CERIF 1.5 Tutorial

[Diagram showing various nodes labeled with terms such as cfExpertise AndSkills, cfFunding, cfEquipment, cfFederated Identifier, cfFunding, cfFederated Identifier, and so on.]

November 5th, 2012
euroCRIS Membership Meeting
Madrid, Spain
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Information Systems, Business Economics

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Innovation Support Center, UKOLN,  
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Introduction of the Speaker

Jan Dvořák

euroCRIS
• CERIF TG Deputy Lead
• CRIS2012 (Prague, June 2012) Organizer

Charles University in Prague
• Faculty of Arts
  – Institute of Information Studies & Librarianship

InfoScience Praha
• Research & Development & Innovation Information System
  [the national CRIS for CZ]

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What is Research Information?

Information about:

- Researchers
- Organisations (Research-performing, Funding)
- Funding Programmes, Calls
- Projects (Proposed, Ongoing, Completed)
- Publications, Patents, Data, Products
- Facilities, Equipment, Services
- Addresses, Geographic Bindings, Languages

- And their Relationships
Who needs Research Information?

- **Researchers**
  - visibility, finding collaborations, competitors, CV generation

- **Decision Makers**
  - performance, strategic decisions, priorities, comparisons

- **Funding Organisations**
  - distribution of programs, evaluation of results, finding reviewers

- **Research Organisations**
  - integration and interoperability, strategic management

- **Intermediaries / Brokers**
  - finding research results of potential market or innovative value

- **Enterprises**
  - finding information for participation in projects, partnerships, usage of results

- **Media**
  - distribution and communication

- **Publishers**
  - finding reviewers, editors

- **Libraries**
  - acquisition, dissemination

- **Project Managers**
  - overview of ongoing activities

- **General Public**
  - information and education, interest

- **Education**
  - integration of relevant findings into lectures and training
Kinds of questions we want to support

• How many articles has author X published in 2011 as a first author?
• How many times have articles by author X been cited by the end of the previous year?
• Did author X publish with institutionally external authors?
• In how many FP7 projects does/did organisation Z participate?
• How many publications have resulted from project Y?
• How many people have been employed in the course of FP7 projects from the 1st call in the New Member States?
• How many PhD students have participated in national research projects in country C? In which countries have they earned their masters degrees?
• How many women have been involved in FP7 projects?
• How often have articles in journal A been requested in 2010?
• How many articles have been published in field B?
Common European Research Information Format
The CERIF Evolution

CERIF 91
- Acronym: ERGO
- Participant: Keith Jeffery, Anne Asserson, many more
- Organisations: Rutherford Appleton, University of Bergen, ...
- Networking of DBs
- Exchange of Records
- EC Recommendation to Member States

CERIF 2000 Model
- Data Model
- Multilinguality
- Controlled Vocabulary
- Roles / Types
- User-driven
- EC Recommendation to Member States

CERIF 2006 / 2008 Model
- Data Model
- Robust/Consistent Structure
- Extensible Structure
- Semantic Layer
- XML Exchange Specification
- Elaboration on Publication
- CERIF Core Semantics (2008 1.2)
Common European Research Information Format

- CERIF is an EU Recommendation to Member States
  http://cordis.europa.eu/cerif/

- The European Commission (EC) has authorised euroCRIS to maintain and develop CERIF and its usage
  http://www.eurocris.org/Index.php?page=CERIFreleases&t=1
Model Levels

- **Conceptual Level** *(Specification)*
  Concepts relevant for the research domain and their relationships

- **Logical Level** *(ER Model)*
  Entities and their relationships

- **Physical Level** *(Database Scripts)*
  Data Definition commands for the database

- **Semantic Layer** *(Declared Semantics)*
  A formalized controlled vocabulary describing a general contextual semantics of the research domain inline with the conceptual, logical and machine description
CERIF Model Structure (Views)

**CERIF Entity Types**
- Base Entities
- Result Entities
- Infrastructure Entities
- 2nd Level Entities
- Link Entities

**CERIF Features**
- Multiple Language
- Semantics
- Measures & Indicators
- Geographic Bounding Box
CERIF Base Entities

- Person
- OrganisationUnit
- Project

Relationships:
- Person → Project → OrganisationUnit
CERIF Base Entities

- **Person**
  - ID
  - URI
  - Gender
  - FirstNames
  - OtherNames
  - FamilyNames
  - NameVariants
  - ResearchInterest
  - Keywords

- **Project**
  - ID
  - URI
  - Acronym
  - StartDate
  - EndDate
  - Title
  - Abstract
  - Keywords

- **OrganisationUnit**
  - ID
  - URI
  - Acronym
  - Name
  - HeadCount
  - CurrencyCode
  - Turnover
  - ResearchActivity
  - Keywords
CERIF Result Entities

ResultPublication

ResultPatent

ResultProduct
CERIF Infrastructure Entities

Facility
- ID
- Acronym
- URI
- Title
- Description
- Keywords

Equipment
- ID
- Acronym
- URI
- Title
- Description
- Keywords

Service
- ID
- Acronym
- URI
- Title
- Description
- Keywords
MICE, a JISC-funded Project coordinated by Richard Gartner, Kings College, London, UK
CERIF Measurement & Indicator

Is an Aggregation Entity

cfMeasureIdentifier
cfCountInteger
cfCountIntegerChange
cfValueFloatingPoint
cfValueFloatingPointChange
cfValueJudgementalNumeric
cfValueJudgementalNumericChange
cfValueJudgementalText
cfValueJudgementalTextChange
cfURI
Measurement & Indicator *(some examples)*

– economic and commercial
  
  • economic
    – impact on business
      » improving performance of existing businesses
      • *increased turnover*
      • *time savings*
      • *reduced costs*
    » new products/processes
      • Creating
      • numbers of new products/services
      • commercialising
      • success measures

*Extract from the MICE List of Indicators*
Measurement & Indicator (some examples)

– economic and commercial
  • economic
    – impact on business
      » improving performance of existing businesses
        • increased turnover
          • time savings
          • reduced costs
      » new products/processes
        • Creating
          • numbers of new products
            • commercialising
            • success measures

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<table>
<thead>
<tr>
<th>cfIndicator</th>
<th>cfIndicID=00123</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td></td>
<td>cfValueFloat=X</td>
</tr>
<tr>
<td>cfOrganisation_Measurement</td>
<td>cfOrgUnitID=01234</td>
</tr>
<tr>
<td></td>
<td>cfMeasID=01234567</td>
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<tr>
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<td></td>
<td>cfClassSchemeID=ImpactOnBusiness</td>
</tr>
<tr>
<td></td>
<td>cftStartDate=2010-01-01</td>
</tr>
<tr>
<td></td>
<td>cfEndDate=2010-12-31</td>
</tr>
<tr>
<td>cfMeasurement</td>
<td>cfMeasID=012345678</td>
</tr>
<tr>
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<td>cfCount=Z</td>
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<tr>
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<td>cfMeasID=01234567</td>
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<td>cfClassSchemeID=ImpactOnBusiness</td>
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<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>cfEndDate=2010-12-31</td>
</tr>
</tbody>
</table>
Measurement & Indicator (some examples)

- economic and commercial
  - economic
    - impact on business
      » improving performance of existing businesses
        - increased turnover
          - time savings
          - reduced costs
      » new products/processes
        - Creating numbers of new products commercialising success measures

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cfMeasurement
  cfMeasID=012345
  cfValueFloat=X

  cfMeasurement
  cfMeasID=012345678
  cfValueFloat=Y

  cfMeasurement_Measurement
  cfMeasID1=012345
  cfMeasID2=012345678
  cfClassID=increasedTurnover
  cfClassSchemeID=ImpactOnBusiness
  cfStartDate=2010-01-01
  cfEndDate=2010-12-31

  cfOrganisation_Measurement
  cfOrgUnitID=01234
  cfMeasID=012345; 012345678
  cfClassID=turnover
  cfClassSchemeID=ImpactOnBusiness
  cfStartDate=2010-01-01
  cfEndDate=2010-12-31

  cfIndicator
  cfIndicID=00123
CERIF Federated Identifiers

• ResultPublication
  – DOI
  – WoS Accession Number

• Person
  – Social Security Number
  – Staff Id in HR system
  – Author identifier
    • ORCID
    • ScopusID

• Organisation
  – VAT Identification Number
  – Internal Code
Some CERIF Link Entities
Some CERIF Link Entities

- Person_ResultPublication: role=author
- Project_ResultPublication: role=deliverable
- Person_OrganisationUnit: role=research assistant
- Person_Project: role=principal investigator
- OrganisationUnit_ResultPublication: role=author’s affiliation
- Project_OrganisationUnit: role=coordinator
Some CERIF Link Entities
CERIF – Generic Link Entity Structure

<table>
<thead>
<tr>
<th>cfEntity1Name_Entity2Name</th>
<th>cfPers_Proj</th>
<th>cfPers_OrgUnit</th>
<th>cfPers_OrgUnit</th>
</tr>
</thead>
<tbody>
<tr>
<td>cfEntity1ID</td>
<td>cfPersID</td>
<td>cfPersID</td>
<td>cfPersID</td>
</tr>
<tr>
<td>cfEntity2ID</td>
<td>cfProjID</td>
<td>cfProjID</td>
<td>cfProjID</td>
</tr>
<tr>
<td>cfClassID</td>
<td>coordinator-uuid</td>
<td>affiliation-uuid</td>
<td>cerif-tg-leader-uuid</td>
</tr>
<tr>
<td>cfClassSchemeID</td>
<td>example-scheme-uuid</td>
<td>example-scheme-uuid</td>
<td>example-scheme-uuid</td>
</tr>
<tr>
<td>cfStartDate</td>
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<td>2005-05-01</td>
</tr>
<tr>
<td>cfEndDate</td>
<td>2007-11-31</td>
<td>2038-12-31</td>
<td>2038-12-31</td>
</tr>
</tbody>
</table>

Semantic Layer | Valid Time Range | Contextual Roles

Vocabulary

Binary, Time-based Links with Semantics
CERIF Modularisation

OrganisationUnit

ResultPublication

Project

Funding

Semantic Layer

SCHEMA 1
  Role X
  Role Y
  Role Z

SCHEMA 2
  Role A
  Role B
  Role C

SCHEMA 3
  Role A
  Role B
  Role C
Result_Publication Instance Diagram
(slide by Keith Jeffery)

- Person A
  - Project leader

- Project P

- Publication X
  - author

- OrgUnit M
  - member

- OrgUnit O
  - Part of
  - employee

- OrgUnit N
  - member
  - Part of

owns IPR
# CERIF Example (Person)

<table>
<thead>
<tr>
<th>CERIF Person example database entry</th>
<th>Attribute</th>
<th>Table</th>
<th>Type</th>
<th>Semantic Layer (CERIF Semantics)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Classifications (cfClassIds)</td>
</tr>
<tr>
<td>person-brigitte-jörg*</td>
<td>cfPersId</td>
<td>cfPers</td>
<td>base</td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>cfGender</td>
<td>cfPers</td>
<td>base</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.dfki.de/~brigitte/">http://www.dfki.de/~brigitte/</a></td>
<td>cfURI</td>
<td>cfPers</td>
<td>base</td>
<td></td>
</tr>
<tr>
<td>Joerg</td>
<td>cfFamilyNames</td>
<td>cfPers</td>
<td>add</td>
<td></td>
</tr>
<tr>
<td>Brigitte</td>
<td>cfFirstName</td>
<td>cfPers</td>
<td>add</td>
<td></td>
</tr>
<tr>
<td>Brigitte is interested in Research Information and Research Information Systems.</td>
<td>cfResInt</td>
<td>cfPersResInt</td>
<td>lang</td>
<td></td>
</tr>
<tr>
<td>Information Systems, Research Information, Ontologies</td>
<td>cfKeyw</td>
<td>cfProjKeyw</td>
<td>lang</td>
<td></td>
</tr>
<tr>
<td>person-brigitte-jörg*</td>
<td>cfPersId2</td>
<td>cfPersName_Pers</td>
<td>link</td>
<td>af6468a0-3acf-11e1-b86c-0800200c9a66 (SpellingVariant)*</td>
</tr>
<tr>
<td>classification-MA*</td>
<td>cfClassId</td>
<td>cfPers_Class</td>
<td>link</td>
<td>M.A._uuid*</td>
</tr>
<tr>
<td>publ-analyzing-european-rtd*</td>
<td>cfResPublId</td>
<td>cfPers_ResPubl</td>
<td>link</td>
<td>49815870-1cf6-11e1-8bc2-0800200c9a66 (Author)*</td>
</tr>
<tr>
<td>publ-analytic-services-for-era*</td>
<td>cfResPublId</td>
<td>cfPers_ResPubl</td>
<td>link</td>
<td>49815870-1cf6-11e1-8bc2-0800200c9a66 (Author)*</td>
</tr>
<tr>
<td>orgunit-dfki*</td>
<td>cfOrgUnitId</td>
<td>cfPers_OrgUnit</td>
<td>link</td>
<td>980965b0-1cd5-11e1-8bc2-0800200c9a66 (Affiliation)*</td>
</tr>
</tbody>
</table>
# CERIF Example (Project)

<table>
<thead>
<tr>
<th>CERIF Project example database record</th>
<th>Semantic Layer (CERIF Semantics)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Data</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>project-ist-world*</td>
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<tr>
<td>IST World</td>
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<tr>
<td><a href="http://www.ist-world.org/">http://www.ist-world.org/</a></td>
<td>cfURI</td>
</tr>
<tr>
<td>2005-04-01</td>
<td>cfStartDate</td>
</tr>
<tr>
<td>2007-11-30</td>
<td>cfEndDate</td>
</tr>
<tr>
<td>Knowledge Base for RTD Competencies in IST</td>
<td>cfTitle</td>
</tr>
<tr>
<td>Wissensbasis für RTD Kompetenzen im Bereich IST</td>
<td>cfTitle</td>
</tr>
<tr>
<td>IST, Research Information, NMS, Portal,</td>
<td>cfKeyw</td>
</tr>
<tr>
<td>The objective of the project is to set up and populate an information portal with innovative functionalities…</td>
<td>cfAbstr</td>
</tr>
</tbody>
</table>

classification-2004-ist-3*

publ-analyzing-eu-rtd*

publ-cris-research-activity*

publ-analytic-services-for-the-era*
CERIF Semantic Layer

Allows to capture any Schema or Structure
- Flat Lists
- Thesauri
- Classification Systems (e.g. SKOS, ...)
- Taxonomies
- Ontologies

Open / Extensible in all directions
- New Schemas
- New Concepts / Terms
- New Relationships

Enables to manage
- Roles / Types Semantics
- Subject Headings
- Archiving (Time component)

Allows for simple Mappings between Schemes
CERIF Semantic Layer (Declared Semantics)

- Recursion
  - is-a
  - maps-to
  - is-part-of
  - Is-broader-term

- Scheme-Assignment
- Time-based
**CERIF Semantic Layer (Declared Semantics)**

**CERIF / SKOS**

Class / Concept

ClassScheme / ConceptScheme

class-class / broadMatch

class-class / broader

class-class / broaderTransitive

class-class / hasTopConcept

class-class / mappingRelation

generic / explicit

(open set) / (defined sets)

---

<table>
<thead>
<tr>
<th>SKOS Types</th>
<th>SKOS Entity</th>
<th>SKOS-CERIF-Mapping (CIM view)</th>
<th>CERIF Entity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>Collection</td>
<td>is type of</td>
<td>cfClassScheme</td>
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<td>Class</td>
<td>Concept</td>
<td>is a</td>
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<tr>
<td>Class</td>
<td>ConceptScheme</td>
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</tr>
<tr>
<td>Class</td>
<td>OrderedCollection</td>
<td>is type of</td>
<td>cfClassScheme</td>
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<td>lexical</td>
<td>allLabel</td>
<td>is term of class in lexical scheme</td>
<td>cfTerm</td>
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<tr>
<td>mapping</td>
<td>broadMatch</td>
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<td>semantic rel.</td>
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<td>docu</td>
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<td>is time-stamped descr. in new/old class</td>
<td>cfClassDescr</td>
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<tr>
<td>mapping</td>
<td>closeMatch</td>
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<td>cfTerm</td>
</tr>
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<td>is a</td>
<td>cfDef</td>
</tr>
<tr>
<td>map prop</td>
<td>editorialNote</td>
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<td>example</td>
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<tr>
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<td>hiddenLabel</td>
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<tr>
<td>map prop</td>
<td>narrower</td>
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</table>

CERIF 1.5

- cfFunding
- cfEquipment
- cfFacility
- cfService
- cfResultPublication
- cfProject
- cfResultPatent
- cfResultProduct
- cfPerson
- cfCitation
- cfEvent
- cfLanguage
- cfCurrency
- cfCountry
- cfOrganisationUnit
- cfElectronicAddress
- cfPostalAddress
- cfGeographicBoundingBox
- cfFederatedIdentifier
- cfQualification
- cfPrize
- cfExpertiseAndSkills
- cfCurriculumVitae
- cfResult
- cfResultProduct
- cfResultPatent
- cfIndicator
- cfMeasurement
- www.eurocris.org
CERIF Federated Identifiers

- ResultPublication
  - DOI
  - WoS Accession Number
- Person
  - Social Security Number
  - Staff Id in HR system
  - Author identifier
    - ORCID
    - ScopusID
- Organisation
  - VAT Identification Number
  - Internal Code
- Classification
  - External Code
CERIF Federated Identifiers

• Records the “tag” by which an object is known elsewhere
• For any Base, Result, Infrastructure, or 2\textsuperscript{nd} Level entity
• Connected to a Service representing the issuer of the identifier
  – Usually an information system
For point-to-point interchange
XML namespace
XML Schema
- Based on the ER model
<CERIF xmlns="urn:xmlns:org:eurocris:cerif-1.5-1">
  <cfProj>
    <cfProjId>internal-project-identifier</cfProjId>
    <cfAcro>ACRO</cfAcro>
    <cfURI>http://www.project-url.ac.uk/acro.html</cfURI>
    <cfTitle cfLangCode="en" cfTrans="o">The title of the project</cfTitle>
    <cfAbstr cfLangCode="en" cfTrans="o">The goals of the project</cfAbstr>
    <cfProj_Class>
      <cfClassId>infrastructure-project-uuid</cfClassId>
      <cfClassSchemeld>project-types-scheme-uuid</cfClassSchemeld>
    </cfProj_Class>
    <cfProj_OrgUnit>
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      <cfClassId>coordinator-uuid</cfClassId>
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CERIF 1.5 Release

- CERIF Model Introduction and Specification coming
- CERIF XML Data Exchange Format Specification coming
- CERIF Formal Semantics (Vocabulary) ✓
- CERIF SQL Scripts ✓
- CERIF XML Schemas ✓
- CERIF XML Examples ✓
- CERIF Semantics (Excel) ✓
What is a CRIS?

**Current**

- of current interest
- not necessarily ongoing

**Research Information**

- Researchers
- Organisations (Research-performing, Funding)
- Funding Programmes, Calls
- Projects
- ...

**System**

- Concepts
- Model
- Implementation
  
  [Information System]

= CRIS

... driven by CERIF

**... that means**

an integrated approach towards managing research information
CRIS and Repositories at an institution
(slided by Keith Jeffery)

- CRIS
  - Research Context
    - projects, persons, organisational units
    - funding, products, patents, publications
    - facilities, equipment, events
- OA Repository
- End-User
- CERIF
- OAI-PMH
- OA Repository
  - (hypermedia) Documents
- e-Research repository
  - Datasets and Software
- Various protocols
Ongoing Activities towards CERIF 2.0

- Model Cleaning

- Cross-TG Activities
  - Linked Open Data TG
  - Institutional Repositories TG
  - Architectures TG
  - Indicators TG
  - Best Practice TG

- Cooperation with
  - CASRAI
  - VIVO
Members beyond Europe

Australia
Canada
China
Iran
Israel
Malaysia
Mexico
South Korea
U.S.  VIVO
What makes CERIF shine

• Right level of abstraction
• Normalized model
  – Record data only once
  – Reference rather than copy
• Versatile Semantic Layer
• Time-based relationships
• Clean design, regular structure