Common European Research Information Format Tutorial

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Information Systems, Economics

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Manager Virtual Information Center
Berlin

CERIF TG Leader, Board Member
euroCRIS

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http://www.dfki.de/~brigitte/
Outline

- Grounding Explanations
- The CERIF Model
  - Entities
  - Model Structure
  - Model Components
  - Semantic Layer
- CERIF Semantics
- Use and Implementations
- Ongoing and Next Steps
- Discussion
Common European Research Information Format

The CERIF Model

- Funding
  - Person
    - Skills
    - CV
  - Project
  - Organisation
    - Service
    - Equipment
  - Publication
  - Patent
  - Product
  - Event

Classification (Semantics)
What is a model?

- ... is a simplified view to describe a particular area of interest
- ... allows for a better communication between parties (mutual understanding)
- ... supports (re-)design decisions
- ... supports workflow identification
- ... supports documentation
- ... supports formalization
- ... can be exchanged, re-used, iterated, extended
“Metadata is **structured data** which **describes the characteristics** of a resource.”

*An Introduction to Metadata, by Chris Taylor, University of Queensland*

“Metadata is sometimes defined literally as 'data about data,' but the term is normally understood to mean **structured data about resources** that can be used to help **support a wide range of operations**. These might include, for example, **resource description** and **discovery**, the **management of information resources** and their long-term preservation.”

*Metadata in a Nutshell, by Michael Day, UKOLN*
### What is Metadata?

**CERIF – Tutorial**

<table>
<thead>
<tr>
<th>Radio Series:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title:</strong> The Hitchhiker's Guide to the Galaxy</td>
</tr>
<tr>
<td><strong>Description:</strong> A science fiction comedy series created by Douglas Adams. Originally a radio comedy broadcast on BBC Radio 4 in 1978, [...]</td>
</tr>
<tr>
<td><strong>Source:</strong> Wikipedia</td>
</tr>
<tr>
<td><strong>Date of Query:</strong> May 30, 2008</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Game Cover Image:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title:</strong> The Hitchhiker's Guide to the Galaxy</td>
</tr>
<tr>
<td><strong>Source:</strong> <a href="http://egotron.com/">http://egotron.com/</a></td>
</tr>
<tr>
<td><strong>Retrieved:</strong> May 30, 2008</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Links:</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.bbc.co.uk/cult/hitchhikers/">http://www.bbc.co.uk/cult/hitchhikers/</a></td>
</tr>
<tr>
<td><strong>HTML-Title:</strong> Cult – The Hitchhiker’s Guide to the Galaxy</td>
</tr>
<tr>
<td><strong>HTML-Title:</strong> The Hitchhiker's Guide to the Galaxy</td>
</tr>
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<table>
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</tr>
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<table>
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<tr>
<th>Series of five Books:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title:</strong> The Hitchhiker’s Guide to the Galaxy</td>
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<tr>
<th>Computer Game:</th>
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<tbody>
<tr>
<td><strong>Title:</strong> The Hitchhiker’s Guide to the Galaxy</td>
</tr>
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<th>Comic Book Adaptations:</th>
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<tr>
<td><strong>Title:</strong> The Hitchhiker’s Guide to the Galaxy</td>
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<tr>
<td><strong>Between:</strong> 1993 - 1996</td>
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</table>
What is semantic, formal Metadata?

Metadata Categories

- **Descriptive Metadata** [intellectual contents]
- **Administrative Metadata**
  - Technical [file formats ...]
  - Rights Management [permissions ...]
  - Provenance [creation, subsequent treatment, ...]
  - ...
- **Structural Metadata** [internal structure of items: page order ...]
- **Contextual Metadata**
  - Project Context [funding programme, participating organisations ...]
  - Publication Context [number of authors, external authors, first ...]
  - Usage Context [downloads, requests, ...]
  - ...

Semantics, Formalization = based on a Model
**What is semantic, formal Metadata?**

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</tr>
<tr>
<td>Structure:</td>
</tr>
<tr>
<td>Type of Resource</td>
</tr>
<tr>
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</table>

**Data about Data Structure:**

- Type of Resource
- Title
- Description
- Source
- Date
- Author, Creator, …
What is Research Information?

Data/Metadata or Information about:

- Scientists
- Project Managers
- Ongoing and Completed Projects
- Research Departments
- Funding Organisations and Programmes
- Research Results
- Publications
- Equipment
- Facilities
- their timely Relationships (Semantics) …
What is a CRIS?

Current Research Information System = CRIS

... that means

- Timeliness
- Vitality

... information about

- People +
- Organisations +
- Projects +
- Funding Programmes +
- Research Results +
- ...

... driven by

- A Concept
- A Model

... incorporated as a

- Implementation (ICT)

an integrated approach towards managing research information
Current Research Information System = CRIS

... that means

- Timeliness
- Vitality
- changing relationships

... information about

- People +
- Organisations +
- Projects +
- Funding Programmes +
- Research Results +
- ...

... driven by

- A Concept
- A Model
- Implementation (ICT)

... incorporated as a

- Metadata
- heterogenous entities
- Integration

an integrated approach towards managing research information
What CRISs aim at?

CRISs to enable Integration and Interchange

Data Silos
- Funding Programmes
- Project Management
- Projects
- Organisations
- Human Resource Management
- Publications
- Terminologies
- Patents
- People
- Finance
- Metadata Host & Carrier

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What CRISs aim at?

Data Silos

Terminologies

Publications

Finance

Patents

People

Projects

Organisations

Human Resource Management

Funding Programmes

Project Management

CRISs to enable
Integration and Interchange
Metadata Host & Carrier
What CRISs aim at?

- Data Silos
- Terminologies
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- Finance
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- People
- Organisations
- Projects
- Human Resource Management
- Project Management
- Funding Programmes
- Classification (Semantics)
- Person
- Project
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- Service
- Equipment
- Publication
- Patent
- Product
- Event

People

Organisations

Projects

Human Resource Management

Finance

Patents

What CRISs aim at?

- Data Silos
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What CRISs aim at?

CERIF – as a Middle-Layer

- Terminologies
- Publications
- Finance
- Patents
- People
- Human Resource Management
- Organisations
- Projects
- Project Management
- Funding Programmes
- Data Silos

CERIF

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euroCRIS Membership Meeting May 25th, 2011, CINECA, Bologna
CRIS and Repositories at 1 institution
(Slide by Keith Jeffery)

- **End-User**
- **CERIF**
- **CRIS**
  - Research Context
  - [projects, persons, organisational units, funding, products, patents, publications, facilities, equipment, events]
- **OA Repository**
  - (hypermedia) Documents
- **e-Research repository**
  - Datasets and Software
- **OAI-PMH**
- **Various protocols**
Who are CRIS users?

- **Researchers**
  to find partners, track competitors, form collaborations

- **Research Managers**
  to assess performance, assess output, find proposal reviewers

- **Research Strategists**
  to decide on priorities and resourcing, compare with other countries

- **Publication Editors**
  to find potential authors, find paper reviewers

- **Intermediaries / Brokers**
  to find research products, identify ideas to be carried forward

- **Media**
  to communicate results

- **General Public**
  for interest
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*Research is International*

*Research Information involves various Entities*
What kind of Questions do we want to answer?

- How many articles has author X published in 2007 as a first author?
- How often have articles by author X been cited?
- Did author X publish with institutionally external authors?
- In how many FP7 projects does organisation Z participate?
- How many publications have resulted from project Y?
- How many people have been employed in the course of FP6 projects from the 1st call in the NMS?
- How many PhD students have participated in FP6 projects?
- How many women have been involved in FP6 projects?
- How often have articles in journal A been requested in 2007?
- How many articles have been published in the field of B?
Common European Research Information Format
What is CERIF?

the **Common European Research Information Format**

- **Conceptual Level** (Specification)
  A description of the concepts of research involved entities and their relationships

- **Logical Level** (Conceptual Model)
  A formal description of the research involved entities and their relationships according to a concept

- **Physical Level** (Database Scripts)
  A formal machine readable description of the entities and their relationships according to a concept

- **Semantic Layer** (current Formal Semantics)
  A formalized controlled vocabulary describing a general contextual semantics of the research domain inline with the conceptual, logical and machine description
The CERIF Evolution

CERIF 91

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

CERIF 2000 Model

- Roles
- EXPERTISE
- OrgUnit
- PERSON
- PROJECT
- RESULTS
- EQUIPMENT
- CLASSIFICATION

CERIF 2006 / 2008 Model

- Data Model
- Model Normalization
- Robust/Consistent Structure
- Extensible Structure
- Semantic Layer
- XML Exchange Specification
- Elaboration on Publication
- CERIF Core Semantics (2008 1.2)

Similar Ideas
UN/UNESCO
OECD
CODATA

EU Working Group on Research Databases Workshop

Acronym: ERGO
Participant: Keith Jeffery, Anne Asser son, many more
Organisations: Rutherford Appleton, University of Bergen,

- Networking of DBs
- Exchange of Records
- EC Recommendation to Member States

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**Common European Research Information Format**

- CERIF is an EU Recommendation to Member States
  

- The European Commission (EC) has authorised euroCRIS to maintain and develop CERIF and its usage
  
Common European Research Information Format
One View of the CERIF Model Structure

CERIF Entity Types

- Base Entities
- Result Entities
- 2nd Level Entities
- Link Entities

CERIF Features

- Multiple Language
- Semantics
CERIF Base Entities

- **Person**
- **Project**
- **OrganisationUnit**

Diagram showing the relationships between Person, Project, and OrganisationUnit in the CERIF model.
CERIF Base Entities in Detail

Person
- ID
- URI
- Gender
- FirstName
- 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 Result Entities in Detail

ResultPublication

ResultPatent

ResultProduct

ResultPublication

ID
URI
Title
Subtitle
Abstract
Bibl. Note
PublicationDate
TotalPages
StartPage
EndPage
Keywords

ResultPatent

ID
URI
PatentNumber
CountryCode
RegistrationDate
ApprovalDate
Description
Keywords

ResultProduct

ID
URI
InternationalID
Some CERIF Link Entities

- Person
- Person_OrganisationUnit
- Person_Project

- ResultPublication
  - Person_ResultPublication
  - Project_ResultPublication
  - OrganisationUnit_ResultPublication

- Project
- OrganisationUnit
  - Project_OrganisationUnit

Some CERIF Semantic Features

- Person_ResultPublication: role=author
- Project_ResultPublication: role=deliverable1.2
- OrganisationUnit_ResultPublication: role=author1 institute
- Person_OrganisationUnit: role=CEO
- Person_OrganisationUnit: role=funder
- Person_Project: role=coordinator
- Project: role=deliverable1.2

Semantic Features associated with Link Entities
More CERIF Semantic Features

Semantic Features associated with Link Entities

- Person
- Person_OrganisationUnit
- Person_Project
- Project
- OrganisationUnit
- ResultPublication
- Project_ResultPublication
- OrganisationUnit_ResultPublication

Roles:
- role=author
- role=author1
- role=reviewer
- role=... ?
- role=coordinator
- role=manager
- role=CEO
- role=researcher
- role=project-manager
- role=deliverable1.2
- role=journal article
- role=public report
- role=funder
- role=investigator
- role=member
- role=editor
- role=... ?

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More CERIF Semantic Features

Semantic Features associated with Link Entities
Current CORE Entities

- cfPerson_Person
- cfPerson_Classification
- cfPerson_OrgansiationUnit
- cfPerson_Project
- cfPerson_ResultPublication
- cfPerson_Funding
- cfOrgansationUnit_OrganisationUnit
- cOrganisationUnit_Classification
- cfOrganisationUnit_Project
- cfOrganisationUnit_ResultPublication
- cfOrganisation_Funding
- cfProject_Project
- cfProject_Classification
- cfProject_ResultPublication
- cfProject_Funding
- cfResultPublication_ResultPublication
- cfResultPublication_Classification
- cfResultPublication_Funding
- cfFunding_Funding
- cfFunding_Classification

CERIF 2008 – 1.2 Semantics

- maintained within the Semantic Layer
- cfPerson_Person: Manager
- cfPerson_Person: Mentor
- cfPerson_Person: Supervisor
### CERIF 2008 – 1.2 Semantics

**cfPerson_Person-Roles**
- Manager
- Mentor
- Supervisor

**cfPerson_OrganisationUnit-Roles**
- Affiliation
- Subaffiliation
- Head
- Employee
- Member
- Director
- Deputy Director
- Dean
- Principle
- Head of Department
- Group Leader
- Manager
- Associate
- Fellow
- Reviewer
- Contractor
- Subcontractor

**cfPerson_OrganisationUnit-Roles**
- Administrator
- Researcher
- Junior Researcher
- Senior Researcher
- Consultant
- Junior Consultant
- Senior Consultant
- Lecturer
- Junior Lecturer
- Senior Lecturer
- Guest Lecturer
- Professor
- Assistant Professor
- Honorary Professor
- Visiting Professor
- Doctor (med)
- Research Fellow
- PostDoc
- ...
CERIF Semantics [Person-Publication Roles]

- Person_Person
  - is author of
  - is author (numbered) of
  - is author (percentage) of
  - is editor (numbered) of
  - is editor of
  - is reviewer of
  - is translator of
  - is subject of
  - is publisher of

Person_Person Scheme
CERIF Semantics [Some more examples]

- number of authors
- number of citations
- number of self citations
- number of external institutes
- number of downloads
- number of access
- number of requests
- area/type of research
- is of publication type
- received Best Paper Award
- claims for number of incoming citations
- ISI Impact Factor
- claims for number of self citations
- claims for number of authors
- claims for number of external institutes
- claims for number of downloads
- claims for number of access
- claims for number of requests
- claims for area/type of research
- claims for is of publication type
- claims for received Best Paper Award
- claims for ISI Impact Factor
Result_Publication Instance Diagram
(Slide partly by Keith Jeffery)

- Person A
  - Project leader
  - member
  - Project P
- Publication X
  - author
- OrgUnit M
  - member
  - employee
- OrgUnit N
  - member
  - Part of
  - own IPR
- OrgUnit O
  - Part of

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CERIF Semantic Layer

- **Allows to capture any Schema or Structure**
  - Flat Lists
  - Classification Systems (i.e. SKOS, FOAF, ...)
  - 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 Schemas**
### Maintaining the CERIF Semantics

#### CERIF 2008 – 1.2 Person-Person Roles

<table>
<thead>
<tr>
<th>efPerson_Person Terms</th>
<th>Descriptions</th>
<th>Source of Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager</td>
<td>in a person-person relationship takes the responsibility of managing persons.</td>
<td>CERIF TG / euroCRIS</td>
</tr>
<tr>
<td>Mentor</td>
<td>a wise and trusted guide and advisor</td>
<td><a href="http://wordnetweb.princeton.edu/perl/webwn?s=mentor">http://wordnetweb.princeton.edu/perl/webwn?s=mentor</a></td>
</tr>
<tr>
<td>Supervisor</td>
<td>one who supervises or has charge and direction of</td>
<td><a href="http://wordnetweb.princeton.edu/perl/webwn?s=supervisor">http://wordnetweb.princeton.edu/perl/webwn?s=supervisor</a></td>
</tr>
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</table>

- SBVR Vocabulary Term (Concept)
- SBVR Description
- SBVR Definition
- SBVR Example
- SBVR Synonym
- SBVR Source
What we currently have ...

CERIF Entities

- ExpertiseAndSkills
- Qualification
- Prize
- CV
- Citation
- Metrics
- Event
- Language
- Person
- OrganisationUnit
- Project
- ResultPublication
- ResultPatent
- ResultProduct
- Facility
- Equipment
- Funding
- Service
- ElectronicAddresse
- PostalAddress
- Country
- Currency

Current CERIF CORE

CERIF Semantics

CERIF Relationships
CERIF Strength

- A generic Research Domain Model
- Generic (binary) Relationships
- Scalability
- Sustainability
- Conceptual Descriptions (Research Domain)

- Relational Model (SQL)

- Formal (Semantic) Descriptions (SBVR)

- Exchange Format (XML, XML Schema)
- Based on W3C Standards
- Refers to XML Schema for Validation
- XML files corresponding to CERIF Structure -> Entities / Separation of Relationships
- Available Specification Document as part of the CERIF 2008 Release

http://www.euroCris.org/cerif/cerif-releases/
According to the CERIF Model Structure

- Base Entities
- Result Entities
- 2nd Level Entities
- Link Entities
- Multilingual Features
- Semantic Features
CERIF Interchange Format

<XML>
  <PERSON>
    <ID>1</ID>
    <URI>http://www.linkedin.com1</URI>
    <Gender>female</Gender>
  </PERSON>
  <PERSON>
    <ID>2</ID>
    <URI>http://www.linkedin.com2</URI>
    <Gender>male</Gender>
  </PERSON>
</XML>
CERIF Interchange Format

ResultPublication

<XML>
<ResultPublication>
  <ID>1</ID>
  <PublicationDate>2006</PublicationDate>
  <URI>http://www.epubs.org/ID1</URI>
</ResultPublication>
<ResultPublication>
  <ID>2</ID>
  <PublicationDate>2005</PublicationDate>
  <URI>http://www.greynet.org/thegreyjournal.html?ID2</URI>
</ResultPublication>
</XML>
CERIF Interchange Format

Person_Publication

- personID
- publicationID
- ClassID
- ClassSchemeID
- Fraction
- StartDate
- EndDate

<XML>
<Person_ResultPublication>
  <personID>1</personID>
  <publicationID>1</publicationID>
  <ClassID>1</ClassID>
  <ClassSchemeID>1</ClassSchemeID>
  <Fraction>0.3</Fraction>
  <StartDate>2010-01-01</StartDate>
  <EndDate>2010-12-31</EndDate>
</Person_ResultPublication>

<Person_ResultPublication>
  <personID>2</personID>
  <publicationID>1</publicationID>
  <ClassID>1</ClassID>
  <ClassSchemeID>1</ClassSchemeID>
  <Fraction>0.3</Fraction>
  <StartDate>2010-01-01</StartDate>
  <EndDate>2010-12-31</EndDate>
</Person_ResultPublication>

---</XML>
## CERIF Example (Integrated Person)

<table>
<thead>
<tr>
<th>CERIF Person</th>
<th>example database entry</th>
<th></th>
<th></th>
<th>Semantic Layer (CERIF Semantics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data</td>
<td>Attribute</td>
<td>Table</td>
<td>Type</td>
<td>Classification (ClassIds)</td>
</tr>
<tr>
<td>person-brigitte-joerg</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>
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## CERIF Example (Integrated Publication)

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CERIF XML Interchange Format

- Based on W3C Standards
- Refers to XML Schema for Validation
- XML files corresponding to CERIF Structure -> Entities / Separation of Relationships
- Available Specification Document as part of the CERIF 2008 Release

http://www.euroCris.org/cerif/cerif-releases/
Towards a CERIF Ontology

CERIF – Tutorial

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euroCRIS Membership Meeting May 25th, 2011, CINECA, Bologna

not final
CERIF Base Entities in Detail (ERM View)

- **Person**
  - cPersId
  - cSurname
  - cName
  - cBirthDate
  - cSex

- **OrganisationUnit**
  - cOrgUnitId
  - cName

- **Project**
  - cProjId
  - cProjName

- **Person**
  - cPersId
  - cSurname
  - cName
  - cBirthDate
  - cSex

- **OrganisationUnit**
  - cOrgUnitId
  - cName

- **Project**
  - cProjId
  - cProjName

- **CERIF Base Entities in Detail (ERM View)**

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Some CERIF Link Entities (ERM View)

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CERIF 2008 – 1.2 (November 2010)

- CERIF Model Introduction and Specification
- CERIF XML Data Exchange Format Specification
- CERIF Formal Semantics (Model-driven Vocabulary)
- CERIF SQL Scripts
- CERIF XML Schemas
- CERIF XML Examples

Ongoing:

- Current Core Semantics to be finalized with collibra (SBVR)
- CERIF XML Grouping / XML Schemas (via Ontology)
- Towards a CERIF Ontology
- Multiple Identifiers
- CERIF Interoperation Compatibility Model
- Infrastructure (Equipment / Facilities)
- Impact / Research Output
- Generate RDF Triples from CERIF Link Entities -> Linked Data
CERIF TG Meetings

- Brigitte Jörg, DFKI, DE (CERIF TG Leader)
- Keith Jeffery, STFC, UK
- Anne Asserson, UiB, NO
- Geert van Grootel, EWI, BE
- Jan Dvořák, InfoScience, CZ
- Henrik Rasmussen, atira, DK
- Luc Strijbosch, avedas, DE
- Thomas Vestdam, atira, DK
- Danica Zendulcova, CVTISR, SK
- Adrian Price, KU, DK

- CERIF Mailinglist
- CERIF Discussion Forum
- Increased International Membership

- Increased Consultation

- Projects / Activities / Implementations
Members outside of Europe:

Australia - Canada - China - Iran - Malaysia - Mexico - South Korea - USA
• UK Projects
  - CERIFY, BRUCE, MICE, IRIOS
  - Research Councils: Research outcomes project (ROP)
  - HEFCE: Research Excellence Framework (REF)
  - JISC:
    - Commissioned study (EXRI): recommended CERIF
    - Convened experts from stakeholders: accepted
    - Supporting several projects to demonstrate:
      - Business case for using CERIF
      - Feasibility of interoperation universities-universities and universities-funders using CERIF

• EU FP7-Infrastructures-2011-2
  - ENGAGE
  - OpenAirPlus
  - EuroRIs-Net+
Projects / Activities / Implementations

- Norway: FRIDA -> CRIStin
- Belgium: FRIS
- Denmark: PURE
- Sweden: Converis
- Netherlands: NARCIS / METIS
  -> Tender (CERIF-based system)
- Plans in Italy, Germany, Switzerland, Greece, Czech Republic, Slovakia, Russia, Austria, Slovenia
- euroHORCS recommended convergence to CERIF
- CERIF Requirement in recent Tender (ERC)
- ESF; MERIL project
- Reference by OpenAIRE

- Collaboration with VOA3R
- PURE, atira
- Converis, avedas
- Symplectic, UK
- uniCRIS, US
- Research in View (a CRIS), Thomson Reuters
- Contact with Elsevier
Upcoming Events

- Joint VOA3R-CERIF TG Meeting, End of July, University of Alcala, Spain

- CERIF TG Meeting, CVTISR Bratislava August 2011

- euroCRIS Seminar, Brussels September 2011

- Membership Meeting, Lille November 2011
– non-for-profit organisation, legally registered in The Netherlands
– promotion and improvement of communication and interaction between global CRISs
– work together to create value for members / the community
– Task Groups: Projects, CERIF, CRIS-IR, Best Practise, CRIS Architecture
– Strategic seminars from 2003 onwards
– maintain and publish the CERIF recommendation (Common European Research Information Format) and any standards endorsed by euroCRIS
– strategic partners: EC, ESF, EARMA, ALLEA, ICSU/CODATA, ERCIM, JISC, APA
– organize and run the CRIS series of conferences with associated workshops and other events;
– organize bi-annual Membership Meetings
http://www.eurocris.org/