification	Y	The peer review status of the journal if known, mapped by the REFEREE_TYPE scheme
openAccess	Classification	Y	The open access status of the journal if known, mapped by the OPEN_ACCESS scheme
creativeCommonsLicense	Classification	Y	The creative commons license of the journal if known, mapped by the CREATIVE_COMMONS_LICENSE scheme
asjc	List of Classification	Y	A number of subjects relevant for the journal, mapped to the ASJC scheme
keywords	List of LocalizedKeywords	Y	Any number of free keywords (see chapter 12.12)
sherpaRomeo	SherpaRoMEO	Y	Sherpa RoMEO information, see below for details on attributes
metrics	List of MetricValue	Y	Any number of MetricValue instances, see below

Table 16 Journal properties

The Sherpa RoMEO properties are encapsulated in their own object:

Attribute	Data-type	Description

color	Classification	The Sherpa RoMEO colour, mapped to the SHERPA_ROMEO_COLOR scheme
preprintArchiving	String	Whether the pre print can be archived
preprintRestrictions	String	Any restrictions to the archiving of pre print
postprintArchiving	String	Whether the post print can be archived
postprintRestrictions	String	Any restrictions on archiving the post print
postprintConditions	String	Any conditions on the post print
postprintCopyright	String	Any copyright on the post print

Table 17 Sherpa RoMEO properties

Journals can have any number of associated metrics, the actual instance varies according to the metric value type, initially there will only be decimal and integer variations.

Attribute	Data-type	Description
type	Classification	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
lastUpdated	Timestamp	Stores when this value was last updated
year	Integer	The year for which this metric value is relevant
value	Integer or BigDecimal	The actual metric value, data type depends on implementation

Table 18 MetricValue properties

12.7 Research output

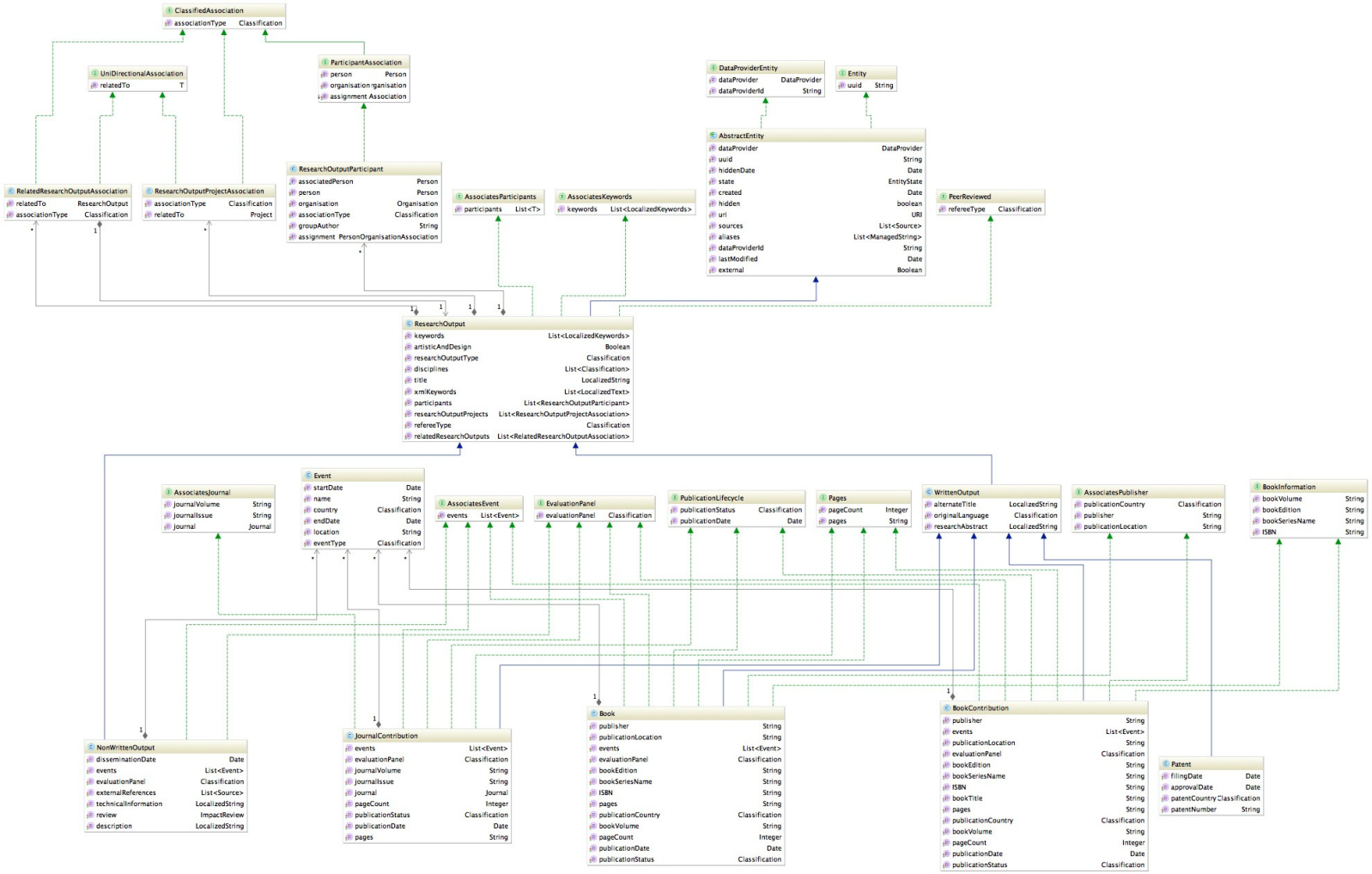

Figure 6 Research output UML class diagram

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.

Attribute	Data-type	Description
title	LocalizedString	The localized title of the output
researchOutputType	Classification	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.
refereeType	Classification	The referee type, mapped to the REFEREE_TYPE scheme
artisticAndDesign	boolean	Whether the research output can be designated a artistic or design output
keywords	List of LocalizedKeywords	Any number of free keywords
researchOutputProjects	List of ResearchOutputProjectAssociation	Any number of related project associations
participants	List of ResearchOutputParticipant	Any number of research output participants
relatedResearchOutputs	List of RelatedResearchOutputAssociation	Any number of related research output associations
disciplines	List of Classification	Any number of discipline codes

Table 19 Research output properties

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

Attribute	Data-type	Description
relatedTo	Project	The related project
associationType	Classification	The association type, mapped to the RESEARCH_OUTPUT_PROJECT_RELATION scheme

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).

Attribute	Data-type	Description
assignment	PersonOrganisationAssociation	Internal person relation to "assignment" enabling un-ambiguous organisation & person attribution.
person	Person	Person relation directly to person instance, only person will be attributable.
organisation	Organisation	Organisation relation directly to organisation instance, only organisation will be attributable
groupAuthor	String	Group author or consortium
associationType	Classification	The association type, mapped to the RESEARCH_OUTPUT_PARTICIPATION_ROLE scheme

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.

Attribute	Data-type	Description
relatedTo	ResarchOutput	The related research output
associationType	Classification	The association type, mapped to the RESEARCH_OUTPUT_RELATION_TYPE scheme

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.

Attribute	Data-type	Description
alternateTitle	LocalizedString	The localized alternate or sub title of the output
originalLanguage	Classification	The original language of the output, mapped to the LANGUAGE scheme
researchAbstract	LocalizedString	The localized abstract or description of the output

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).

Attribute	Data-type	Description
ISBN	String	The ISBN of the book or referred book
bookEdition	String	The edition of the book or referred book
bookVolume	String	The volume of the book or referred book
bookSeriesName	String	The series name of the book or referred book
bookTitle	String	The title of the referred book (only applicable for AssociatesBook)

Table 24 Associates book and book information properties

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

Attribute	Data-type	Description
events	List of Event	Any number of associated Events

Table 25 Associates event property

The Event properties are:

Attribute	Data-type	Description
name	String	The name of the event
eventType	Classification	The type of event
location	String	The location or city of the event, mapped to the EVENT_TYPE scheme
country	Classification	The country classification of the event, mapped to the COUNTRY scheme
startDate	Date	The start date of the event
endDate	Date	The end date of the event

Table 26 Event properties

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

Attribute	Data-type	Description

journalIssue	String	The issue that this contribution was published in
journalVolume	String	The volume that this contribution was published in
journal	Journal	The journal that this contribution was published in

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).

Attribute	Data-type	Description
publisher	String	The name of the publisher
publicationLocation	String	The location or city where this work was published
publicationCountry	Classification	The country classification of the country where this work was published, mapped to the COUNTRY scheme

Table 28 Associates publisher properties

The Pages interface encapsulates paging information for a contribution.

Attribute	Data-type	Description
pages	String	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
pageCount	Integer	The number of pages contributed

Table 29 Pages properties

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

Attribute	Data-type	Description
publicationDate	Date	The date a work was published
publicationState	Classification	The publication state of a work, for example "In press" or "Published". mapped to the PUBLICATION_STATUS scheme

Table 30 Publication lifecycle properties

The EvaluationPanel interface contains a single property.

Attribute	Data-type	Description
evaluationPanel	Classification	The evaluation panel of an output, mapped to the EVALUATION_PANEL scheme

Table 31 Evaluation panel property

The PeerReviewed interface contains a single property.

Attribute	Data-type	Description
refereeType	Classification	The peer review or referee status of an output, mapped to the REFEREE_TYPE scheme

Table 32 Peer reviewed property

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:

Output type composition	Book	Book Contribution	Journal Contribution	Patent	Non Written Output
Research output (Table 19)	Yes	Yes	Yes	Yes	Yes
Written Output (Table 23)	Yes	Yes	Yes	Yes	
Book information (Table 24)	Yes				
Associates book (Table 24)		Yes			
Associates event (Table 25 **&** Table 26)	Yes	Yes	Yes		Yes
Associates journal (Table 27)			Yes		
Associates publisher (Table 28)	Yes	Yes			
Pages (Table 29)	Yes	Yes	Yes		
Publication lifecycle (Table 30)	Yes	Yes	Yes		
Evaluation panel (Table 31)	Yes	Yes	Yes		Yes
Peer reviewed (Table 32)	Yes	Yes	Yes	Yes	Yes

Table 33 Research output type compositions

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):

Attribute	Data-type	Description
filingDate	Date	The date the patent was filed at the patent office
approvalDate	Date	The date the patent was approved
patentNumber	String	The patent number
patentCountry	Classification	The country classification of the country of the patent office, mapped to the COUNTRY scheme

Table 34 Patent type properties

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

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

Table 35 NonWrittenOutput properties

The ImpactReview properties:

Attribute	Data-type	Description
impactDescription	LocalizedString	A localized impact description
researchContext	LocalizedString	A localized description of the research context
impactReferences	List of Source	The impact references of this output. The source authority is mapped to the IMPACT_REFERENCE_AUTHORITY scheme

Table 36 ImpactReview properties

12.8 Classification Scheme & Classification

Each classification scheme consists of a number of associated hierarchical 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.

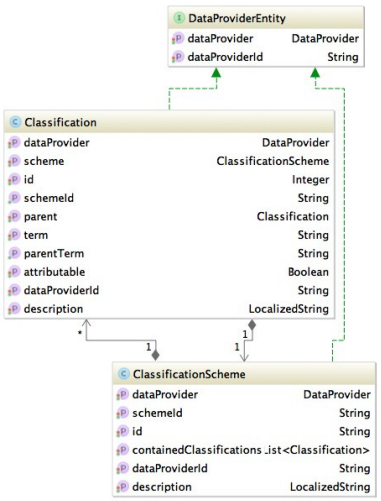

Figure 7 Classification scheme & classification UML class diagram

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.

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

[4] http://www.w3.org/2004/02/skos/ Simple Knowledge Organisation System

containedClassifications	List of Classification	The list of classifications contained in this scheme

Table 37 Classification scheme attributes

A classification is equivalent to a SKOS Concept and typically expresses some form of formal categorisation.

Attribute	Data-type	Description
id	Integer	The managed entity id
dataProvider	DataProvider	A reference to the data-provider responsible for this entity
dataProviderId	String	The local, data-provider identifier
term	String	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.
description	LocalizedString	Classification description is a short description of the classification, for example “General biomedical sciences”.
scheme	ClassificationScheme	The scheme that this classification is part of
parent	Classification	The parent classification
attributable	Boolean	Specifies whether a particular classification is attributable/selectable.

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.

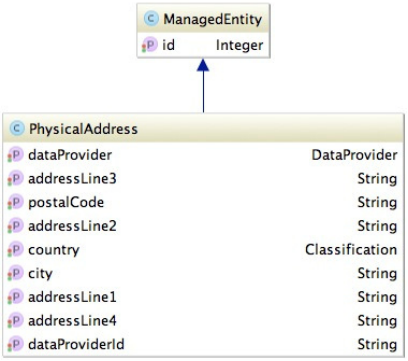

Figure 8 Physical address UML class diagram

Attribute	Data-type	Description
id	Integer	The managed entity id

dataProvider	DataProvider	A reference to the data-provider responsible for this entity
dataProviderId	String	The local, data-provider identifier
addressLine1	String	Must contain the campus
addressLine2	String	Must contain the building
addressLine3	String	Must contain the street and number
addressLine4	String	Not used
postalCode	String	The post code
city	String	The city
country	Classification	The country classification, mapped to the COUNTRY scheme

Table 39 Physical address attributes

12.10 Electronic Address

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

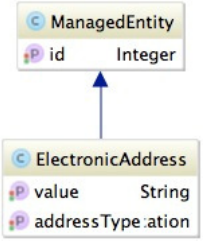

Figure 9 Electronic address UML class diagram

Attribute	Data-type	Description
id	Integer	The managed entity id
addressType	Classification	The address type, mapped to the ELECTRONIC_ADDRESS scheme
value	String	The electronic address value

Table 40 Electronic address association attributes

12.11 Source

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

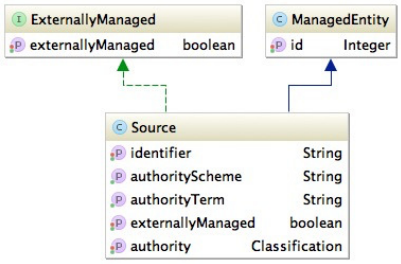

Figure 10 Source UML class diagram

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

Table 41 Source attributes

12.12 Localized Keywords

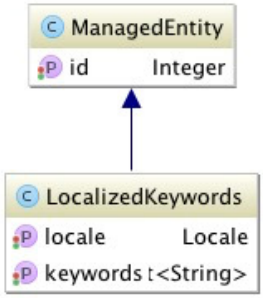

Figure 11 LocalizedKeywords UML class diagram

Attribute	Data-type	Description
id	Integer	The managed entity id
locale	Locale	The locale for which the keywords are applicable
keywords	List of String	A list of free keywords