FRIS IT-Infrastructure

Integration guide

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1 Document History

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2 Introduction

The goal of the FRIS infrastructure is to provide access to the aggregate research information of the associated knowledge institutions. It provides the possibility of uniquely identifying and classifying researchers, organisations, projects, research output and other associated aspects across organisational boundaries.

The aggregated data is to be used in a number of different scenarios, namely:

- Increase visibility for research, potentially increasing the citation index of Flemish knowledge institutions
- Enabling easy location of individual domain experts and provide meaningful inter-disciplinary collaboration suggestions
- Provide reports and benchmark indicators to support government policies
- Coupling of financial information to research information enabling budget analysis for administrators and easy funding discovery and application for researchers
- Integration with other research networks potentially linking the research information for all European knowledge institutions

The main goal of the FRIS R4 system is to aggregate research information from all research institutions in the region using standards compliant technology[1]. In order to facilitate this the main system interfaces of the solution will be document literal SOAP web services with research data payload in the CERIF XML standard.

The purpose of this document is to offer a guide to the data providers how to integrate with the FRIS R4 system. The document will elaborate on the possible integration scenarios with the FRIS Ingestion Service that must be supported for full compliance with the FRIS research vision. In order to facilitate unambiguous integration, the FRIS concepts and their representation in CERIF-FRIS xml will be documented in great detail. As such this document can be used as a guide for creating the XML dataset that will be imported into the FRIS R4 system.

2.1 Format

The FRIS R4 system will support the CERIF[2] 1.5 XML-based ingestion format.

Due to the need for an unambiguous delineation of the object graph for incremental updates the CERIF XML will be interpreted in a manner particular to the FRIS systems. The high-level specifics of this interpretation will be documented in our chapter 0, with a detailed description in chapter 4.

Note that only the data protocol is CERIF based, internally the FRIS system will use a representation that is closer to the business view of the research space. This model is described in detail in the FRIS R4 architecture and design documentation.

2.2 Ingestion interfaces

One of the goals of the FRIS system is to accurately reflect the state of research in the region. In order for this to be achievable it is necessary to use an incremental model where changes are propagated in real-time. This incremental model will require a much tighter integration with the research institution CRIS facilitating updates based on state and workflow changes. The types of operations exposed are “ingest” and “delete” operations supporting the incremental model. In the incremental model each discrete “ingest” or “delete” pertains to only one logical entity. Please note that any update of the information requires the “ingest” operation. We’ll explain this more in detail in our chapter on the ingestion service.

[1] In accordance with the EWI Multi Year Plan requirements from the 04/05/2012

[2] Common European Research Information Format

The bulk model will still be available in order to support easy upload of initial data sets and on demand synchronisation of the entire CRIS data set in case of software or process errors. The type of operation exposed is the “ingestBulk” operation that represents the entire data set for the data-provider. Any previously ingested entity for the data-provider that is not included in the bulk set will be deleted (deletion by omission).

The actual format of the content in the bulk and incremental upload will be identical between the two web service operations, though with different semantics.

The main ingestion interfaces will be a set of secured SOAP web service operations.

The minimum expected level of integration work for research institutions is expected to be:

- Implement support for bulk update of all managed content
- Implement support for incremental update and delete which is executed whenever an create/save or delete event on a managed entity is triggered
- Implement support for relaying feedback to the responsible user from the update operations

In addition the following aspects can be implemented in order to increase the quality of the managed data:

- Implement support for searching in the FRIS services whenever an unmanaged entity is to be referred from a managed entity (for example if the user wants to add an external organisation as a collaboration partner the system also performs a search against the FRIS organisation service which contains a sizeable percentage of the Flemish organisations)

Refer to the “Service Descriptions FRIS R4” document for details on the services offered.

2.3 New concepts

The new FRIS R4 system uses a number of new concepts compared to the first version of the researchportal.be that can benefit from a more detailed introduction.

2.3.1 Federated identifiers

Federated identifiers is a concept introduced in CERIF 1.5 which is intended as a structure that connects the internal world (the set of managed entities) with the external world. Federated identifiers record identifiers under which a CERIF base object is known in other context: one of the central notions of the federated identifier concept is that it refers to an identity designation that is managed by some form of authority.

In FRIS both the authority and provenance information is encoded into a single (hierarchical) classification representation, for example "Scopus" -> "Scopus id". This means that the federated identifier representation can be simplified greatly.

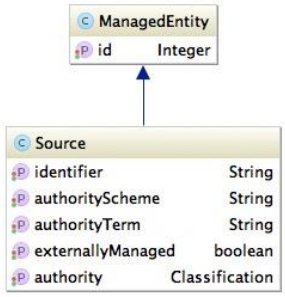

Figure 1 FRIS Source entity

The following example[3] shows the CERIF XML used to represent a "Scopus id":

```
<cfFedId>
    <cfFedIdId>ignored by FRIS since we only use embedded</cfFedIdId>
    <cfFedId>the actual Scopus id</cfFedId>
    <cfClassId>Scopus Id</cfClassId>
    <cfClassSchemeId>Identifier Authority Type</cfClassSchemeId>
</cfFedId>
```

In the FRIS R4 system these federated identifiers are modelled as the Source entity shown in Figure 1, which is characterised by an identifier, and identifier type and an authority (represented by a classification).

[3] http://www.eurocris.org/Uploads/Web%20pages/CERIF-1.5/orgUnit-with-fedId-sample.xml

2.3.2 Embedded entities

Since the CERIF 1.4 XML protocol[4] it has been possible to embed link entities into an appropriate first level entity, i.e. that link entities are embedded directly in the owner entity instead of being a separate element. The embedded link entities generally have the same structure as their standalone counterparts, except that it is not necessary/possible to specify the owning entity ID since this is now implicit.

CERIF has retained support for the old "all elements as children of the root element" in order to be backwards compatible with earlier versions. As explained in the CERIF 1.5 specification (Eurocris), unary link entities (such as classifications and keywords) and binary link entities can be embedded under the base object or could be structured as standalone xml. In the FRIS system, however, we require that the newer embedded approach be used for all link entities with an embedded variant. If any standalone link entities are supplied in the CERIF xml bundle, these will not be processed. This is mandated in order to provide unambiguous and robust incremental update facilities by having clear delineation of the object graph.

The XML mark up representing a CERIF link entity can be embedded under either end of the relationship they represent, as can be found in the CERIF specification of Eurocris. This would imply that e.g. the link entity cfProj_OrgUnit could be embedded under either the cfOrgUnit xml or the cfProj xml. In FRIS R4, however, we have made explicit choices under which end each relation can be embedded. These choices will be explained in the detailed format guide for each of the FRIS entities.

The following example shows the difference between the embedded and standalone structure of a unary relation. Only the embedded variant is supported in FRIS.

Example of an embedded unary relation, the cfOrgUnitKeyw element:

```
<fris:cfOrgUnit>
    <cerif:cfOrgUnitId>organisation-identifier</cerif:cfOrgUnitId>
    <cerif:cfKeyw cfLangCode="nl" cfTrans="o">Keyword 1, keyword
2</cerif:cfKeyw>
</fris:cfOrgUnit>
```

Or

```
<fris:cfOrgUnit>
    <cerif:cfOrgUnitId>organisation-identifier</cerif:cfOrgUnitId>
    <cerif:cfKeyw cfTrans="o" cfLangCode="en">Keyword 1</cerif:cfKeyw>
    <cerif:cfKeyw cfTrans="o" cfLangCode="en">keyword 2</cerif:cfKeyw>
</fris:cfOrgUnit>
```

Example of a stand-alone unary relation, the cfOrgUnitKeyw element:

```
<cfOrgUnit>
    <cfOrgUnitId>organisation-identifier</cfOrgUnitId>
</cfOrgUnit>
<cfOrgUnitKeyw>
    <cfOrgunitId>organisation-identifier</cfOrgunitId>
    <cfKeyw cfLangCode="nl" cfTrans="o">Keyword 1, keyword 2</cfKeyw>
</cfOrgUnitKeyw>
```

Or

```
<cfOrgUnit>
    <cfOrgUnitId>organisation-identifier</cfOrgUnitId>
</cfOrgUnit>
<cfOrgUnitKeyw>
    <cfOrgunitId>organisation-identifier</cfOrgunitId>
    <cfKeyw cfLangCode="nl" cfTrans="o">Keyword 1</cfKeyw>
    <cfKeyw cfLangCode="nl" cfTrans="o">keyword 2</cfKeyw>
</cfOrgUnitKeyw>
```

[4] http://www.eurocris.org/Uploads/Web%20pages/CERIF-1.4/CERIF_1.4_0.xsd

The following examples show the difference between the embedded and the standalone structure for a binary relation, in CERIF terms a link entity. Only the embedded variant is supported in FRIS

Example of an embedded binary relation, the cfPers_cfOrgUnit link entity between cfPers and cfOrgUnit:

```
<cfPers>
    <cfPersId>person-identifier</cfPersId>
    <cfPers_OrgUnit>
        <cfOrgUnitId>c745365f-1a19-419f-b9c2-74cd43ed64f6</cfOrgUnitId>
        <cfClassId>Member</cfClassId>
        <cfClassSchemeId>Assignment Role</cfClassSchemeId>
        <cfStartDate>2013-09-01T09:16:42.995+02:00</cfStartDate>
    </cfPers_OrgUnit>
</cfPers>
```

Example of a stand-alone binary relation, the cfPers_cfOrgUnit link entity between cfPers and cfOrgUnit:

```
<cfPers>
    <cfPersId>person-identifier</cfPersId>
</cfPers>
<cfPers_OrgUnit>
     <cfPersId>person-identifier</cfPersId>
     <cfOrgUnitId>organisation-identifier</cfOrgUnitId>
     <cfClassId>Member</cfClassId>
     <cfClassSchemeId>Assignment Role</cfClassSchemeId>
     <cfStartDate>2013-09-01T09:16:42.995+02:00</cfStartDate>
</cfPers_OrgUnit>
```

As is clear from the examples above, the embedded relations generally have the same structure as their standalone counterparts, except that it is not necessary/possible to specify the owning entity ID since this is now implicit.

2.3.3 Ternary relationships

The FRIS business needs define a specific constraint on one conceptual entity pair: for the Person Organisation relation it is required that it can be identified in a persistent manner in order to capture the specific assignment of a Person to an Organisation and relate this Assignment to other conceptual entities. This is needed since the Assignment can change through time or a person can have several assignments simultaneously with the same provider and the relevant Assignment need to be related to another entity. FRIS recognises the conceptual entity Assignment identified by an Assignment Identifier.

The Assignment concept allows for a business driven limitation on the degrees of freedom on the otherwise unconstrained ternary relation Person-OrgUnit-Other Entity (eg. Result Publication).

The Assignment concept becomes an entity in itself. For relationships with other entities again the classical binary relationship can be used, resulting for instance in an Assignment to Result Publication relation that expresses coherently and unambiguous the business requirement.

The constrained conceptual ternary relationship is constructed via a binary relationship with an objectified binary relationship.

The CERIF model does not support this structure as its modelling technique is inaccurate in some situations, for example when one considers the relationship between CfOrgUnit, CfResPubl and CfPers, where it becomes impossible to accurately state during which tenure a particular author produced a specific publication since this is solely inferred from the temporal properties of the three link associations.

Moreover, the conceptual level of the Assignment cannot be defined by CERIF since only the logical and physical database levels are documented. On both documented CERIF level Relationships are quaternary since each relationship primary key is dependent on four other entities. This technique is adequate for conceptual binary relationship. The concept of a ternary relationship with equal participation of three conceptual entities is inadequate when it comes to expressing specific constraints on one of the participating conceptual binary relationships in the ternary relation.

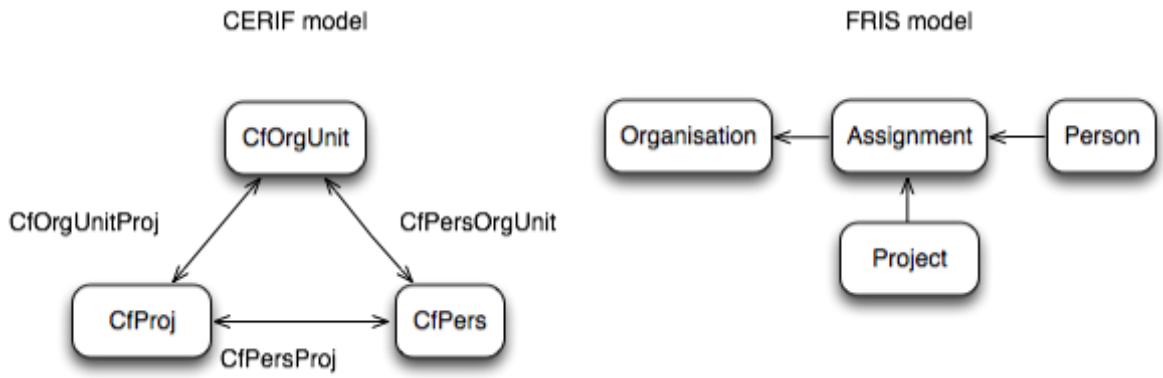

Figure 2 Ternary relationship example

Since CERIF does not support this structure a number of changes have been made to CERIF XSD specification supported by the FRIS R4 system. In our FRIS R4 model we do make the Assignment relation explicit by extending the simple person-organisation association to encompass the concept of an assignment to an organisation and by interpreting all participation in creating a publication as having been done as a part of an assignment to that organisation. The FRIS R4 system only accepts participation of managed persons as assignment relations. If this information is not explicit in the source data-set the data provider must infer a representation based on available data.

A new frAssignment type has been introduced[5] that is to be used instead of the cfPers_OrgUnit concept. The frAssignment type is basically a cfPers_OrgUnit representation with an explicit, persistent identity (frAssignmentId). See chapter 4.4.11 for further details. The imprecise cfOrgUnit <-> cfPers <-> cfProj binary relations in CERIF have been replaced by a new frParticipant type that allows relations to frAssigment types for managed persons, to cfPers for un-managed persons, to cfOrgUnit for organisations or a stand-alone frParticipant type for group authors. See chapter **Fout! Verwijzingsbron niet gevonden.** and **Fout! Verwijzingsbron niet gevonden.** for more details.

2.3.4 External entities

In order to ensure a correct representation of projects and research output it is necessary to store information on for example collaboration partners and external authors. These “external entities” are submitted along with the normal “internally” managed entities.

Like CERIF the FRIS R4 system does not have separate entity types for external versions, we re-use the existing structures (Person, Organisation, etc) and mark the entity as “external” by setting the external property to true. Note that entities marked external are subject to a much less rigorous validation.

All CERIF first-level entities can be marked as “externally managed” by adding the following *_Class relation (example for cfOrgUnit):

```
<cfOrgUnit_Class>
     <cfClassId>external</cfClassId>
     <cfClassSchemeId>Dataprovider Viewpoint Type</cfClassSchemeId>
</cfOrgUnit_Class>
```

All other data structures are exactly as for their fully managed counterparts. This means that if, for example, that the FRIS system UUID of a collaboration partner is known this information can be submitted as a normal federated identifier along with other data structures.

[5] See the FRIS-CERIF.xsd for a formal description of the FRIS extensions to the CERIF 1.5 XML standard.

2.4 The four entities of the FRIS model

The following paragraphs will provide a high-level overview of the scope of each of the four base entities: Organisation, Person, Project and Research Output. The FRIS R4 system will support a CERIF 1.5 XML based format, but due to the need for an unambiguous delineation of the object graph for incremental updates, the CERIF XML will be interpreted in a manner particular to the FRIS systems. Note that the exact makeup of the entities will likely change a bit as a result of the upcoming modelling work in the DGC[6] and that the details of the information model will be definite each time the service will be developed.

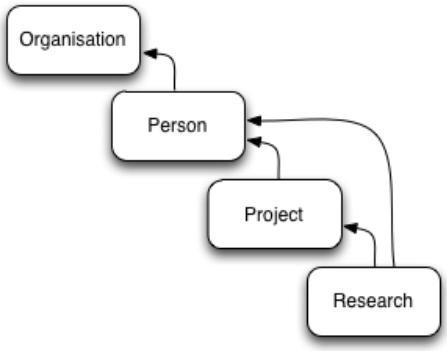

Figure 3 High-level entity relations

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 shown in Figure 3.

Each of the shown entity types contains all of the associated information needed to describe that entity; in CERIF terms all associated second level and link entities.

The base entity embeds both the relation and the content of the associated concepts, this means for example that a physical address is not a separate concept in FRIS, but tied completely to the lifecycle of the owning entity.

In the diagrams below dotted rectangles signify concepts that are not managed as part of the base entity lifecycle, whereas the line ones are. In the case of a relation to a dotted concept only the association itself is managed as part of the entity. If a particular association is "missing" from an entity diagram this typically means that it is managed by a different entity. The direction of the association indicates the visibility between the entities.

2.4.1 The Organisation entity

The high-level organisation entity concept consists of numerous associated concepts as shown by Figure 4.

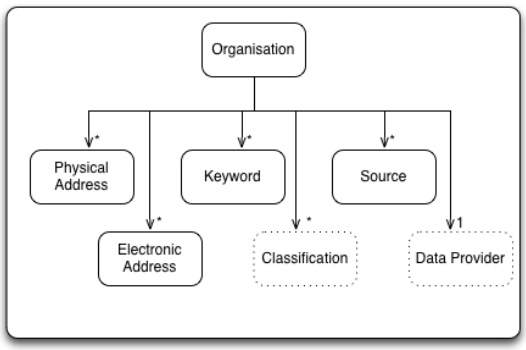

Figure 4 Contents of high-level organisation concept

Besides a number of inherent properties like name, type, name variants, acronym, start/end date all of the shown relations are managed as an inherent part of the organisation entity. Some of these are wholly owned by the organisation, i.e. when that entity is deleted the associated objects are deleted as well. These are the relations to physical address, electronic address and keyword. The remaining relations are to entities that exist outside of their relation to the organisation and only the association is managed.

A Source is a, in CERIF terms, federated identifier that consists of an identifier, authority classification and identifier type.

All classification references submitted to the FRIS services must conform to the set of valid classifications returned by the classification service. This set of valid classifications is available in the FRIS administration module and the FRIS classification service. It is the responsibility of the data provider at all times to correctly map from local concepts to the canonical FRIS

[6] Data Governance Center

classifications.

2.4.2 The Person entity

The high-level person entity concept consists of the elements shown in Figure 5.

The inherent properties like name and gender are not shown.

The key concept is the organisation association that represents an assignment to an organisation. As in previous case we regard the organisation association and the addresses as being owned/managed by the person entity. The remaining concepts exist outside of their relation to the person and only the association is managed.

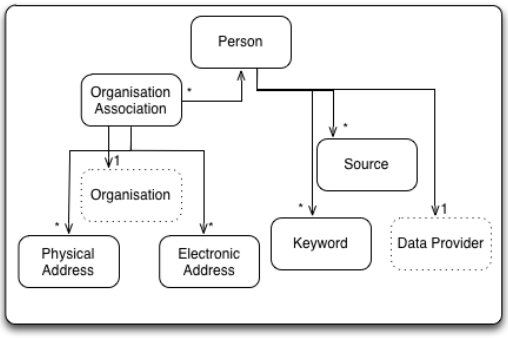

Figure 5 Contents of high-level person concept

2.4.3 The Project Entity

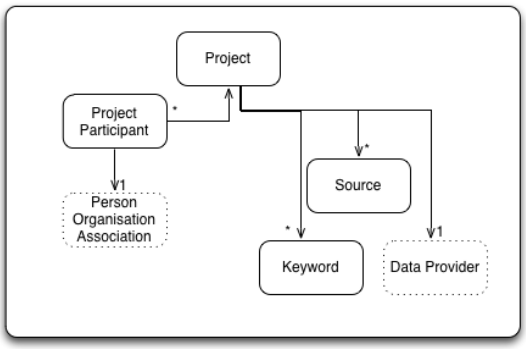

Figure 6 Contents of high-level project concept

The high-level project entity concept consists of the elements shown in **Fout! Verwijzingsbron niet gevonden.**.

The inherent properties like name, description, type and start/end date are not shown.

A key concept is the participant association to the person organisation relation indicating that participation is performed as a part of an employment. Given that this is the person organisation association this effectively makes it a ternary relation between project, person and organisation.[7]

In the case of a participant that is not a person managed by one of the FRIS data-providers an alternative will be defined in order to be able to capture this information.

2.4.4 The Research Output Entity

The high-level research output entity concept consists of the elements shown in **Fout! Verwijzingsbron niet gevonden.**

The inherent structure of the research output concept has not been defined yet as it will be defined as a part of the DGC modelling effort, but is expected to encompass a broad range of research output and not only published articles. Published articles will be the primary focus, but research in the arts will be included as well (cf. ECOOM VUB project).

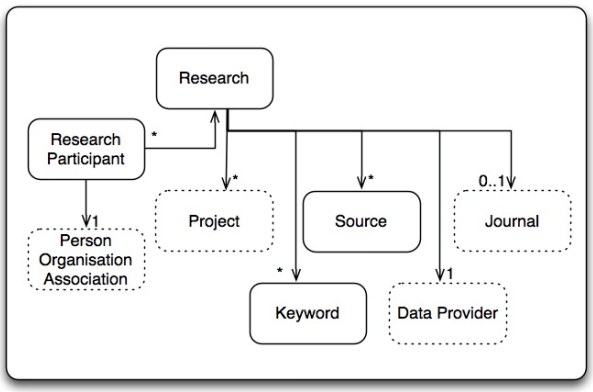

Figure 7 High-level research output model

[7] Cf. the concept of ternary relation as explained ***.

As with projects a key concept is the research participation association that refers to a person organisation relation indicating that the participation is performed as a part of an assignment.

Contrary to CERIF a FRIS journal is a discrete entity that is managed in a separate process. The FRIS services will publish a curated list of journals. This list is accessible in the same manner than any other managed entity in the FRIS infrastructure, via dedicated web services.

2.5 Managing data over time

As time goes by the managed research information data set will change in numerous ways. When managing these changes, it is important to keep in mind that the data set should be correct both in regards to the current state but also in regards to historic data.

One example of a scenario where care must be exhibited is in the case of external persons becoming internal. If for example a researcher at another research institution was added as an external person in the data set because she was co-author on a paper along with one or more authors from the source research institution. If this researcher gained employment at the source research institution care must be taken to ensure that the historical data still is attributable to its original sources. So in this case it would not be correct to migrate any existing publication relations for the research to her new person-organisation relation (the ternary participant structure described in the preceding chapter) since that also signifies that the new organisation, incorrectly, is attributable for the research output in question. In this case the participant relation should remain as an "external person" relation to the researcher.

3 FRIS Ingestion Service: Integration scenarios

There are three integration scenarios with the FRIS Ingestion Service that must be supported for full compliance with the FRIS research vision. This chapter will serve as an introduction explaining briefly each of the integration scenarios.

Further on in the document, in a chapter dedicated to the ingestion service, we will outline the available operations/functionalities and detail the format structure for each operation.

3.1 Bulk scenario: Initial Load

The bulk scenario is similar to the current researchportal.be scenario, when requested the data-provider systems generate a CERIF package with all entities to be exported and push this package to the FRIS ingestion service. It is assumed that the package represents the complete data set and any previously existing entities that are not present will be deleted. The bulk update operation should only be used when initially populating the FRIS database or to fix mass errors in the data set. The daily maintenance of the data set is managed through the incremental update operation described after this chapter.

An important note in regards to the deletion functionality, which is by omission in the bulk operation the intention is that deletion is mainly for erroneous data, it is not expected that historical entries be deleted but rather rendered inactive by using the appropriate lifecycle dates on the entities or associations.

The following diagram showcases a sample bulk export flow for a data provider.

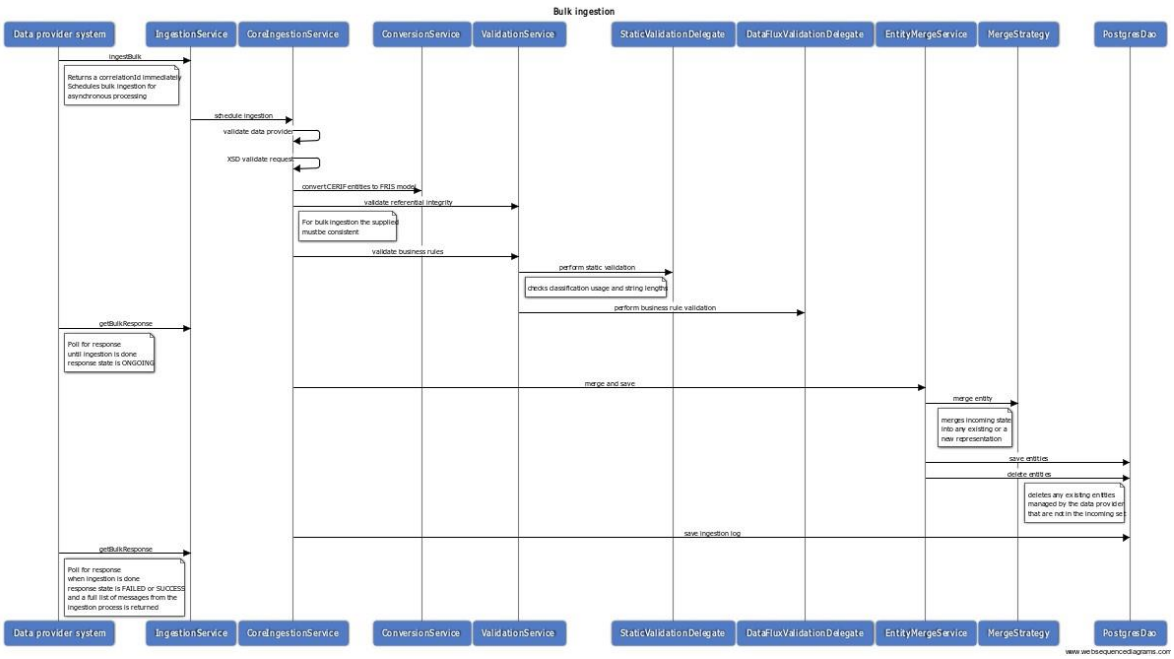

Figure 8 Bulk ingestion sequence diagram

Step	Description
1	An administrator initiates a bulk export in the data-provider system.
1.1	The data provider system generates a single CERIF xml representation with the entire data set to be exported; organisations, persons, projects and research output.
1.2	The data provider sends the generated CERIF xml to the FRIS ingestion service using the FastInfoSet[8] protocol.
2	The FRIS SOAP ingestion service receives the payload, schedules the submitted request for processing in the CoreIngestionService. The processing is performed asynchronously so a correlation id is returned to the service user which must be used when polling for a processing result (see the section below the table for details).
3.1	The CoreIngestionService verifies the permissions of the data provider submitting the request.
3.2	The CoreIngestionService performs XSD validation of the received CERIF xml.
4	The CoreIngestionService calls the ConversionService in order to convert all submitted entities from the CERIF format to the FRIS object model.
5	The CoreIngestionService calls the ValidationService for a referential integrity validation of the submitted data set. For a bulk data set all references to internally managed entities must be present in the submitted set.
6	The CoreIngestionService calls the ValidationService for a business rule validation of the submitted data set.
6.1	The ValidationService calls the StaticValidationDelegate for a validation of all classification usage and string property lengths.
6.2	The ValidationService calls the DataFluxValidationDelegate for a business rule (as defined by EWI) validation of the submitted data set.
7	The CoreIngestionService calls the EntityMergeService to persist the incoming data set state.
7.1	The EntityMergeService resolves any existing representations in the database of the entities in the submitted data set and either updates any changed representation or creates a completely new instance.
7.2	The EntityMergeService saves the updated entity representations in the database using the PostgreDao.
7.3	The EntityMergeService deletes any previously existing entities that are missing from the ingestion set.
8	The CoreIngestionService saves the ingestion result log.
Exception	The ingestion procedure will halt at any of the steps if any validation violations or errors are encountered. In these cases the ingestion response will include a failed status and a list of validation errors.

Since the ingestion process may take a significant amount of time for non-trivial data sets the procedure is designed to be asynchronous. This means that the service user is responsible for polling the FRIS SOAP ingestion service for an ingestion result using the correlation id returned from the initial “ingestBulk” request.

Suggested polling interval depends on the size of the submitted CERIF payload:

More than 1GB – poll every 10 minutes

More than 100 MB – poll every minute

Less than 100 MB – poll every 10 seconds

While the ingestion process is incomplete, a response document with the state “ONGOING” will be returned. When the ingestion process has completed, the response document state will be either “FAILED” or “SUCCESS”.

If a response state of “UNKNOWN” is returned, it means that the correlation id is not valid.

Note : for the Bulk Ingest good communication with EWI is needed as only one bulk ingestion is ran at a time, so if there are other requests (pending) any subsequent will be delayed until all previous requests have been processed.

3.2 Incremental Load

The incremental scenario (incremental inserts and incremental updates) is intended to be the main mechanism in which the FRIS system is kept synchronised with the data-provider data set. The premise is that each time an organisation, person, project or research output is updated in the data-provider systems the change is evaluated whether the entity should be exported to the FRIS ingestion service. Depending on the data-structure and workflow in the data-provider system a number of scenarios can be envisioned, for example:

Scenario	System decision
A researcher creates a new publication, but it has not yet been pushed to a “published” workflow state.	The publication is not synchronised to the FRIS systems.
A publication is pushed to the “published” workflow state or a “published” publication is edited.	The publication is synchronised to the FRIS systems.
A publication is deleted or pushed back to a non-published workflow state.	An entity deletion is requested from the FRIS systems.

The scope of the update is determined by the high-level delineation outlined in chapter 2.4. It is the responsibility of the data provider to ensure that the exported entity representation is valid and complete, i.e. if there is any associations to entities that have not been exported these should be omitted. The inverse of this situation is that an export may trigger multiple ingestion requests the first time an entity is exported there are any dependent, already exported entities with associations to the entity they have to be re-exported including the new, now valid association. An example, a publication has associations to person A and B, at the time the publication is exported person B is still local only so that association is omitted. At a later date person B is exported, in this case it is necessary to also export the publication in order to add the previously omitted association to its FRIS representation.

The diagram below shows a sample incremental ingestion scenario.

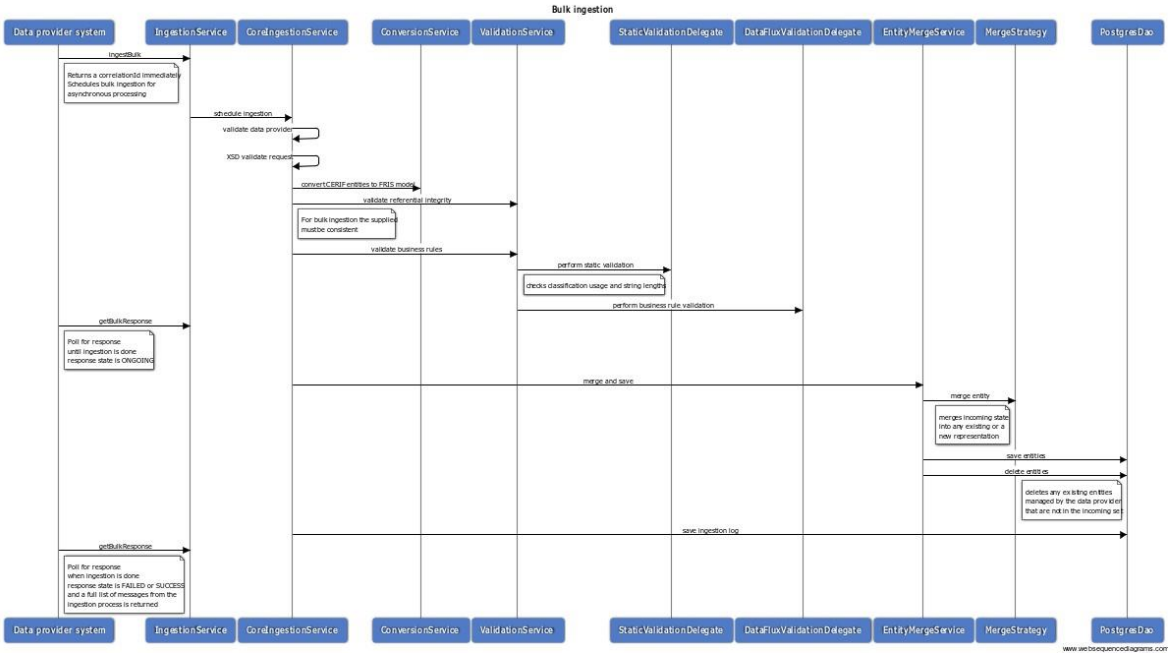

Figure 9 Incremental update sequence diagram

Step	Description
1	A researcher submits a modification to a publication in the data provider system.
1.1	The system evaluates whether an export (or delete) is necessary based on the state of the saved publication.
1.2	The data provider system generates a CERIF representation of the saved publication and its owned associations only.
1.3	The data provider system sends the generated CERIF xml to the FRIS SOAP ingestion service.
2	The FRIS SOAP ingestion service receives the payload and submits the payload for immediate processing in the CoreIngestionService.
3.1	The CoreIngestionService verifies the permissions of the data provider submitting the request.
3.2	The CoreIngestionService performs XSD validation of the received CERIF xml.
4	The CoreIngestionService calls the ConversionService in order to convert all submitted entities from the CERIF format to the FRIS object model.
5	The CoreIngestionService calls the ValidationService for a referential integrity validation of the submitted data set. For a bulk data set all references to internally managed entities must be present in the submitted set.
6	The CoreIngestionService calls the ValidationService for a business rule validation of the submitted data set.
6.1	The ValidationService calls the StaticValidationDelegate for a validation of all classification usage and string property lengths.
6.2	The ValidationService calls the DataFluxValidationDelegate for a business rule (as defined by EWI) validation of the submitted data set.
7	The CoreIngestionService calls the EntityMergeService to persist the incoming data set state.

7.1	The EntityMergeService resolves any existing representations in the database of the entities in the submitted data set and either updates any changed representation or creates a completely new instance.
7.2	The EntityMergeService saves the updated entity representations in the database using the PostgreDao.
8	The CoreIngestionService saves the ingestion result log and returns the result to the service user as part of the response document.
Exception	The ingestion procedure will halt at any of the steps if any validation violations or errors are encountered. In these cases the ingestion response will include a failed status and a list of validation errors.

3.3 Deletion in the incremental scenario

Any deletion in the incremental scope is performed through a dedicated delete operation on the FRIS ingestion service, i.e. a dedicated delete operation for each entity separately will be available. Note that this 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.

An important note in regards to the deletion functionality, by explicit delete in the case of incremental update, the intention is that deletion is mainly for *erroneous* data, it is not expected that historical entries be deleted but rather rendered inactive by using the appropriate lifecycle dates on the entities or associations.

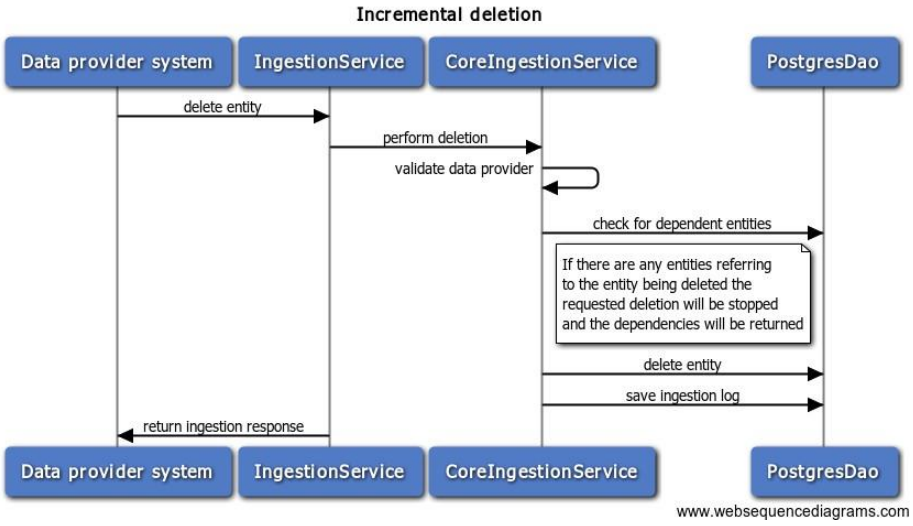

Figure 10 Incremental deletion sequence

Step	Description
1	A researcher deletes a publication in the data provider system.
2	The data provider system sends a delete entity request with the local identifier of the deleted entity to the FRIS SOAP ingestion service.
3	The FRIS SOAP ingestion service receives the payload and submits the payload for immediate processing in the CoreIngestionService.
4	The CoreIngestionService verifies the permissions of the data provider submitting the request.

5	The CoreIngestionService checks whether there are any entities in the FRIS database referring to the entity being requested deleted. If there are any dependencies the deletion is cancelled and a list of dependency errors is returned to the service user (up to a hundred per request).
6	The CoreIngestionService calls the PostgresDao for a delete of the submitted entity identifier.
7	The FRIS ingestion service will return a response with a list of error messages if deletion could not be performed.

3.4 Datavalidation: error feedback

There are 3 levels of errors:

- XSD
- Referential/internal checks
- Business Rules validation by Dataflux

The validation service in the FRIS R4 system is included as integration to the Dataflux software.

The validation service encapsulates both referential integrity checking and business rules validation. The referential integrity check validates that all referred entity identifiers are either present in the supplied ingestion set or already in the FRIS database. The business rules validation is a template-based configuration using a number of pre-defined rule patterns.

The error feedback from Dataflux in FRIS R4 will provide the following information to the dataproviders:

1. Entitytype: name of the Entity (Organisatie, Persoon, Project, Research Output)
2. Dataproviderid: Entity ID that has been submitted by the Dataprovider
3. Error: specific error feedback detailing what kind of error has occurred

To give a clear example of the error feedback:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <ns1:ingestResponse xmlns:ns1="http://fris.ewi.be/">
      <ingestionResponse operation-status="FAILED" operation="INCREMENTAL" ingestionDate="2020-10-30T07:19:40.756Z" reference-id="335314759" xmlns="http://fris.ewi.be/response">
        <success>false</success>
        <messages entity-type="ORGANISATION" entity-id="4">
          <source>INTERNAL_CHECK</source>
          <level>ERROR</level>
          <message>Organisation (ID: 4): (@organisationActivityTypes[1]) No known classification exists for: Organisation Activity Type/Fake Research</message>
        </messages>
        <messages entity-type="ORGANISATION" entity-id="4">
          <source>BUSINESS_RULE</source>
          <level>ERROR</level>
          <message>Organisatie heeft geen parent of heeft geen relatie overgenomen door</message>
        </messages>
      </ingestionResponse>
    </ns1:ingestResponse>
  </soap:Body>
</soap:Envelope>
```

Example of XSD error:

<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
<soap:Body>
<ns1:ingestResponse xmlns:ns1="http://fris.ewi.be/">
<ingestionResponse operation-status="FAILED" operation="INCREMENTAL" ingestionDate="2020-10-30T07:23:00.728Z" reference-id="335314786" xmlns="http://fris.ewi.be/response">
<success>false</success>
<messages>
<source>XSD</source>
<level>ERROR</level>
<message>line 27: Expected elements 'cfName@urn:xmlns:org:eurocris:cerif-1.5-1 cfResAct@urn:xmlns:org:eurocris:cerif-1.5-1 cfKeyw@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_Class@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_Equip@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_EAddr@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_Event@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_ExpSkills@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_Facil@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_Fund@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_OrgUnit@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_Prize@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_ResPat@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_ResProd@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_ResPubl@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_Srv@urn:xmlns:org:eurocris:cerif-1.5-1 cfPers_OrgUnit@urn:xmlns:org:eurocris:cerif-1.5-1 cfProj_OrgUnit@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_PAddr@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_DC@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_Medium@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_Meas@urn:xmlns:org:eurocris:cerif-1.5-1 cfOrgUnit_Indic@urn:xmlns:org:eurocris:cerif-1.5-1 cfFedId@urn:xmlns:org:eurocris:cerif-1.5-1' instead of 'cfOrgUnit_Classy@urn:xmlns:org:eurocris:cerif-1.5-1' here in element cfOrgUnit@urn:xmlns:org:eurocris:cerif-1.5-1-FRIS</message>
</messages>
</ingestionResponse>
</ns1:ingestResponse>
</soap:Body>
</soap:Envelope>

3.5 Data enrichment: the FRIS retrieval services

One of the main problems in the existing research-portal.be solution is the existence of data silos; each data-provider only uploads the part of the data that is managed directly in their systems. This means that relations to externally managed entities are not uploaded which makes analysis of institution collaboration impossible. If institutions actively use the FRIS retrieval services any time an external entity is referred to, this would be a major asset to the FRIS architecture and would increase data quality and data correctness in the FRIS portal.

In addition, entities may have logical duplicates across data-providers, for example persons that are/have been employed at different data-providers. One of the greatest challenges of any system designed to integrate data from multiple data-providers thus is the inherent problem of entity identity management (relation between entities from the same data-provider, a logical unique entity that is managed by multiple data-providers, relations to entities that are managed by another data-provider etc.)

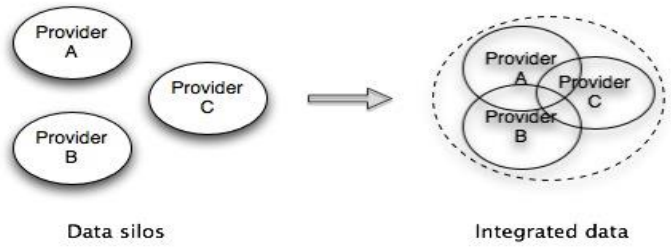

Figure 11 Data silos illustration

It is a major goal of the FRIS R4 system to enable a transition from data silo state to an integrated data set where entities have known duplicates/aliases and references to entities not managed by the uploading data-provider are explicit.

In the aliasing strategy used in the FRIS R4 system two or more entity representations are marked as being semantically the same, similar to the owl:sameAs concept from the "OWL Web Ontology Language". This strategy retains the data source as the ultimate authority on a particular entity representation recognising that the different representations are facets of the entity.

4 FRIS XML - CERIF 1.5 XML: structural format

FRIS XML is the data exchange format to enable transport of data between the data-providers and the FRIS R4 architecture and is based on the CERIF 1.5 exchange format. This chapter will describe in detail all FRIS xml features and will explain in detail how to create a valid xml dataset.

The FRIS interpretation of the CERIF XML format is based on the 1.5 data exchange format specification[8]. For a comprehensive guide about CERIF 1.5 and the CERIF xml 1.5 schema necessary for creating a valid CERIF xml, we refer to the Eurocris website.

Due to the need for an unambiguous way of exchanging information, the CERIF xml will sometimes be interpreted in a manner particular to the FRIS system. The specifics for such a FRIS interpretation needs particular attention and will be clearly marked in the chapter below. Along the same lines, the differences between CERIF 2006 and CERIF 1.5 will be indicated.

In the following we will detail how to represent FRIS concepts in CERIF XML. This chapter thus can be used as a guide for creating the XML dataset that will be imported into the FRIS R4 system.

There is a difference between the structural requirements below and the business rules that are applicable at a given time. These business rules contain additional requirements for the data exchange. They will be implemented in the DataFlux solution.

Note that when business rules are not mentioned at that particular feature, no business rule is implemented. **If a CERIF element or attribute is omitted from the XML-fragments below it means that it is disregarded in the FRIS system.**

If a start date is required by a business rule but unknown in the data provider systems please use “0000-01-01” and if end date is required but unknown please use “9999-12-31”.

For the sake of clarity we will use the following symbols throughout the document:

Important remark!

Marks a FRIS R4 deviation from CERIF 1.5 or an important difference between CERIF 1.5 and CERIF 2006.

4.1 CERIF root elements

4.1.1 The Namespaces

The FRIS specific elements are added under the “urn:xmlns:org:eurocris:cerif-1.5-1-FRIS” namespace and the original CERIF elements use the normal “urn:xmlns:org:eurocris:cerif-1.5-1” namespace. In the subsequent chapters a “fris” namespace prefix will always specify a FRIS specific element and a “cerif” namespace prefix a normal CERIF element. If the namespace prefix is omitted in order to increase readability of the XML samples it will always refer to a CERIF element.

4.1.2 CERIF markup root: the CERIF element

4.1.3 FRIS R4 CERIF Header

```
<?xml version="1.0" encoding="utf-8"?>
<fris:CERIF
        xmlns:fris="urn:xmlns:org:eurocris:cerif-1.5-1-FRIS"
        xmlns:cerif="urn:xmlns:org:eurocris:cerif-1.5-1"
        release="1.5" date="2014-09-02" sourceDatabase="ignored">
</fris:CERIF>
```

[8] CERIF XML data exchange format specification

The specification release should be set to CERIF version “1.5”, and the date should be set to a representation with the “YYYY-MM-DD” pattern.

Source database can be set to any value since data provider is based on the request authentication instead. This means that the value of the source database is ignored in favour of the data-provider defined in FRIS R4.

Note that the root CERIF element is a FRIS specific element where cfPers refers to the frPers__Type and cfProj refers to the frProj__Type, see the FRIS-CERIF.xsd specification for details.

4.2 General elements

4.2.1 Embedded structure of link entities

As explained above in our chapter on “New Concepts”, FRIS does not longer support the concept of standalone link entities, but requires that the embedded approach be used for all link entities with an embedded variant in CERIF.

This applies to:

- unary relations such as keywords, classifications

- federated identifiers

- binary relations such as link entities

We’ll clearly explain the format structure difference of an embedded vs. a standalone concept for each of the above categories in our chapter of the format structure of the Organisation entity. This could serve as an example for all FRIS entities.

4.2.2 Timestamp format

Timestamps are used to indicate start- and end dates. The appropriate format of the timestamp is as follows: YYYY-MM-DDThh:mm:ss

YYYY	4 digit year representation for example 2014
MM	two-digit month representation for example 12
DD	two-digit day of the month representation for example: 31
hh:mm:ss	Time of the day, hours:minutes:seconds for example: 12:00:00

4.2.3 Aliasing

Aliasing is used in the FRIS system to mark two or more entities as semantically the same. Aliasing is represented in FRIS R4 by using federated identifiers with an alias as cfClassId and FRIS as the authority.

Example:

```
<fris:cfOrgUnit>
…
<cerif:cfFedId>
    <cerif:cfFedIdId>ignored</cerif:cfFedIdId>
    <cerif:cfFedId>29c351cf-f7f0-40e7-8cdd-ab334f7219a1</cerif:cfFedId>
    <cerif:cfClassId>FRIS Alias Id</cerif:cfClassId>
    <cerif:cfClassSchemeId>Identifier Authority Type</cerif:cfClassSchemeId>
  </cerif:cfFedId>
…
</fris:cfOrgUnit>
```

Please note that some elements are required by CERIF 1.5 and thus should be present in the XML representation, but are ignored in the FRIS system. We’ll explain this in more detail when discussing the alias representation for an Organisation entity.

4.2.4 Language dependent elements

CERIF multilingual entities are transformed to XML using a standardized construct: an XML element with multilingual attributes containing the text value itself, i.e. the XML element has two additional qualifying XML attributes: **cfLangCode** (the code of the language) and **cfTrans** (the translation mode)**.** FRIS R4 does not use the cfTrans attribute.

The FRIS R4 ingestion service will accept a language code in the format of the ISO 639-1 code, for example "nl" or "en" or as a local string consisting of a language and country code, for example "nl_BE" or "en_GB". If a local string is received, it will be reduced to its language component. Texts can be submitted in any available language, whether the submitted representation is valid is decided by the DataFlux validation service. *Example*

```
<cfName cfLangCode="nl" cfTrans="o">Organisatie Naam</cfName>
<cfName cfLangCode="en" cfTrans="o">Organisation Name</cfName>
```

The FRIS R4 system will accept localised string values for any valid ISO 639-1 language code. The DataFlux validation service **may** require entries for specific languages, like "nl" or "en".

4.2.5 Classifications and classification schemes

The FRIS system does not follow the CERIF concept of expressing all terms and scheme-ids as UUID's. Terms and scheme-id's are human readable and defined in the FRIS admin module.

Note that the cfClassSchemeId element contains the identifier/label of the concept scheme.

4.2.6 Federated identifiers

Federated identifiers are a new feature in the CERIF 1.5 Full Data Model. They record identifiers under which a CERIF base object is known in other contexts. We refer for more general information on this feature to the CERIF 1.5 FDM specification; here we concentrate on the XML representation.

In the FRIS model, federated identifiers are used to express aliasing in addition to external identifiers.

As with all CERIF entities, federated identifiers in CERIF 1.5 can be either recorded stand-alone (as a separate element being a child of the owning first level entity), or embedded. In the FRIS system we only support the embedded version:

```
<cfResPubl>
 …
  <cfFedId>
    <cfFedIdId>ignored</cfFedIdId>
    <cfFedId>10.1186/1471-2105-10-324</cfFedId>
    <cfStartDate>ignored</cfStartDate>
    <cfClassId>Doi</cfClassId>
    <cfClassSchemeId>Identifier Authority Type</cfClassSchemeId>
  </cfFedId>
</cfResPubl>
```

Most of the CERIF federated identifier elements are ignored by the FRIS system. The used elements are:

- cfFedId is the actual external identifier
- cfClassId should be the appropriate authority/provenance term
- cfClassSchemeId should be the appropriate authority/provenance scheme id

4.2.7 External entities

In many cases it is necessary to store information on entities that are not managed directly in order to be able to provide a correct and complete representation of directly managed entity. In the FRIS system we term these as external entities, which is short for externally managed entities. This can for example be

external persons in order to be able to represent a correct list of authors on a journal article or external organisations to be able to represent collaboration partners on a research project.

In the FRIS system we have chosen to model these externally managed entities as normal entities (organisation, person, project & research output) that have been marked external. We recognise that the data-quality of these instances is not of the same standard as internally managed entities so the business rules validation will be minimal.

In all cases an entity is marked external by adding a specific classification relation to the entity.

Structure:

```
<*_Class>
      <cfClassId>external</cfClassId>
      <cfClassSchemeId>Dataprovider Viewpoint Type</cfClassSchemeId>
</*_Class>
```

Example :

```
<fris:cfPers>
…
<cerif:cfPers_Class>
   <cerif:cfClassId>external</cerif:cfClassId>
   <cerif:cfClassSchemeId>Dataprovider Viewpoint Type</cerif:cfClassSchemeId>
 </cerif:cfPers_Class>
…
</fris:cfPers>
```

4.3 Organisation CERIF mapping

The CERIF cfOrgUnit entity is mapped to the FRIS Organisation entity <fris:cfOrgUnit>.

Note that the business rules described below should be considered neither exhaustive nor authoritative. The full, context dependent list is available in DataFlux.

> Every time an organisation is submitted, ALL of the elements detailed in this chapter must be included if appropriate. If any element is omitted it means that the attribute represented by the element is cleared.

4.3.1 Overview of cfOrgUnit elements in FRIS R4

	Id	name	Type	Fris R4
1	cfOrgUnitId	Organisation Unit Identifier	Identifier (max 128 chars)	Yes
0-1	cfAcro	Acronym	String	Yes
0-1	cfHeadcount	Headcount	Integer	Not used
0-1	cfTurn	Turnover	Currency amount field	Not used
0-1	cfURI	Uniform Resource Identifier	string	Not used
0-N	cfName	Name	Multi-lingual text field	Yes
0-N	cfResAct	Research Activity	Multi-lingual text field	Yes
0-N	cfKeyw	Keywords	Multi-lingual text field	Yes
0-N	cfOrgUnit_Class	Relationship with Classification		Embedded
0-N	cfOrgUnit_Equip	Relationship with Equipment		Not used
0-N	cfOrgUnit_EAddr	Relationship with Electronic Address		Embedded
0-N	cfOrgUnit_Event	Relationship with Event		Not used
0-N	cfOrgUnit_ExpSkills	Relationship with Expertise And Skills		Not used
0-N	cfOrgUnit_Facil	Relationship with Facility		Not used
0-N	cfOrgUnit_Fund	Relationship with Funding		Not used
0-N	cfOrgUnit_OrgUnit	Relationship with Organisation Unit		Embedded
0-N	cfOrgUnit_Prize	Relationship with Prize Award		Not used
0-N	cfOrgUnit_ResPat	Relationship with Result Patent		Not used
0-N	cfOrgUnit_ResProd	Relationship with Result Product		Not used
0-N	cfOrgUnit_ResPubl	Relationship with Result Publication		Not used
0-N	cfOrgUnit_Srv	Relationship with Service		Not used
0-N	cfPers_OrgUnit	Relationship with Person		Not used
0-N	cfProj_OrgUnit	Relationship with Project		Not used
0-N	cfOrgUnit_PAddr	Relationship with Post Address		Embedded
0-N	cfOrgUnit_DC	Relationship with Dublin Core		Not used
0-N	cfOrgUnit_Medium	Relationship with Medium		Not used
0-N	cfOrgUnit_Meas	Relationship with Measurement		Not used
0-N	cfOrgUnit_Indic	Relationship with Indicator		Not used
0-N	cfFedId	Federated Identifier		Embedded

4.3.2 Organisation identifier

XML structure:

<cerif:cfOrgUnitId>internal-orgunit-identifier</cerif:cfOrgUnitId>

Name Business Rule: Organisation Dataprovider Identifier

FRIS R4 Specification: The OrgUnitId is the identifier for the organisation and is required. The mandatory local organisation identifier will be stored along with the data provider to uniquely identify this entity whenever an updated representation is submitted to the ingestion service. The organisation will be assigned a FRIS UUID which is used when exposing this entity through the FRIS organisation services. The identifier value may not be larger than 256 characters.

4.3.3 Acronym of an Organisation

XML structure:

```
<cerif:cfAcro>Organisation acronym</cerif:cfAcro>
```

Name Business Rule: Organisation Acronym

FRIS R4 Specification: The acronym of an organisation is not a requirement of the CERIF 1.5 standard nor a mandatory element in the FRIS R4 system. It does seem, however, an asset to send it to FRIS as it will increase the quality of the data and will be used in the search functionality of the FRIS portal.

The Acronym has been made language independent and this excludes the possibility to send acronyms in different languages. FRIS supports multiple acronyms from version R4. Should there be acronyms available in English and Dutch, the data provider is free to choose the most appropriate/known acronym.

The acronym value may not be larger than 256 characters. No HTML text formatting is allowed.

4.3.4 Name of an Organisation

XML structure:

```
<cerif:cfName cfLangCode="nl" cfTrans="o">Organisatie Naam</cerif:cfName>
<cerif:cfName cfLangCode="en" cfTrans="o">Organisation name</cerif:cfName>
```

Name Business Rule: Organisation Name

FRIS R4 specification: This is the official name of an organisation. The translation type, though mandatory in the CERIF standard, is ignored by FRIS. The title values may not be larger than 32.000 characters. No HTML text formatting is allowed.

4.3.5 Research activities of an Organisation

XML structure:

```
<cerif:cfResAct cfLangCode="nl"
cfTrans="o">Onderzoeksactiviteiten</cerif:cfResAct>
<cerif:cfResAct cfLangCode="en" cfTrans="o">Research activity</cerif:cfResAct>
```

Name Business Rule: Organisation Research Activity

FRIS R4 specification: Activities performed by an organisation whose activity type is research. Conditionally required. The research activity values may not be larger than 32.000 characters. Full HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.3.6 Organisation Keywords

XML structure:

```
<cerif:cfKeyw cfLangCode="en" cfTrans="o">Keyword</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 1</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 2</cerif:cfKeyw>
```

Name Business Rule: Organisation Keywords

FRIS R4 specification: Keywords are free text fields where mapping to a centrally known taxonomy is not necessary. The FRIS system accepts any number keyword elements. Keywords are used in FRIS in the

embedded variant (not the standalone xml). The individual keyword values may not be larger than 256 characters, the string length may not be larger than 2048 characters. No HTML text formatting is allowed.

Note : Please supply one keyword per line. In the past multiple keywords (comma-separated) in one element were allowed.

4.3.7 Organisation Type

XML structure:

```
<cerif:cfOrgUnit_Class>
    <cerif:cfClassId>University</cerif:cfClassId>
    <cerif:cfClassSchemeId>Organisation Type</cerif:cfClassSchemeId>
    <cerif:cfStartDate>organisation start date</cerif:cfStartDate>
    <cerif:cfEndDate>organisation end date</cerif:cfEndDate>
</cerif:cfOrgUnit_Class>
```

Name Business Rule: Organisation Type

FRIS R4 specification: The classification describes the organisation type, only one value may be supplied. Please refer to "Organisation Types" in the FRIS administration module for the valid classification values.

4.3.8 Organisation Activity Type

XML structure:

```
<cerif:cfOrgUnit_Class>
     <cerif:cfClassId>Research</cerif:cfClassId>
     <cerif:cfClassSchemeId>Organisation Activity
Type</cerif:cfClassSchemeId>
</cerif:cfOrgUnit_Class>
```

Name Business Rule: Organisation Activity Type

FRIS R4 specification: The classification describes the activity for a given organisation, more than one value may be supplied. Please refer to "Organisation Activity Types" in the FRIS administration module for the valid classification values.

4.3.9 Marking an Organisation as Root

XML structure:

```
<cerif:cfOrgUnit_Class>
     <cerif:cfClassId>Root</cerif:cfClassId>
     <cerif:cfClassSchemeId>Organisation Activity
Type</cerif:cfClassSchemeId>
</cerif:cfOrgUnit_Class>
```

Name Business Rule: Organisation Dataprovider Root

FRIS R4 specification: The top level of the organisational hierarchy must be signalled as Root of the hierarchy by using the Organisation Activity Type classification. A Root organisation cannot have parents.

4.3.10 Marking an Organisation as External

XML structure:

```
<cerif:cfOrgUnit_Class>
     <cerif:cfClassId>external</cerif:cfClassId>
     <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
</cerif:cfOrgUnit_Class>
```

Name Business Rule: Project External Organisation, Research Output External Organisation

FRIS R4 specification: If a particular organisation is not managed by the data-provider, but is included in the set for completeness sake, this is signalled by marking the entity as external using the above XML snippet. This pattern is used for example to include collaboration partners in a research project.

4.3.11 Marking organisation View Permission

XML structure:

```
<cerif:cfOrgUnit_Class>
     <cerif:cfClassId>confidential</cerif:cfClassId>
     <cerif:cfClassSchemeId>View Permission Type</cerif:cfClassSchemeId>
</cerif:cfOrgUnit_Class>


<cerif:cfOrgUnit_Class>
     <cerif:cfClassId>backend</cerif:cfClassId>
     <cerif:cfClassSchemeId>View Permission Type</cerif:cfClassSchemeId>
</cerif:cfOrgUnit_Class>
```

Name Business Rule: Organisation Confidentiality

FRIS R4 specification: If a particular entity should be considered backend-only or confidential using one of the above XML fragment signals this. If an entity is marked confidential it (and relations to it) will not be publicly accessible and only FRIS administrators or users coupled with the owning data-provider will be able to access it in the FRIS administration module. If an entity is marked backend-only it (and relations to it) will not be publicly accessible and all authenticated users will be able to access it in the FRIS administration module.

If the fragment is omitted the FRIS system defaults to public.

4.3.12 Discipline codes of an Organisation

XML structure:

```
    <cerif:cfOrgUnit_Class>
      <cerif:cfClassId>01010101</cerif:cfClassId>
      <cerif:cfClassSchemeId>Flemish Research
Disciplines</cerif:cfClassSchemeId>
    </cerif:cfOrgUnit_Class>
```

Name Business Rule: Organisation Disciplines

FRIS R4 specification: The FRIS system accepts associated discipline codes. The minimum required level in the Discipline code taxonomy is specified by the business rules. Conditionally required.

Please refer to "Flemish Research Disciplines" in the FRIS administration module for the valid classification values.

4.3.13 Other classifications of an Organisation

XML structure:

```
   <cerif:cfOrgUnit_Class>
      <cerif:cfClassId>?</cerif:cfClassId>
      <cerif:cfClassSchemeId>?</cerif:cfClassSchemeId>
   </cerif:cfOrgUnit_Class>
```

FRIS R4 specification: Other recognised organisation classifications are mapped to the organisation classifications property. Should the data-provider have other classifications to qualify the organisation, these could be sent as explained here. Current examples of additional classification schemes are NACE

codes & VKBO Rechtsvorm codes.

4.3.14 Start- and end date of an Organisation

XML structure:

```
<cerif:cfOrgUnit_Class>
   <cerif:cfClassId>University</cerif:cfClassId>
   <cerif:cfClassSchemeId>Organisation Type</cerif:cfClassSchemeId>
   <cerif:cfStartDate>organisation start date</cerif:cfStartDate>
   <cerif:cfEndDate>organisation end date</cerif:cfEndDate>
  </cerif:cfOrgUnit_Class>
```

Name business rule: Organisation Lifecycle

FRIS R4 specification: The start and end dates on the Organisation Type classification relation are interpreted as the organisation lifecycle start and end dates. This implies that an Organisation can have only one type attributed.

4.3.15 Electronic address of an Organisation

XML structure:

```
<cerif:cfOrgUnit_EAddr>
  <cerif:cfEAddrId>>org-eaddr-id</cerif:cfEAddrId>>
  <cerif:cfClassId>Contact Address</cerif:cfClassId>
  <cerif:cfClassSchemeId>Electronic Address to Organisation
Role</cerif:cfClassSchemeId>
  <cerif:cfStartDate>start date</cerif:cfStartDate>
  <cerif:cfEndDate>end date</cerif:cfEndDate>
</cerif:cfOrgUnit_EAddr>
```

Name Business Rule: Organisation Electronic Address

FRIS R4 specifications: Start and end date of the relation is expressed in the appropriate cfStartDate or cfEndDate element. The referred address is specified in chapter 0. Please refer to "Organisation Electronic Address Roles" in the FRIS administration module for the valid classification values.

4.3.16 Postal address of an Organisation

XML structure:

```
<cerif:cfOrgUnit_PAddr>
  <cerif:cfPAddrId>>org-paddr-id</cerif:cfPAddrId>>
  <cerif:cfClassId>Postal Address</cerif:cfClassId>
  <cerif:cfClassSchemeId>Physical Address to Organisation
Role</cerif:cfClassSchemeId>
  <cerif:cfStartDate>start date</cerif:cfStartDate>
  <cerif:cfEndDate>end date</cerif:cfEndDate>
</cerif:cfOrgUnit_PAddr>
```

Name Business Rule: Organisation Physical Address

FRIS R4 specification: Start and end date of the address relation is expressed in the appropriate cfStartDate or cfEndDate element. The referred address is specified in chapter 4.11. Please refer to "Organisation Physical Address Roles" in the FRIS administration module for the valid classification values.

4.3.17 Relation between Organisations

XML structure:

```
<cerif:cfOrgUnit_OrgUnit>
 <cerif:cfOrgUnitId2>localid-parent</cerif:cfOrgUnitId2>
 <cerif:cfClassId>Child</cerif:cfClassId>
 <cerif:cfClassSchemeId>Organisation to Organisation
Role</cerif:cfClassSchemeId>
 <cerif:cfStartDate>start date</cerif:cfStartDate>
 <cerif:cfEndDate>end date</cerif:cfEndDate>
</cerif:cfOrgUnit_OrgUnit>
```

Name Business Rule: Organisation to Organisation Relation

FRIS R4 specification: The XML fragment above shows a parent-child relationship between two organisations. The child organisation refers to its parent organisation using the "Child" (Child of) classification on an embedded cfOrgUnit_OrgUnit relation. The FRIS system supports any number of cfOrgUnit_OrgUnit relations, though it expects at most one parent.

Please refer to "Organisation Relation Roles" in the FRIS administration module for the valid classification values.

4.3.18 Organisation external identifier & alias

XML structure:

```
<cerif:cfFedId>
      <cerif:cfFedIdId>required but ignored</cerif:cfFedIdId>
      <cerif:cfFedId>grid.434261.6</cerif:cfFedId>
      <cerif:cfClassId>GRID ID</cerif:cfClassId>
      <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
 </cerif:cfFedId>
```

Name Business Rule: Organisation External Identifier

FRIS R4 specifications: Federated ID's are only to be used in their embedded form (see chapter 2.3.1).

Generic entity external identifiers are represented as:

- cfFedId is the actual external identifier
- cfClassId should be an instance of the "Source Authorities" classification scheme
- cfClassSchemeId equals 'Identifier Authority Type'

The FRIS system supports any number of cfFedId relations.

The identifier values may not be larger than 255 characters.

Please refer to "Source Authorities" in the FRIS administration module for the valid classification values.

Aliases are created by the FRIS system when multiple entities share a federated identifier. Entity aliasing (see chapter 4.2.3) is a special case where an alias is specifically ingested. It is represented as federated identifiers with "FRIS Alias Id" cfClassId and the **FRIS UUID** of the alias as the cfFedId.

XML structure:

```
<cerif:cfFedId>
      <cerif:cfFedIdId>required but ignored</cerif:cfFedIdId>
      <cerif:cfFedId>FRIS UUID</cerif:cfFedId>
      <cerif:cfClassId>FRIS Alias Id</cerif:cfClassId>
      <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
 </cerif:cfFedId>
```

4.4 Person CERIF mapping

The CERIF cfPers entity is mapped to the FRIS Person entity.

Note that the business rules described below should be considered neither exhaustive nor authoritative. The full, context dependent list is available in DataFlux.

Note that the cfPers element is a FRIS specific extension of the CERIF cfPers. The difference is that the frAssigment element is used instead of cfPersOrgUnit to express person-organisation relations.

> Every time a person is submitted ALL of the elements detailed in this chapter must be included if appropriate. If any element is omitted it means that the attribute represented by the element is cleared.

4.4.1 Overview of cfPers elements in FRIS R4

	Id	Name	Type	FRIS R4
1	cfPersId	Person Identifier	Identifier (max 128 chars)	Yes
0-1	cfBirthdate	Birthdate	ISO Date	Not used
0-1	cfGender	Gender	Gender field	Yes
0-1	cfURI	Uniform Resource Identifier	String	Not used
0-N	cfResInt	Research Interest	Multi-lingual text field	Yes
0-N	cfKeyw	Keywords	Multi-lingual text field	Yes
0-N	cfPers_Pers	Relationship with Person		Embedded
0-N	cfPers_EAddr	Relationship with Electronic Address		Embedded
0-N	cfPers_Class	Relationship with Classification		Embedded
0-N	cfPers_CV	Relationship with Curriculum Vitae		Not used
0-N	cfPers_Equip	Relationship with Equipment		Not used
0-N	cfPers_Event	Relationship with Event		Not used
0-N	cfPers_ExpSkills	Relationship with Expertise And Skills		Yes
0-N	cfPers_Facil	Relationship with Facility		Not used
0-N	cfPers_Fund	Relationship with Funding		Not used
0-N	cfPers_Lang	Relationship with Language		Not used
0-N	cfPers_Country	Relationship with Country		Used
0-N	cfPers_OrgUnit	Relationship with Organisation Unit		Not used
0-N	frAssignment	Relationship with Organisation Unit		Embedded
0-N	cfPers_Prize	Relationship with Prize Award		Not used
0-N	cfPers_ResPat	Relationship with Result Patent		Not used
0-N	cfPers_ResProd	Relationship with Result Product		Not used
0-N	cfPers_ResPubl	Relationship with Result Publication		Not used
0-N	cfPers_Srv	Relationship with Service		Not used
0-N	cfProj_Pers	Relationship with Project		Not used
0-N	cfPers_PAddr	Relationship with Post Address		Embedded
0-N	cfPers_DC	Relationship with Dublin Core		Not used

0-N	cfPers_Qual	Relationship with Qualification	Not used
0-N	cfPersName_Pers	Relationship with Person Name	Embedded
0-N	cfPers_Medium	Relationship with Medium	Not used
0-N	cfPers_Meas	Relationship with Measurement	Not used
0-N	cfPers_Indic	Relationship with Indicator	Not used
0-N	cfFedId	Federated Identifier	Embedded

4.4.2 Person identifier

XML structure:

```
<cerif:cfPersId>internal-person-id</cerif:cfPersId>
```

Name Business Rule: Person Dataprovider Identifier

FRIS R4 specifications: The mandatory local person identifier will be stored along with the data provider to uniquely identify this entity whenever an updated representation is submitted to the ingestion service. The person will also be assigned a FRIS UUID which is used when exposing this entity through the FRIS person services. The identifier value may not be larger than 256 characters.

4.4.3 Gender of a Person

XML structure:

```
<cerif:cfGender>f</cerif:cfGender>
```

Name Business Rule: Gender

FRIS R4 specifications: Contains one of “m” (male), “f” (female) or “u” (unknown). The gender property will be mapped to “unknown” if not set.

4.4.4 Person names[9]

XML structure:

```
<cfPersName_Pers>
     <cfClassId>main</cfClassId>
     <cfClassSchemeId>Person Name Type</cfClassSchemeId>
     <cfFamilyNames>lastnames</cfFamilyNames>
     <cfFirstNames>firstnames</cfFirstNames>
</cfPersName_Pers>
```

Example:

```
<cerif:cfPersName_Pers>
   <cerif:cfPersNameId>4536</cerif:cfPersNameId>
   <cerif:cfClassId>main</cerif:cfClassId>
   <cerif:cfClassSchemeId>Person Name Type</cerif:cfClassSchemeId>
   <cerif:cfFamilyNames>Andre</cerif:cfFamilyNames>
   <cerif:cfFirstNames>Charlotte</cerif:cfFirstNames>
 </cerif:cfPersName_Pers>
 <cerif:cfPersName_Pers>
   <cerif:cfPersNameId>4551</cerif:cfPersNameId>
   <cerif:cfClassId>variant</cerif:cfClassId>
   <cerif:cfClassSchemeId>Person Name Type</cerif:cfClassSchemeId>
```

[9] The name variant types are hard coded to “main” and “variant”. The schemeId is actually ignored.

```
    <cerif:cfFamilyNames>André</cerif:cfFamilyNames>
    <cerif:cfFirstNames>Charlotte</cerif:cfFirstNames>
 </cerif:cfPersName_Pers>
```

Name Business Rule: Person Name

FRIS R4 specifications: Contains one or more person name relations. The cfFirstNames element includes first and middle names, the cfFamilyNames includes last names. The name property is required and it is expected that there is only one name marked "main", with the remainder marked "variant". The first name variant (if any) will be used to store the 'calling name' and this will be the name shown in the portal. The name values may not be larger than 255 characters. No HTML text formatting is allowed.

4.4.5 Research interest of a Person

XML structure:

```
<cerif:cfResInt cfTrans="o" cfLangCode="en">ResInt</cerif:cfResInt>
<cerif:cfResInt cfTrans="o" cfLangCode="nl">NL ResInt</cerif:cfResInt>
```

Name Business Rule : Person Research Expertise

FRIS R4 specifications: Person research interest multi-lingual field. The research interest values may not be larger than 32.000 characters. Full HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.4.6 (Possible) Users of Research Expertise of a Person

```
 <cerif:cfPers_ExpSkills>
   <cerif:cfExpSkillsId>expertise:d10bfd61-9424-4075-bb8c-
1937142ff796</cerif:cfExpSkillsId>
   <cerif:cfClassId>expertise users</cerif:cfClassId>
   <cerif:cfClassSchemeId>Expertise Types</cerif:cfClassSchemeId>
</cerif:cfPers_ExpSkills>
```

Name Business Rule: Person Research Expertise Users

FRIS R4 specifications: Targeted audience / users of a Person research expertise. Multi-lingual field. The values may not be larger than 32.000 characters. Full HTML text formatting is allowed, see chapter 0 for details on allowed tags.

Please refer to "Expertise Types" in the FRIS administration module for the valid classification values.

4.4.7 Research Techniques of a Person

```
<cerif:cfPers_ExpSkills>
   <cerif:cfExpSkillsId>techniques:d10bfd61-9424-4075-bb8c-
1937142ff796</cerif:cfExpSkillsId>
   <cerif:cfClassId>techniques</cerif:cfClassId>
   <cerif:cfClassSchemeId>Expertise Types</cerif:cfClassSchemeId>
</cerif:cfPers_ExpSkills>
```

Name Business Rule: Person Research Expertise Technique

FRIS R4 specifications: Person Research Techniques multi-lingual field. The values may not be larger than 32.000 characters. Full HTML text formatting is allowed, see chapter 5 for details on allowed tags.

Please refer to "Expertise Types" in the FRIS administration module for the valid classification values.

4.4.8 Keywords of a Person

XML structure:

```
<cerif:cfKeyw cfLangCode="en" cfTrans="o">Keyword</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 1</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 2</cerif:cfKeyw>
```

Name Business Rule: Organisation Keywords

FRIS R4 specification: Keywords are free text fields where mapping to a centrally known taxonomy is not necessary. The FRIS system accepts any number keyword elements. Keywords are used in FRIS in the embedded variant (not the standalone xml). The individual keyword values may not be larger than 256 characters, the string length may not be larger than 2048 characters. No HTML text formatting is allowed.

Note : Please supply one keyword per line. In the past multiple keywords (comma-separated) in one element were allowed.

4.4.9 Person relations

XML structure:

```
<cerif:cfPers_Pers>
     <cerif:cfPersId2>referred person id</cerif:cfPersId2>
     <cerif:cfClassId>Promoter</cerif:cfClassId>
     <cerif:cfClassSchemeId>Person to Person Role</cerif:cfClassSchemeId>
     <cerif:cfStartDate>2012-10-07T10:50:04.639+02:00</cerif:cfStartDate>
     <cerif:cfEndDate>2013-09-16T10:50:04.639+02:00</cerif:cfEndDate>
</cerif:cfPers_Pers>
```

Name Business Rule: Person to Person Relation

FRIS R4 specifications: Any person-to-person relations are expressed through the cfPers_Pers element with the referred person identity as cfPersId2; since the element should be embedded the cfPersId1 element is implied. Both the start and end dates are functionally optional. The FRIS system supports any number of cPers_Pers relations.

Please refer to "Person Relation Roles" in the FRIS administration module for the valid classification values.

4.4.10 Person Nationality

XML structure:

```
<cerif:cfPers_Country>
    <cerif:cfCountryCode>BE</cerif:cfCountryCode>
    <cerif:cfClassId>Nationality</cerif:cfClassId>
    <cerif:cfClassSchemeId>Country to Person Role</cerif:cfClassSchemeId>
</cerif:cfPers_Country>
```

Name Business Rule: Nationality

FRIS R4 specifications: Element describes the nationality of a person as a relation to a country. The country is available as a classification in FRIS. For a list of the available countries and matching codes please refer to the ISO classification used. These can also be found in the classification "Country codes" in the FRIS administration module.

4.4.11 Person organisation relations: Assignment

XML structure:

```
<fris:frAssignment>
   <fris:frAssignmentId>268</fris:id>
   <fris:cfOrgUnitId>003cea3d-c33b-4957-9372-
5c76aa911f32</fris:cfOrgUnitId>
   <cerif:cfClassId>Responsible</cerif:cfClassId>
```

```
   <cerif:cfClassSchemeId>Assignment Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2013-09-20T14:30:50.485+02:00</cerif:cfStartDate>
</fris:frAssignment>
```

Name Business Rule: Assignment (Person Organisation)

FRIS R4 specifications: A person organisation association captures the person-organisation assignment concept and is an important part of the FRIS data-model. In the FRIS model some of the relations that in traditional models refer to a person, refer to the person-organisation association instead to accurately express the ternary relations between person-organisation-project and person-organisation-research output. For this purpose, we need to be able to accurately identify the specific person-organisation relation which is the reason we've chosen to extend the original CERIF representation with an additional "id" element. Start and end dates signify the assignment lifecycle and fraction is ignored by FRIS. The FRIS system supports any number of frAssignment relations.

Please refer to "Person Organisation Roles" in the FRIS administration module for the valid classification values.

Note that some elements are in the FRIS namespace.

4.4.12 Electronic address of a person

XML structure:

```
<cerif:cfPers_EAddr>
 <cerif:cfEAddrId>4495</cerif:cfEAddrId>
 <cerif:cfClassId>Work Address</cerif:cfClassId>
 <cerif:cfClassSchemeId>Electronic Address to Person
Role</cerif:cfClassSchemeId>
 <cerif:cfStartDate>2015-01-09T14:57:13.544Z</cerif:cfStartDate>
 <cerif:cfEndDate>person address relation end date</cerif:cfEndDate>
</cerif:cfPers_EAddr>
```

Name Business Rule: Person Electronic Address

FRIS R4 specifications: Start and end date of the relation is expressed in the appropriate cfStartDate or cfEndDate element. The referred address is specified in chapter 0.

Please refer to "Person Electronic Address Roles" in the FRIS administration module for the valid classification values.

4.4.13 Postal address of a person

XML structure:

```
<cerif:cfPers_PAddr>
 <cerif:cfPAddrId>4555</cerif:cfPAddrId>
 <cerif:cfClassId>Work Address</cerif:cfClassId>
 <cerif:cfClassSchemeId>Physical Address to Person
Role</cerif:cfClassSchemeId>
 <cerif:cfStartDate>2014-10-01T13:57:13.544Z</cerif:cfStartDate>
</cerif:cfPers_PAddr>
```

Name Business Rule: Person Physical Address

FRIS R4 specifications: Start and end date of the address relation is expressed in the appropriate cfStartDate or cfEndDate element. The referred address is specified in chapter 4.11.

Please refer to "Person Physical Address Roles" in the FRIS administration module for the valid classification values.

4.4.14 Marking a person as external

XML structure:

```
<cerif:cfPers_Class>
  <cerif:cfClassId>external</cerif:cfClassId>
  <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
</cerif:cfPers_Class>
```

Name Business Rule: Project External Person, Research Output External Person

FRIS specifications:

If a particular person is not managed by the data-provider, but is included in the set for completeness sake, this is signalled by marking the entity as external using the above XML snippet. This pattern is used for example to include all external authors of a journal article or external project members in a research project.

4.4.15 Marking view permission for a Person

XML structure:

```
<cerif:cfPers_Class>
     <cerif:cfClassId>confidential</cerif:cfClassId>
     <cerif:cfClassSchemeId>View Permission Type</cerif:cfClassSchemeId>
</cerif:cfPers_Class>


<cerif:cfPers_Class>
     <cerif:cfClassId>backend</cerif:cfClassId>
     <cerif:cfClassSchemeId>View Permission Type</cerif:cfClassSchemeId>
</cerif:cfPers_Class>
```

Name Business Rule: Person Confidentiality

FRIS R4 specifications: If a particular entity should be considered backend-only or confidential using one of the above XML fragment signals this. If an entity is marked confidential it (or relations to it) will not be publicly accessible and only FRIS administrators or users for the owning data-provider will be able to access it in the FRIS administration module. If an entity is marked backend-only it (or relations to it) will not be publicly accessible and all authenticated users will be able to access it in the FRIS administration module.

If the fragment is omitted the FRIS system defaults to public.

4.4.16 Disciplines of a Person

```
<cerif:cfPers_Class>
     <cerif:cfClassId>01010101</cerif:cfClassId>
     <cerif:cfClassSchemeId>Flemish Research
Disciplines</cerif:cfClassSchemeId>
</cerif:cfPers_Class>
```

Name Business Rule: Person Disciplines

FRIS R4 specifications: The FRIS system accepts associated discipline codes. The minimal required level in the Discipline code taxonomy is specified by the business rules.

Please refer to "Flemish Research Disciplines" in the FRIS administration module for the valid classification values.

4.4.17 Other classifications of a person

XML structure:

```
<cerif:cfPers_Class>
     <cerif:cfClassId>?</cerif:cfClassId>
     <cerif:cfClassSchemeId>?</cerif:cfClassSchemeId>
</cerif:cfPers_Class>
```

FRIS R4 specifications:

Other recognised person classifications are mapped to the person classifications property.

Should the data-provider have other classifications to qualify the person, these could be sent as explained here.

4.4.18 Person external identifier & alias

XML structure:

```
<cerif:cfFedId>
      <cerif:cfFedIdId>required but ignored</cerif:cfFedIdId>
      <cerif:cfFedId>0000-0002-2751-5691</cerif:cfFedId>
      <cerif:cfClassId>ORCID</cerif:cfClassId>
      <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
 </cerif:cfFedId>
```

Name Business Rule: Person External Identifier

FRIS R4 specifications: Federated ID's are only to be used in their embedded form (see chapter 2.3.1).

Generic entity external identifiers are represented as:

- cfFedId is the actual external identifier
- cfClassId should be an instance of the "Source Authorities" classification scheme
- cfClassSchemeId equals 'Identifier Authority Type'

The FRIS system supports any number of cfFedId relations.

The identifier values may not be larger than 255 characters.

Please refer to "Source Authorities" in the FRIS administration module for the valid classification values.

Aliases are created by the FRIS system when multiple entities share a federated identifier. Entity aliasing (see chapter 4.2.3) is a special case where an alias is specifically ingested. It is represented as federated identifiers with "FRIS Alias Id" cfClassId and the **FRIS UUID** of the alias as the cfFedId.

XML structure:

```
<cerif:cfFedId>
      <cerif:cfFedIdId>required but ignored</cerif:cfFedIdId>
      <cerif:cfFedId>FRIS UUID</cerif:cfFedId>
      <cerif:cfClassId>FRIS Alias Id</cerif:cfClassId>
      <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
 </cerif:cfFedId>
```

4.5 Infrastructure CERIF mapping

The CERIF cfFacil or cfEquip entity is mapped to the FRIS Infrastructure entity.

Note that the business rules described below should be considered neither exhaustive nor authoritative. The full, context dependent list is available in DataFlux.

> Every time a infrastructure is submitted ALL of the elements detailed in this chapter must be included if appropriate. If any element is omitted it means that the attribute represented by the element is cleared.

Note that the cfFacil or cfEquip element is a FRIS specific extension of the CERIF cfEquip of cfFacil. The biggest difference is that the frParticipant element is used instead of cfOrgUnit_Facil or cfPers_Facil to express the relation between person-organisation relations. Also

4.5.1 Overview of cfEquip and cfFacil elements in FRIS R4

For infrastructure 2 elements are used an equipment (cfEquip) and a facility (cfFacil):

- **Infrastructure**: global name for cfEquip and cfFacil.
- **CfEquip**: Instrument for scientific research, mostly off the shelf and located on one site. For example a bioreactor, telescope,….
- **CfFacil**: Virtual and/or distributed space for scientific research that has one or more equipments and/or e-resources. It has a service function and after an investment costs also has an operation cost to keep the facility running (maintenance, scientific personnel, …) Note: in short a facility can contain equipments, but this is not necessary. Example: Flemish Super Computer (facility with e-resources), Elixir (facility without equipment), …

4.5.1.1 cfEquip

	Id	Name	Type	FRISR4
1	cfEquipId	Equipment Identifier	Identifier (max 128 chars)	Yes
0-1	cfAcro	Acronym	string	Yes
0-1	cfURI	Uniform Resource Identifier	string	Yes
0-N	cfDescr	Description	Multi-lingual text field	Yes
0-N	cfKeyw	Keywords	Multi-lingual text field	Yes
0-N	cfName	Name	Multi-lingual text field	Yes
0-N	cfEquip_Class	Relationship with Classification		Yes
0-N	cfEquip_Fund	Relationship with Funding		No
0-N	cfOrgUnit_Equip	Relationship with Organisation Unit		No
0-N	cfPers_Equip	Relationship with Person		No
0-N	cfProj_Equip	Relationship with Project		No, please check 4.6.15
0-N	cfResPubl_Equip	Relationship with Result Publication		No, please check 4.7.29
0-N	cfEquip_Medium	Relationship with Medium		No

0-N	cfEquip_PAddr	Relationship with Post Address		Yes	
0-N	cfEquip_Equip	Relationship with Equipment		Yes	
0-N	cfFacil_Equip	Relationship with Facility		Yes	
0-N	cfEquip_Srv	Relationship with Service		No	
0-N	cfEquip_Event	Relationship with Event		No	
0-N	cfResPat_Equip	Relationship with Result Patent		No	
0-N	cfResProd_Equip	Relationship with Result Product		No	
0-N	cfEquip_Meas	Relationship with Measurement		No	
0-N	cfEquip_Indic	Relationship with Indicator		No	
0-N	cfFedId	Federate Identifier		Yes	
0-N	frParticipant	Participant relationship		Embedded	
1	frModalitiesOfUse	Modalities to use the infrastructure	Multi-lingual text field	Yes	
1		frStartDate	Start date of infrastructure	Date	Yes
1		frEndDate	End date of infrastructure	Date	Yes

4.5.1.2 cfFacil

Except for the naming almost all elements are the same, the only exception is that the a facility can't be a part of an equipment. So the relationship cfFacil_Equip is used for an equipment, but is not used for a facility.

	Id	Name	Type	FRISR4
1	cfFacilId	Equipment Identifier	Identifier (max 128 chars)	Yes
0-1	cfAcro	Acronym	string	Yes
0-1	cfURI	Uniform Resource Identifier	string	Yes
0-N	cfDescr	Description	Multi-lingual text field	Yes
0-N	cfKeyw	Keywords	Multi-lingual text field	Yes
0-N	cfName	Name	Multi-lingual text field	Yes
0-1	frModalitiesOfUse	Modalities to use the infrastructure	Multi-lingual text field	Yes
0-N	cfFacil_Class	Relationship with Classification		Yes

0-N	cfFacil_Fund	Relationship with Funding		No
0-N	cfOrgUnit_Facil	Relationship with Organisation Unit		No
0-N	cfPers_Facil	Relationship with Person		No
0-N	cfProj_Facil	Relationship with Project		No, please check 4.6.15
0-N	cfResPubl_Facil	Relationship with Result Publication		No, please check 4.7.29
0-N	cfFacil_Medium	Relationship with Medium		No
0-N	cfFacil_PAddr	Relationship with Post Address		Yes
0-N	cfFacil_Facil	Relationship with Equipment		Yes
0-N	cfFacil_Equip	Relationship with Facility		No
0-N	cfFacil_Srv	Relationship with Service		No
0-N	cfFacil_Event	Relationship with Event		No
0-N	cfResPat_Facil	Relationship with Result Patent		No
0-N	cfResProd_Facil	Relationship with Result Product		No
0-N	cfFacil_Meas	Relationship with Measurement		No
0-N	cfFacil_Indic	Relationship with Indicator		No
0-N	cfFedId	Federate Identifier		Yes
0-N	frParticipant	Participant relationship		Embedded
1	frModalitiesOfUse	Modalities to use the infrastructure	Multi-lingual text field	Yes
1	frStartDate	Start date of infrastructure	Date	Yes
1	frEndDate	End date of infrastructure	Date	Yes

4.5.2 Infrastructure identifier

XML structure:

```
<cerif:cfEquipId>internal-infrastructure-id</cerif:cfEquipId>
<cerif:cfFacilId>internal-infrastructure-id</cerif:cfFacilId>
```

Name Business Rule: Infrastructure identifier

FRIS R4 specifications: The mandatory local infrastructure identifier will be stored along with the data provider to uniquely identify this entity whenever an updated representation is submitted to the ingestion service. The patent will be assigned a FRIS UUID which is used when exposing this entity through the FRIS infrastructure services. The identifier value may not be larger than 256 characters.

4.5.3 Infrastructure Acronym

XML structure:

```
<cerif:cfAcro>acronym</cerif:cfAcro>
```

Name Business Rule: Infrastructure Acronym

FRIS R4 specifications: The infrastructure acronym is a language independent short name of the infrastructure. The acronym value may not be larger than 255 characters. No HTML text formatting is allowed.

4.5.4 Infrastructure URI

XML structure:

```
<cerif:cfURI>http://infrastructure.homepage.com</cerif:cfURI>
```

Name Business Rule: Infrastructure URL

FRIS specifications: The infrastructure homepage is the URL. The homepage value may not be larger than 2048 characters. No HTML text formatting is allowed.

4.5.5 Infrastructure name

XML structure:

```
<cerif:cfName cfLangCode="nl" cfTrans="o">Infrastructuur Naam</cerif:cfName>
<cerif:cfName cfLangCode="en" cfTrans="o">Infrastructure name</cerif:cfName>
```

Name Business Rule: Infrastructure Name

FRIS R4 specification: This is the official name of an infrastructure. The translation type, though mandatory in the CERIF standard, is ignored by FRIS. The title values may not be larger than 32.000 characters. No HTML text formatting is allowed.

4.5.6 Infrastructure description

XML structure:

```
<cerif:cfDescr cfTrans="o" cfLangCode="en">EN description</cerif:cfDescr>
<cerif:cfDescr cfTrans="o" cfLangCode="nl">NL
beschrijving</cerif:cfDescr>
```

Name Business Rule: Infrastructure Description

FRIS R4 specifications: The infrastructure description is a free-form description of the infrastructure. The description values may not be larger than 32.000 characters. Full HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.5.7 Infrastructure keywords

XML structure:

```
<cerif:cfKeyw cfLangCode="en" cfTrans="o">Keyword</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 1</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 2</cerif:cfKeyw>
```

Name Business Rule: Infrastructure Keywords

FRIS R4 specification: Keywords are free text fields where mapping to a centrally known taxonomy is not necessary. The FRIS system accepts any number keyword elements. Keywords are used in FRIS in the embedded variant (not the standalone xml). The individual keyword values may not be larger than 256 characters, the string length may not be larger than 2048 characters. No HTML text formatting is allowed.

Note : Please supply one keyword per line. In the past multiple keywords (comma-separated) in one element were allowed.

4.5.8 Infrastructure Accessibility

This classification must be added to an infrastructure. Ingestion will be prohibited by business rules without this classification.

XML structure:

```
<cerif:cfEquip_Class>
     <cerif:cfClassId>Not Accessible</cerif:cfClassId>
     <cerif:cfClassSchemeId>Infrastructure
Accessibility</cerif:cfClassSchemeId>
</cerif:cfEquip_Class>


<cerif:cfFacil_Class>
     <cerif:cfClassId>Everyone</cerif:cfClassId>
     <cerif:cfClassSchemeId>Infrastructure Accessibility
</cerif:cfClassSchemeId>
</cerif:cfFacil_Class>
```

Name Business Rule: Infrastructure accessibility

FRIS R4 specifications: Please refer to "TO ADJUST" in the FRIS administration module for the valid classification values.

4.5.9 Infrastructure type

This classification can be added to an infrastructure and is optional.

XML structure:

```
<cerif:cfEquip_Class>
     <cerif:cfClassId>E-resource</cerif:cfClassId>
     <cerif:cfClassSchemeId>Infrastructure Type</cerif:cfClassSchemeId>
</cerif:cfEquip_Class>


<cerif:cfFacil_Class>
     <cerif:cfClassId>E-resource</cerif:cfClassId>
     <cerif:cfClassSchemeId>Infrastructure Type</cerif:cfClassSchemeId>
</cerif:cfFacil_Class>
```

Name Business Rule: Infrastructure type

FRIS R4 specifications: Please refer to "TO ADJUST " in the FRIS administration module for the valid classification values.

4.5.10 Infrastructure Location Type

This classification must be added to an infrastructure. Ingestion will be prohibited by business rules without this classification.

XML structure:

```
<cerif:cfEquip_Class>
     <cerif:cfClassId>Single sited</cerif:cfClassId>
```

```
     <cerif:cfClassSchemeId>Infrastructure Location
Type</cerif:cfClassSchemeId>
</cerif:cfEquip_Class>


<cerif:cfFacil_Class>
     <cerif:cfClassId>Distributed</cerif:cfClassId>
     <cerif:cfClassSchemeId>Infrastructure Location
Type</cerif:cfClassSchemeId>
</cerif:cfFacil_Class>
```

Name Business Rule: Infrastructure Location Type

FRIS R4 specifications: Please refer to "TO ADJUST" in the FRIS administration module for the valid classification values. (e.g. Single Sited, Distributed)

4.5.11 Infrastructure Fraunhofer Technology Codes

This classification must be added to an infrastructure, if applicable.

XML structure:

```
<cerif:cfEquip_Class>
     <cerif:cfClassId>35</cerif:cfClassId>
     <cerif:cfClassSchemeId>Fraunhofer Technology
Codes</cerif:cfClassSchemeId>
</cerif:cfEquip_Class>


<cerif:cfFacil_Class>
     <cerif:cfClassId>35</cerif:cfClassId>
     <cerif:cfClassSchemeId>Fraunhofer Technology
Codes</cerif:cfClassSchemeId>
</cerif:cfFacil_Class>
```

Name Business Rule: Infrastructure Technology

FRIS R4 specifications: The FRIS system accepts associated Fraunhofer Technology codes (Fraunhofer 35). Start and End date are ignored.

Please refer to "Fraunhofer Technology Codes" in the FRIS administration module for the valid classification values.

4.5.12 Infrastructure Flemish research disciplines

This classification must be added to an infrastructure. Ingestion will be prohibited by business rules without this classification.

XML structure:

```
    <cerif:cfFacil_Class>
      <cerif:cfClassId>01010101</cerif:cfClassId>
      <cerif:cfClassSchemeId>Flemish Research
Disciplines</cerif:cfClassSchemeId>
    </cerif:cfFacil_Class>

    <cerif:cfEquip_Class>
      <cerif:cfClassId>01010101</cerif:cfClassId>
      <cerif:cfClassSchemeId>Flemish Research
Disciplines</cerif:cfClassSchemeId>
    </cerif:cfEquip_Class>
```

Name Business Rule: Infrastructure Discipline

FRIS R4 specification: The FRIS system accepts associated discipline codes. The minimum required level in the Discipline code taxonomy is specified by the business rules. Conditionally required.

Please refer to "Flemish Research Disciplines" in the FRIS administration module for the valid classification values.

4.5.13 Infrastructure to Data Provider Role

Classifications only applies to the data provider, the classification must be given. Business rules are checked based on this classification and golden record later will be based on this classification.

XML structure:

```
<cerif:cfFacil_Class>
   <cerif:cfClassId>Coordinator of</cerif:cfClassId>
   <cerif:cfClassSchemeId>Infrastructure to Data Provider Role
</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:cfFacil_Class>


<cerif:cfEquip_Class>
   <cerif:cfClassId>Partner of</cerif:cfClassId>
   <cerif:cfClassSchemeId>Infrastructure to Data Provider Role
</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:cfEquip_Class>
```

Name Business Rule: Infrastructure Consortium Coordinator

FRIS R4 specifications:

Please refer to "Infrastructure Data Provider Role" in the FRIS administration module for the valid classification values for person associations.

4.5.14 Infrastructure address

Address of the infrastructure, postal code and city are obligated. Other fields: street, campus, … are optional.

XML structure:

```
<cerif:cfFacil_PAddr>
     <cerif:cfPAddrId>locationInfraGent</cerif:cfPAddrId>
     <cerif:cfClassId>Infrastructure Address</cerif:cfClassId>
     <cerif:cfClassSchemeId>Infrastructure to Physical Address
Role</cerif:cfClassSchemeId>
</cerif:cfFacil_PAddr>

<cerif:cfEquip_PAddr>
     <cerif:cfPAddrId>locationInfraGent</cerif:cfPAddrId>
     <cerif:cfClassId>Infrastructure Address</cerif:cfClassId>
     <cerif:cfClassSchemeId>Infrastructure to Physical Address
Role</cerif:cfClassSchemeId>
</cerif:cfEquip_PAddr>
```

Name Business Rule: Infrastructure Physical address

FRIS R4 specifications: Address for infrastructure is given similar to other addresses with a classification. Address for infrastructure only needs to contain postal code and city. See further in this document: 4.11.

4.5.15 Federated identifier

The federated identifier used for infrastructure is the FRIS Infrastructure number. This is a list created and maintained by the department of EWI and updated once a year. (To be more precise twice every 2 year, but the infrastructures that are update are once the international infrastructure, and once the other infrastructure).

XML structure:

```
<cerif:cfFedId>
      <cerif:cfFedIdId>required but ignored</cerif:cfFedIdId>
      <cerif:cfFedId>INFRA_VSC</cerif:cfFedId>
      <cerif:cfClassId>FRIS Infrastructure Number</cerif:cfClassId>
      <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
 </cerif:cfFedId>
```

Name Business Rule: Infrastructure Federated Identifier

FRIS R4 specifications: Federated ID's are only to be used in their embedded form (see chapter 2.3.1).

Generic entity external identifiers are represented as:

- cfFedId is the actual external identifier
- cfClassId should be an instance of the "Source Authorities" classification scheme
- cfClassSchemeId equals 'Identifier Authority Type'

The FRIS system supports any number of cfFedId relations.

The identifier values may not be larger than 255 characters.

Please refer to "Source Authorities" in the FRIS administration module for the valid classification values.

Aliases are created by the FRIS system when multiple entities share a federated identifier. Entity aliasing (see chapter 4.2.3) is a special case where an alias is specifically ingested. It is represented as federated identifiers with "FRIS Alias Id" cfClassId and the **FRIS UUID** of the alias as the cfFedId.

XML structure:

```
<cerif:cfFedId>
      <cerif:cfFedIdId>required but ignored</cerif:cfFedIdId>
      <cerif:cfFedId>FRIS UUID</cerif:cfFedId>
      <cerif:cfClassId>FRIS Alias Id</cerif:cfClassId>
      <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
 </cerif:cfFedId>
```

4.5.16 Infrastructure to Infrastructure Role

Optional link to another infrastructure.

XML structure:

```
<cerif:cfFacil_Equip>
     <cerif:cfEquipId>facil-id</cerif:cfEquipId>
     <cerif:cfClassId>Part of</cerif:cfClassId>
```

```
     <cerif:cfClassSchemeId>Infrastructure to Infrastructure
Role</cerif:cfClassSchemeId>
</cerif:cfFacil_Equip>


<cerif:cfFacil_Facil>
     <cerif:cfEquipId>facil-id</cerif:cfEquipId>
     <cerif:cfClassId>Part of</cerif:cfClassId>
     <cerif:cfClassSchemeId>Infrastructure to Infrastructure
Role</cerif:cfClassSchemeId>
</cerif:cfFacil_Facil>


<cerif:cfEquip_Equip>
     <cerif:cfEquipId>equipment id</cerif:cfEquipId>
     <cerif:cfClassId>Part of</cerif:cfClassId>
     <cerif:cfClassSchemeId>Infrastructure to Infrastructure
Role</cerif:cfClassSchemeId>
</cerif:cfEquip_Equip>
```

Name Business Rule: Infrastructure to Infrastructure

FRIS R4 specifications: Any infrastructure-to-infrastructure relations are expressed through the cfFacil_Equip, cfFacil_Facil or cfEquip_Equip elements with the referred infrastructure identity as cfEquipId, cfFacilId2 or cfEquipId2; since the element should be embedded respectively the cfFacilId, cfFacilId1 or cfEquipId1 element is implied. Both the start and end dates are functionally optional. The FRIS system supports 1 relation.

Please refer to "TODO " in the FRIS administration module for the valid classification values.

4.5.17 Infrastructure participant

4.5.17.1 Infrastructure to Organisation Participant Role

This can be:

- the link to your own organisation or sub organisation.
- Or the link to an external organisation

XML structure:

```
<fris:frParticipant>
     <fris:cfOrgUnitId>ID Org 5</fris:cfOrgUnitId>
     <cerif:cfClassId>Consortium Partner</cerif:cfClassId>
   <cerif:cfClassSchemeId>Infrastructure to Organisation Participant
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

Name Business Rule: Infrastructure Organisation

FRIS R4 specifications: The relationship between an organisation and an infrastructure is not expressed by the cfOrgUnit_Equip or cfOrgUnit_Facil relation, but by the frParticipant-entity. This entity is given in the fris namespace and can contain internal and external organisations.

4.5.17.2 Infrastructure to Consortium Person Role

This can be :

- The affiliation of an internal person
- The link to an external person (or external affiliation)

XML structure:

```
<fris:frParticipant>
   <fris:cfPersId>Id-External-Pers</fris:cfPersId>
   <cerif:cfClassId>Consortium Partner</cerif:cfClassId>
<cerif:cfClassSchemeId>Infrastructure to Consortium Person Role
</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>


<fris:frParticipant>
   <fris:frAssignmentId>assignmentperson</fris:frAssignmentId>
   <cerif:cfClassId>Consortium Partner</cerif:cfClassId>
<cerif:cfClassSchemeId>Infrastructure to Consortium Person Role
</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

Name Business Rule: Infrastructure Consortium Partner

FRIS R4 specifications: The relationship between a person and an infrastructure is not expressed by the cfPers_Facil or cfOrgUnit_Equip relation, but by the frParticipant-entity. This entity is given in the fris namespace and contains external persons.

4.5.17.3 Infrastructure to Contact Person Participant Role

This classification must be added at least once to an infrastructure. Ingestion will be prohibited by business rules without this classification.

This can be :

- The affiliation of an internal person
- The external person (or external affiliation)

XML structure:

```
<fris:frParticipant>
   <fris:frAssignmentId>Assignment2</fris:frAssignmentId>
     <cerif:cfClassId>Operational responsible</cerif:cfClassId>
     <cerif:cfClassSchemeId>Infrastructure to Contact Person Role
     </cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>


<fris:frParticipant>
    <fris:cfPersId>Id-External-Pers</fris:cfPersId>
     <cerif:cfClassId>Operational responsible</cerif:cfClassId>
     <cerif:cfClassSchemeId>Infrastructure to Contact Person
     Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

Name Business Rule: Infrastructure Contact person

FRIS R4 specifications: The relationship between a person and an infrastructure is not expressed by the cfPers_Facil or cfOrgUnit_Equip relation, but by the frParticipant-entity. This entity is given in the fris namespace and contains assignments for internal persons.

Please note that all person participations have optional cfFirstNames and cfFamilyNames elements for the cases where the actual person name used at the time differs from what is registered directly on the person. Examples:

Internal person

```
<fris:frParticipant>
   <fris:frAssignmentId>Assignment2</fris:frAssignmentId>
   <fris:cfFamilyNames>De Muyt</fris:cfFamilyNames>
   <fris:cfFirstNames>Bart</fris:cfFirstNames>
   <cerif:cfClassId>Coordinator of</cerif:cfClassId>
   <cerif:cfClassSchemeId>Infrastructure to Data Provider
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

If an external person is not a managed object but only exists as a participant it is recommended not to ingest this as an external person but simply provide the names in the frParticipant without a reference to cfPersId

Unmanaged external person

```
<fris:frParticipant>
   <fris:cfFamilyNames>Peters</fris:cfFamilyNames>
   <fris:cfFirstNames>An</fris:cfFirstNames>
   <cerif:cfClassId>Collaborator</cerif:cfClassId>
   <cerif:cfClassSchemeId>Infrastructure to Contact Person
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

4.5.18 Infrastructure User modalities

XML structure:

```
<fris:frModalitiesOfUse cfLangCode="en" cfTrans="o">modalities of use
text</fris:frModalitiesOfUse>
<fris:frModalitiesOfUse cfLangCode="nl"
cfTrans="o">gebruikersmodaliteiten tekst</fris:frModalitiesOfUse>
```

Name Business Rule: Infrastructure Modalities Of Use

FRIS R4 specification: The modalities of use is a free-form text field of the infrastructure. The text values may not be larger than 32.000 characters. Full HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.5.19 Infrastructure start date

XML structure:

```
<fris:frStartDate>2008-10-01T00:00:00.000Z</fris:frStartDate>
```

Name Business Rule:

FRIS R4 specification: Contains the infrastructure start date.

4.5.20 Infrastructure end date

XML structure:

```
<urn:frEndDate>2009-09-30T00:00:00.000Z</urn:frEndDate>
```

Name Business Rule:

FRIS R4 specification: Contains the infrastructure end date.

4.6 Project CERIF mapping

The CERIF cfProj entity is mapped to the FRIS Project entity.

Note that the business rules described below should be considered neither exhaustive nor authoritative. The full, context dependent list is available in DataFlux.

> Every time a project is submitted ALL of the elements detailed in this chapter must be included if appropriate. If any element is omitted it means that the attribute represented by the element is cleared.

Note that the cfProj element is a FRIS specific extension of the CERIF cfProj. The difference is that the frParticipant element is used to express Project Assignment relation.

4.6.1 Overview of cfProj elements in FRIS R4

	id	name	type	FRIS R4
1	cfProjId	Project Identifier	Identifier (max 128 chars)	Yes
0-1	cfStartDate	Start Date	ISO Date	Yes
0-1	cfEndDate	End Date	ISO Date	Yes
0-1	cfAcro	Acronym	string	Yes
0-1	cfURI	Uniform Resource Identifier	string	Yes
0-N	cfTitle	Title	Multi-lingual text field	Yes
0-N	cfAbstr	Abstract	Multi-lingual text field	Yes
0-N	cfKeyw	Keywords	Multi-lingual text field	Yes
0-N	cfProj_Class	Relationship with Classification		Embedded
0-N	cfProj_Equip	Relationship with Equipment		Embedded
0-N	cfProj_Event	Relationship with Event		Not used
0-N	cfProj_Facil	Relationship with Facility		Embedded
0-N	cfProj_Fund	Relationship with Funding		Embedded
0-N	cfProj_OrgUnit	Relationship with Organisation Unit (Only owner)		Embedded
0-N	cfProj_Pers	Relationship with Person		Not used
0-N	frParticipant	Participant relationship		Embedded
0-N	cfProj_Prize	Relationship with Prize Award		Not used
0-N	cfProj_ResPat	Relationship with Result Patent		Not used
0-N	cfProj_Proj	Relationship with Project		Embedded
0-N	cfProj_ResProd	Relationship with Result Product		Not used
0-N	cfProj_ResPubl	Relationship with Result Publication		Not used
0-N	cfProj_DC	Relationship with Dublin Core		Not used
0-N	cfProj_Srv	Relationship with Service		Not used
0-N	cfProj_Medium	Relationship with Medium		Not used
0-N	cfProj_Meas	Relationship with Measurement		Not used
0-N	cfProj_Indic	Relationship with Indicator		Not used
0-N	cfFedId	Federated Identifier		Embedded
0-N	fris:frParticipant	Ternary relationship with Person and Organisation Unit		Yes

0-N	fris:cfProjFund	Fris version: Contains Benificiary and Budgetyear	Yes
0-1	fris: frProject_CallId	Refers to the ID of the project call	Only for FWO

4.6.2 Project identifier

XML structure:

```
<cerif:cfProjId>internal-project-id</cerif:cfProjId>
```

Name Business Rule: Project Dataprovider Identifier

FRIS R4 specifications: The mandatory local project identifier will be stored along with the data provider to uniquely identify this entity whenever an updated representation is submitted to the ingestion service. The project will be assigned a FRIS UUID which is used when exposing this entity through the FRIS project services. The identifier value may not be larger than 256 characters.

4.6.3 Project lifecycle

XML structure:

```
<cerif:cfStartDate>2000-01-01Z</cerif:cfStartDate>
<cerif:cfEndDate>2020-12-31Z</cerif:cfEndDate>
```

Name Business Rule: Project Lifecycle

FRIS R4 specifications: Contains the project start and end dates.

4.6.4 Project acronym

XML structure:

```
<cerif:cfAcro>acronym</cerif:cfAcro>
```

Name Business Rule: Project Acronym

FRIS R4 specifications: The project acronym is a language independent short name of the project. The acronym value may not be larger than 255 characters. No HTML text formatting is allowed.

4.6.5 Project homepage

XML structure:

<cerif:cfURI>http://project.homepage.com</cerif:cfURI>

FRIS specifications: The project homepage is the URL to the project or research group homepage. The homepage value may not be larger than 2048 characters. No HTML text formatting is allowed.

4.6.6 Project title

XML structure:

```
<cerif:cfTitle cfTrans="o" cfLangCode="en">Project Title</cerif:cfTitle>
<cerif:cfTitle cfTrans="o" cfLangCode="nl">Project Titel</cerif:cfTitle>
```

Name Business Rule: Project Title

FRIS R4 specifications: This is the official title of the project. The title values may not be larger than 32.000 characters. Reduced HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.6.7 Project abstract

XML structure:

```
<cerif:cfAbstr cfTrans="o" cfLangCode="en">EN Abs Project</cerif:cfAbstr>
<cerif:cfAbstr cfTrans="o" cfLangCode="nl">NL Abs Project</cerif:cfAbstr>
```

Name Business Rule: Project Abstract Flemish Funder, Project Abstract International Funder

FRIS R4 specifications: The project abstract is a free-form description of the project. The abstract values may not be larger than 32.000 characters. Full HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.6.8 Project keywords

XML structure:

```
<cerif:cfKeyw cfLangCode="en" cfTrans="o">Keyword</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 1</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 2</cerif:cfKeyw>
```

Name Business Rule: Project Keywords

FRIS R4 specification: Keywords are free text fields where mapping to a centrally known taxonomy is not necessary. The FRIS system accepts any number keyword elements. Keywords are used in FRIS in the embedded variant (not the standalone xml). The individual keyword values may not be larger than 256 characters, the string length may not be larger than 2048 characters. No HTML text formatting is allowed.

Note : Please supply one keyword per line. In the past multiple keywords (comma-separated) in one element were allowed.

4.6.9 Project type

XML structure:

```
<cerif:cfProj_Class>
      <cerif:cfClassId>Collaboration</cerif:cfClassId>
      <cerif:cfClassSchemeId>Project Type</cerif:cfClassSchemeId>
</cerif:cfProj_Class>
```

Name Business Rule: Project Type

FRIS R4 specifications: The FRIS system supports one or more project types.

Please refer to "Project Types" in the FRIS administration module for the valid classification values.

4.6.10 Project view permission

XML structure:

```
<cerif:cfProj_Class>
   <cerif:cfClassId>confidential</cerif:cfClassId>
   <cerif:cfClassSchemeId>View Permission Type</cerif:cfClassSchemeId>
</cerif:cfProj_Class>
<cerif:cfProj_Class>
   <cerif:cfClassId>backend</cerif:cfClassId>
   <cerif:cfClassSchemeId>View Permission Type</cerif:cfClassSchemeId>
</cerif:cfProj_Class>
```

Name Business Rule: Project Confidentiality

FRIS R4 specifications: If a particular entity should be considered backend-only or confidential using one of the above XML fragment signals this. If an entity is marked confidential it (or relations to it) will not be publicly accessible and only FRIS administrators or users for the owning data-provider will be able to access it in the FRIS administration module. If an entity is marked backend-only it (or relations to it) will not be publicly accessible and all authenticated users will be able to access it in the FRIS administration module.

If the fragment is omitted the FRIS system defaults to public.

4.6.11 Marking a project as external

XML structure:

```
<cerif:cfProj_Class>
```

```
 <cerif:cfClassId>external</cerif:cfClassId>
 <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
</cerif:cfProj_Class>
```

FRIS R4 specifications: If a particular project is not managed by the data-provider, but is included in the set for completeness sake, this is signalled by marking the entity as external using the above XML snippet.

4.6.12 Project application codes

XML structure:

```
<cerif:cfProj_Class>
   <cerif:cfClassId>O460</cerif:cfClassId>
   <cerif:cfClassSchemeId>Application Code</cerif:cfClassSchemeId>
</cerif:cfProj_Class>
```

Name Business Rule: Project Application Codes

FRIS R4 specifications: The FRIS system accepts associated application codes codes.

Please refer to "Application Codes" in the FRIS administration module for the valid application codes.

4.6.13 Project discipline codes

XML structure:

```
<cerif:cfProj_Class>
   <cerif:cfClassId>01010101</cerif:cfClassId>
   <cerif:cfClassSchemeId>Flemish Research
Disciplines</cerif:cfClassSchemeId>
</cerif:cfProj_Class>
```

Name Business Rule: Project Discipline Codes

FRIS R4 specifications: The FRIS system accepts associated discipline codes. The minimal required level in the Discipline code taxonomy is specified by the business rules.

Please refer to "Flemish Research Disciplines" in the FRIS administration module for the valid classification values.

4.6.14 Project Technology Readiness Level

XML structure:

```
<cerif:cfProj_Class>
   <cerif:cfClassId>TRL1</cerif:cfClassId>
   <cerif:cfClassSchemeId>Project Start Technology Readiness
Level</cerif:cfClassSchemeId>
</cerif:cfProj_Class>


<cerif:cfProj_Class>
   <cerif:cfClassId>TRL9</cerif:cfClassId>
   <cerif:cfClassSchemeId>Project End Technology Readiness
Level</cerif:cfClassSchemeId>
</cerif:cfProj_Class>
```

Name Business Rule: Project TRL

FRIS R4 specifications: FRIS accepts a TRL at the start and end of a Project: a value ranging from TRL1 to TRL9.

Please refer to "Project Start Technology Readiness Level" and "Project End Technology Readiness Level" in the FRIS administration module for the valid classification values.

A Fris Data steward may have specified a range of allowed TRLs at start and end for the project's Funding Code in the FRIS administration module.

4.6.15 Project infrastructure role

XML structure:

```
<cerif:cfProj_Facil>
  <cerif:cfFacilId>4b54e759-de97-4233-8b72-00736d38582f</cerif:cfFacilId>
  <cerif:cfClassId>Financed by</cerif:cfClassId>
  <cerif:cfClassSchemeId>Project to Infrastructure
Role</cerif:cfClassSchemeId>
</cerif:cfProj_Facil>

<cerif:cfProj_Equip>
  <cerif:cfEquipId>equipmentid</cerif:cfEquipId>
  <cerif:cfClassId>Used by</cerif:cfClassId>
  <cerif:cfClassSchemeId>Project to Infrastructure
Role</cerif:cfClassSchemeId>
</cerif:cfProj_Equip>
```

Business rule name: Project Infrastructure

FRIS R4 specifications: The relation between Project and infrastructure. The infrastructure can be an equipment or a facility. The relation between a Project and an infrastructure will always be given in the project. Start and end date are ignored.

Please refer to "Project to Infrastructure Role" in the FRIS administration module for the valid classification values.

4.6.16 Project Organisation Relation

XML structure:

```
    <cerif:cfProj_OrgUnit>
      <cerif:cfOrgUnitId>ID Org 1</cerif:cfOrgUnitId>
      <cerif:cfClassId>Project Owner</cerif:cfClassId>
      <cerif:cfClassSchemeId>Organisation to Project
Role</cerif:cfClassSchemeId>
      <cerif:cfStartDate>2016-01-01T10:46:17.983Z</cerif:cfStartDate>
      <cerif:cfEndDate>2016-12-31T11:46:17.983Z</cerif:cfEndDate>
    </cerif:cfProj_OrgUnit>
```

Name Business Rule: Organisation Project Relation

FRIS R4 specification: This relation expresses any relation an organisation may have towards a project. We recommend to only use internal organisations for this relation. External organisations can be linked via project participant.

Please refer to "Project Organisation Association Roles" in the FRIS administration module for the valid classification values.

4.6.17 Projects relation

XML structure:

```
<cerif:cfProj_Proj>
   <cerif:cfProjId2>related project identifier</cfProjId2>
   <cerif:cfClassId>Successor</cfClassId>
   <cfClassSchemeId>Project to Project Role</cfClassSchemeId>
   <cfStartDate>2014-05-31T08:56:12.394</cfStartDate>
   <cfEndDate>2014-12-22T08:56:12.394</cfEndDate>
</cfProj_Proj>
```

Name Business Rule: Project to Project

FRIS R4 specifications: The project relation element expresses any inter-project relationships.

Please refer to "Project Relation Roles" in the FRIS administration module for the valid classification values.

4.6.18 Project Funder identifiers

XML structure:

```
<cerif:cfFedId>
      <cerif:cfFedIdId>ignored</cerif:cfFedIdId>
      <cerif:cfFedId>the funding identifier</cerif:cfFedId>
      <cerif:cfClassId>AIO Contract Id</cerif:cfClassId>
      <cerif:cfClassSchemeId>Funder Identifier
Type</cerif:cfClassSchemeId>
</cerif:cfFedId>
```

Name Business Rule: Project IWT Funder Identifier, Project FWO Funder Identifier, Project EU Funder Identifier, Project Hercules Funder Identifier

FRIS R4 specifications: The project funder identifier is the contract identifier issued by the funding body and mentioned on the official contract. Federated ID's are only to be used in their embedded form.

Please refer to "Funder Identifier Types" in the FRIS administration module for the valid classification values.

4.6.19 Project external identifier & alias

XML structure:

```
<cerif:cfFedId>
      <cerif:cfFedIdId>ignored</cerif:cfFedIdId>
      <cerif:cfFedId>e2fb0dc2-3561-4f57-9f1d-fa684c59de11</cerif:cfFedId>
      <cerif:cfClassId>externalProvider</cerif:cfClassId>
      <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
    </cerif:cfFedId>
```

FRIS R4 specifications: Federated ID's are only to be used in their embedded form (see chapter 2.3.1).

Generic entity external identifiers are represented as:

- cfFedId is the actual external identifier
- cfClassId should be an instance of the "Source Authorities" classification scheme
- cfClassSchemeId equals 'Identifier Authority Type'

The FRIS system supports any number of cfFedId relations.

The identifier values may not be larger than 255 characters.

Please refer to "Source Authorities" in the FRIS administration module for the valid classification values.

Aliases are created by the FRIS system when multiple entities share a federated identifier. Entity aliasing (see chapter 4.2.3) is a special case where an alias is specifically ingested. It is represented as federated identifiers with "FRIS Alias Id" cfClassId and the **FRIS UUID** of the alias as the cfFedId.

XML structure:

```
<cerif:cfFedId>
      <cerif:cfFedIdId>required but ignored</cerif:cfFedIdId>
      <cerif:cfFedId>FRIS UUID</cerif:cfFedId>
      <cerif:cfClassId>FRIS Alias Id</cerif:cfClassId>
      <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
 </cerif:cfFedId>
```

4.6.20 Project participant

XML structure:

Internal person

```
<fris:frParticipant>
   <fris:frAssignmentId>Assignment2</fris:frAssignmentId>
   <cerif:cfClassId>Collaborator</cerif:cfClassId>
   <cerif:cfClassSchemeId>Project Person Participant
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

External person

```
<fris:frParticipant>
   <fris:cfPersId>Id-External-Pers</fris:cfPersId>
   <cerif:cfClassId>Collaborator</cerif:cfClassId>
   <cerif:cfClassSchemeId>Project Person Participant
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

Organisation

```
<fris:frParticipant>
   <fris:cfOrgUnitId>ID Org 5</fris:cfOrgUnitId>
   <cerif:cfClassId>Contractor</cerif:cfClassId>
   <cerif:cfClassSchemeId>Project Organisation Participant
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
   <cerif:cfPAddrId>2206</cerif:cfPAddrId>
</fris:frParticipant>
```

Name Business Rule: Project Assignment, Project External Person, Project External Organisation

FRIS specifications:

Instead of expressing the project-person-organisation relationship as an inherently inaccurate combination of three binary relations (person-organisation, project-organisation, project-person) we have extended the FRIS person-organisation relation to have an explicit identity (assignment identity), which in turn is referred directly from the project participant element.

> Note that the participant concept is specific to FRIS and a number of elements are in the FRIS namespace.

The participant concept supports the following variations:

frAssigmentId	A reference to an internally managed person-organisation assignment

cfPersId	A reference to an (external) person collaborator
cfOrgUnitId	A reference to an (external) organisation collaborator

Please refer to "Project Person Participant Role" in the FRIS administration module for the valid classification values for person associations.

Please refer to "Project Organisation Participant Role" in the FRIS administration module for the valid classification values for organisation associations.

Please note that all person participations have optional cfFirstNames and cfFamilyNames elements for the cases where the actual person name used at the time differs from what is registered directly on the person. Examples:

Internal person

```
<fris:frParticipant>
   <fris:frAssignmentId>Assignment2</fris:frAssignmentId>
   <fris:cfFamilyNames>VanYs</fris:cfFamilyNames>
   <fris:cfFirstNames>Amelie</fris:cfFirstNames>
   <cerif:cfClassId>Collaborator</cerif:cfClassId>
   <cerif:cfClassSchemeId>Project Person Participant
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

Managed external person

```
<fris:frParticipant>
   <fris:cfPersId>Id-External-Pers</fris:cfPersId>
   <fris:cfFamilyNames>Peters</fris:cfFamilyNames>
   <fris:cfFirstNames>An</fris:cfFirstNames>
   <cerif:cfClassId>Collaborator</cerif:cfClassId>
   <cerif:cfClassSchemeId>Project Person Participant
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

If an external person is not a managed object but only exists as a participant it is recommended not to ingest this as an external person but simply provide the names in the frParticipant without a reference to cfPersId

Unmanaged external person

```
<fris:frParticipant>
   <fris:cfFamilyNames>Peters</fris:cfFamilyNames>
   <fris:cfFirstNames>An</fris:cfFirstNames>
   <cerif:cfClassId>Collaborator</cerif:cfClassId>
   <cerif:cfClassSchemeId>Project Person Participant
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

For project partners of type organisation the optional cfPAddrId element corresponds with the contract address of that project partner. It requires that the corresponding cfPAddr element is present in the same message. This address contains at least country and city. See section Physical Address for formatting details

4.6.21 Project funding

XML structure: (also exists in the fris namespace)

```
<cerif:cfProj_Fund>
    <cerif:cfFundId>7008</cerif:cfFundId>
    <cerif:cfClassId>Principal Funding</cerif:cfClassId>
    <cerif:cfClassSchemeId>Funding Source to Project
Role</cerif:cfClassSchemeId>
    <cerif:cfStartDate>2015-07-14T10:46:17.983Z</cerif:cfStartDate>
    <cerif:cfEndDate>2016-01-10T11:46:17.983Z</cerif:cfEndDate>
</cerif:cfProj_Fund>
```

Name Business Rule: Project Funding Source

FRIS R4 specifications: The cfFundId element must contain a valid "Funding Source Code" and the cfClassId must contain a valid "Funding Source Role" term.

We consider each unique combination of cfFundId, cfStartDate and cfEndDate to be a specific instance of project funding; One entry with the project funding role (with no amount) and a number of budget entries (with amount).

Please refer to "Funding Source Roles" in the FRIS administration module for the valid classification values.

Please refer to "Funding Source Codes" in the FRIS administration module for the valid classification values.

4.6.22 Project budget line

Standard XML structure: (also exists in the fris namespace)

```
    <cerif:cfProj_Fund>
      <cerif:cfFundId>7008</cerif:cfFundId>
      <cerif:cfClassId>Allocated Capital Investment</cerif:cfClassId>
      <cerif:cfClassSchemeId>Project Allocated Budget
Type</cerif:cfClassSchemeId>
      <cerif:cfStartDate>2015-07-14T10:46:17.983Z</cerif:cfStartDate>
      <cerif:cfEndDate>2016-01-10T11:46:17.983Z</cerif:cfEndDate>
      <cerif:cfAmount cfCurrCode="EUR">386679</cerif:cfAmount>
    </cerif:cfProj_Fund>
```

XML structure when using budgetyear: (does not exist in the cerif namespace)

```
    <fris:cfProj_Fund>
      <cerif:cfFundId>7008</cerif:cfFundId>
      <cerif:cfClassId>Allocated Capital Investment</cerif:cfClassId>
      <cerif:cfClassSchemeId>Project Allocated Budget
Type</cerif:cfClassSchemeId>
      <fris:frBudgetYear>2014<fris:frBudgetYear>
      <cerif:cfStartDate>2015-07-14T10:46:17.983Z</cerif:cfStartDate>
      <cerif:cfEndDate>2016-01-10T11:46:17.983Z</cerif:cfEndDate>
      <cerif:cfAmount cfCurrCode="EUR">386679</cerif:cfAmount>
    </fris:cfProj_Fund>
```

Name Business Rule: Project Allocated Budget, Project Spent Budget

FRIS R4 specifications: The cfFundId must contain a valid "Funding Source Code" and the cfClassId must contain a valid "Project Budget Line" term.

A project budget line belongs to a project funding and should share the cfFundId, cfStartDate and cfEndDate with it. We consider each unique combination of cfFundId, cfStartDate , cfEndDate and frBudgetYear to be a specific instance of project budget line. The budget amounts are expected to always be in "EUR". frBudgetYear is optional and is only allowed for the allocated project budget lines; these in classification scheme "Project Budget Type". If you use the total "Allocated Budget" you are not allowed to send other detailed Allocated budgetlines and vica versa. The same rule applies for the total "Spent Costs"

en the detailed Spent types. You can however combine detailed Allocated budgetlines with a total Spent Costs.

> Project budgets are never shown in the public project representations; they are strictly limited to the FRIS backend.

Please refer to "Project Budget Lines" and "Project Spent Budget Lines" in the FRIS administration module for the valid classification values.

Project Budget Type:

- Allocated Budget
- Allocated Capital Investment
- Allocated Overhead
- Allocated Personnel Costs
- Allocated Running Costs

Project Spent Budget Type:

- Spent Costs
- Spent Capital Investment
- Spent Overhead
- Spent Personnel Costs
- Spent Running Costs

Please refer to "Funding Source Codes" in the FRIS administration module for the valid classification values.

4.7 Research output CERIF mapping

The CERIF cfResPubl and cfResPat entities are mapped to the FRIS research output entity. As the rules and required fields are different, Patent has been described in its own section.

4.7.1 FRIS Research output Model

The FRIS research output model is markedly different from the CERIF model and will require an introduction in order to be able to understand why the mapping is structured as it is.

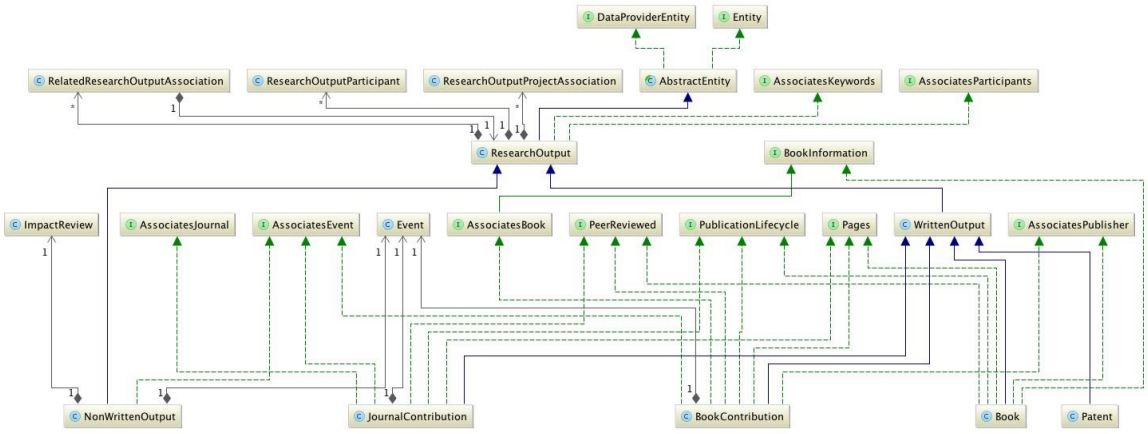

Figure 12 UML class diagram of FRIS research output model classes

The generic FRIS research output concept is called ResearchOutput and beyond a handful of properties common to all research output types it also contains associations to project, other research output and a ternary relationship to person-organisation via a participant (identical pattern to project participant). All ResearchOutput properties will be described in detail in the sections below.

Currently the FRIS research output model recognizes five distinct research output types; Book, BookContribution, NonWrittenOutput, JournalContribution and Patent. Each of these sub-types contains a distinct combination of properties, in some cases completely unique for the sub-type in question, in other cases a "trait" shared across a number of sub-types (shown as interfaces in the class diagram). Each trait contains a small number of properties that relate to a specific area of concern. Each of these traits will be described in detail in the sections below.

Note that the business rules described below should be considered neither exhaustive nor authoritative. The full, context dependent list is available in DataFlux.

Note that the cfResPubl and cfResPat elements are FRIS specific extensions of the CERIF elements and thus should be used in the fris namespace. The difference with CERIF is that the frParticipant element is used to express the Assignment – Research Output relation.

> Every time a research output is submitted ALL of the elements detailed in this chapter must be included if appropriate. If any element is omitted it means that the attribute represented by the element is removed.

4.7.1.1 FRIS ResearchOutput description

The FRIS ResearchOutput super-type captures properties and associations that are common to all research output types. The full FRIS class diagram for ResearchOutput is shown in the diagram above.

FRIS property	CERIF mapping	Notes
dataProviderId	cfResPubId	Primary source identifier.

Aliases	cfFedId	FRIS aliasing is expressed as federated identifiers, see chapter **Fout! Verwijzingsbron niet gevonden.** for details.
Sources	cfFedId	Secondary source information is expressed as federated identifiers, see chapter **Fout! Verwijzingsbron niet gevonden.** for details.
External	cfResPubl_Class	Entity can be marked external by adding a marker classification.
View permission	cfResPubl_Class	Entity can be marked confidential or backend-only by adding a marker classification.
researchOutputType	cfResPubl_Class	The Research Output taxonomy type.
Title	cfTitle	
Disciplines	cfResPubl_Class	Associated discipline codes.
relatedResearchOutputs	cfResPubl_ResPubl & cfResPubl_ResPat	
researchOutputProjects	cfProj_ResPubl	
participants	frParticipant	Relationship to Assignment, Person, and Organisation. Supports both internal and external associations.
refereeType	cfResPubl_Class	The referee type classification, whether an output has been peer-reviewed or not.

4.7.1.2 FRIS WrittenOutput description

The FRIS WrittenOutput super-type captures properties that are common to all published output types, for example Book, BookContribution and JournalContribution types.

FRIS property	CERIF mapping	Notes
alternateTitle	cfSubtitle	
researchAbstract	cfAbstr	
originalLanguage	cfResPubl_Class	The original language of the output is specified by including the relevant language code as a classification.
publicationCode	cfResPubl_Class	

4.7.1.3 FRIS AssociatesBook trait

The FRIS AssociatesBook trait is used by research output that is part of a book, for example BookContribution.

FRIS property	CERIF mapping	Notes
bookTitle	cfTitle	Mapped to cfResPubl through a cfResPubl_ResPubl relation
ISBN	cfISBN	Mapped to cfResPubl through a cfResPubl_ResPubl relation
bookEdition	cfEdition	Mapped to cfResPubl through a cfResPubl_ResPubl relation
bookVolume	cfVol	Mapped to cfResPubl through a cfResPubl_ResPubl relation
bookSeriesName	cfSeries	Mapped to cfResPubl through a cfResPubl_ResPubl relation

4.7.1.4 FRIS AssociatesPublisher trait

The FRIS AssociatesPublisher trait contains properties specific to an associated external publisher. (an internal publisher should be delivered as an internal organisation in RO Participant with Role Publisher see below)

FRIS property	CERIF mapping	Notes
Publisher	cfOrgUnit_ResPubl	Publisher name is expressed in CERIF as a cfOrgUnit cfName element. See chapter 4.7.27 for details on how types implementing the PublishingInformation trait are composed.
publicationLocation	cfOrgUnit_ResPubl	Publisher location is expressed in CERIF as a cfOrgUnit cfPAddr element.
publicationCountry	cfOrgUnit_ResPubl	Publisher country is expressed in CERIF as a cfOrgUnit cfPAddr element.

4.7.1.5 FRIS AssociatesJournal trait

The FRIS AssociatesJournal trait contains common properties for output that has been published in a journal, for example the JournalContribution type.

FRIS property	CERIF mapping	Notes
journalIssue	cfIssue	
journalVolume	cfVol	
Journal	cfResPubl_ResPubl	A journal association is represented in CERIF as a cfResPubl_ResPubl entry.

4.7.1.6 FRIS AssociatesEvent trait

The FRIS AssociatesEvent trait contains information about associated events, for example a conference. The actual event properties are captured in a separate Event object. Any number of events are supported.

FRIS property	CERIF mapping	Notes
Event	cfResPubl_Event	Reference to the Event containing the event properties. Note that multiple event associations are supported.
event.name	cfResPubl_Event -> cfName	The name of the conference where this conference contribution was presented.
event.location	cfResPubl_Event -> cfCityTown	The location of the conference where this conference contribution was presented.
event.country	cfResPubl_Event -> cfCountryCode	The country of the conference where this conference contribution was presented.
event.startDate	cfResPubl_Event -> cfStartDate	The start date of the event.
event.endDate	cfResPubl_Event -> cfEndDate	The end date of the event.
event.eventType	cfResPubl_Event -> cfEvent_Class	The event type

4.7.1.7 FRIS Book type

The FRIS Book type contains the following properties in addition to the ResearchOutput, WrittenOutput, AssociatesPublisher and AssociatesEvent properties.

FRIS property	CERIF mapping	Notes
ISBN	cfISBN	
bookEdition	cfEdition	
bookVolume	cfVol	
bookSeriesName	cfSeries	
publicationDate	cfResPublDate	
publicationStatus	cfResPubl_Class	
Pages	cfStartPage (& cfEndPage)	Any page range may be expressed directly in cfStartPage. The CERIF cfEndPage is optional, if present it will concatenated to the cfStartPage value.
pageCount	cfTotalPages	
evaluationPanel	cfResPubl_Class	The evaluation panel classification.

4.7.1.8 FRIS BookContribution type

The FRIS BookContribution type contains the following properties in addition to the ResearchOutput, WrittenOutput, AssociatesBook, AssociatesEvent (if conference proceedings) and AssociatesPublisher properties.

FRIS property	CERIF mapping	Notes
publicationDate	cfResPublDate	
publicationStatus	cfResPubl_Class	
Pages	cfStartPage (& cfEndPage)	Any page range may be expressed directly in cfStartPage. The CERIF cfEndPage is optional, if present it will concatenated to the cfStartPage value.
pageCount	cfTotalPages	
evaluationPanel	cfResPubl_Class	The evaluation panel classification.
ArticleNumber	cfFedId	

4.7.1.9 FRIS NonWrittenOutput type

The FRIS NonWrittenOutput type represents the non-traditional output. In addition to ResearchOutput and AssociatesEvent the type contains the following properties:

FRIS property	CERIF mapping	Notes
disseminationDate	cfResPublDate	
Description	cfAbstr	
technicalInformation	cfResPublMedium -> CfMedium -> cfDescr	Refers to a CfMedium instance with the technical information in cfDescr
externalReferences	cfFed	External references are expressed as federated identifiers using the "External reference authority" authority scheme.
Review	fr:ImpactReviewType	Custom FRIS type containing impact review information.
review.impactDescription	fr:ImpactReviewType -> impactDescription	CfMLangString impact description property.
review.researchcontext	fr:ImpactReviewType -> researchcontext	CfMLangString research context property.
review.impactReferences	fr:ImpactReviewType -> impactReferences	CfFedId impact references property
evaluationPanel	cfResPubl_Class	The evaluation panel classification.

4.7.1.10 FRIS JournalContribution type

The FRIS JournalContribution type contains the following properties in addition to the ResearchOutput, WrittenOutput, AssociatesEvent (if conference proceedings) and AssociatesJournal properties.

FRIS property	CERIF mapping	Notes
Pages	cfStartPage (& cfEndPage)	Any page range may be expressed directly in cfStartPage. The CERIF cfEndPage is optional, if present it will concatenated to the cfStartPage value.
pageCount	cfTotalPages	
publicationDate	cfResPublDate	
publicationStatus	cfResPubl_Class	
researchOutputType	cfResPubl_Class	The Journal Contribution taxonomy type. The presence of a Journal Contribution taxonomy type classification will enable this cfResPubl instance to be interpreted as a Journal Contribution type.
evaluationPanel	cfResPubl_Class	The evaluation panel classification.
ArticleNumber	cfFedId	

4.7.2 Overview of cfResPubl elements in FRIS R4

	Id	name	type	FRIS R4
1	cfResPublId	Result Publication Identifier	Identifier (max 128 chars)	Yes
0-1	cfResPublDate	Result Publication Date	ISO Date (nb. not dateTime!)	Yes
0-1	cfNum	Number	string	No
0-1	cfVol	Volume	string	Yes
0-1	cfEdition	Edition	string	Yes
0-1	cfSeries	Series	string	Yes
0-1	cfIssue	Issue	string	Yes
0-1	cfStartPage	Start Page	string	Yes
0-1	cfEndPage	End Page	string	Yes
0-1	cfTotalPages	Total Pages	string	Yes
0-1	cfISBN	International Standard Book Number	string	Yes
0-1	cfISSN	International Standard Serial Number	string	Yes
0-1	cfURI	Uniform Resource Identifier	string	No
0-N	cfTitle	Title	Multi-lingual text field	Yes
0-N	cfAbstr	Abstract	Multi-lingual text field	Yes
0-N	cfKeyw	Keywords	Multi-lingual text field	Yes
0-N	cfBiblNote	Bibliographic Note	Multi-lingual text field	No
0-N	cfNameAbbrev	Name Abbreviation	Multi-lingual text field	No
0-N	cfSubtitle	Subtitle	Multi-lingual text field	Yes
0-N	cfVersInfo	Version Info	Multi-lingual text field	No
0-N	cfResPubl_Event	Relationship with Event		Embedded

0-N	cfOrgUnit_ResPubl	Relationship with Organisation Unit	Embedded (as publisher reference)
0-N	cfPers_ResPubl	Relationship with Person	No
0-N	cfProj_ResPubl	Relationship with Project	Embedded
0-N	cfResPubl_ResPubl	Relationship with Result Publication	Embedded
0-N	cfResPubl_Class	Relationship with Classification	Embedded
0-N	cfResPubl_Fund	Relationship with Funding	No
0-N	cfResPubl_DC	Relationship with Dublin Core	No
0-N	cfResPubl_Facil	Relationship with Facility	Embedded
0-N	cfResPubl_Equip	Relationship with Equipment	Embedded
0-N	cfResPubl_ResProd	Relationship with Result Product	No
0-N	cfResPubl_ResPat	Relationship with Result Patent	Embedded
0-N	cfResPubl_Cite	Relationship with Citation	No
0-N	cfResPubl_Metrics	Relationship with Metrics	No
0-N	cfResPubl_Medium	Relationship with Medium	Embedded
0-N	cfResPubl_Srv	Relationship with Service	No
0-N	cfResPubl_Meas	Relationship with Measurement	No
0-N	cfResPubl_Indic	Relationship with Indicator	No
0-N	cfFedId	Federated Identifier	Embedded
0-N	fris:frParticipant	Ternary relationship with Person and Organisation Unit	Yes
0-1	fris:frImpactReview	ImpactReview information for NonWrittenOutput.	Yes

4.7.3 Research output identifier

XML structure:

```
<cerif:cfResPublId>internal-research-output-id</cerif:cfResPublId>
```

BR FRIS: A research output has a unique and persistent identifier managed by the supplying institution.

FRIS R4 specifications: ResearchOutput property used by all types.

The mandatory local research output identifier will be stored along with the data provider to uniquely identify this entity whenever an updated representation is submitted to the ingestion service. The research output will be assigned a FRIS UUID which is used when exposing this entity through the FRIS project services. The identifier values may not be larger than 256 characters.

4.7.4 Research Publication Date

XML structure:

```
<cerif:cfResPublDate>2014-01-01</cerif:cfResPublDate>
```

FRIS R4 specifications:

The Publication status is used by the Book, BookContribution and JournalContribution sub-types.

The cfResPublDate is the publication date of the publication, if either month or date is unknown please use "1" as value for that token.

4.7.5 Pages properties

XML structure:

```
<cerif:cfStartPage>start page or full pages
information</cerif:cfStartPage>
<cerif:cfEndPage>optional end page</cerif:cfEndPage>
```

<cerif:cfTotalPages>31</cerif:cfTotalPages>

FRIS R4 specifications: The Pages trait is used by the Book, BookContribution and JournalContribution sub-types. The paging and total pages of the research output. Note that for more complex page ranges the full page range should be entered in cfStartPage, the cfEndPage is optional and it is expected that cfTotalPages can be parsed as a positive integer. The pages value may not be larger than 255 characters. No HTML text formatting is allowed.

4.7.6 Research output title

XML structure:

```
<cerif:cfTitle cfTrans="o" cfLangCode="en">English title</cerif:cfTitle>
<cerif:cfTitle cfTrans="o" cfLangCode="nl">Nederlandstalige
titel</cerif:cfTitle>
```

Name Business Rule: Journal Contribution Mandatory Properties Rule, Book Mandatory Properties Rule, Book Contribution Mandatory Properties Rule, Journal Contribution Mandatory Journal Properties Rule

FRIS R4 specifications: ResearchOutput property used by all types. The official title of the research output. The title values may not be larger than 32.000 characters. Reduced HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.7.7 Research output abstract

XML structure:

```
<cerif:cfAbstr cfTrans="o" cfLangCode="en">EN Abstract</cerif:cfAbstr>
<cerif:cfAbstr cfTrans="o" cfLangCode="nl">NL Abstract</cerif:cfAbstr>
```

FRIS R4 specifications: Used both as WrittenOutput abstract and NonWrittenOutput description property. The research output abstract is a free-form description/abstract of the research output. The research abstract values may not be larger than 32.000 characters. Full HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.7.8 Research output keywords

XML structure:

```
<cerif:cfKeyw cfLangCode="en" cfTrans="o">Keyword</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 1</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 2</cerif:cfKeyw>
```

FRIS R4 specification: Keywords are free text fields where mapping to a centrally known taxonomy is not necessary. The FRIS system accepts any number keyword elements. Keywords are used in FRIS in the embedded variant (not the standalone xml). The individual keyword values may not be larger than 256 characters, the string length may not be larger than 2048 characters. No HTML text formatting is allowed.

Note : Please supply one keyword per line. In the past multiple keywords (comma-separated) in one element were allowed.

4.7.9 Research output alternate title

XML structure:

```
<cerif:cfSubtitle cfTrans="o" cfLangCode="en">EN</cerif:cfSubtitle>
```

<cerif:cfSubtitle cfTrans="o" cfLangCode="nl">NL</cerif:cfSubtitle>**FRIS R4 specifications:** WrittenOutput property. The alternate/sub title of the research output. The alternate title values may not be larger than 32.000 characters. Reduced HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.7.10 Research output View Permission

XML structure:

```
<cerif:cfResPubl_Class>
      <cerif:cfClassId>confidential</cerif:cfClassId>
      <cerif:cfClassSchemeId>View Permission Type</cerif:cfClassSchemeId>
</cerif:cfResPubl_Class>


<cerif:cfResPubl_Class>
      <cerif:cfClassId>backend</cerif:cfClassId>
      <cerif:cfClassSchemeId>View Permission Type</cerif:cfClassSchemeId>
</cerif:cfResPubl_Class>
```

Name Business Rule: FRISBO View Permissions Rule

FRIS R4 specifications: ResearchOutput property used by all types. If a particular entity should be considered backend-only or confidential using one of the above XML fragment signals this. If an entity is marked confidential it (or relations to it) will not be publicly accessible and only FRIS administrators or users for the owning data-provider will be able to access it in the FRIS administration module. If an entity is marked backend-only it (or relations to it) will not be publicly accessible and all authenticated users will be able to access it in the FRIS administration module.

If the fragment is omitted the FRIS system defaults to public.

4.7.11 Marking a research output as external

XML structure:

```
<cerif:cfResPubl_Class>
      <cerif:cfClassId>external</cerif:cfClassId>
      <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
</cerif:cfResPubl_Class>
```

FRIS R4 specifications: ResearchOutput property used by all types. If a particular research output is not managed by the data-provider, but is included in the set for completeness sake, this is signalled by marking the entity as external using the above XML snippet.

4.7.12 Marking a research output as art and design

XML structure:

```
<cerif:cfResPubl_Class>
    <cerif:cfClassId>artistic</cerif:cfClassId>
    <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
</cerif:cfResPubl_Class>
```

Name Business Rule: Art and Design Research Output Rule

FRIS R4 specifications: ResearchOutput property used by all types. If a particular research output is an art or design output, this is signalled by marking the entity as artistic using the above XML snippet.

4.7.13 Research output taxonomy & Thesis public defense date

XML structure:

```
<cerif:cfResPubl_Class>
    <cerif:cfClassId>Book</cerif:cfClassId>
    <cerif:cfClassSchemeId>Research Output Taxonomy
Type</cerif:cfClassSchemeId>
</cerif:cfResPubl_Class>
```

Name Business Rule: Non-written Output Taxonomy Type Rule, Book Contribution Taxonomy Type Rule, Journal Contribution Taxonomy Type Rule

FRIS specifications: ResearchOutput property used by all types. This taxonomy is hierarchical and the specified type decides which research sub-type (book, book-contribution, conference-contribution, journal-contribution, patent) that the FRIS system will interpret the supplied cfResPubl entry as.

The Research Output Taxonomy does not use Start date or End date with as exception for the term "Dissertation"(subtype of book) for which only a Start date is permitted. Then the Start date is used to indicate the thesis public defense date.

> Note that it is very important that the correct taxonomy type is provided!

Please refer to "Research Output Taxonomy" in the FRIS administration module for the valid classification values.

4.7.14 Research output evaluation panel

XML structure:

```
<cerif:cfResPubl_Class>
  <cerif:cfClassId>Architecture</cerif:cfClassId>
  <cerif:cfClassSchemeId>Research Output Evaluation
Panel</cerif:cfClassSchemeId>
</cerif:cfResPubl_Class>
```

Name Business Rule: Art and Design Evaluation Panel Rule

FRIS R4 specifications: Book, BookContribution, JournalContribution & NonWrittenOutput property. The impact evaluation panel classification of the research output.

Please refer to "Impact Review Evaluation Panels" in the FRIS administration module for the valid classification values.

4.7.15 Research output original language

XML structure:

```
<cerif:cfResPubl_Class>
   <cerif:cfClassId>nl</cerif:cfClassId>
   <cerif:cfClassSchemeId>ISO 639-1:2002 Language
Code</cerif:cfClassSchemeId>
</cerif:cfResPubl_Class>
```

FRIS R4 specifications: WrittenOutput property. For all written output the original language of the output can be described by adding the ISO-639-1 code as a classification.

Please refer to "ISO Language Codes" in the FRIS administration module for the valid classification values.

4.7.16 Research output publication code

XML structure:

```
<cerif:cfResPubl_Class>
      <cerif:cfClassId>A1.1</cerif:cfClassId>
      <cerif:cfClassSchemeId>Publication Codes</cerif:cfClassSchemeId>
```

```
</cerif:cfResPubl_Class>
```

FRIS R3R4 specifications: WrittenOutput property.

Please refer to "Publication Codes" in the FRIS administration module for the valid classification values.

4.7.17 Research referee type

XML structure:

```
<cerif:cfResPubl_Class>
      <cerif:cfClassId>Peer Reviewed</cerif:cfClassId>
      <cerif:cfClassSchemeId>Referee Type</cerif:cfClassSchemeId>
</cerif:cfResPubl_Class>
```

FRIS R4 specifications: Applicable to all research output types.

Please refer to "Referee Types" in the FRIS administration module for the valid classification values.

4.7.18 Research output discipline codes

XML structure:

```
<cerif:cfResPubl_Class>
      <cerif:cfClassId>01010101</cerif:cfClassId>
      <cerif:cfClassSchemeId>Flemish Research
Disciplines</cerif:cfClassSchemeId>
</cerif:cfResPubl_Class>
```

FRIS R4 specifications: The FRIS system accepts associated discipline codes.

Please refer to "Flemish Research Disciplines" in the FRIS administration module for the valid classification values.

4.7.19 Collaboration classification

This classification may be added to a research output.

XML structure:

```
<cerif:cfResPubl_Class>
      <cerif:cfClassId>International</cerif:cfClassId>
      <cerif:cfClassSchemeId>Collaboration Type</cerif:cfClassSchemeId>
</cerif:cfResPubl_Class>
```

Name Business Rule: RO International collaboration

FRIS R4 specifications: Please refer to "Research Output Collaboration Type" in the FRIS administration module for the valid classification values. (e.g. International, National, Regional)

4.7.20 Research output sector classification

XML structure:

```
<cerif:cfResPubl_Class>
      <cerif:cfClassId>Higher Education</cerif:cfClassId>
      <cerif:cfClassSchemeId>Research Output Sector
Type</cerif:cfClassSchemeId>
</cerif:cfResPubl_Class>
```

Name Business Rule: RO Sector

FRIS R4 specifications: Multiple values are allowed. Please refer to "Research Output Sector Type" in the FRIS administration module for the valid classification values (e.g. higher education, hospital, government, private)

4.7.21 BOF & IOF research output validation classification

XML structure:

```
<cerif:cfResPubl_Class>
      <cerif:cfClassId>BOF</cerif:cfClassId>
      <cerif:cfClassSchemeId>Research Output Validation
Type</cerif:cfClassSchemeId>
      <cerif:cfStartDate>2014-01-01T00:00:00.000Z</cerif:cfStartDate>
</cerif:cfResPubl_Class>
```

Name Business Rule: BOF Validation label, IOF Validation label

FRIS R4 specifications: This indicates whether the research output is validated for BOF and/or IOF and since when (via cfStartdate). Therefore, we do not expect more than 1 entry of each. Please refer to "Research Output Validation Type" in the FRIS administration module for the valid classification values. (eg. BOF, IOF)

4.7.22 Research output characteristic score and scale classification (CSS score)

XML structure:

```
<cerif:cfResPubl_Class>
      <cerif:cfClassId>2</cerif:cfClassId>
      <cerif:cfClassSchemeId>Research Output Characteristic Score and
Scale Type</cerif:cfClassSchemeId>
<cerif:cfStartDate>2014-01-01T00:00:00.000Z</cerif:cfStartDate>
</cerif:cfResPubl_Class>
```

Name Business Rule: RO CSS

FRIS R4 specifications: Please refer to "Research Output Characteristic Score and Scale Type" in the FRIS administration module for the valid classification values. (eg. 1, 2, 3, 4)

4.7.23 Research output BOF weight type

XML structure:

```
<cerif:cfResPubl_Class>
      <cerif:cfClassId>2</cerif:cfClassId>
      <cerif:cfClassSchemeId>Research Output BOF Weight
Type</cerif:cfClassSchemeId>
<cerif:cfStartDate>2014-01-01T00:00:00.000Z</cerif:cfStartDate>
</cerif:cfResPubl_Class>
```

Name Business Rule: RO BOF Weight

FRIS R4 specifications: Please refer to "Research Output Characteristic Score and Scale Type" in the FRIS administration module for the valid classification values. (eg. 0,1 ; 0,5 ; 1 ; 2 ; 3 ; 6 ; 10)

4.7.24 Research output project association

XML structure:

```
<cerif:cfProj_ResPubl>
   <cerif:cfProjId>c0c18498-770e-490a-a03a-432cf775cc59</cerif:cfProjId>
   <cerif:cfClassId>Result</cerif:cfClassId>
   <cerif:cfClassSchemeId>Research Output to Project
Role</cerif:cfClassSchemeId>
</cerif:cfProj_ResPubl>
```

Name Business Rule: Research Output to Project Optional Relationship Rule

FRIS R4 specifications: ResearchOutput property used by all types. The research output project element expresses project relationships. Start and end date are ignored.

Please refer to "Research Output Project Relation Roles" in the FRIS administration module for the valid classification values.

4.7.25 Related research output association

XML structure:

```
<cerif:cfResPubl_ResPubl>
 <cerif:cfResPublId2>c304d02a-2e9f-48df-b14a-
34210197f972</cerif:cfResPublId2>
 <cerif:cfClassId>Part</cerif:cfClassId>
 <cerif:cfClassSchemeId>Research Output to Research Output
Role</cerif:cfClassSchemeId>
</cerif:cfResPubl_ResPubl>
```

FRIS R4 specifications: ResearchOutput property used by all types. The research output relation element expresses any inter-research-output relationships. Start and end date are ignored.

Please refer to "Research Output Relation Roles" in the FRIS administration module for the valid classification values.

4.7.26 Publication status

XML structure:

```
<cerif:cfResPubl_Class>
   <cerif:cfClassId>Published</cerif:cfClassId>
   <cerif:cfClassSchemeId>Publication Status Type</cerif:cfClassSchemeId>
</cerif:cfResPubl_Class>
```

FRIS R4 specifications: The Publication status is used by the Book, BookContribution and JournalContribution sub-types.

Please refer to "Publication Status" in the FRIS administration module for the valid classification values. (eg. In Print, Published)

4.7.27 AssociatesPublisher properties

XML structure:

```
<fris:cfOrgUnit>
    <cerif:cfOrgUnitId>organisatie ID</cerif:cfOrgUnitId>
    <cerif:cfOrgUnit_Class>
      <cerif:cfClassId>component</cerif:cfClassId>
      <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
    </cerif:cfOrgUnit_Class>
    <cerif:cfName cfTrans="o" cfLangCode="nl">Thomson
Medicas</cerif:cfName>
    <cerif:cfOrgUnit_PAddr>
      <cerif:cfPAddrId>address ID</cerif:cfPAddrId>
      <cerif:cfClassId>ignored</cerif:cfClassId>
      <cerif:cfClassSchemeId>ignored</cerif:cfClassSchemeId>
    </cerif:cfOrgUnit_PAddr>
</fris:cfOrgUnit>


<fris:cfResPubl>
    <cerif:cfResPublId>c304d02a-2e9f-48df-b14a-
34210197f972</cerif:cfResPublId>
…
<cerif:cfOrgUnit_ResPubl>
```

```
      <cerif:cfOrgUnitId>organisatie ID</cerif:cfOrgUnitId>
      <cerif:cfClassId>publisher-component</cerif:cfClassId>
      <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
    </cerif:cfOrgUnit_ResPubl>
 …
</fris:cfResPubl>
<fris:cfPAddr>
    <cerif:cfPAddrId>address ID</cerif:cfPAddrId>
    <cerif:cfCountryCode>FR</cerif:cfCountryCode>
    <cerif:cfCityTown>Hopeulikit</cerif:cfCityTown>
    <cerif:cfPAddr_Class>
      <cerif:cfClassId>component</cerif:cfClassId>
      <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
    </cerif:cfPAddr_Class>
```

</fris:cfPAddr>

FRIS R4 specifications: The AssociatesPublisher trait is used by the Book and BookContribution sub-types. Expressing publishing information in CERIF is done through an OrgUnit association. If the OrgUnit representing the publisher is a managed organisation in the source data-provider set, the entity can also be supplied as a research output participant with role 'Publisher'. Any first level entity marked as a component will not be ingested as an independent entity. In this case the cfName of the OrgUnit is used as the publisher name and the first associated physical address as the publication location and country. The cfOrgUnit_ResPubl element must indicate that the association is a "publisher-component" relation if it is to be used as such.

The associated publisher name and location values may not be larger than 255 characters.

4.7.28 AssociatesEvent properties

XML structure:

```
<fris:cfEvent>
    <cerif:cfEventId>event-component:4690</cerif:cfEventId>
    <cerif:cfCountryCode>CH</cerif:cfCountryCode>
    <cerif:cfCityTown>Geneva</cerif:cfCityTown>
    <cerif:cfStartDate>2015-01-07+01:00</cerif:cfStartDate>
    <cerif:cfEndDate>2015-01-11+01:00</cerif:cfEndDate>
    <cerif:cfName cfTrans="o" cfLangCode="nl">sill ghost</cerif:cfName>
    <cerif:cfEvent_Class>
      <cerif:cfClassId>Concert</cerif:cfClassId>
      <cerif:cfClassSchemeId>Event Type</cerif:cfClassSchemeId>
    </cerif:cfEvent_Class>
  </fris:cfEvent>
…
<fris:cfResPubl>
    <cerif:cfResPublId>RO ID</cerif:cfResPublId>
…
   <cerif:cfResPubl_Event>
      <cerif:cfEventId>event-component:4690</cerif:cfEventId>
      <cerif:cfClassId>event-component</cerif:cfClassId>
      <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
    </cerif:cfResPubl_Event>
…
</fris:cfResPubl>
```

FRIS R4 specifications: Applicable for the Book, BookContribution, JournalContribution and NonWrittenOutput types. The AssociatesEvent type is an instance of output presented at a conference (in the case of BookContribution & JournalContribution); this may be a conference paper or abstract.

The conference information is expressed as a CERIF Event type. The cfResPubl_Event entry must be classified with the "event-component" term.

Please refer to "Event Type" in the FRIS administration module for the valid classification values.

The associated event name values may not be larger than 512 characters. The associated event location value may not be larger than 255 characters. No HTML text formatting is allowed.

4.7.29 Research output infrastructure role

XML structure:

```
<cerif:cfResPubl_Facil>
  <cerif:cfFacilId>facilityid</cerif:cfFacilId>
  <cerif:cfClassId>Used by</cerif:cfClassId>
  <cerif:cfClassSchemeId>Research Output to Infrastructure Role</
cerif:cfClassSchemeId>
</cerif:cfResPubl_Facil>

<cerif:cfResPubl_Equip>
  <cerif:cfEquipId>equipmentid</cerif:cfFacilId>
  <cerif:cfClassId>Used by</cerif:cfClassId>
  <cerif:cfClassSchemeId>Research Output to Infrastructure Role</
cerif:cfClassSchemeId>
</cerif:cfResPubl_Equip>
```

Business rule name: Research Output Infrastructure

FRIS R4 specifications: The relation between Research Output and infrastructure. The infrastructure can be an equipment or a facility. The relation between a Research Output and an infrastructure will always be given in the research output. Start and end date are ignored.

Please refer to "Research Output to Infrastructure Role" in the FRIS administration module for the valid classification values.

4.7.30 Research output external identifier & alias

XML structure:

```
<cerif:cfFedId>
   <cerif:cfFedIdId>ignored</cerif:cfFedIdId>
   <cerif:cfFedId>d2c6ff61-692b-4445-b8fb-90eec1bbc0e7</cerif:cfFedId>
   <cerif:cfClassId>WoS Id</cerif:cfClassId>
   <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
</cerif:cfFedId>
```

Business rule name: Research Output External Identifier

FRIS R4 specifications: Federated ID's are only to be used in their embedded form (see chapter 2.3.1).

Generic entity external identifiers are represented as:

- cfFedId is the actual external identifier
- cfClassId should be an instance of the "Source Authorities" classification scheme
- cfClassSchemeId equals 'Identifier Authority Type'

The FRIS system supports any number of cfFedId relations.

The identifier values may not be larger than 255 characters.

Please refer to "Source Authorities" in the FRIS administration module for the valid classification values. (e.g. ArticleNumber, VABB ID, DOI, ISSN, ISBN, WoS ID, …)

Aliases are created by the FRIS system when multiple entities share a federated identifier. Entity aliasing (see chapter 4.2.3) is a special case where an alias is specifically ingested. It is represented as federated identifiers with "FRIS Alias Id" cfClassId and the **FRIS UUID** of the alias as the cfFedId.

XML structure:

```
<cerif:cfFedId>
      <cerif:cfFedIdId>required but ignored</cerif:cfFedIdId>
      <cerif:cfFedId>FRIS UUID</cerif:cfFedId>
      <cerif:cfClassId>FRIS Alias Id</cerif:cfClassId>
      <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
 </cerif:cfFedId>
```

4.7.31 Article Number

XML structure:

```
<cerif:cfFedId>
   <cerif:cfFedIdId>ignored</cerif:cfFedIdId>
   <cerif:cfFedId>138-142 (2021)</cerif:cfFedId>
   <cerif:cfClassId>ArticleNumber</cerif:cfClassId>
   <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
</cerif:cfFedId>
```

FRIS R4 specifications: An Article Number is an optional field that can be provided for book contributions and journal contributions in case the pages property is not foreseen. It follows exactly the same structure as the external identifiers even though 'ArticleNumber' does not exist in the list of "Source Authorities" in the FRIS administration module. This federated identifier has to be supplied at the level of the journal contribution or book contribution and not at the linked journal or book.

4.7.32 Research output participant

XML structure:

Internal person

```
<fris:frParticipant>
   <fris:frAssignmentId>assignment identifier</fris:frAssignmentId>
   <cerif:cfClassId>Author</cerif:cfClassId>
   <cerif:cfClassSchemeId>Written Output Person Participant
Role</cerif:cfClassSchemeId>
</fris:frParticipant>
```

External person

```
<fris:frParticipant>
   <fris:cfPersId>8bb4cbbe-4aed-4152-a0da-9c0333b348f1</fris:cfPersId>
   <cerif:cfClassId>Reviewer</cerif:cfClassId>
   <cerif:cfClassSchemeId>Written Output Person Participant
Role</cerif:cfClassSchemeId>
</fris:frParticipant>
```

Organisation

```
<fris:frParticipant>
```

```
   <fris:cfOrgUnitId>organisation identifier</fris:cfOrgUnitId>
   <cerif:cfClassId>Partner</cerif:cfClassId>
   <cerif:cfClassSchemeId>Written Output Organisation Participant
Role</cerif:cfClassSchemeId>
</fris:frParticipant>
```

Group Author

```
<fris:frParticipant>
   <fris:frGroupAuthor>Group Author or Consortium
Name</fris:frGroupAuthor>
   <cerif:cfClassId>Group Author</cerif:cfClassId>
   <cerif:cfClassSchemeId>Research Output Group Author Participant
Role</cerif:cfClassSchemeId>
</fris:frParticipant>
```

Name Business Rule: External Participant Identifier Rule, Book Contribution Mandatory Participant Rule, Book Contribution Optional Participant Rule, Book Mandatory Participant Rule, Book Optional Participant Rule

FRIS R4 specifications: ResearchOutput property used by all types.

In FRIS we regard the Research Output Assignment - relationship to be a ternary relationship, see chapter 2.3.3. This means that instead of expressing this relationship as an inherently inaccurate combination of three binary relations (person-organisation, research output-organisation, research output-person) we have extended the FRIS person-organisation relation to have an explicit identity (assignment), which in turn is referred directly from the research output participant element.

The participant concept supports the following variations:

frAssignmentId	A reference to an internally managed person-organisation function
cfPersId	A reference to an (external) person collaborator
cfOrgUnitId	A reference to an (external) organisation collaborator
frGroupAuthor	A reference to a group author or consortium, since this is just a simple string it is expected that any internal, attributable participation must be expressed as a discrete (=individually separate and distinct) internalPerson reference

Note that the participant concept is specific to FRIS and a number of elements are in the FRIS namespace.

Note that for research output participant start and end dates are ignored.

Research output participation associations use different role classification schemes depending on whether a person is referred (frAssignmentId/ cfPersId/ groupAuthor) or an organisation (cfOrgUnitId). In addition, there are separate role schemes for written output (Book, Book Contribution & Journal Contribution) and Non Written Output. The full list is as follows:

Please refer to "Written Output Organisation Participant Role" in the FRIS administration module for the valid organisation roles for book, book contribution and journal contributions.

Please refer to "Written Output Person Participant Role" in the FRIS administration module for the valid person roles for book, book contribution and journal contributions.

Please refer to "Research Output Group Author Participant Role" in the FRIS administration module for the valid Group Author roles for book, book contribution and journal contributions. (only in combination with fris:frGroupAuthor)

Please refer to "Non Written Output Organisation Participant Role" in the FRIS administration module for the valid organisation roles for non-written output.

Please refer to "Non Written Output Person Participant Role" in the FRIS administration module for the valid person roles for non-written output.

Please note that all person participations have optional cfFirstNames and cfFamilyNames elements for the cases where the actual person name used on the research output differs from what is registered directly on the person. Examples:

Internal person

```
<fris:frParticipant>
   <fris:frAssignmentId>assignment identifier</fris:frAssignmentId>
   <fris:cfFamilyNames>Baldwin</fris:cfFamilyNames>
   <fris:cfFirstNames>Kendra</fris:cfFirstNames>
   <cerif:cfClassId>Author</cerif:cfClassId>
   <cerif:cfClassSchemeId>Written Output Person Participant
Role</cerif:cfClassSchemeId>
</fris:frParticipant>
```

Managed external person

```
<fris:frParticipant>
   <fris:cfPersId>8bb4cbbe-4aed-4152-a0da-9c0333b348f1</fris:cfPersId>
   <fris:cfFamilyNames>VanYs</fris:cfFamilyNames>
   <fris:cfFirstNames>Amelie</fris:cfFirstNames>
   <cerif:cfClassId>Reviewer</cerif:cfClassId>
   <cerif:cfClassSchemeId>Written Output Person Participant
Role</cerif:cfClassSchemeId>
</fris:frParticipant>
```

If an external person is not a managed object but only exists as a participant it is recommended not to ingest this as an external person but simply provide the names in the frParticipant without a reference to cfPersId

Unmanaged external person

```
<fris:frParticipant>
   <fris:cfFamilyNames>Peters</fris:cfFamilyNames>
   <fris:cfFirstNames>An</fris:cfFirstNames>
   <cerif:cfClassId>Collaborator</cerif:cfClassId>
   <cerif:cfClassSchemeId>Written Output Person Participant
Role</cerif:cfClassSchemeId>
</fris:frParticipant>
```

4.7.33 Book type properties

XML structure:

```
<cerif:cfVol>Book volume</cerif:cfVol>
<cerif:cfEdition>Book edition</cerif:cfEdition>
<cerif:cfSeries>Book series name</cerif:cfSeries>
<cerif:cfISBN>3-3038-5831-8</cerif:cfISBN>
```

Name Business Rule: Book Type Rule

FRIS R4 specifications: Only applicable for Book type. The Book type is a concrete instance of a book research output type; this may be a book, anthology or dissertation based on research or scholarly findings.

A Book representation includes all of the properties listed as applicable for research output in addition to the properties listed for the AssociatesPublisher trait, Pages, PublicationLifecycle and AssociatesEvent.

The book specific properties shown in the XML example should be self-explanatory.

The book series title value may not be larger than 512 characters (Reduced HTML formatting allowed). The book edition, volume values may not be larger than 255 characters (No HTML text formatting is allowed).

4.7.34 Book contribution type properties

XML structure:

```
<fris:cfResPubl>
 <cerif:cfResPublId>c3ba721d-4783-4b70-acd7-
da2536dc4617</cerif:cfResPublId>
…
  <cerif:cfResPubl_ResPubl>
   <cerif:cfResPublId2>book Id</cerif:cfResPublId2>
   <cerif:cfClassId>book-component</cerif:cfClassId>
   <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
  </cerif:cfResPubl_ResPubl>
</fris:cfResPubl>
…
<fris:cfResPubl>
 <cerif:cfResPublId>book Id</cerif:cfResPublId>
 <cerif:cfEdition>1</cerif:cfEdition>
 <cerif:cfSeries>igcxnjqvakb</cerif:cfSeries>
 <cerif:cfISBN>1-9630-0186-7</cerif:cfISBN>
 <cerif:cfResPubl_Class>
    <cerif:cfClassId>component</cerif:cfClassId>
    <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
 </cerif:cfResPubl_Class>
 <cerif:cfTitle cfTrans="o" cfLangCode="nl">book title</cerif:cfTitle>
</fris:cfResPubl>
```

Name Business Rule: Book Contribution Taxonomy Type Rule

FRIS R4 specifications: Only applicable for Book Contribution type. The BookContribution type is a concrete instance of a contribution to a larger scholarly work; this may be a book chapter, book editorial, dictionary entry or encyclopaedia entry.

A BookContribution representation includes all of the properties listed as applicable for research output in addition to the properties listed for the AssociatesPublisher trait, Pages, PublicationLifecycle, AssociatesEvent and ArticleNumber.

The larger work that this contribution is part of is represented as a separate cfResPubl element where all of the book specific properties are documented. The referred book may or may not be managed explicitly by the data provider. If it is not managed explicitly it should be marked as a component as shown in the XML example above. In all cases the relation from the contribution to the book is represented as a cfResPubl_ResPubl element with the "book-component" cfClassId.

The associated book title values may not be larger than 32.000 characters (Reduced HTML formatting allowed). The associated book series title value may not be larger than 512 characters (Reduced formatting allowed). The associated book edition, volume values may not be larger than 255 characters (No HTML text formatting is allowed.).

4.7.35 Journal contribution type properties

XML structure:

```
<fris:cfResPubl>
 <cerif:cfResPublId>JCID1</cerif:cfResPublId>
 <cerif:cfResPublDate>2015-03-22+01:00</cerif:cfResPublDate>
```

```
 <cerif:cfVol>5</cerif:cfVol>
 <cerif:cfIssue>5</cerif:cfIssue>
 <cerif:cfStartPage>5-96</cerif:cfStartPage>
 …
 <cerif:cfResPubl_ResPubl>
     <cerif:cfResPublId2>JournalID1</cerif:cfResPublId2>
     <cerif:cfClassId>journal-component</cerif:cfClassId>
     <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
 </cerif:cfResPubl_ResPubl>
…
</fris:cfResPubl>
<fris:cfResPubl>
 <cerif:cfResPublId>JournalID1</cerif:cfResPublId>
 <cerif:cfISSN>9415-3445</cerif:cfISSN>
 <cerif:cfTitle cfTrans="o" cfLangCode="nl">Title Journal</cerif:cfTitle>
     <cerif:cfResPubl_Class>
     <cerif:cfClassId>journal-component</cerif:cfClassId>
     <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
     </cerif:cfResPubl_Class>
…
</fris:cfResPubl>
```

Name Business Rule: Journal Contribution Taxonomy Type Rule

FRIS R4 specifications: Only applicable for Journal Contribution type. The JournalContribution type is a concrete instance of output published in a scholarly journal; this may be an article, letter or editorial.

A JournalContribution representation includes all of the properties listed as applicable for research output in addition to the properties listed for the AssociatesPublisher trait, Pages, PublicationLifecycle, AssociatesEvent and ArticleNumber.

The title and ISSN of the journal containing the contribution is expressed through a reference to a cfResPubl entry representing the journal. The association type is always "journal-component". The journal issue and volume are expressed directly on the contribution entry. In FRIS this is interpreted as the abstract concept of the journal and not a particular issue of a journal. From this follows that cfIssue and cfVolume should be expressed on the contribution element and not the referred journal element.

The associated journal title values may not be larger than 512 characters. The journal issue, volume values may not be larger than 255 characters. The ISSN[10] property may not be larger than 9 characters. No HTML text formatting is allowed.

In FRIS we do not support journals from research institutions as separate managed entities, this means that all associated journal elements must be marked as "component".

4.7.36 Non written output type properties

XML structure:

```
<cfResPubl>
    <cerif:cfResPublId>test_nonwritten</cerif:cfResPublId>
    <cerif:cfResPublDate>2015-01-01+01:00</cerif:cfResPublDate>
    <cerif:cfTitle cfLangCode="nl" cfTrans="o">titel</cerif:cfTitle>
    <cerif:cfResPubl_Class>
        <cerif:cfClassId>Artefact</cerif:cfClassId>
```

[10] http://www.issn.org/understanding-the-issn/what-is-an-issn/

```
        <cerif:cfClassSchemeId>Research Output Taxonomy
Type</cerif:cfClassSchemeId>
    </cerif:cfResPubl_Class>

    <cerif:cfResPubl_Medium>
        <cerif:cfMediumId>1828</cerif:cfMediumId>
        <cerif:cfClassId>technical-information-
component</cerif:cfClassId>
        <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
    </cerif:cfResPubl_Medium>
    <cerif:cfFedId>
        <cerif:cfFedIdId>ignored</cerif:cfFedIdId>
        <cerif:cfFedId>http://external.reference.com</cerif:cfFedId>
        <cerif:cfClassId>non-written-external-reference-provenance-
1</cerif:cfClassId>
        <cerif:cfClassSchemeId>Research Output External
Reference</cerif:cfClassSchemeId>
    </cerif:cfFedId>

    <fris:frParticipant>
        <fris:frAssignmentId>14968</fris:frAssignmentId>
        <cerif:cfClassId>Creator</cerif:cfClassId>
        <cerif:cfClassSchemeId>Non Written Output Person Participant
Role</cerif:cfClassSchemeId>
    </fris:frParticipant>
    <fris:frImpactReview>
        <fris:frImpactDescription cfTrans="o" cfLangCode="en">Impact
description</fris:frImpactDescription>
        <fris:frImpactDescription cfTrans="o" cfLangCode="nl">Impact
description</fris:frImpactDescription>
        <fris:frResearchContext cfTrans="o" cfLangCode="en">Research
context</fris:frResearchContext>
        <fris:frResearchContext cfTrans="o" cfLangCode="nl">Research
context</fris:frResearchContext>
        <fris:frImpactReferences>
            <cerif:cfFedIdId>ignored</cerif:cfFedIdId>
            <cerif:cfFedId>http://impact.reference.com</cerif:cfFedId>
            <cerif:cfClassId>Impact Reference Art or Design Research
Outcome</cerif:cfClassId>
            <cerif:cfClassSchemeId>Research Output Impact
Reference</cerif:cfClassSchemeId>
        </fris:frImpactReferences>
    </fris:frImpactReview>
</cfResPubl>
<cfMedium>
    <cerif:cfMediumId>1828</cerif:cfMediumId>
    <cerif:cfDescr cfTrans="o" cfLangCode="en">Technical
information</cerif:cfDescr>
```

```
    <cerif:cfDescr cfTrans="o" cfLangCode="nl">Technical
information</cerif:cfDescr>
</cfMedium>
```

Name Business Rule: Non-written Output Taxonomy Type Rule

FRIS R4 specifications: Only applicable for NonWrittenOutput type. The NonWrittenOutput type contains in addition to the properties listed in ResearchOutput and AssociatesEvent the properties shown in the XML sample.

The cfResPubl property is used to represent dissemination date, cfAbstr as the output description, the associated cfResPubl_Medium entry contains a technical information description, cfFedId contains the external references under the "Research Output External Reference" scheme and the FRIS specific ImpactReviewType contains all of the impact related properties.

The CfMedium association must be marked as a "technical-information-component" relation type.

The ImpactReview type is specific to FRIS and contains the following properties: impact description (CfMLangType), research context description (CfMLangType) and impact references (CfFedId type, cfClassId from the " Impact Review Reference Source Authorities" scheme).

Please refer to "Impact Review Reference Source Authorities", "Non-Written external reference source authorities" and "Non Written Output Person Participant Role", "Non Written Output Organisation Participant Role" in the FRIS administration module for the valid classification values.

The impact review description, research context and technical information properties may not be longer than 32.000 characters. Full HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.7.37 Research Output Open Access Label

XML structure:

```
<cerif:cfResPubl_Class>
     <cerif:cfClassId>Embargoed</cerif:cfClassId>
     <cerif:cfClassSchemeId>Open access label</cerif:cfClassSchemeId>
       <cerif:cfStartDate>2021-01-01T00:00:00</cerif:cfStartDate>
     <cerif:cfEndDate>2021-06-01T00:00:00</cerif:cfEndDate>
</cerif:cfResPubl_Class>
```

Name Business Rule:

FRIS R4 Specifications:

Only applicable for Book, Book Contribution and Journal contribution type. The Open Access Label is a label provided to show the open access status of a publication. Possible values for this classification can be found here https://stfrisr4.researchportal.be/admin/classifications/view/OPEN_ACCESS_LABEL. An enddate is expected for the Embargoed value. Startdate is optional.

4.8 Patent CERIF mapping

Note that the cfResPubl and cfResPat elements are FRIS specific extensions of the CERIF elements and thus should be used in the fris namespace. The difference with CERIF is that the frParticipant element is used to express the Assignment – Research Output relation. The CERIF cfResPat is also mapped internally to the FRIS Research Output.

Every time a patent is submitted ALL of the elements detailed in this chapter must be included if appropriate. If any element is omitted it means that the attribute represented by the element is removed.

4.8.1 Overview of cfResPat elements in FRIS R4

	id	name	type	Fris R4
1	cfResPatId	Result Patent Identifier	Identifier (max 128 chars)	Yes
0-1	cfCountryCode	Country Code	string	No
0-1	cfRegistrDate	Registration Date	ISO Date (nb. not dateTime!)	Yes
0-1	cfApprovDate	Approval Date	ISO Date (nb. not dateTime!)	Yes
0-1	fris:frResPatPublDate	Publication date	ISO Date (nb. not dateTime!)	Yes
0-1	cfPatentNum	Patent Number	string	Yes
0-1	cfURI	Uniform Resource Identifier	string	Yes
0-N	cfTitle	Title	Multi-lingual text field	Yes
0-N	cfAbstr	Abstract	Multi-lingual text field	Yes
0-N	cfKeyw	Keywords	Multi-lingual text field	Yes
0-N	cfVersInfo	Version Info	Multi-lingual text field	Not used
0-N	cfOrgUnit_ResPat	Relationship with Organisation Unit	-	Not used, Use frParticipant instead
0-N	cfPers_ResPat	Relationship with Person	-	Not used, Use frParticipant instead
0-N	cfProj_ResPat	Relationship with Project	-	Embedded
0-N	cfResPat_Class	Relationship with Classification	-	Embedded
0-N	cfResPat_Fund	Relationship with Funding	-	Not used
0-N	cfResPubl_ResPat	Relationship with Result Publication	-	Embedded
0-N	cfResPat_ResPat	Relationship with Result Patent	-	Not used
0-N	cfResPat_Medium	Relationship with Medium	-	Not used
0-N	cfResPat_Facil	Relationship with Facility	-	Not used
0-N	cfResPat_Srv	Relationship with Service	-	Not used

0-N	cfResPat_Equip	Relationship with Equipment	-	Not used
0-N	cfResPat_Meas	Relationship with Measurement	-	Not used
0-N	cfResPat_Indic	Relationship with Indicator	-	Not used
0-N	cfFedId	Federate Identifier		Embedded
0-N	fris:frParticipant	Ternary relationship with Person and Organisation Unit		Yes

4.8.2 Patent identifier

XML structure:

```
<cerif:cfResPatId>internal-patent-id</cerif:cfResPatId >
```

Name Business Rule: Patent identifier

FRIS R4 specifications: The mandatory local patent identifier will be stored along with the data provider to uniquely identify this entity whenever an updated representation is submitted to the ingestion service. The patent will be assigned a FRIS UUID which is used when exposing this entity through the FRIS research output services. The identifier value may not be larger than 256 characters.

4.8.3 Patent dates

XML structure:

```
<cerif:cfRegistrDate>1967-08-13</cerif:cfRegistrDate>
<cerif:cfApprovDate>1970-08-13</cerif:cfApprovDate>
<fris:frResPatPublDate>1971-08-10</fris:frResPatPublDate>
```

Name Business Rule:

FRIS R4 specifications: Contains the registration date when the patent was first filed, the approval and the publication date of the patent. Note that frResPatPublDate must be used with the fris namespace and is mandatory. The other 2 fields are optional.

4.8.4 Patent number

XML structure:

```
<cerif:cfPatentNum>EP123456789</cerif:cfPatentNum>
```

Name Business Rule: Patent Publication number

FRIS R4 specifications: Uniquely identifies the patent. Note that this number must also be supplied as fedId under the correct patent office.

The patent number value may not be larger than 255 characters. No HTML text formatting is allowed.

4.8.5 Patent URI

XML structure:

```
<cerif:cfURI>
https://worldwide.espacenet.com/patent/search/family/018930091/publicatio
n/JP2002268684A?q=pn%3DJP2002268684A</cerif:cfURI>
```

Name Business Rule: Patent URI

FRIS R4 specifications: Link to the patent on Espacenet or other service. The page value may not be larger than 2048 characters. No HTML text formatting is allowed.

4.8.6 Patent title

XML structure:

```
<cerif:cfTitle cfTrans="o" cfLangCode="en">Patent title</cerif:cfTitle>
<cerif:cfTitle cfTrans="o" cfLangCode="nl">Patent titel </cerif:cfTitle>
```

Name Business Rule: Patent Title

FRIS R4 specifications: This is the official title of the patent. The title values may not be larger than 32.000 characters. Reduced HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.8.7 Patent abstract

XML structure:

```
<cerif:cfAbstr cfTrans="o" cfLangCode="en">EN Abs Patent</cerif:cfAbstr>
<cerif:cfAbstr cfTrans="o" cfLangCode="nl">NL Abs Patent </cerif:cfAbstr>
```

Name Business Rule: Patent Abstract

FRIS R4 specifications: The patent abstract is a free-form description of the patent. The abstract values may not be larger than 32.000 characters. Full HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.8.8 Patent keywords

XML structure:

```
<cerif:cfKeyw cfLangCode="en" cfTrans="o">Keyword</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 1</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 2</cerif:cfKeyw>
```

FRIS R4 specification: Keywords are free text fields where mapping to a centrally known taxonomy is not necessary. The FRIS system accepts any number keyword elements. Keywords are used in FRIS in the embedded variant (not the standalone xml). The individual keyword values may not be larger than 256 characters, the string length may not be larger than 2048 characters. No HTML text formatting is allowed.

Note : Please supply one keyword per line. In the past multiple keywords (comma-separated) in one element were allowed.

4.8.9 Patent project relation

XML structure:

```
<cerif:cfProj_ResPat>
   <cerif:cfProjId>internal-project-id</cerif:cfProjId>
   <cerif:cfClassId>Valorises</cerif:cfClassId>
   <cerif:cfClassSchemeId>Research Output to Project
Role</cerif:cfClassSchemeId>
</cerif:cfProj_ResPat>
```

Name Business Rule:

FRIS R4 specifications: A patent can be linked to a project. The classification for research outputs to projects is reused.

Please refer to "Research Output Project Relation Roles" in the FRIS administration module for the valid classification values (eg. "Result", "Valorises").

4.8.10 Patent view permission

XML structure:

```
<cerif:cfResPat_Class>
   <cerif:cfClassId>confidential</cerif:cfClassId>
   <cerif:cfClassSchemeId>View Permission Type</cerif:cfClassSchemeId>
</cerif:cfResPat_Class>
```

```
<cerif:cfResPat_Class>
   <cerif:cfClassId>backend</cerif:cfClassId>
   <cerif:cfClassSchemeId>View Permission Type</cerif:cfClassSchemeId>
</cerif:cfResPat_Class>
```

Name Business Rule:

FRIS R4 specifications: If a particular entity should be considered backend-only or confidential using one of the above XML fragment signals this. If an entity is marked confidential it (or relations to it) will not be publicly accessible and only FRIS administrators or users for the owning data-provider will be able to access it in the FRIS administration module. If an entity is marked backend-only it (or relations to it) will not be publicly accessible and all authenticated users will be able to access it in the FRIS administration module.

If the fragment is omitted the FRIS system defaults to public.

4.8.11 Marking a patent as external

XML structure:

```
<cerif:cfResPat_Class>
 <cerif:cfClassId>external</cerif:cfClassId>
 <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
</cerif:cfResPat_Class>
```

Name Business Rule:

FRIS R4 specifications: If a particular patent is not managed by the data-provider, but is included in the set for completeness sake, this is signalled by marking the entity as external using the above XML snippet.

4.8.12 Patent status

XML structure:

```
<cerif:cfResPat_Class>
 <cerif:cfClassId>Assigned</cerif:cfClassId>
 <cerif:cfClassSchemeId>Patent Status</cerif:cfClassSchemeId>
</cerif:cfResPat_Class>
```

Name Business Rule: Patent status

FRIS R4 specifications: Start and Enddate are ignored.

Please refer to "Patent status" in the FRIS administration module for the valid classification values. (eg. Assigned, Requested)

4.8.13 Fraunhofer technology code

XML structure:

```
<cerif:cfResPat_Class>
     <cerif:cfClassId>35</cerif:cfClassId>
     <cerif:cfClassSchemeId>Fraunhofer Technology
Codes</cerif:cfClassSchemeId>
</cerif:cfResPat_Class>
```

Name Business Rule: Patent Technology

FRIS R4 specifications: The FRIS system accepts associated Fraunhofer Technology codes (Fraunhofer 35). Start and Enddate are ignored.

Please refer to "Fraunhofer Technology Codes" in the FRIS administration module for the valid classification values.

4.8.14 BOF & IOF research output validation classification

XML structure:

```
<cerif:cfResPat_Class>
      <cerif:cfClassId>IOF</cerif:cfClassId>
      <cerif:cfClassSchemeId>Research Output Validation
Type</cerif:cfClassSchemeId>
      <cerif:cfStartDate>2014-01-01T00:00:00.000Z</cerif:cfStartDate>
</cerif:cfResPat_Class>
```

Name Business Rule: Patent IOF label

FRIS R4 specifications: This indicates whether the research output is validated for BOF and/or IOF and since when (via cfStartdate). Therefore, we do not expect more than 1 entry of each. Please refer to "Research Output Validation Type" in the FRIS administration module for the valid classification values. (eg. BOF, IOF)

4.8.15 Patent external identifier & alias

XML structure:

```
<cerif:cfFedId>
    <cerif:cfFedIdId>ignored</cerif:cfFedIdId>
    <cerif:cfFedId>WO2019US42934</cerif:cfFedId>
    <cerif:cfClassId>EPO</cerif:cfClassId>
    <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
</cerif:cfFedId>
```

FRIS R4 specifications: Federated ID's are only to be used in their embedded form (see chapter 2.3.1).

Generic entity external identifiers are represented as:

- cfFedId is the actual external identifier.
- cfClassId should be an instance of the "Source Authorities" classification scheme
- cfClassSchemeId equals 'Identifier Authority Type'

The FRIS system supports any number of cfFedId relations.

The identifier values may not be larger than 255 characters.

Please refer to "Source Authorities" in the FRIS administration module for the valid classification values.

Specifically for patents there is a requirement to send the patent number also as a federated identifier together with the patent office:

- the cfFedId should be the same number identification number as sent in the cfPatentNum field
- the cfClassId refers to the patent office: EPO, USPTO or WIPO

Aliases are created by the FRIS system when multiple entities share a federated identifier. Entity aliasing (see chapter 4.2.3) is a special case where an alias is specifically ingested. It is represented as federated identifiers with "FRIS Alias Id" cfClassId and the **FRIS UUID** of the alias as the cfFedId.

XML structure:

```
<cerif:cfFedId>
      <cerif:cfFedIdId>required but ignored</cerif:cfFedIdId>
      <cerif:cfFedId>FRIS UUID</cerif:cfFedId>
      <cerif:cfClassId>FRIS Alias Id</cerif:cfClassId>
      <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
 </cerif:cfFedId>
```

4.8.16 Patent participant

XML structure:

Internal person

```
<fris:frParticipant>
   <fris:frAssignmentId>Assignment2</fris:frAssignmentId>
   <cerif:cfClassId>Inventor</cerif:cfClassId>
   <cerif:cfClassSchemeId>Patent Person Participant
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

External person

```
<fris:frParticipant>
   <fris:cfPersId>Id-External-Pers</fris:cfPersId>
   <cerif:cfClassId>Inventor</cerif:cfClassId>
   <cerif:cfClassSchemeId>Patent Person Participant
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

Organisation

```
<fris:frParticipant>
   <fris:cfOrgUnitId>ID Org 5</fris:cfOrgUnitId>
   <cerif:cfClassId>Contact</cerif:cfClassId>
   <cerif:cfClassSchemeId>Patent Organisation Participant
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

Name Business Rule: Patent Participation, Patent Contact Organisation, Patent External Person, Patent External Organisation

FRIS specifications: Instead of expressing the patent-person-organisation relationship as an inherently inaccurate combination of three binary relations (person-organisation, patent-organisation, project-person) we have extended the FRIS person-organisation relation to have an explicit identity (assignment identity), which in turn is referred directly from the project participant element.

> Note that the participant concept is specific to FRIS and a number of elements are in the FRIS namespace.

The participant concept supports the following variations:

frAssigmentId	A reference to an internally managed person-organisation assignment
cfPersId	A reference to an (external) person collaborator
cfOrgUnitId	A reference to an (external) organisation collaborator

The link to the TTO organisation should have the 'Contact' classification. If an external person or organisation is sent as a participant it is required that they contain at least the country in their physical address. See section: Physical address

Please refer to "Patent Organisation Participant Role" in the FRIS administration module for the valid classification values for organisation associations.

Please refer to "Patent Person Participant Role" in the FRIS administration module for the valid classification values for person associations.

Please note that all person participations have optional cfFirstNames and cfFamilyNames elements for the cases where the actual person name used at the time differs from what is registered directly on the person. Examples:

Internal person

```
<fris:frParticipant>
   <fris:frAssignmentId>Assignment2</fris:frAssignmentId>
   <fris:cfFamilyNames>VanYs</fris:cfFamilyNames>
   <fris:cfFirstNames>Amelie</fris:cfFirstNames>
   <cerif:cfClassId>Inventor</cerif:cfClassId>
   <cerif:cfClassSchemeId>Patent Person Participant
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

External person

```
<fris:frParticipant>
   <fris:cfPersId>Id-External-Pers</fris:cfPersId>
   <fris:cfFamilyNames>Peters</fris:cfFamilyNames>
   <fris:cfFirstNames>An</fris:cfFirstNames>
   <cerif:cfClassId>Inventor</cerif:cfClassId>
   <cerif:cfClassSchemeId>Patent Person Participant
Role</cerif:cfClassSchemeId>
   <cerif:cfStartDate>2015-03-11T11:46:17.983Z</cerif:cfStartDate>
   <cerif:cfEndDate>2016-06-11T10:46:17.983Z</cerif:cfEndDate>
</fris:frParticipant>
```

4.9 Dataset CERIF mapping

The CERIF cfResProd entity is mapped to the FRIS Dataset entity.

Note that the business rules described below should be considered neither exhaustive nor authoritative. The full, context dependent list is available in DataFlux.

> Every time a dataset is submitted ALL of the elements detailed in this chapter must be included if appropriate. If any element is omitted it means that the attribute represented by the element is cleared.

Note that the cfResProd element is a FRIS specific extension of the CERIF cfResProd. The difference is that several FRIS specific elements have been added at the bottom of the list.

4.9.1 Overview of cfResProd elements in FRIS R4

	id	name	type	FRIS R4
1	cfResProdId	Result Product Identifier	Identifier (max 128 chars)	Yes
0-1	cfURI	Uniform Resource Identifier	string	No
0-N	cfName	Title	Multi-lingual text field	Yes
0-N	cfDescr	Description	Multi-lingual text field	Yes
0-N	cfKeyw	Keywords	Multi-lingual text field	Yes
0-1	cfVersInfo	Version Info	Multi-lingual text field	Yes
0-N	cfOrgUnit_ResProd	Relationship with Organisation Unit		No, use frParticipant
0-N	cfPers_ResProd	Relationship with Person		No, use frParticipant
0-N	cfProj_ResProd	Relationship with Project		Embedded
0-N	cfResProd_Class	Relationship with Classification		Embedded
0-N	cfResProd_Fund	Relationship with Funding		No
0-N	cfResPubl_ResProd	Relationship with Result Publication		Embedded
0-N	cfResProd_ResProd	Relationship with Result Product		Embedded
0-N	cfResProd_Medium	Relationship with Medium		No
0-N	cfResProd_Facil	Relationship with Facility		Embedded
0-N	cfResProd_Srv	Relationship with Service		No
0-N	cfResProd_Equip	Relationship with Equipment		Embedded
0-N	cfResProd_Meas	Relationship with Measurement		No
0-N	cfResProd_Indic	Relationship with Indicator		No
0-N	cfFedId	Federated Identifier		Embedded
0-N	fris:frParticipant	Ternary relationship with Person and Organisation Unit		Yes
0-N	fris:frAbstr	Abstract	Multi-lingual text field	Yes
0-1	fris:frPublisher	Publisher	string	Yes
0-1	fris:frPublYear	Publication Year	integer	Yes
0-1	fris:frSize	Description of the size	string	Yes
0-N	fris:frFormat	List of filetypes of the dataset	string	Yes
0-1	fris:frIsOpenFormat	indication whether format is open	boolean	Yes
0-1	fris:frOptOutClarification	opt-out clarification	string	Yes

4.9.2 Dataset identifier

XML structure:

```
<cerif:cfResProdId>internal-project-id</cerif:cfResProdId>
```

Name Business Rule: Dataset Identifier

FRIS R4 specifications: The mandatory local dataset identifier will be stored along with the data provider to uniquely identify this entity whenever an updated representation is submitted to the ingestion service. The project will be assigned a FRIS UUID which is used when exposing this entity through the FRIS dataset services. The identifier value may not be larger than 256 characters. No HTML formatting is allowed.

4.9.3 Dataset title

XML structure:

```
<cerif:cfName cfTrans="o" cfLangCode="en">Dataset name</cerif:cfName>
<cerif:cfName cfTrans="o" cfLangCode="nl">Dataset naam</cerif:cfName>
```

Name Business Rule: Dataset Title

FRIS R4 specifications: This is the official name of the dataset. The name values may not be larger than 32.000 characters. Reduced HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.9.4 Dataset description

XML structure:

```
<cerif:cfDescr cfTrans="o" cfLangCode="en">description</cerif:cfDescr>
<cerif:cfDescr cfTrans="o" cfLangCode="nl">omschrijving</cerif:cfDescr>
```

Name Business Rule: Dataset Description

FRIS R4 specifications: This is free-form description of the dataset that contains other information that is not already covered in Dataset Abstract (see below). The description values may not be larger than 32.000 characters. Reduced HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.9.5 Dataset keywords

XML structure:

```
<cerif:cfKeyw cfLangCode="en" cfTrans="o">Keyword</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 1</cerif:cfKeyw>
<cerif:cfKeyw cfLangCode="nl" cfTrans="o">Trefwoord 2</cerif:cfKeyw>
```

Name Business Rule: Dataset Keywords

FRIS R4 specification: Keywords are free text fields where mapping to a centrally known taxonomy is not necessary. The FRIS system accepts any number keyword elements. Keywords are used in FRIS in the embedded variant (not the standalone xml). The individual keyword values may not be larger than 256 characters, the string length may not be larger than 2048 characters. No HTML text formatting is allowed.

Note : Please supply one keyword per line. In the past multiple keywords (comma-separated) in one element were allowed.

4.9.6 Dataset Version info

XML structure:

```
<cerif:cfVersInfo cfTrans="o" cfLangCode="en">Version</cerif:cfVersInfo>
```

Name Business Rule: Dataset Version Number

FRIS R4 specifications: This field contains information about the version of the dataset. The values may not be larger than 32.000 characters. Reduced HTML text formatting is allowed, see chapter 5 for details on allowed tags. Even though this is a multilanguage field in CERIF we will only ingest the English version.

4.9.7 Dataset project relation

XML structure:

```
<cerif:cfProj_ResProd>
   <cerif:cfProjId>c0c18498-770e-490a-a03a-432cf775cc59</cerif:cfProjId>
   <cerif:cfClassId>Referenced by</cerif:cfClassId>
   <cerif:cfClassSchemeId>Dataset to Project Role</cerif:cfClassSchemeId>
</cerif:cfProj_ResProd>
```

Name Business Rule: Dataset Project Link

FRIS R4 specifications: The dataset project element expresses project relationships. Start and end date are ignored.

Please refer to “Dataset Project Relation Roles” in the FRIS administration module for the valid classification values.

4.9.8 Dataset view permission

XML structure:

```
<cerif:cfResProd_Class>
   <cerif:cfClassId>confidential</cerif:cfClassId>
   <cerif:cfClassSchemeId>View Permission Type</cerif:cfClassSchemeId>
</cerif:cfResProd_Class>
<cerif:cfResProd_Class>
   <cerif:cfClassId>backend</cerif:cfClassId>
   <cerif:cfClassSchemeId>View Permission Type</cerif:cfClassSchemeId>
</cerif:cfResProd_Class>
```

FRIS R4 specifications: If a particular entity should be considered backend-only or confidential using one of the above XML fragment signals this. If an entity is marked confidential it (or relations to it) will not be publicly accessible and only FRIS administrators or users for the owning data-provider will be able to access it in the FRIS administration module. If an entity is marked backend-only it (or relations to it) will not be publicly accessible and all authenticated users will be able to access it in the FRIS administration module.

If the fragment is omitted the FRIS system defaults to public.

4.9.9 Marking a dataset as external

XML structure:

```
<cerif:cfResProd_Class>
 <cerif:cfClassId>external</cerif:cfClassId>
 <cerif:cfClassSchemeId>Dataprovider Viewpoint
Type</cerif:cfClassSchemeId>
</cerif:cfResProd_Class>
```

FRIS R4 specifications: If a particular dataset is not managed by the data-provider, but is included in the set for completeness sake, this is signalled by marking the entity as external using the above XML snippet.

4.9.10 Dataset language

XML structure:

```
<cerif:cfResProd_Class>
   <cerif:cfClassId>nl</cerif:cfClassId>
   <cerif:cfClassSchemeId>ISO 639-1:2002 Language
Code</cerif:cfClassSchemeId>
</cerif:cfResProd_Class>
```

FRIS R4 specifications: For all datasets the primary language can be described by adding the ISO-639-1 code as a classification.

Please refer to "ISO Language Codes" in the FRIS administration module for the valid classification values.

4.9.11 Dataset discipline codes

XML structure:

```
<cerif:cfResProd_Class>
      <cerif:cfClassId>01010101</cerif:cfClassId>
      <cerif:cfClassSchemeId>Flemish Research
Disciplines</cerif:cfClassSchemeId>
</cerif:cfResProd_Class>
```

FRIS R4 specifications: The FRIS system accepts associated discipline codes.

Please refer to "Flemish Research Disciplines" in the FRIS administration module for the valid classification values.

4.9.12 Dataset licenses

XML structure:

```
<cerif:cfResProd_Class>
      <cerif:cfClassId>CC0</cerif:cfClassId>
      <cerif:cfClassSchemeId>Dataset Licences</cerif:cfClassSchemeId>
</cerif:cfResProd_Class>
```

FRIS R4 specifications: Contains the license information that applies to this dataset. Multiple values are allowed.

Please refer to "Dataset Licences" in the FRIS administration module for the valid classification values.

4.9.13 Dataset access rights

XML structure:

```
<cerif:cfResProd_Class>
      <cerif:cfClassId>open</cerif:cfClassId>
      <cerif:cfClassSchemeId>Dataset Access
Rights</cerif:cfClassSchemeId>

</cerif:cfResProd_Class>
cerif:cfResProd_Class>
      <cerif:cfClassId>embargoed</cerif:cfClassId>
      <cerif:cfClassSchemeId>Dataset Access
Rights</cerif:cfClassSchemeId>
       <cerif:cfEndDate>2021-02-16T00:00:00Z</cerif:cfEndDate>
</cerif:cfResProd_Class>
```

Name Business rule: Dataset Access Rights

FRIS R4 specifications: Describes which open access label applies to the dataset. (eg. Open, closed, under embargo,…) Only one value allowed. Start and enddate are ignored, except when the value is 'embargoed', then the enddate is mandatory and represents the end date of the embargo.

Please refer to "Dataset Access Rights" in the FRIS administration module for the valid classification values.

4.9.14 Dataset opt-out reason

XML structure:

```
<cerif:cfResProd_Class>
      <cerif:cfClassId>privacy</cerif:cfClassId>
      <cerif:cfClassSchemeId>Dataset Opt-out</cerif:cfClassSchemeId>
</cerif:cfResProd_Class>
```

FRIS R4 specifications: Contains the reason for an opt-out. Multiple values are allowed.

Please refer to "Dataset Opt-out Reason" in the FRIS administration module for the valid classification values.

4.9.15 Dataset research output relation

XML structure:

```
<cerif:cfResPubl_ResProd>
 <cerif:cfResPublId>c304d02a-2e9f-48df-b14a-
34210197f972</cerif:cfResPublId>
 <cerif:cfClassId>Referenced by</cerif:cfClassId>
 <cerif:cfClassSchemeId>Dataset to Research Output
Role</cerif:cfClassSchemeId>
</cerif:cfResPubl_ResProd>
```

Name Business Rule: Dataset to Publication Link

FRIS R4 specifications: This relation element expresses any links to a research output. Start and end date are ignored.

Please refer to "Dataset Research Output Relation Roles" in the FRIS administration module for the valid classification values.

4.9.16 Related dataset relation

XML structure:

```
<cerif:cfResProd_ResProd>
 <cerif:cfResProdId2>c304d02a-2e9f-48df-b14a-
34210197f972</cerif:cfResProdId2>
 <cerif:cfClassId>Referenced by</cerif:cfClassId>
 <cerif:cfClassSchemeId>Dataset to Dataset Role</cerif:cfClassSchemeId>
</cerif:cfResProd_ResProd>
```

FRIS R4 specifications: This relation element expresses any interdataset relationships. Start and end date are ignored.

Please refer to "Dataset Relation Roles" in the FRIS administration module for the valid classification values.

4.9.17 Dataset infrastructure relation

XML structure:

```
<cerif:cfResProd_Facil>
 <cerif:cfFacilId>c304d02a-2e9f-48df-b14a-34210197f972</cerif:cfFacilId>
 <cerif:cfClassId>Referenced by</cerif:cfClassId>
 <cerif:cfClassSchemeId>Dataset to Infrastructure
Role</cerif:cfClassSchemeId>
</cerif:cfResProd_Facil>
<cerif:cfResProd_Equip>
 <cerif:cfEquipId>c304d02a-2e9f-48df-b14a-34210197f972</cerif:cfEquipId>
 <cerif:cfClassId>Referenced by</cerif:cfClassId>
 <cerif:cfClassSchemeId>Dataset to Infrastructure
Role</cerif:cfClassSchemeId>
</cerif:cfResProd_Equip>
```

FRIS R4 specifications: This relation element expresses any links between a dataset and infrastructure. The infrastructure can be an equipment or a facility. Start and end date are ignored.

Please refer to "Dataset Infrastructure Relation Roles" in the FRIS administration module for the valid classification values.

4.9.18 Dataset external identifier & alias

XML structure:

```
<cerif:cfFedId>
   <cerif:cfFedIdId>ignored</cerif:cfFedIdId>
   <cerif:cfFedId>https://doi.org/10.3917/ls.165.0051</cerif:cfFedId>
   <cerif:cfClassId>DOI</cerif:cfClassId>
   <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
</cerif:cfFedId>
```

Business rule name: Dataset Federated Identifier

FRIS R4 specifications: Federated ID's are only to be used in their embedded form (see chapter 2.3.1).

Generic entity external identifiers are represented as:

- cfFedId is the actual external identifier
- cfClassId should be an instance of the "Source Authorities" classification scheme
- cfClassSchemeId equals 'Identifier Authority Type'

The FRIS system supports any number of cfFedId relations. Note that the first cfFedId in the list will be stored as the main identifier for future integration to OpenAIRE. The identifier values may not be larger than 255 characters.

Please refer to "Source Authorities" in the FRIS administration module for the valid classification values. (e.g. DOI, Handle, ARK, ...)

Aliases are created by the FRIS system when multiple entities share a federated identifier. Entity aliasing (see chapter 4.2.3) is a special case where an alias is specifically ingested. It is represented as federated identifiers with "FRIS Alias Id" cfClassId and the **FRIS UUID** of the alias as the cfFedId.

XML structure:

```
<cerif:cfFedId>
      <cerif:cfFedIdId>required but ignored</cerif:cfFedIdId>
      <cerif:cfFedId>FRIS UUID</cerif:cfFedId>
      <cerif:cfClassId>FRIS Alias Id</cerif:cfClassId>
      <cerif:cfClassSchemeId>Identifier Authority
Type</cerif:cfClassSchemeId>
 </cerif:cfFedId>
```

4.9.19 Dataset participant

XML structure:

Internal person

```
<fris:frParticipant>
   <fris:frAssignmentId>assignment identifier</fris:frAssignmentId>
   <cerif:cfClassId>Creator</cerif:cfClassId>
   <cerif:cfClassSchemeId>Dataset Person Participant
Role</cerif:cfClassSchemeId>
</fris:frParticipant>
```

External person

```
<fris:frParticipant>
   <fris:cfPersId>8bb4cbbe-4aed-4152-a0da-9c0333b348f1</fris:cfPersId>
   <cerif:cfClassId>Contact Person</cerif:cfClassId>
   <cerif:cfClassSchemeId>Dataset Person Participant
Role</cerif:cfClassSchemeId>
</fris:frParticipant>
```

Organisation

```
<fris:frParticipant>
   <fris:cfOrgUnitId>organisation identifier</fris:cfOrgUnitId>
   <cerif:cfClassId>Hosting Institution</cerif:cfClassId>
   <cerif:cfClassSchemeId>Dataset Organisation Participant
Role</cerif:cfClassSchemeId>
</fris:frParticipant>
```

Name Business Rule: Dataset Creator (Participant)

FRIS R4 specifications:

In FRIS we regard the Dataset Assignment - relationship to be a ternary relationship, see chapter 2.3.3. This means that instead of expressing this relationship as an inherently inaccurate combination of three binary relations (person-organisation, dataset-organisation, dataset-person) we have extended the FRIS person-organisation relation to have an explicit identity (assignment), which in turn is referred directly from the dataset participant element.

The participant concept supports the following variations:

frAssignmentId	A reference to an internally managed person-organisation function
cfPersId	A reference to an (external) person collaborator
cfOrgUnitId	A reference to an (external) organisation collaborator

Note that the participant concept is specific to FRIS and a number of elements are in the FRIS namespace.

Note that for datasets participant start and end dates are ignored.

Dataset participation associations use different role classification schemes depending on whether a person is referred (frAssignmentId/ cfPersId) or an organisation (cfOrgUnitId).

Please refer to “Dataset Person Participant Role” in the FRIS administration module for the valid classification values for person associations.

Please refer to “Dataset Organisation Participant Role” in the FRIS administration module for the valid classification values for organisation associations.

Please note that all person participations have optional cfFirstNames and cfFamilyNames elements for the cases where the actual person name used on the research output differs from what is registered directly on the person. Examples:

Internal person

```
<fris:frParticipant>
   <fris:frAssignmentId>assignment identifier</fris:frAssignmentId>
   <fris:cfFamilyNames>Baldwin</fris:cfFamilyNames>
   <fris:cfFirstNames>Kendra</fris:cfFirstNames>
   <cerif:cfClassId>Data Manager</cerif:cfClassId>
   <cerif:cfClassSchemeId>Dataset Person Participant
Role</cerif:cfClassSchemeId>
</fris:frParticipant>
```

External managed person

```
<fris:frParticipant>
   <fris:cfPersId>8bb4cbbe-4aed-4152-a0da-9c0333b348f1</fris:cfPersId>
   <fris:cfFamilyNames>VanYs</fris:cfFamilyNames>
   <fris:cfFirstNames>Amelie</fris:cfFirstNames>
   <cerif:cfClassId>Producer</cerif:cfClassId>
   <cerif:cfClassSchemeId>Dataset Person Participant
Role</cerif:cfClassSchemeId>
</fris:frParticipant>
```

If an external person is not a managed object but only exists as a participant it is recommended not to ingest this as an external person but simply provide the names in the frParticipant without a reference to cfPersId

Unmanaged external person

```
<fris:frParticipant>
   <fris:cfFamilyNames>Peters</fris:cfFamilyNames>
   <fris:cfFirstNames>An</fris:cfFirstNames>
   <cerif:cfClassId>Distributor</cerif:cfClassId>
   <cerif:cfClassSchemeId>Dataset Person Participant
Role</cerif:cfClassSchemeId>
</fris:frParticipant>
```

4.9.20 Dataset abstract

XML structure:

```
<fris:frAbstr cfTrans="o" cfLangCode="en">abstract</fris:frAbstr>
<fris:frAbstr cfTrans="o" cfLangCode="nl">abstract</fris:frAbstr>
```

Name Business Rule: Dataset Abstract

FRIS R4 specifications: This is a multilingual text field representing the abstract of the dataset. The description values may not be larger than 32.000 characters. Reduced HTML text formatting is allowed, see chapter 5 for details on allowed tags.

4.9.21 Dataset publisher

XML structure:

```
<fris:frPublisher>publisher name</fris:frPublisher>
```

Name Business Rule: Dataset Publisher

FRIS R4 specifications: This is a free text field. The value may not be larger than 255 characters. No HTML text formatting is allowed.

4.9.22 Dataset publication year

XML structure:

```
<fris:frPublYear>2020</fris:frPublYear>
```

Name Business Rule: Dataset Publication Date

FRIS R4 specifications: This corresponds with the year of publication.

4.9.23 Dataset size

XML structure:

```
<fris:frSize>5.34 Gb</fris:frSize>
```

Name Business Rule: Dataset Size

FRIS R4 specifications: This is a free text field that describes the size of the dataset. Max 1 value allowed. The value may not be larger than 255 characters. No HTML text formatting is allowed.

4.9.24 Dataset format

XML structure:

```
<fris:frFormat>xml</fris:frFormat>
```

FRIS R4 specifications: This is a free text field that describes the format of the dataset. Multiple values are allowed. Guideline is to use lowercase without punctuation marks. The value may not be larger than 255 characters. No HTML text formatting is allowed.

4.9.25 Dataset open format

XML structure:

```
<fris:frIsOpenFormat>true</fris:frIsOpenFormat>
```

FRIS R4 specifications: This value describes whether the dataset contains a format that is open. Only the values ‘true’ and ‘false’ are allowed.

4.9.26 Dataset opt-out reason clarification

XML structure:

```
<fris:frOptOutClarification>shared IP with industry
partner</fris:frOptOutClarification>
```

FRIS R4 specifications: This free text field describes the reason behind the opt-out. Max 1 value allowed. The value may not be larger than 32.000 characters. No HTML text formatting is allowed.

4.10 Electronic address

XML structure:

```
<fris:cfEAddr>
    <cerif:cfEAddrId>eaddr-id</cerif:cfEAddrId>
    <cerif:cfURI>arehold@yah00.net</cerif:cfURI>
    <cerif:cfEAddr_Class>
      <cerif:cfClassId>E-mail</cerif:cfClassId>
      <cerif:cfClassSchemeId>Electronic Address
Type</cerif:cfClassSchemeId>
    </cerif:cfEAddr_Class>
```

FRIS R4 specifications:

Please refer to "Electronic Address Types" in the FRIS administration module for the valid classification values.

The electronic address values may not be larger than 255 characters.

4.11 Physical address

XML structure:

```
</fris:cfPAddr>
    <fris:cfPAddr>
    <cerif:cfPAddrId>paddr-id</cerif:cfPAddrId>
    <cerif:cfCountryCode>BE</cerif:cfCountryCode>
    <cerif:cfAddrline2>Apt #100268</cerif:cfAddrline2>
    <cerif:cfAddrline3>nieuwstraat</cerif:cfAddrline3>
    <cerif:cfPostCode>1000</cerif:cfPostCode>
    <cerif:cfCityTown>Brussel</cerif:cfCityTown>
</fris:cfPAddr>
```

FRIS R4 specifications:

Address line 1 must contain campus, address line 2 must contain the building and address line 3 must contain the street and number.

A Physical Address contains address lines with identification of the street, number, community/ city, zip code and country code of this physical address (Address line 1, 2 and 3 are not mandatory; other lines are).

Please refer to "Country Codes" in the FRIS administration module for the valid country codes.

The FRIS ingestion service accepts incremental ingestion requests with cfPAddr elements in case physical addresses are managed as a separate entity in the data-provider systems.

The physical address values may not be larger than 255 characters. No HTML text formatting is allowed.

4.12 Classification scheme

The FRIS services do not support ingestion of CfClassScheme entities from data providers. All definition of concepts and concept schemes are managed centrally and synchronised with the FRIS system through a separate process. This section relates to how concepts are expressed in the FRIS classification scheme service.

```
<cfClassScheme xmlns="urn:xmlns:org:eurocris:cerif-1.5-1">
     <cfClassSchemeId>scheme-id</cfClassSchemeId>
     <cfDescr cfTrans="o" cfLangCode="en">English scheme
description</cfDescr>
```

```
     <cfDescr cfTrans="o" cfLangCode="nl">Dutch scheme
description</cfDescr>
     <cfClass>
          <cfClassId>parent-term</cfClassId>
          <cfDescr cfTrans="o" cfLangCode="en">English classification
description</cfDescr>
          <cfDescr cfTrans="o" cfLangCode="nl">Dutch classification
description</cfDescr>
     </cfClass>
     <cfClass>
          <cfClassId>child-term</cfClassId>
          <cfDescr cfTrans="o" cfLangCode="en">English classification
description</cfDescr>
          <cfDescr cfTrans="o" cfLangCode="nl">Dutch classification
description</cfDescr>
          <cfClass_Class>
               <cfClassId2>parent-term</cfClassId2>
               <cfClassSchemeId2>test-scheme</cfClassSchemeId2>
               <cfClassId1>child-term</cfClassId1>
               <cfClassSchemeId1>test-scheme</cfClassSchemeId1>
               <cfClassId>broader</cfClassId>
               <cfClassSchemeId>iso25964-1</cfClassSchemeId>
          </cfClass_Class>
     </cfClass>
</cfClassScheme>
```

Note that the interpretation of the CfClassScheme properties differs slightly from the official CERIF specification.

The cfClassSchemeId element contains the identifier/label of the concept scheme. This is in contrast to CERIF that suggests a UUID as cfClassSchemeId.

Each cfClass element describes a contained classification (implicit skos:inScheme relation).

The cfClassId element contains the term/label of the concept, which is similar to the SKOS[11] characterisation though FRIS has no altLabel or prefLabel concepts. This is in contrast to CERIF that suggests a UUID as cfClassId.

In practice FRIS only recognises one specific classification relation, namely the iso25964-1:broader relation from a child to a parent classification. This is expressed through the cfClass_Class element with *Id1 being the "from classification", *Id2 the "to classification" and *Id the relation type between these.

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5 Text Format Policies

The FRIS system allows two distinct text format policies; reduced and full format policy. The allowed HTML format tags and attributes are documented below:

5.1 General formatting

For both Reduced and Full format policies the following applies:

- The content must be valid XHTML and comply with W3C standards.
- No attributes are allowed unless they are mentioned specifically for a given tag. This means for example no CSS styling will be possible. Any disallowed attributes will automatically be removed.
- Any disallowed or invalid tags will be removed.

5.2 Reduced format Policy

This policy primarily targets single line fields like title and name. Therefore only a limited set of text formatting HTML tags is allowed.

Italic tag: <i>

This is the simple italic tag and text between will be formatted as *italic text*.

Example of italic:

```
<i>This text is in italic</i>
```

Superscript and subscript tags: <sup> & <sub>

The text between these tags will appear either $^{\text{superscript}}$ or $_{\text{subscript}}$.

Example use of superscript:

```
<sup>This is in superscript</sup>
```

Example use of subscript:

```
<sub>This is in subscript</sub>
```

For all these tags no attributes are allowed. Also notice that single line breaks (br) aren't allowed for this policy and will be removed.

5.3 Full format Policy

The policy is minded towards larger text fields like abstracts and description fields. This opens of up for a broader set of allowed tags. This policy also includes allowed from the Reduced format Policy tags.

Text indenting: <blockquote>

The blockquote tag is used to indent a section of text, for example a quotation.

Example of indented text:

```
<blockquote>This is a quotation from another source</blockquote>
```

**Line break and paragraph:
 & <p>**

The line break tag is used to insert a single line break. Notice the line break tag must be properly closed or it will be removed. Example of properly closed tag:

The paragraph tag is used indicate a paragraph instead for a single line break. The paragraph tag can also be used for text alignment (See next section)

Example of single line break:

```
This is a single line<br />
```

Example use of paragraph:

```
<p>This is a paragraph</p>
```

**Text alignment: <p> & **

Both the paragraph and div tags can be used for text alignment. Text can be aligned either left, right, or center. For both tags the attribute *align* is used to specify the text alignment.

Example of center alignment with the paragraph tag:

```
<p align="center">The text is centered</p>
```

Example of right alignment with the div tag:

```
<div align="right">The text is right aligned</div>
```

Bullet point lists: <ul>, <ol> & :

These tags are used to create bullet (ul) or numbered point (ol) lists. The li tag is used to differentiate the different points.

Bullet point list example:

```
<ul>
<li>First bullet point</li>
<li>Second bullet point</li>
</ul>
```

Numbered list example:

```
<ol>
<li>First bullet point</li>
<li>Second bullet point</li>
</ol>
```

Bold/Strong tags: <b> & :

These are simple bold tags and any text between these tags will appear in **bold text**.

Bold text example:

```
<b>The text is bold</b>
```