May 2nd, 2009

CERIF 2008 – 1.0 XML
Data Exchange Format Specification

Editors:

Brigitte Jörg	DFKI GmbH, Saarbrücken, Germany
Ojars Krast	uniCRIS AG, Zug, Switzerland
Keith Jeffery	Science and Technology Facilities Council, Didcot, UK
Geert van Grootel	Flemish Government, Brussels, Belgium

Abstract:

The CERIF 2008 – 1.0 XML Data Exchange Format Specification is one component of the CERIF 2008 – 1.0 FDM release. It aims to support consistent and quality XML data interchange across systems and applications, based on the CERIF model. With this document we present the CERIF XML specification and recommend the organisation of CERIF XML files according to a conceptual structure. The CERIF XML Data Exchange Format is based on a W3C recommendation.

CERIF (the **C**ommon **E**uropean **R**esearch **I**nformation **F**ormat) is a formal model to support the management of Research Information and to enable interoperation between Research Information Systems. The CERIF model is considered as a standard; recommended by the European Union to its Member States. It has been developed with support by the European Commission in two major phases: 1987-1990 and 1997-1999. In 2002 the European Commission handed over care and custody of CERIF to euroCRIS (http://www.eurocris.org) a not-for-profit organisation dedicated to the promotion of CRISs (**C**urrent **R**esearch **I**nformation **S**ystems).

Status:
This document will be updated alongside major CERIF model updates.

Location:
http://www.eurocris.org/fileadmin/Upload/CERIF/CERIF2008_1.0_XML.pdf

Table of Contents

1. Introduction

The CERIF XML Interchange Format is one of several components of the CERIF 2008 – 1.0 Full Data Model (FDM) release. It is intended to support and enable consistent and quality data interchange across systems and applications. CERIF XML builds on the widely known and popular XML format recommended by the W3C [3].

With the CERIF 2008 – 1.0 Full Data Model Introduction and Specification document, the CERIF model has been conceptually structured into entity types and features [1]. In between the types it distinguishes core, result, link and 2nd level entities, as features it considers multilinguality and semantics. This conceptual structure is also represented by colors in model related documents and screenshots. For more information about CERIF types and features we refer to [1]. For this document, we distinguish CERIF entities and features accordingly:

CERIF Entity Types	CERIF Features
Core Entities [core]	Multiple Language [lang]
Result Entities [result]	Semantics [class]
2nd Level Entities [2nd]	Additional [add]
Link Entities [link]	

This conceptual structure is only a virtual structure and as such not inherent in the physical data model, and therefore also not incorporated with the SQL scripts and the physical representation of CERIF XML. It rather supports the management of CERIF XML files; in particular, their ordering, as recommended during data interchanges. A list of the conceptually structured CERIF entities is attached in the Appendix. Figure 1 shows the core, result and some 2nd level CERIF entities and their relationships from an abstract perspective. For model insights at physical level, including attributes, datatypes and keys, we refer to the screenshots in [1].

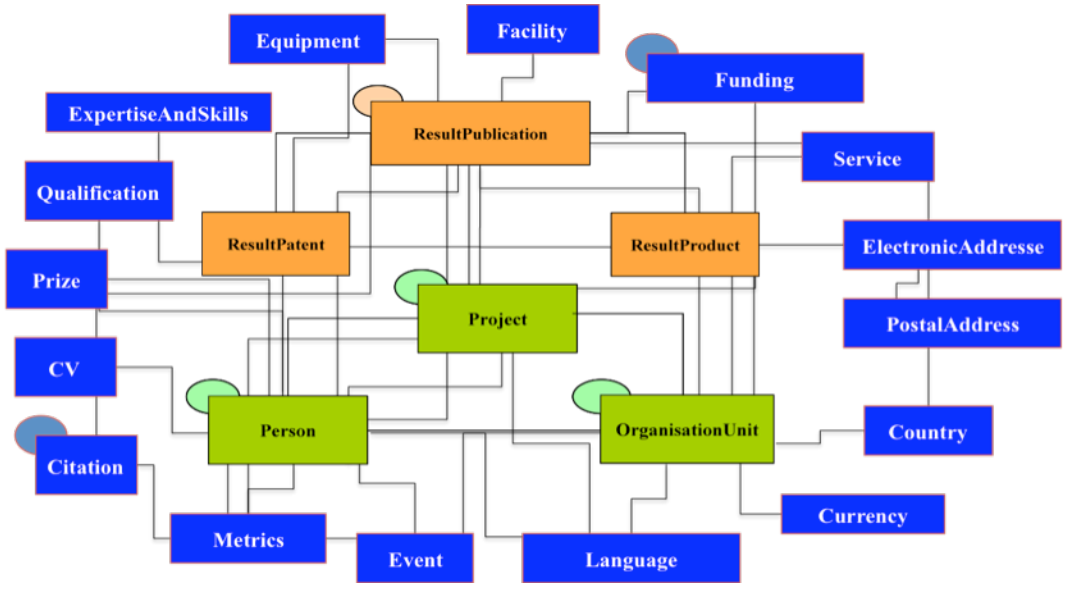


Figure 1: Some CERIF entities and their relationships in abstract view

The CERIF XML interchange happens with operations at physical level and therefore conforms to the naming (short names) at physical level. Because in some databases the length of a table name is restricted to a particular number of characters, we have shortened the table names at physical level to ensure the consistency of SQL scripts by avoiding uncontrolled truncations. The table names are still understandable by human readers. Every table name includes a prefix ‘cf’ for CERIF.

1.1 Purpose of CERIF XML

CERIF XML aims to support and enable consistency and quality data interchanges across applications and between data providers by offering a structured XML format based on the CERIF model.

1.2 Scope of CERIF XML

The CERIF 2008 – 1.0 XML Data Exchange and Format Specification includes CERIF XML examples and the corresponding CERIF XML Schema files for the validation of CERIFXML Exchange files.

1.3 CERIF 2008 – 1.0 Full Data Model Components

The current CERIF 2008 – 1.0 release comprises the following components:

- CERIF 2008 – 1.0 FDM: Model Introduction and Specification
  separate document available from the euroCRIS website [1]
- CERIF 2008 – 1.0 FDM: SQL scripts for most common databases
  available from the euroCRIS website for members only
- CERIF 2008 – 1.0 XML: Data Exchange Format Specification
  this document
- CERIF 2008 – XML Examples
  available from the euroCRIS website for members only
- CERIF 2008 – XML Schema Files
  CERIF XML validation files available from the euroCRIS website
- CERIF 2008 – 1.0 Semantics
  separate document available from the euroCRIS website [2]

CERIF 2008 – 1.0 related files and more documents and background information about CERIF and CRISs can be downloaded from the public euroCRIS website: http://www.eurocris.org/cerif/cerif-releases/cerif-2008/. The physical SQL scripts and XML examples files are available for members only[1*].

[*] The CERIF 2008 – 1.0 release was modeled with Toad Data Modeler[1] by Quest Software[1] which allows to draw ERM diagrams, to generate SQL scripts for most common databases (Oracle, Microsoft, IBM, etc.), to reverse engineer from databases, to create screenshots of the model and model parts, and to model at physical and logical level. The resulting CERIF SQL scripts are generated automatically from the physical level.

2. CERIF XML File Production

The following steps describe in brief a possible process to produce CERIF XML files from CERIF-based databases according to the conceptual structure as introduced in the specification document "CERIF 2008 – 1.0 Full Data Model" [1], and indicated in the introduction of this document. A full list of the CERIF entities, and some CERIF XML examples have been provided with the appendix. The XML examples and SQL scripts can be downloaded from the internal euroCRIS website.

Step 0: Naming of CERIF XML Files

We recommend that the names of CERIF XML files indicate the entity name (at physical level) and the entity type or feature (core, 2nd, link, lang, class, add). To ensure data integrity during the import process, the CERIF XML files should follow this naming convention and we recommend the following order for a file generation:

(1) XML File Names for CERIF Classification Entities
- cfClass-CLASS.xml
- cfClassScheme-CLASS.xml

(2) XML File Names for 2nd Level CERIF Entities
- cfCurrency-2ND.xml
- cfCountry-2ND.xml
- cfLang-2ND.xml
- cfCV-2ND.xml
- cfEvent-2ND.xml
- …

(3) XML File Names for Core CERIF Entities
- cfPers-CORE.xml
- cfProj-CORE.xml
- cfOrgUnit-CORE.xml

(4) XML File Names for CERIF Result Entities
- cfResPubl-RES.xml
- cfResPat-RES.xml
- cfResProd-RES.xml

(5) XML File Names for CERIF Link Entities
- cfPers_OrgUnit-LINK.xml
- cfProj_Pers-LINK.xml
- cfProj_Class-LINK.xml
- cfProj_Equip-LINK.xml
- cfClass_Class-LINK.xml
- cfCV_Class-LINK.xml
- …

(6) XML File Names for Language-dependent CERIF Entities
- cfProjAbstr-LANG.xml
- cfProjKeyw-LANG.xml
- cfProjTitle-LANG.xml
- cfClassDescr-LANG.xml
- cfClassTerm-LANG.xml
- cfClassSchemeDescr-LANG.xml
- …

(7) XML File Names for Additional CERIF Entities
- cfPersName-ADD.xml
- cfDC-ADD.xml
- …

Step 1: XML Header

For all CERIF XML files the default XML version and a UTF-8 encoding has to be defined to support Unicode and thus allow for character sets in multiple languages.

```
<?xml version="1.0" encoding="UTF-8"?>
```

Step 2: XML Root Element CERIF

Additional to the XML header, each CERIF XML file contains a CERIF root element. The CERIF root element nests all entity-related data belonging to individual source databases. For a validation of nested data the schema reference ***xsi:schemaLocation*** has to be added according to W3C standards. Moreover, according to W3C convention, namespace references ***xmlns; xmlns:xsi*** have to be added at the same level within the CERIF root element. To identify the CERIF release to which the data belong to, the date at which the data were produced, and the source database of the data, ***release***, ***date*** and ***sourceDatabase*** attributes are mandatory.

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEntityName-EntityType
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEntityName-EntityType.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEntityName-EntityType"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0"  date="2009-05-02" sourceDatabase="name of source db">

   < CERIF XML Data
     - per entity and
     - per source database
     - recommended! >

</CERIF>
```

Step 3: CERIF XML Structure

We strongly recommend to create the CERIF XML files as many XML files containing **only per entity** (cfPerson, cfOrgUnit, cfProject, …) **data** and per source database data. A single CERIF XML file mixing data for all CERIF entities cannot be validated with the provided CERIF XML Schema files. In particular, the complexity of the structure, but also the size of the file may become a serious problem when containing all data within one large XML file. Therefore, for reasons of simplicity and for ease of validation, error detection and data integrity we strongly recommend to create per entity structured XML files corresponding to single CERIF entities. The presented examples in this document show such per entity structured XML records.

Each CERIF XML file contains the CERIF root element nesting the entity elements (cfPers, cfOrgUnit, cfFacil, etc). Each entity element is prefixed with cf, corresponding to the physical names of the CERIF tables.

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF …>
  <cfPers>
    …
  </cfPers>
  <cfPers>
    …
  </cfPers>
</CERIF>
```

CERIF XML example structure for person records in the file cfPers-CORE.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF …>
  <cfOrgUnit>
    …
  </cfOrgUnit>
  <cfOrgUnit>
    …
  </cfOrgUnit>
</CERIF>
```

CERIF XML example file for organization records in the file cfOrgUnit-CORE.xml

At the next level, each XML entity element nests the table attributes (cfId, cfURI, …) as XML elements.

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF …>
  <cfPers>
    <cfPersId>ID</cfPersId>
    <cfURI>String</cfURI>
    <cfSex>Selection</cfSex>
  </cfPers>
  <cfPers>
    <cfPersId>ID</cfPersId>
    <cfURI>String</cfURI>
    <cfSex>Selection</cfSex>
  </cfPers>
</CERIF>
```

CERIF XML example file for person records in the file cfPers-CORE.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF …>
   <cfPersResInt>
      <cfPersId>ID</cfPersId>
      <cfResInt cfLangCode="DE" cfTrans="o">String</cfResInt>
   </cfPersResInt>
   <cfPersResInt>
      <cfPersId>ID</cfPersId>
      <cfResInt cfLangCode="EN" cfTrans="o">String</cfResInt>
   </cfPersResInt>
</CERIF>
```

CERIF XML example file for person research interest records in the file cfPersResInt-LANG.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF …>
   <cfPersKeyw>
      <cfPersId>ID</cfPersId>
      <cfKeyw cfLangCode="DE" cfTrans="o">String</cfKeyw>
   <cfPersKeyw>
   <cfPersKeyw>
      <cfPersId>ID</cfPersId>
      <cfKeyw cfLangCode="EN" cfTrans="o">String</cfKeyw>
   <cfPersKeyw>
</CERIF>
```

CERIF XML example file for person keyword records in the file cfPersResKeyw-LANG.xml

Step 4: CERIF Tables –> CERIF XML Entities

(1) Core Tables become Core XML Entities

The transformation of a core table into a core XML entity is demonstrated with the core table **person (cfPers)** that becomes a core XML entity **<cfPers>** nesting person related elements. The core table attributes become XML elements nested within XML entity elements. The field values become XML element values; empty fields are omitted.

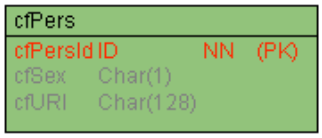


Figure 2: CERIF Person table

```
<cfPers>
    <cfPersId>ID</cfPersId>
    <cfURI>String</cfURI>
    <cfSex>Selection</cfSex>
</cfPers>
```

cfPers-CORE.xml record structure

(2) Result Tables become Result XML Entities

The transformation of a result table into a result XML entity is demonstrated with the core table **publication (cfResPubl)** that becomes a core XML entity **<cfResPubl>** nesting related elements. The result table attributes become XML elements nested within XML entity elements. The field values become XML element values; empty fields are omitted.

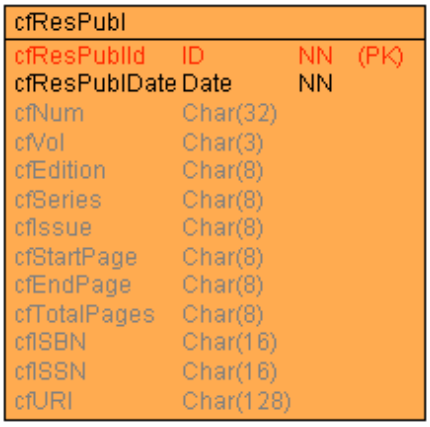


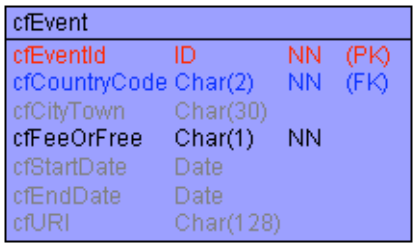
Figure 3: CERIF ResultPublication table

```
<cfResPubl>
    <cfResPublId>ID</cfResPublId>
    <cfURI>String</cfURI>
    <cfResPublDate>Date</cfResPublDate>
    <cfNum>String</cfNum>
    <cfVol>String</cfVol>
    <cfEdition>String</cfEdition>
    <cfSeries>String</cfSeries>
    <cfIssue>String</cfIssue>
    <cfStartPage>String</cfStartPage>
    <cfEndPage>String</cfEndPage>
    <cfTotalPages>String</cfTotalPages>
    <cfISBN>String</cfISBN>
    <cfISSN>String</cfISSN>
</cfResPubl>
```

cfResPubl-RES.xml record structure

(3) 2nd Level Tables become 2nd Level XML Entites

The transformation of 2nd level tables into 2nd level XML entities is equal to the transformation of the core and result tables and is demonstrated with the 2nd level table **event (cfEvent)** that becomes a 2nd level XML entity **<cfEvent>** nesting related elements. The 2nd Level table fields become XML elements nested within XML entity elements. The field values become XML element values; empty fields are omitted.



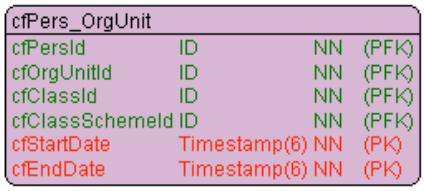
cfEvent			
cfEventId	ID	NN	(PK)
cfCountryCode	Char(2)	NN	(FK)
cfCityTown	Char(30)		
cfFeeOrFree	Char(1)	NN	
cfStartDate	Date		
cfEndDate	Date		
cfURI	Char(128)		

```
<cfEvent>
   <cfEventId>ID</cfEventId>
   <cfURI>String</cfURI>
   <cfLocation>String</cfLocation>
   <cfFeeOrFree>String</cfFeeOrFree>
   <cfStartDate>Date</cfStartDate>
   <cfEndDate>Date</cfEndDate>
   </cfEvent>
<cfEvent>
```

Figure 4: CERIF Event table *cfEvent-2ND.xml record structure*

(4) Link Tables become XML Link Entites

The transformation of CERIF link tables into CERIF XML link entities is demonstrated with the link table **Person_Organisation (cfPers_OrgUnit)** that becomes an XML link entity **<cfPers_OrgUnit>** nesting related elements. The Link Table attributes become XML elements nested within XML entity elements.

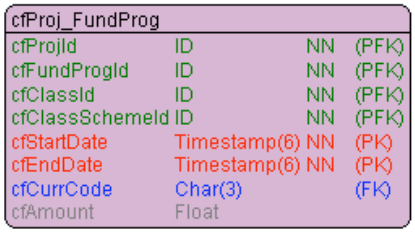


cfPers_OrgUnit			
cfPersId	ID	NN	(PFK)
cfOrgUnitId	ID	NN	(PFK)
cfClassId	ID	NN	(PFK)
cfClassSchemeId	ID	NN	(PFK)
cfStartDate	Timestamp(6)	NN	(PK)
cfEndDate	Timestamp(6)	NN	(PK)

```
<cfPers_OrgUnit>
   <cfPersId>ID</cfPersId>
   <cfOrgUnitId>ID</cfOrgUnitId>
   <cfClassId>ID</cfClassId>
   <cfClassSchemeId>ID</cfClassSchemeId>
   <cfStartDate>Timestamp</cfStartDate>
   <cfEndDate>Timestamp</cfEndDate>
</cfPers_OrgUnit>
```

Figure 5: CERIF Person_OrgUnit table *cfPers_OrgUnit-LINK.xml record structure*

Field values become XML element values, except from cfCurrencyCode fields, which are transformed into attributes within currency-dependent elements, in order to be associated correctly with their intension. Field values become XML element values; empty fields are omitted.



cfProj_FundProg			
cfProjId	ID	NN	(PFK)
cfFundProgId	ID	NN	(PFK)
cfClassId	ID	NN	(PFK)
cfClassSchemeId	ID	NN	(PFK)
cfStartDate	Timestamp(6)	NN	(PK)
cfEndDate	Timestamp(6)	NN	(PK)
cfCurrCode	Char(3)		(FK)
cfAmount	Float		

```
<cfProj_FundProg>
   <cfProjId>ID</cfProjId>
   <cfFundProgId>ID</cfFundProgId>
   <cfClassId>ID</cfClassId>
   <cfClassSchemeId>ID</cfClassSchemeId>
   <cfAmount cfCurrencyCode="EUR">Float</cfAmount>
   <cfStartDate>Timestamp</cfStartDate>
   <cfEndDate>Timestamp</cfEndDate>
</cfProj_FundProg>
```

Figure 6: CERIF Project_FundingProgramme table *cfProj_FundProg-LINK.xml record structure*

Each link table contains references to the classification table (semantic layer) [1, 2], and thus, with all CERIF link entities, a classification id (cfClassId) and the classification scheme id (cfClassSchemeId) as well as a timestamped startDate and endDate are mandatory.

(5) Language-dependent Tables become Language-dependent XML Entities

The transformation of language-dependent tables into language-dependent XML link entities is demonstrated with the language-dependent table **OrgUnitResearchActivity (cfOrgUnitResAct)** that becomes a language-dependent XML entity **<cfOrgUnitResAct>** nesting related elements. Language table attributes become XML elements nested within XML entity elements except from cfLangCode and cfTrans, which are transformed into attributes within XML elements in order to be associated correctly. Field values become XML element values except from cfLangCode and cfTrans field values, which become values of attributes inside their corresponding elements; empty fields are omitted.

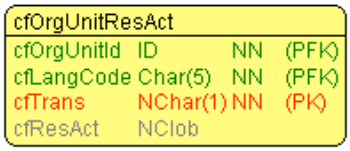


Figure 7: CERIF Organisation Unit Research Activity table

```
<cfOrgUnitResAct>
    <cfOrgUnitId>ID</cfOrgUnitId>
    <cfResAct cfLangCode="DE" cfTrans="o">String</cfResAct>
</cfOrgUnitResAct>
```

cfOrgUnitResAct-LANG.xml record structure

(6) Classification Tables become XML Classification Entities

The transformation of classification tables into XML classification entities is demomstrated with the table **Classification (cfClass)** that becomes a XML class entity **<cfClass>** nesting related elements. Class table attributes become XML elements nested within XML entity elements. The field values become XML element values; empty fields are omitted.

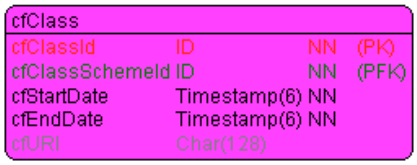


Figure 8: CERIF Classification table

```
<cfClass>
        <cfClassId>ID</cfClassId>
        <cfClassSchemeId>ID</cfClassSchemeId>
        <cfStartDate>Timestamp</cfStartDate>
        <cfEndDate>Timestamp</cfEndDate>
        <cfURI>String</cfURI>
</cfClass>
```

cfClass-CLASS.xml record structure

CERIF XML operates at a purely technical operation and representation level. More detailed information about the entire CERIF data model can be found in the CERIF 2008 – 1.0 Full Data Model introduction and specification document [1]. For the CERIF Semantics we refer to the CERIF 2008 – 1.0 Semantics document [2]. XML examples are provided in the appendix and example xml files are available at the euroCRIS website for members.

3. CERIF XML Validation

For validating the CERIF 2008 XML files, XML Schema files are provided. XML Schema is a format supported by W3C [3]. The validation of XML files with XML Schema ensures data quality and consistency across datasets and allows for error detection. Any import of CERIF XML data should be avoided if no validation of the XML files has been undertaken to prevent from erroneous data in the repository.

To validate the CERIF XML files, XML Schema references have to be added to the CERIF root element, as explained in the previous section.

```
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEntityName-EntityType
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEntityName-EntityType.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEntityName-EntityType"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
>
```

We strongly recommend the creation of single entity and source database centered XML files also for reasons of validation.

With the CERIF XML Schemas, the CERIF XML-based data will be validated against data type, structure and mandatory elements. The semantics of data values will not be validated and is considered to be in the responsibility of data suppliers.

The XML Schema files for validation are available from the euroCRIS website for download and for reference.

4. XML Import Process

In order to achieve quality and consistency with data, the following steps are recommended for importing CERIF XML data.

(1) Data Validation: Only validated CERIF XML files should be imported.

(2) Data Separation: XML files should be separated by source database **and** by entity type as recommended in chapter 2 - XML File Production.

(3) Assigning Source Database: If XML data from multiple data sources will be imported into one physical database, then, the originating source database has to be identified. A collection of multiple source databases and their identifiers can be managed from the Semantic Layer [1].

For data import from heterogeneous sources the following is recommended:

-> Definition of a source databases in the cfClassification table (cfClassId)
-> Connection of this source databases with a Classification Scheme (cfClassSchemeId)
-> With source database definition at the Semantic Layer the import process can start.
-> During the import process all Core, Result, 2nd Level database entries should get a reference entry to the source database within their related Class-link tables (cfPers_Class, cfProj_Class, cfOrgUnit_Class, cfEvent_Class…)

The collection of source databases, their description and extension is maintained and pre-defined within the Semantic Layer with Classification Entities [1]. For the data import we recommend a particular import order (see 4), which requires Classification data to be imported (or defined) first, as during imports, the references to the link tables (cfClassId, cfClassSchemeId) have to be set.

An identifier (URI) for the source database definition within the Semantic Layer can be extracted from the *sourceDatabase* attribute within the CERIF XML root elements.

(4) Referential Integrity: To maintain referential integrity during the import process, the sequence of entities should be determined:

(1) Import of Classification Entities
(2) Import of 2nd Level Entities
(3) Import of Core Entities
(4) Import of Result Entities
(5) Import of Link Entities
(6) Import of Language-dependent Entities
(7) Import of Additional Entities

If only a single XML file with no separation of entity types is provided. The order of the XML entities inside the XML file should correspond to the above order, to guarantee referential integrity within the single XML file and later the importing respository. A validation of one single XML file however is not supported with the current CERIF XML Schema files and due to size and complexity may become a serious problem. Therefore, we strongly recommend for a separation of data according to the presented entity types.

(5) Error Handling: No partial import should be allowed to ensure integrity of data.

Each of the steps is dependent on the previous one. If any step could not be successfully completed, then the next step should not be started. A particular import order within XML files themselves is not foreseen.

Requirements and System Constraints:

- Availability of a universal data import format at the repository, capable to accommodate different subsets of a data model from different data suppliers.
- Availability of an export format from the running systems of data suppliers.
- Mapping definition of system entities to CERIF entities.
- Unicode support in systems of data suppliers.

5. Non-CERIF Extensions

Data providers may also add non-CERIF fields and entities to XML files. Such additions:

(1) could be mapped to CERIF entities if there is substantial overlap
(2) could be ignored by the import process if there is only little overlap

An example for attribute extension at the link table Project_FundingProgramme (cfProj_FundProg) and its corresponding XML link entity <cfProj_FundProg> representation is given below:

Example Attributes for Extension at Link Table Project_FundingProgramme (cfPROJ_FUNDProg)

RC = RunningCosts (default=0, contractdata) in euro
PC = PersonelCosts (default=0, contractdata) in euro
OH = Overhead (default=0, contractdata) in euro
EC = EquimentCost (default=0, contractdata) in euro
RCS = RunningCosts spent (default=0, spending) in euro
PCS = PersonelCosts spent (default=0, spending) in euro
OHS = Overhead spent(default=0, spending) in euro
ECS = EquipmentCosts spent (default=0, spending) in euro

```
<!-- XML Link Entity Project_FundingProgramme containing extenstions -->

<cfProj_FundProg>
   <cfProjId>ID</cfProjId>
   <cfFundProgId>ID</cfFundProgId>
   <cfClassSchemeId>CLASSIFICATIONSCHEMEID</cfClassSchemeId>
   <cfCLASSId>CLASSIFICATIONID</cfCLASSId>
   <cfAmount cfCurrencyCode="EUR">Float</cfAmount>
<!-- CERIF Extension -->
   <cfRC cfCurrencyCode="EUR">Float</cfRC>
   <cfPC cfCurrencyCode="EUR">Float</cfPC>
   <cfOH cfCurrencyCode="EUR">Float</cfOH>
   <cfEC cfCurrencyCode="EUR">Float</cfEC>
   <cfRCS cfCurrencyCode="EUR">Float</cfRCS>
   <cfPCS cfCurrencyCode="EUR">Float</cfPCS>
   <cfOHS cfCurrencyCode="EUR">Float</cfOHS>
   <cfECS cfCurrencyCode="EUR">Float</cfECS>
<!-- End of CERIF Extension -->
   <cfStartDate>Timestamp</cfStartDate>
   <cfEndDate>Timestamp</cfEndDate>
</cfProj_FundProg>
```

The extension of CERIF with introduced attributes (see above) allows for a yearly budgetting and for the calculation of spendings per project.

Data providers should contact the CERIF taskgroup and the Best Practice taskgroup for needed extensions. Proposals can be submitted to the CERIF taskgroup, where the suggestions will then be discussed within task groups and a decision towards extension will be taken and the CERIF model accordingly adapted.

6. Future Work

More work on namespaces is being considered for future CERIF XML specifications.

7. Appendix

7.1 CERIF XML Examples

7.1.1 CERIF CORE XML Entities (XML Examples)

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfPers-CORE
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfPers-CORE.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfPers-CORE"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfPers>
          <cfPersId>person-keith-jeffery</cfPersId>
          <cfSex>m</cfSex>
        </cfPers>
        <cfPers>
          <cfPersId>person-anne-asserson</cfPersId>
          <cfSex>f</cfSex>
        </cfPers>
        <cfPers>
          <cfPersId>person-brigitte-joerg</cfPersId>
          <cfURI>http://www.dfki.de/~brigitte/</cfURI>
          <cfSex>f</cfSex>
        </cfPers>
        <cfPers>
          <cfPersId>person-geert-van-grootel</cfPersId>
          <cfSex>m</cfSex>
        </cfPers>
          ...
</CERIF>

<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfProj-CORE
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfProj-CORE.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfProj-CORE"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfProj>
          <cfProjId>project-ist-world</cfProjId>
          <cfURI>http://www.ist-world.org/</cfURI>
          <cfAcronym>IST World</cfAcronym>
          <cfStartDate>2005-04-01</cfStartDate>
          <cfEndDate>2007-09-30</cfEndDate>
        </cfProj>
        <cfProj>
          <cfProjId>project-lt-world</cfProjId>
          <cfURI>http://www.lt-world.org/</cfURI>
          <cfAcronym>LT World</cfAcronym>
          <cfStartDate>2001-04-01</cfStartDate>
          <cfEndDate>2006-12-31</cfEndDate>
        </cfProj>
        <cfProj>
          ...
</CERIF>

<?xml version="1.0" encoding="UTF-8"?>
```

```
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfOrgUnit-CORE
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfOrgUnit-CORE.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfOrgUnit-CORE"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfOrgUnit>
              <cfOrgUnitId>orgunit-dfki</cfOrgUnitId>
              <cfURI>http://www.dfki.de/</cfURI>
              <cfAcronym>DFKI</cfAcronym>
        </cfOrgUnit>
        <cfOrgUnit>
              <cfOrgUnitId>orgunit-lt-lab</cfOrgUnitId>
              <cfURI>http://www.dfki.de/lt/</cfURI>
              <cfAcronym>LT Lab</cfAcronym>
              <cfHeadCount>50</cfHeadCount>
        </cfOrgUnit>
              ...
</CERIF>
```

7.1.2 CERIF Result XML Entities (XML Examples)

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfResPubl-RES
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfResPubl-RES.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfResPubl-RES"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfResPubl>
              <cfResPublId>publication-joerg-et-al</cfResPublId>
              <cfURI>http://www.eurocris.org/fileadmin/Upload/Events/
                    Conferences/CRIS2008/Papers/cris2008_Joerg.pdf </cfURI>
              <cfResPublDate>2008</cfResPublDate>
              <cfStartPage>107</cfStartPage>
              <cfEndPage>123</cfEndPage>
              <cfISBN>978-961-6133-38-8</cfISBN>
        </cfResPubl>
        <cfResPubl>
              <cfResPublId>publication-veda-c-storey</cfResPublId>
              <cfURI>http://www.springerlink.com/content/j23263j02m850617/</cfURI>
              <cfResPublDate>1993</cfResPublDate>
              <cfNum>4</cfNum>
              <cfVol>2</cfVol>
              <cfStartPage>455</cfStartPage>
              <cfEndPage>488</cfEndPage>
              <cfISSN>1066-8888</cfISSN>
        </cfResPubl>
          ...
</CERIF>
```

7.1.3 CERIF 2nd Level XML Entities (XML Examples)

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEAddr-2ND
```

```
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEAddr-2ND.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEAddr-2ND"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfEAddr>
          <cfEAddrId>eaddress-skype.joerg</cfEAddrId>
          <cfPAddrId>paddress-bj</cfPAddrId>
          <cfURI>brigitte.joerg</cfURI>
        </cfEAddr>
        <cfEAddr>
          <cfEAddrId>eaddress-email-joerg</cfEAddrId>
          <cfPAddrId>paddress-bj</cfPAddrId>
          <cfURI>brigitte.joerg@dfki.de</cfURI>
        </cfEAddr>
</CERIF>

<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfPAddr-2ND
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfPAddr-2ND.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfPAddr-2ND"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfPAddr>
          <cfPAddrId>paddress-dfki</cfPAddrId>
          <cfAddrline1>Stuhlsatzenhausweg 3</cfPAddrline1>
          <cfAddrline2>Postfach</cfAddrline2>
          <cfCityTown>Saarbrücken</cfCityTown>
          <cfPostCode>66123</cfPostCode>
          <cfCountryCode>DE</cfCountryCode>
        </cfPAddr>
          ...
</CERIF>

<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEquip-2ND
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEquip-2ND.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEquip-2ND"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfEquip>
          <cfEquipId>equip-smart</cfEquipId>
          <cfOEMId>013212300</cfOEMId>
          <cfEquipOwnId>0142123</cfEquipOwnId>
        </cfEquip>
        <cfEquip>
          <cfEquipId>equip-sony-smart</cfEquipId>
          <cfOEMId>013212301</cfOEMId>
          <cfEquipOwnId>0142123</cfEquipOwnId>
        </cfEquip>
          ...
</CERIF>

<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEvent-2ND
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEvent-2ND.xsd"
```

```
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEvent-2ND"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfEvent>
            <cfEventId>event-cris06</cfEventId>
            <cfLocation>Bergen</cfLocation>
            <cfFeeOrFree>Fee</cfFeeOrFree>
            <cfStartDate>2006-05-11</cfStartDate>
            <cfEndDate>2006-05-13</cfEndDate>
            <cfURI>http://www.eurocris.org/CRIS2006/</cfURI>
        </cfEvent>
        <cfEVENT>
            <cfEventId>event-cris08</cfEventId>
            <cfLocation>Maribor</cfLocation>
            <cfFeeOrFree>Fee</cfFeeOrFree>
            <cfStartDate>2008-05-11</cfStartDate>
            <cfEndDate>2008-05-13</cfEndDate>
            <cfURI>http://www.eurocris.org/CRIS2008/</cfURI>
        </cfEvent>
</CERIF>
```

7.1.4 CERIF Multiple Language Entities (XML Examples)

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClassDescr-LANG
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClassDescr-LANG.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClassDescr-LANG"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfClassDescr>
            <cfClassId>class-manager</cfClassId>
            <cfClassSchemeId>class-scheme-org-structure</cfClassSchemeId>
            <cfDescr cfLangCode="EN" cfTrans="o">A manager is a person that …</cfDescr>
        </cfClassDescr>
        <cfClassDescr>
            <cfClassId>class-manager</cfClassId>
            <cfClassSchemeId>class-scheme-org-structure</cfClassSchemeId>
            <cfDescr cfLangCode="DE" cfTrans="h">Ein Manager ist eine Person, die …</cfDescr>
        </cfClassDescr>
        <cfClassDescr>
            <cfClassId>class-ceo</cfClassId>
            <cfClassSchemeId>class-scheme-org-structure</cfClassSchemeId>
            <cfDescr cfLangCode="EN" cfTrans="o">A CEO is a person that …</cfDescr>
        </cfClassDescr>
        <cfClassDescr>
            <cfClassId>class-ceo</cfClassId>
            <cfClassSchemeId>class-scheme-org-structure</cfClassSchemeId>
            <cfDescr cfLangCode="DE" cfTrans="h">Ein CEO ist eine Person, die …</cfDescr>
        </cfClassDescr>
          …
</CERIF>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClassSchemeDescr-LANG
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClassSchemeDescr-LANG.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClassSchemeDescr-LANG"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfClassSchemeDescr>
          <cfClassSchemeId>class-scheme-org-structure</cfClassSchemeId>
          <cfDescr cfLangCode="DE" cfTrans="o">Das Schema "Organisations-Struktur"  ermöglicht die
                    Strukturierung von Aufgaben- und Stellen …</cfDescr>
        </cfClassSchemeDescr>
        <cfClassSchemeDescr>
          <cfClassSchemeId>class-scheme-org-structure</cfClassSchemeId>
          <cfDescr cfLangCode="EN" cfTrans="h">The scheme "Organisations-Struktur" allows for the
                    structuring of tasks and entities …</cfDescr>
        </cfClassSchemeDescr>
          …
</CERIF>

<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClassTerm-LANG
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClassTerm-LANG.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClassTerm-LANG"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfClassTerm>
          <cfClassId>class-manager</cfClassId>
          <cfClassSchemeId>class-scheme-org-structure</cfClassSchemeId>
          <cfTerm cfLangCode="EN" cfTrans="o">Manager</cfTerm>
        </cfClassTerm>
        <cfClassTerm>
          <cfClassId>class-ceo</cfClassId>
          <cfClassSchemeId>class-scheme-org-structure</cfClassSchemeId>
          <cfTerm cfLangCode="EN" cfTrans="o">Chief Executive Officer</cfTerm>
        </cfClassTerm>
          …
</CERIF>

<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEventName-LANG
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEventName-LANG.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfEventName-LANG"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfEventName>
          <cfEventId>event-cris06</cfEventId>
          <cfName cfLangCode="EN" cfTrans="o">8th international Conference on Current Research Information
        Systems</cfName>
        </cfEventName>
        <cfEventName>
          <cfEventId>event-cris08</cfEventId>
          <cfName cfLangCode="EN" cfTrans="o">9th international Conference on Current Research Information
        Systems</cfName>
        </cfEventName>
</CERIF>
```

7.1.5 CERIF Link Entities (XML Examples)

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfResPubl_Class-LINK
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfResPubl_Class-LINK.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfResPubl_Class-LINK"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfResPubl_Class>
            <cfResPublId>publication-joerg-et-al</cfResPublId>
            <cfClassId>class-conf-proceedings-article</cfClassId>
            <cfClassSchemeId>class-scheme-cerif-publication-types</cfClassSchemeId>
            <cfStartDate>2008-10-01T00:00:00-00:00</cfStartDate>
            <cfEndDate>2099-12-31T00:00:00-00:00</cfEndDate>
        </cfResPubl_Class>
        <cfResPubl_Class>
            <cfResPublId>publication-storey-c-veda</cfResPublId>
            <cfClassId>class-journal-article</cfClassId>
            <cfClassSchemeId>class-scheme-cerif-publication-types</cfClassSchemeId>
            <cfStartDate>2008-10-01T00:00:00-00:00</cfStartDate>
            <cfEndDate>2099-12-31T00:00:00-00:00</cfEndDate>
        </cfResPubl_Class>
            ...
</CERIF>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfPers_OrgUnit-LINK
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfPers_OrgUnit-LINK.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfPers_OrgUnit-LINK"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfPers_OrgUnit>
            <cfPersId>person-brigitte-joerg</cfPersId>
            <cfOrgUnitId>orgunit-dfki</cfOrgUnitId>
            <cfClassId>class-is-affiliated-with</cfClassId>
            <cfClassSchemeId>class-scheme-pers-orgunit-roles</cfClassSchemeId>
            <cfStartDate>2004-04-01T00:00:00-00:00</cfStartDate>
            <cfEndDate>2099-12-31T00:00:00-00:00</cfEndDate>
        </cfPers_OrgUnit>
        <cfPers_OrgUnit>
            <cfPersId>person-brigitte-joerg</cfPersId>
            <cfOrgUnitId>orgunit-lt-lab</cfOrgUnitId>
            <cfClassId>class-is-subaffiliated-with</cfClassId>
            <cfClassSchemeId>class-scheme-pers-orgunit-roles</cfClassSchemeId>
            <cfStartDate>2004-04-01T00:00:00-00:00</cfStartDate>
            <cfEndDate>2099-12-31T00:00:00-00:00</cfEndDate>
        </cfPers_OrgUnit>

            ...
</CERIF>
```

7.1.6 CERIF Classification Entities (XML Examples)

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClass-CLASS
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClass-CLASS.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClass-CLASS"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfClass>
          <cfClassId>class-manager</cfClassId>
          <cfClassSchemeId>class-scheme-org-structure</cfClassSchemeId>
          <cfStartDate>1990-01-01T00:00:00-00:00</cfStartDate>
          <cfEndDate>2099-12-31T00:00:00-00:00</cfEndDate>
        </cfClass>
        <cfClass>
          <cfClassId>class-conf-proceedings-article</cfClassId>
          <cfClassSchemeId>class-scheme-cerif-publication-types</cfClassSchemeId>
          <cfStartDate>2009-01-19T00:00:00-00:00</cfStartDate>
          <cfEndDate>2099-12-31T00:00:00-00:00</cfEndDate>
        </cfClass>
        <cfClass>
          <cfClassId>class-journal-article</cfClassId>
          <cfClassSchemeId>class-scheme-cerif-publication-types</cfClassSchemeId>
          <cfStartDate>2009-01-19T00:00:00-00:00</cfStartDate>
          <cfEndDate>2099-12-31T00:00:00-00:00</cfEndDate>
        </cfClass>
          ...
</CERIF>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<CERIF
  xsi:schemaLocation="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClassScheme-CLASS
  http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClassScheme-CLASS.xsd"
  xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClassScheme-CLASS"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  release="2008-1.0" date="2009-04-20" sourceDatabase="euroCRIS">
        <cfClassScheme>
          <cfClassSchemeId>class-scheme-cerif-publication-types</cfClassSchemeId>
          <cfURI>http://www.eurocris.org/fileadmin/cerif-2008/CERIF2008_1.0_Semantics.pdf</cfURI>
        </cfClassScheme>
        <cfClassScheme>
          <cfClassSchemeId>class-scheme-org-structure</cfClassSchemeId>
        </cfClassScheme>
          ...
</CERIF>
```

7.2 CERIF XML Schema Examples

CERIF XML Schemas are provided for validation of XML files. They are available for download from the euroCRIS website. A validation of CERIF XML files is realised by referring to validating CERIF XML Schema files from within CERIF XML files, as explained within the section 3. CERIF XML Schema builds on the XML Schema specification as recommended by the W3C [4]. The targetNamespace attribute in the following XML Schema example indicates to which CERIF XML entity (cfClass_Class-LINK) the schema belongs. The following schema belongs to the CERIF Link Entity cfClass_Class.

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="http://www.eurocris.org/fileadmin/cerif-2008/XML-SCHEMAS/cfClass_Class-LINK"
           xmlns:xs="http://www.w3.org/2001/XMLSchema"
           xmlns="http://www.eurocris.org/fileadmin/cerif-2008/XML_SCHEMAS/cfClass_Class-LINK">
    <xs:element name="CERIF">
        <xs:complexType>
            <xs:sequence>
                <xs:element ref="cfClass_Class"/>
            </xs:sequence>
            <xs:attribute name="release" type="xs:string" use="required"/>
            <xs:attribute name="date" type="xs:date" use="required"/>
            <xs:attribute name="sourceDatabase" type="xs:string" use="required"/>
        </xs:complexType>
    </xs:element>
    <xs:element name="cfClass_Class">
        <xs:complexType>
            <xs:sequence>
                <xs:element ref="cfClassId1"/>
                <xs:element ref="cfClassId2"/>
                <xs:element ref="cfClassSchemeId1"/>
                <xs:element ref="cfClassSchemeId2"/>
                <xs:element ref="cfClassId"/>
                <xs:element ref="cfClassSchemeId"/>
                <xs:element ref="cfStartDate"/>
                <xs:element ref="cfEndDate"/>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="cfClassId1" type="cfClassId1Type"/>
    <xs:element name="cfClassId2" type="cfClassId2Type"/>
    <xs:element name="cfClassSchemeId1" type="cfClassSchemeId1Type"/>
    <xs:element name="cfClassSchemeId2" type="cfClassSchemeId2Type"/>
    <xs:element name="cfClassId" type="cfClassIdType"/>
    <xs:element name="cfClassSchemeId" type="cfClassSchemeIdType"/>
    <xs:element name="cfStartDate" type="xs:dateTime"/>
    <xs:element name="cfEndDate" type="xs:dateTime"/>
    <xs:simpleType name="cfClassId1Type">
        <xs:restriction base="xs:string">
            <xs:maxLength value="32"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="cfClassId2Type">
        <xs:restriction base="xs:string">
            <xs:maxLength value="32"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="cfClassSchemeId1Type">
        <xs:restriction base="xs:string">
            <xs:maxLength value="32"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="cfClassSchemeId2Type">
        <xs:restriction base="xs:string">
            <xs:maxLength value="32"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="cfClassIdType">
        <xs:restriction base="xs:string">
            <xs:maxLength value="32"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="cfClassSchemeIdType">
        <xs:restriction base="xs:string">
            <xs:maxLength value="32"/>
        </xs:restriction>
    </xs:simpleType>
</xs:schema>
```

7.3 List of CERIF Entities

Following is a full list of the CERIF entities in alphabetic order, grouped by entity type, giving the Logical and Physical Name of entities in brackets.

7.3.1 CERIF Core Entities (Logical (PhysicalName))

cfProject (cfProj)
cfPerson (cfPers)
cfOrgUnit (cfOrgUnit)

7.3.2 CERIF Result Entities (Logical (PhysicalName))

cfResultPublication (cfResPubl)
cfResultPatent (cfResPat)
cfResultProduct (cfResProd)

7.3.3 CERIF 2nd Level Entities (Logical (PhysicalName))

cfCitation (cfCite)
cfCountry (cfCountry)
cfCurrency (cfCurrency)
cfCurriculumVitae (cfCV)
cfElectronicAddress (cfEAddr)
cfEquipment (cfEquip)
cfEvent (cfEvent)
cfExpertiseAndSkills (cfExpSkills)
cfFacility (cfFacil)
cfFundingProgramme (cfFundProg)
cfLanguage (cfLanguage)
cfMetrics (cfMetrics)
cfPostalAddress (cfPAddr)
cfPrizeAward (cfPrize)
cfPublicationReference (cfPublRef)
cfQualification (cfQqual)
cfService (cfSrv)

7.3.4 CERIF Link Entities (Logical (PhysicalName))

cfCitation_Classification (cfCite_Class)
cfClassification_Classification (cfClass_Class)
cfClassScheme_ClassScheme (cfClassScheme_ClassScheme)
cfCountry_Classification (cfCountry_Class)
cfCurrency_Classification (cfCurrency_Class)
cfCV_Classification (cfCV_Class)
cfElectronicAddress_Classification (cfEAddr_Class)
cfEquipment_Classification (cfEquip_Class)
cfEquipment_FundingProgramme (cfEquip_FundProg)
cfEvent_Event
cfEvent_Classification (cfEvent_Class)
cfEvent_FundingProgramme (cfEvent_FundProg)
cfEvent_ResultPublication (cfEvent_ResPubl)
cfExpertiseAndSkills_Classification (cfExpSkills_Class)
cfFacility_Classification (cfFacil_Class)
cfFacility_FundingProgramme (cfFacil_FundProg)
cfFundingProgramme_Classification (cfFundProg_Class)
cfFundingProgramme_FundingProgramme (cfFundProg_FundProg)
cfLanguage_Classification (cfLanguage_Class)
cfMetrics_Classification (cfMetrics_Class)

cfOrganisationUnit_Classification (cfOrgUnit_Class)
cfOrganisationUnit_DublinCore (cfOrgUnit_DC)
cfOrganisationUnit_ElectronicAddress (cfOrgUnit_EAddr)
cfOrganisationUnit_Equipment (cfOrgUnit_Equip)
cfOrganisationUnit_Event (cfOrgUnit_Event)
cfOrganisationUnit_ExpertiseAndSkills (cfOrgUnit_ExpSkills)
cfOrganisationUnit_Facility (cfOrgUnit_Facil)
cfOrganisaitonUnit_FundingProgramme (cfOrgUnit_FundProg)
cfOrganisationUnit_OrgUnit (cfOrgUnit_OrgUnit)
cfOrganisationUnit_PostalAddress (cfOrgUnit_PAddr)
cfOrganisationUnit_PrizeAward (cfOrgUnit_Prize)
cfOrganisationUnit_ResultPatent (cfOrgUnit_ResPat)
cfOrganisationUnit_ResultProduct (cfOrgUnit_ResProd)
cfOrganisationUnit_ResultPublication (cfOrgUnit_ResPubl)
cfOrganisationUnit_Service (cfOrgUnit_Srv)
cfPerson_Classification (cfPers_Class)
cfPerson_CV (cfPers_CV)
cfPerson_DublinCore (cfPers_DC)
cfPerson_ElectronicAddress (cfPers_EAddr)
cfPerson_Equipment (cfPers_Equip)
cfPerson_Event (cfPers_Event)
cfPerson_ExpertiseAndSkills (cfPers_ExpSkills)
cfPerson_Facility (cfPers_Facil)
cfPerson_FundingProgramme (cfPers_FundProg)
cfPerson_Language (cfPers_Language)
cfPerson_Country (cfPers_Country)
cfPerson_OrganisationUnit (cfPers_OrgUnit)
cfPerson_Person (cfPers_Pers)
cfPerson_PostAddress (cfPers_PAddr)
cfPerson_PrizeAward (cfPers_Prize)
cfPerson_Qualification (cfPers_Qual)
cfPerson_ResultPatent (cfPers_ResPat)
cfPerson_ResultProduct (cfPers_ResProd)
cfPerson_ResultPublication (cfPers_ResPubl)
cfPerson_Service (cfPers_Srv)
cfPersonName_Person (cfPersName_Pers)
cfPostAddress_Classification (cfPAddr_Class)
cfProject_Classification (cfProj_Class)
cfProject_DublinCore (cfProj_DC)
cfProject_Equipment (cfProj_Equip)
cfProject_Event (cfProj_Event)
cfProject_Facility (cfProj_Facil)
cfProject_FundingProgramme (cfProj_FundProg)
cfProject_OrganisationUnit (cfProj_Orgunit)
cfProject_Person (cfProj_Pers)
cfProject_PrizeAward (cfProj_Prize)
cfProject_Project (cfProj_Proj)
cfProject_Service (cfProj_Srv)
cfProject_ResultPatent (cfProj_ResPat)
cfProject_ResultProduct (cfProj_ResProd)
cfProject_ResultPublication (cfProj_ResPubl)
cfResultPatent_Classification (cfResPat_Class)
cfResultPatent_FundingProgramme (cfResPat_FundProg)
cfResultProduct_Classification (cfResProd_Class)
cfResultProduct_FundingProgramme (cfResProd_FundProg)
cfResultCitation_Citation (cfResPubl_Cite)
cfResultPublication_Classification (cfResPubl_Class)
cfResultPublication_DublinCore (cfResPubl_DC)

cfResultPublication_Event (cfResPubl_Event)
cfResultPublication_Equipment (cfResPubl_Equip)
cfResultPublication_Facility (cfResPubl_Facil)
cfResultPublication_FundingProgramme (cfResPubl_FundProg)
cfResultPublication_Metrics (cfResPubl_Metrics)
cfResultPublication_ResultPatent (cfResPubl_ResPat)
cfResultPublication_ResultProduct (cfResPubl_ResProd)
cfResultPublication_ResultPublication (cfResPubl_ResPubl)
cfService_Classification (cfSrv_Class)

7.3.5 CERIF Multiple Language Features (Logical (PhysicalName))

cfCitationDescription (cfCiteDescr)
cfCitationTitle (cfCiteTitle)
cfClassificationDescription (cfClassDescr)
cfClassificationTerm (cfClassTerm)
cfClassificationSchemeDescription (cfClassSchemeDescr)
cfCountryName (cfCountryName)
cfCurrencyEntityName (cfCurrencyEntityName)
cfCurrencyName (cfCurrencyName)
cfEquipmentDescription (cfEquipPDescr)
cfEquipmentKeywords (cfEquipKeyw)
cfEquipmentName (cfEquipName)
cfEventDescription (cfEventDescr)
cfEventKeywords (cfEventKeyw)
cfEventName (cfEventName)
cfExpertiseAndSkillsDescription (cfExpSkillsDescr)
cfExpertiseAndSkillsKeywords (cfExpSillsKeyw)
cfExpertiseAndSkillsName (cfExpSkillsName)
cfFacilityDescription (cfFacilDescr)
cfFacilityKeywords (cfFacilKeyw)
cfFacilityName (cfFacilName)
cfFundingProgrammeDescription (cfFundProgDescr)
cfFundingProgrammeKeywords (cfFundProgKeyw)
cfFundingProgrammeName (cfFundProgName)
cfLanguageName (cfLanguageName)
cfMetricsDescription (cfMetricsDescr)
cfMetricsName (cfMetricsName)
cfOrganisationUnitKeywords (cfOrgUnitKeyw)
cfOrganisationUnitName (cfOrgUnitName)
cfOrganisationUnitResearchActivity (cfOrgUnitResAct)
cfPersonResearchInterest (cfPersResInt)
cfPersonKeywords (cfPersKeyw)
cfProjectAbstract (cfProjAbstr)
cfProjectKeywords (cfProjKeyw)
cfProjectTitle (cfProjTitle)
cfResultPatentAbstract (cfResPatAbstr)
cfResultPatentKeywords (cfResPatKeyw)
cfResultPatentTitle (cfResPatTitle)
cfResultProductDescription (cfResProdDescr)
cfResultProductKeywords (cfResProdKeyw)
cfResultProductName (cfResProdName)
cfResultPublicationAbstract (cfResPublAbst)
cfResultPublicationBibliographicNote (cfResPublBiblNote)
cfResultPublicationKeywords (cfResPublKeyw)
cfResultPublicationNameAbbreviation (cfResPublNameAbbrev)
cfResultPublicationSubtitle (cfResPublSubtitle)
cfResultPublicationTitle (cfResPublTitle)

cfServiceDescription (cfSrvDescr)
cfServiceKeywords (cfSrvKeyw)
cfServiceName (cfSrvName)

7.3.6 Additional Entities (Logical (PhysicalName))

cfPersonName (cfPersName)
cfDublinCore (cfDC)
cfDCAudience (cfDCAudience)
cfDCContributor (cfDCContributor)
cfDCCoverage (cfDCCoverage)
cfDCCoverageSpatial (cfDCCoverageSpatial)
cfDCCoverateTemporal (cfDCCoverageTemporal)
cfDCCreator (cfDCCreator)
cfDCDate (cfDCDate)
cfDCDescription (cfDCDescription)
cfDCFormat (cfDCFormat)
cfDCLanguage (cfDCLanguage)
cfDCProvenance (cfDCProvenance)
cfDCPublisher (cfDCPublisher)
cfDCRelation (cfDCRelation)
cfDCResourceIdentifier (cfDCResourceIdentifier)
cfDCResourceType (cfDCResourceType)
cfDCRightsHolder (cfDCRighsHolder)
cfDCRightsManagement (cfDCRightsMM)
cfDCRightsManagementAccessRights (cfDCRightsMMAccessRight)
cfDCRightsManagementLicense (cfDCRightsMMLicence)
cfDCSource (cfDCSource)
cfDCSubject (cfDCSubject)
cfDCTitle (cfDCTitle)
cfFormalisedDublinCoreRightsManagementPricing (FDCRightsMMPricing)
cfFormalisedDublinCoreRightsManagementPrivacy (FDCRightsMMPrivacy)
cfFormalisedDublinCoreRightsManagementRights (FDCRightsMM)
cfFormalisedDublinCoreRightsManagementSecurity (FDCRightsMMSecurity)

7.3.7 CERIF Classification Entities (Logical (PhysicalName))

cfClassification (cfClass)
cfClassificationScheme (cfClassScheme)

7.3.8 CERIF Attributes including language or currency

7.3.8.1 Language-dependent attributes including cflangCode and cfTrans

cfAbstract (cfAbstr)
cfDescription (cfDescr)
cfKeywords (cfKeyw)
cfName (cfName)
cfResearchActivity (cfResAct)
cfResearchInterest (cfResInt)
cfTerm (cfTerm)
cfTitle (cfTitle)

7.3.8.2 Currency-dependent attributes

cfAmount (cfAmount)
cfPrice (cfPrice)
cfTurnover (cfTurn)

7.4 Logical / Physical CERIF Entity Names

The following table 1 gives an overview of all CERIF 2008 – 1.0 entities, their corresponding attributes with logical and physical names (including cf prefixes).

Table 1: List of Entities with Logical (alphabetical order) and Physical Names

Logical CERIF 2008 – 1.0 Entities	Physical CERIF 2008 – 1.0 Entities
cfCitation	cfCite
cfCitation_Classification	cfCite_Class
cfCitationDescription	cfCiteDescr
cfCitationTitle	cfCiteTitle
cfClassification	cfClass
cfClassification_Classification	cfClass_Class
cfClassificationDescription	cfClassDescr
cfClassificationScheme	cfClassScheme
cfClassificationScheme_ClassificationScheme	cfClassScheme_ClassScheme
cfClassificationSchemeDescription	cfClassSchemeDescr
cfClassificationTerm	cfClassTerm
cfCountry	cfCountry
cfCountry_Classification	cfCountry_Class
cfCountryName	cfCountryName
cfCurrency	cfCurrency
cfCurrency_Classification	cfCurrency_Class
cfCurrencyEntityName	cfCurrencyEntName
cfCurrencyName	cfCurrencyName
cfCurriculumVitae	cfCV
cfCurriculumVitae_Classification	cfCV_Class
cfDublinCore	cfDC
cfDublinCoreAudience	cfDCAudience
cfDublinCoreContributor	cfDCContributor
cfDublinCoreCoverage	cfDCCoverage
cfDublinCoreCoverageSpatial	cfDCCoverageSpatial
cfDublinCoreCoverageTemporal	cfDCCoverageTemporal
cfDublinCoreCreator	cfDCCreator
cfDublinCoreDate	cfDCDate
cfDublinCoreDescription	cfDCDescription
cfDublinCoreFormat	cfDCFormat
cfDublinCoreLanguage	cfDCLanguage
cfDublinCoreProvenance	cfDCProvenance
cfDublinCorePublisher	cfDCPublisher
cfDublinCoreRelation	cfDCRelation
cfDublinCoreResourceIdentifier	cfDCResourceIdentifier
cfDublinCoreResourceType	cfDCResourceType
cfDublinCoreRightsHolder	cfDCRightsHolder
cfDublinCoreRightsManagement	cfDCRightsMM
cfDublinCoreRightsManagementAccessRights	cfDCRightsMMAccessRights
cfDublinCoreRightsManagementLicense	cfDCRightsMMLicense
cfDublinCoreSource	cfDCSource
cfDublinCoreSubject	cfDCSubject
cfDublinCoreTitle	cfDCTitle
cfElectronicAddress	cfEAddr
cfElectronicAddress_Classification	cfEAddr_Class
cfEquipment	cfEquip
cfEquipment_Classification	cfEquip_Class
cfEquipment_FundingProgramme	cfEquip_FundProg
cfEquipmentDescription	cfEquipDescr

cfEquipmentKeywords	cfEquipKeyw
cfEquipmentName	cfEquipName
cfEvent	cfEvent
cfEvent_Classification	cfEvent_Class
cfEvent_Event	cfEvent_Event
cfEvent_FundingProgramme	cfEvent_FundProg
cfEvent_ResultPublication	cfEvent_ResPubl
cfEventDescription	cfEventDescr
cfEventKeywords	cfEventKeyw
cfEventName	cfEventName
cfExpertiseAndSkills	cfExpSkills
cfExpertiseAndSkills_Classification	cfExpSkills_Class
cfExpertiseAndSkillsDescription	cfExpSkillsDescr
cfExpertiseAndSkillsKeywords	cfExpSkillsKeyw
cfExpertiseAndSkillsName	cfExpSkillsName
cfFacility	cfFacil
cfFacility_Classification	cfFacil_Class
cfFacility_FundingProgramme	cfFacil_FundProg
cfFacilityDescription	cfFacilDescr
cfFacilityKewords	cfFacilKeyw
cfFacilityName	cfFacilName
cfFormalisedDublinCoreRightsManagementPricing	cfFDCRightsMMPricing
cfFormalisedDublinCoreRightsManagementPrivacy	cfFDCRightsMMPrivacy
cfFormalisedDublinCoreRightsManagementRights	cfFDCRightsMMRights
cfFormalisedDublinCoreRightsManagementSecurity	cfFDCRightsMMSecurity
cfFundingProgramme	cfFundProg
cfFundingProgramme_Classification	cfFundProg_Class
cfFundingProgramme_FundingProgramme	cfFundProg_FundProg
cfFundingProgrammeDescription	cfFundProgDescr
cfFundingProgrammeKeywords	cfFundProgKeyw
cfFundingProgrammeName	cfFundProgName
cfLanguage	cfLang
cfLanguage_Classification	cfLang_Class
cfLanguageName	cfLangName
cfMetrics	cfMetrics
cfMetrics_Classification	cfMetrics_Class
cfMetricsDescription	cfMetricsDescr
cfMetricsName	cfMetricsName
cfOrganisationUnit	cfOrgUnit
cfOrganisationUnit_Classification	cfOrgUnit_Class
cfOrganisationUnit_DublinCore	cfOrgUnit_DC
cfOrganisationUnit_ElectronicAddress	cfOrgUnit_EAddr
cfOrganisationUnit_Equipment	cfOrgUnit_Equip
cfOrganisationUnit_Event	cfOrgUnit_Event
cfOrganisationUnit_ExpertiseAndSkills	cfOrgUnit_ExpSkills
cfOrganisationUnit_Facility	cfOrgUnit_Facil
cfOrganisationUnit_FundingProgramme	cfOrgUnit_FundProg
cfOrganisationUnit_OrganisationUnit	cfOrgUnit_OrgUnit
cfOrganisationUnit_PostAddress	cfOrgUnit_PAddr
cfOrganisationUnit_PrizeAward	cfOrgUnit_Prize
cfOrganisationUnit_ResultPatent	fOrgUnit_ResPat
cfOrganisationUnit_ResultProduct	cfOrgUnit_ResProd
cfOrganisationUnit_ResultPublication	cfOrgUnit_ResPubl
cfOrganisationUnit_Service	cfOrgUnit_Srv
cfOrganisationUnitKeywords	cfOrgUnitKeyw
cfOrganisationUnitName	cfOrgUnitName
cfOrganisationUnitResearchActivity	cfOrgUnitResAct
cfPerson	cfPers

cfPerson_Classification	**cfPers_Class**
cfPerson_Country	**cfPers_Country**
cfPerson_CurriculumVitae	**cfPers_CV**
cfPerson_DublinCore	**cfPers_DC**
cfPerson_ElectronicAddress	**cfPers_EAddr**
cfPerson_Equipment	**cfPers_Equip**
cfPerson_Event	**cfPers_Event**
cfPerson_ExpertiseAndSkills	**cfPers_ExpSkills**
cfPerson_Facility	**cfPers_Facil**
cfPerson_FundingProgramme	**cfPers_FundProg**
cfPerson_Language	**cfPers_Language**
cfPerson_OrganisationUnit	**cfPers_OrgUnit**
cfPerson_Person	**cfPers_Pers**
cfPerson_PostAddress	**cfPers_PAddr**
cfPerson_PrizeAward	**cfPers_Prize**
cfPerson_Qualification	**cfPers_Qual**
cfPerson_ResultPatent	**cfPers_ResPat**
cfPerson_ResultProduct	**cfPers_ResProd**
cfPerson_ResultPublication	**cfPers_ResPubl**
cfPerson_Service	**cfPers_Serv**
cfPersonKeywords	**cfPersKeyw**
cfPersonName	**cfPersName**
cfPersonName_Person	**cfPersName_Pers**
cfPersonResearchInterest	**cfPersResInt**
cfPostAddress	**cfPAddr**
cfPostAddress_Classification	**cfPAddr_Class**
cfPrizeAward	**cfPrize**
cfPrizeAward_Classification	**cfPrize_Class**
cfProject	**cfProj**
cfProject_Classification	**cfProj_Class**
cfProject_DublinCore	**cfProj_DC**
cfProject_Equipment	**cfProj_Equip**
cfProject_Event	**cfProj_Event**
cfProject_Facility	**cfProj_Facil**
cfProject_FundingProgramme	**cfProj_FundProg**
cfProject_OrganisationUnit	**cfProj_OrgUnit**
cfProject_Person	**cfProj_Pers**
cfProject_PrizeAward	**cfProj_Prize**
cfProject_Project	**cfProj_Proj**
cfProject_ResultPatent	**cfProj_ResPat**
cfProject_ResultProduct	**cfProj_ResProd**
cfProject_ResultPublication	**cfProj_ResPubl**
cfProject_Service	**cfProj_Srv**
cfProjectAbstract	**cfProjAbstr**
cfProjectKeywords	**cfProjKeyw**
cfProjectTitle	**cfProjTitle**
cfPublicationReference	**cfPublRef**
cfQualification	**cfQual**
cfQualification_Classification	**cfQual_Class**
cfQualificationDescription	**cfQualDescr**
cfQualificationKeywords	**cfQualKeyw**
cfResultPatent	**cfResPat**
cfResultPatent_Classification	**cfResPat_Class**
cfResultPatent_FundingProgramme	**cfResPat_FundProg**
cfResultPatentAbstract	**cfResPatAbstr**
cfResultPatentKeywords	**cfResPatKeyw**
cfResultPatentTitle	**cfResPatTitle**
cfResultProduct	**cfResProd**

cfResultProduct_Classification	**cfResProd_Class**
cfResultProduct_FundingProgramme	**cfResProd_FundProg**
cfResultProductDescription	**cfResProdDescr**
cfResultProductKeywords	**cfResProdKeyw**
cfResultProductName	**cfResProdName**
cfResultPublication	**cfResPubl**
cfResultPublication_Citation	**cfResPubl_Cite**
cfResultPublication_Classification	**cfResPubl_Class**
cfResultPublication_DublinCore	**cfResPubl_DC**
cfResultPublication_FundingProgramme	**cfResPubl_FundProg**
cfResultPublication_Equipment	**cfResPubl_Equip**
cfResultPublication_Event	**cfResPubl_Event**
cfResPubl_Facility	**cfResPubl_Facil**
cfResPubl_FundingProgramme	**cfResPubl_FundProg**
cfResPubl_Metrics	**cfResPubl_Metrics**
cfResPubl_ResultPatent	**cfResPubl_ResPat**
cfResPubl_ResultProduct	**cfResPubl_ResProd**
cfResultPublication_ResultPublication	**cfResPubl_ResPubl**
cfResultPublicationAbstract	**cfResPublAbstr**
cfResultPublicationBibliographicNote	**cfResPublBiblNote**
cfResultPublicationKeywords	**cfResPublKeyw**
cfResultPublicationNameAbbreviation	**cfResPublNameAbbrev**
cfResultPublicationSubtitle	**cfResPublSubtitle**
cfResultPublicationTitle	**cfResPublTitle**
cfService	**cfSrv**
cfService_Classification	**cfSrv_Class**
cfServiceDescription	**cfSrvDescr**
cfServiceKeywords	**cfSrvKeyw**
cfServiceName	**cfSrvName**

8. References

[1] Jörg, B.; Jeffery, K.G.; Asserson, A.; van Grootel, G (2009): CERIF 2008 – 1.0 Full Data Model (FDM): Introduction and Specification. euroCRIS, January 2009.

[2] Jörg, B.; Jeffery, K.G.; Asserson, A.; van Grootel, G.; Rasmussen, H.; Price, A.; Vestam, T.; Elbæk, M.K.; Houssos, N.; Voigt, R.; Simons, E.J. (2008): CERIF 2008 – 1.0 Semantics. euroCRIS, January 2009.

[3] W3C Recommendation: Extensible Markup Language (XML) 1.0, Fourth Edition, 16 August 2006, edited in place, 29 September 2006. http://www.w3.org/TR/2006/Rec-xml-2006-08-16/

[4] W3C XML Schema: http://www.w3.org/XML/Schema