euroCRIS, CERIF and CRIS

Ed Simons, Ph.D., Radboud University Nijmegen, the Netherlands
President of euroCRIS
Structure of the Presentation

• Short introduction of the Speaker
• euroCRIS “in a nutshell”
• The CERIF Research Information (meta)Data Model
• Concrete examples of application of CRIS (Netherlands, UK, Spain).
• Challenges
• Conclusions.
Introduction of the Speaker

- Ph.D. In Social Sciences

- Working at Radboud University, NL: Central “Concern Information Management” Department. (www.ru.nl/english)

- “International IT-project Manager” (especially IT-projects with universities in developing countries) Most recent project: OPUS-College: open source student registration and information system (www.opus-college.net).

- Initiator and project leader Dutch Research Information System (CRIS) “METIS”.
  - Since 2003: used by all Dutch universities and Royal Academy of Sciences.

- Since January 2013: President of euroCRIS.
The euroCRIS organisation

International nonprofit association, of users, experts and developers of research information systems (CRIS)

Mission statement: “Advancing exchange of Research Information through CERIF”

Main activity: development, maintenance and promotion of the CERIF metadatamodel, the “Common European Research Information Format”, a standard for the development of and interoperability between CRIS. CERIF is an official EU Recommendation to Member States.

Also: offering a platform for the exchange of ideas and experiences on CRIS and RI in general.

euroCRIS members range from institutions (universities, research institutes) over funding agencies (e.g. DFG) and national RI organisations (e.g. KNAW, SURF (nl), JISC (uk)) to vendors of CRIS systems (Atira, Avedas, Symplectic) and major publishers (e.g. Elsevier).

Currently 179 members from 43 countries, mainly Europe (but e.g. also Canada and US)
Strategic Partners of euroCRIS.
CERIF: Common European Research Information format

Strong points of CERIF:

- **Broad coverage**: metadata on all aspects of research information.
- **Detailed**: highly normalizes.
- **Optimal relational architecture**: Basic principle: expressing properties and semantics of the information objects and their relations by means of time-stamped links (linking entities) between the entities instead of as attributes of the entities. This makes the model very flexible and scalable:
  - Any number of relations can exist and be expressed between information objects in the model (e.g. various roles of a person in research at the same time)
  - Any level of granularity of the metaddata can be expressed. E.g. the role of a researcher concerning a publication can both be expressed according to the low-grained DC (creator, contributor) or by means of a more fine-grained classification (1st author, author, editor, reviewer, conductor of the experiment, etc...).
- **A separated “semantic layer”** allowing the use of multiple (any) controlled vocabularies (classifications, typologies) as well as their cross-linking and mapping.
- **Multi-lingual.**
CERIF Metadata Model: broad coverage

- **Persons** involved in the research and their possible roles (researcher, manager,...)
- **Organizations** involved: research institutions, funding agencies, partners, customers,...
- **Projects**: content description, academic domain, period, language, ...
- **Input**: both in terms of human (fte’s) and financial resources.
- **Output**: publications, patents, products, contributions to events, services rendered,...
- **Datasets used/produced**: identification, volume, location, access/use rights, ...
- **Equipment and services used/produced** in the research.
- **Metrics**: number of publications, citations, grants, awards, etc...
- **Impact on society**: economic, health, climate...
- **Semantic definitions**: controlled vocabularies, both for formal-administrative (e.g. typologies of roles in research or publication types) and content-related (e.g. taxonomies for a given scientific domain) characterization and clarification.
CERIF Metadata Model: broad coverage

- cfExpertise
- AndSkills
- cfExpertise
- cfFunding
- cfEquipment
- cfFacility
- Service
- cfCountry
- cfPostalAddress
- cfElectronicAddress
- cfGeographic
- BoundingBox
- cfPerson
- cfProject
- cfResultPublication
- cfResultPatent
- cfResultProduct
- cfOrganisation
- Unit
- cfResult
- Publication
- cfResult
- cfIndicator
- cfMeasurement
- cfLanguage
- cfCurrency
- cfFederatedIdentifier
- cfPrize
- cfQualification
- cfCurriculum
- Vitae
- cfCitation
- cfEvent
CERIF Metadata Model: optimal architecture

Person

Person_ResultPublication
role=author
role=author1
role=reviewer
role=... ?

Person_OrganisationUnit
role=CEO
role=researcher
role=project-manager

Person_Project
role=coordinator
role=manager

ResultPublication

Project

Project_ResultPublication
role=deliverable1.2
role=journal article
role=public report

OrganisationUnit

Project_OrganisationUnit

Project_OrganisationUnit_ResultPublication
role=author1-institute
role=editor
role=... ?

Person_OrganisationUnit_ResultPublication

Person_Project

Person_Project_ResultPublication

OrganisationUnit_ResultPublication

Role summary:
- author
- author1
- reviewer
- ... ?
- CEO
- researcher
- project-manager
- funder
- investigator
- member
- editor
- author1-institute
CERIF Metadata Model: optimal architecture

<table>
<thead>
<tr>
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<th>Type</th>
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<td>cfEndDate</td>
<td>datetime</td>
</tr>
<tr>
<td>cfFraction</td>
<td>double</td>
</tr>
</tbody>
</table>


cfResPubl_Class
For expressing Classification of Publication (e.g. the scientific field or subject area it belongs to)

cfPers_OrgUnit
For expressing Role of a Person in an Organization
Integrating the CERIF-solution are:

- CERIF-XML: for interoperability between CRIS and other RI systems and applications (e.g. OA Repositories).

- The ORCID unique researcher identifier.

- CASRAI dictionary definitions and profiles.
On top of CERIF research information systems (CRIS) were/are being built that – in the course of time – evolved from mere research assessment systems to multipurpose systems that can deliver a multitude of services to the various stakeholders in the research information ecosystem.

Currently some 150-200 implementations of CRIS in Europe.
Research Information: stakeholders

- Researchers
  - Finding collaborations, competitors, CV generation

- Decision Makers
  - Performance, strategic decisions, priorities, cross-country comparisons

- Funding Organisations
  - Distribution of programs, evaluation of results, finding reviewers

- Research Organisations
  - Integration and interoperability, strategic management

- Project Managers
  - Overview of ongoing activities

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

- SMEs
  - Finding information for participation in projects, partnerships, usage of results

- Media
  - Distribution and communication

- General Public
  - Information and education, interest

- Publishers
  - Finding reviewers

- Education
  - Integration of relevant information into lectures and training

- World
NL: Central position of CRIS in RI environment

CRIS in the RI Ecosystem: the Dutch Example

External Bibliographic Resources
- WoS, Scopus, PubMed, Reference Manager, ...

Publication Metadata (Web Service)

Citation Counts (Web Service)

Imported data presented for check
(cleansed) Publication metadata
(Personal METIS)

Researchers

Secretariat (Inst./Dept.)

Imported data presented for check
(cleansed) data on HRM, projects, ...
(Personal METIS)

Administrative systems (local, funders)
- HRM, Financial, PMS, ...

(Affiliations, f.t.e., financial data, ...)

(Web Service)

Institutional Repository
- URL to Full Text (Web Service)
- Repository Metadata (Web Service)

CV / Profiling / Reporting Applications

Data Warehouse/RMI Systems

Research + Publication Metadata
(Web Services)

Research Management Metadata
(Web Services)

National Systems/Portals

External Web Application
Formats (OAI/PMH/LOD)

Mods-DIDL/DC/LOD-RDF
(Web Service)

Metis CRIS
- Webservice endpoints (APIs, interfaces)
  - Promas (SOAP)
  - WSDL
  - Metis Rest Api (REST)

Webservice clients
- ISI (SOAP-achtig)
- Scopus (REST)

...
NL: Central position of CRIS in RI environment
### Table 5.2 Research staff at institutional and programme level

<table>
<thead>
<tr>
<th>Entire Institute</th>
<th>Non-tenured staff</th>
<th>Tenured staff</th>
<th>Total researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head of School</td>
<td>10</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Department</td>
<td>15</td>
<td>35</td>
<td>50</td>
</tr>
<tr>
<td>Center</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>60</td>
<td>90</td>
</tr>
</tbody>
</table>

### Table 5.3 Main categories of research output at institutional and programme level

<table>
<thead>
<tr>
<th>Year</th>
<th>Research papers</th>
<th>Conference papers</th>
<th>Books</th>
<th>Book chapters</th>
<th>Grants</th>
<th>Other research</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022</td>
<td>150</td>
<td>50</td>
<td>200</td>
<td>100</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>2023</td>
<td>160</td>
<td>60</td>
<td>250</td>
<td>110</td>
<td>25</td>
<td>55</td>
</tr>
<tr>
<td>2024</td>
<td>170</td>
<td>70</td>
<td>300</td>
<td>120</td>
<td>30</td>
<td>60</td>
</tr>
</tbody>
</table>

### Table 5.4 Funding at institutional and programme level

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Funding</th>
<th>Research Grants</th>
<th>Contract Research</th>
<th>Other (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022</td>
<td>$1,000,000</td>
<td>$2,000,000</td>
<td>$3,000,000</td>
<td>$4,000,000</td>
</tr>
<tr>
<td>2023</td>
<td>$1,200,000</td>
<td>$2,400,000</td>
<td>$3,600,000</td>
<td>$4,800,000</td>
</tr>
<tr>
<td>2024</td>
<td>$1,400,000</td>
<td>$2,800,000</td>
<td>$4,000,000</td>
<td>$5,200,000</td>
</tr>
</tbody>
</table>

### Table 5.5 Standard PhD-Candidates (1)

<table>
<thead>
<tr>
<th>Enrolment (male/female)</th>
<th>Total (male + female)</th>
<th>Graduated (≤ 4 years)</th>
<th>Graduated (≤ 5 years)</th>
<th>Graduated (≤ 6 years)</th>
<th>Graduated (≤ 7 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-8</td>
<td>#M #F</td>
<td>#</td>
<td>#/%</td>
<td>#/%</td>
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<tr>
<td>T-6</td>
<td>#M #F</td>
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<td>#/%</td>
<td>#/%</td>
<td>#/%</td>
</tr>
<tr>
<td>T-5</td>
<td>#M #F</td>
<td>#</td>
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<tr>
<td>T-4</td>
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<td>#</td>
<td>#/%</td>
<td>#/%</td>
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</tbody>
</table>

Note 1: Standard PhD-candidate with employee status and conducting research with primary aim/obligation to graduate; (AIO, promovendus)

### Table 5.6 Contract PhD-candidates (1)

<table>
<thead>
<tr>
<th>Enrolment (male/female)</th>
<th>Total (male + female)</th>
<th>Graduated (≤ 4 years)</th>
<th>Graduated (≤ 5 years)</th>
<th>Graduated (≤ 6 years)</th>
<th>Graduated (≤ 7 years)</th>
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<tr>
<td>T-4</td>
<td>#M #F</td>
<td>#</td>
<td>#/%</td>
<td>#/%</td>
<td>#/%</td>
</tr>
</tbody>
</table>

Note 1: Contract PhD-candidates without employee status, receiving external funding or university scholarships conducting research under the authority of the institute with primary aim to graduate; (beurspromovendus)
Researcher Profiles/CV’s generated from CRIS

Erasmus Research Institute of Management

D.L. (Daan) van Knippenberg

Full Professor

Professor of Organizational Behavior

Department of Organization and Personnel Management

Erasmus University Rotterdam

T: +31 10 4082058
E: daan.vanknippenberg@erasmus.nl

Programme: Organisation

ERM Membership: Fellow ERM (since 2002)

Profile

Publications (161)

A cross-level perspective on employee creativity: Goal orientation, team learning behavior, and individual creativity. Academy of Management Journal, 52(2), 280-293.


Articles (119)

Centres

Leadership

Latest publication


Latest news


In her PhD thesis entitled Morality in Interactions: On the Display of Moral Behavior by Leaders and Employees, Suzanne van Gilis analyses the interplay between employees and their organisational environment.
This table shows the overall production in ISI journals. The results are shown in the so-called 'quartile performance countings'. For example ISI 1st are publications in the highest 25% of the subject category (the so-called 'ISI 1st' quartile) averaged over the most recent 8 years.
NL: CRIS-Repository Interaction
UK: MICE: Measuring Impact in CERIF

MICE: a UK project to define societal (economic, health, climate, etc..) impact indicators for research (2011).

Outcome: A broad taxonomy of impact indicators has been defined and the CERIF model has been extended in order to be able to deal with these impact indicators.

- Economic
- Environment
- Health
- Social
- Cultural
- Legal
- Public policy
- .....
MICE: Measuring Impact in CERIF

Impact indicators
economic and commercial (3)
  economic
    impact on business (1)
    improving performance of existing businesses (1)
      increased turnover (1)
      time savings (3)
      reduced costs (1)
      fuel savings
    success measures for new products (1)
    revenue growth
    reduced financial risk
    increased productivity
MICE: Measuring Impact in CERIF

social/cultural/environmental (3)
    environmental
        sustainable development (1)
            environmental sustainability (1)
                reduced pollution (1)/ waste (3)
                    recycling rates (3)
                improved waste management (3)
                reduced consumption of natural resources (3)
                regeneration of natural resources (1)
        new technologies/processes/services (1)
            monitoring (2)
            risk assessment (2)
    behavioural changes (1)
MICE: Measuring Impact in CERIF

health

health sector (1)
improved patient care (1)

reduced treatment times (1)
reduced treatment costs (1)
equal access to services (1)
changes to clinical/healthcare training/practice/guidelines (1)
new or improved drugs (1)
new or improved treatments/medical interventions (1)
number of advanced phases clinical trials (1)
changes to clinical policy (2)
improved health outcomes (1)
lives saved (1)
reduced infection rates (1)
Improved quality of life for patients (2)
UK: CERIF-y ing the Snowball Metrics

euroCRIS currently is involved in a project with Elsevier and a few universities from the UK aimed at expressing the “Snowball Metrics” in CERIF.

Snowball Metrics: a set of indicators for inter-institutional benchmarking of research.
Snowball Metrics
GLOBAL STANDARDS FOR INSTITUTIONAL BENCHMARKING

www.snowballmetrics.com

WHAT ARE SNOWBALL METRICS?

- Metrics that support institutional strategic decision making through benchmarking
- Defined and agreed by higher education institutions themselves
- Aspire to become global standards and cover the entire spectrum of research activities
- Tested methodologies are freely available and can be generated by any organization
- Can be generated independent of data source

WHY IS THIS INITIATIVE IMPORTANT TO THE HIGHER EDUCATION SECTOR?

- A myriad of metrics is available, compounded by many similar versions of the same metric
- Difficult to know which metric will give the most useful insights, whether a metric is being calculated appropriately, or whether other institutions are looking at things in the same way
- Built by the sector, Snowball Metrics create consistency and facilitate benchmarking between peer institutions
- The Snowball Metrics initiative invites all research institutions, funding agencies, government groups and suppliers to apply the framework
Snowball Metrics
GLOBAL STANDARDS FOR INSTITUTIONAL BENCHMARKING

www.snowballmetrics.com

PROJECT PARTNERS

- University of Oxford
- University College London
- University of Cambridge
- Imperial College London
- University of Bristol
- University of Leeds
- Queen’s University Belfast
- University of St Andrews
- Elsevier
INPUT METRICS

• Applications Volume
• Awards Volume

PROCESS METRICS

• Income Volume
• Market Share

OUTPUT METRICS

• Scholarly Output
• Citation Count
• h-index
• Field-Weighted Citation Impact
• Outputs in Top Percentiles
• Collaboration
Spain: expressing the CVN in CERIF

euroCRIS is currently involved in a project with FECYT to express the “normalized CV” (CVN) for researchers, a CV-format used in the whole of Spain.

A first draft version is ready. This means that it will be possible to directly generate the CVN from the metadata in a CRIS based on CERIF.
A plethora of metadata models and formats exists within the research information domain, both concerning “generic” aspects (i.e. metadata applicable to all disciplines) as well as “discipline- or subject-specific” metadata (controlled vocabularies that hold content- or aspect-specific classifications related to a given scientific discipline or research subject e.g. the MeSH-classification for Medical Sciences).
Challenges for euroCRIS and CERIF

To intensify and optimize our relationship with “neighbouring” stakeholders in the Research Information Ecosystem: CASRAI, ORCID, VIVO, RDA, Lattes, Repository community, ....

Promote the use and implementation of the CERIF data model, also outside of Europe

Data quality:
• On time and up-to-date availability of research information data is often a problem.
• Data quality in external resources is often questionable, also with the “big guys” (Scopus, WoS). E.g. errors concerning affiliations of researchers, multiple “unique” identifiers. Leading to time-consuming and costly data cleaning and validation.
• Relying on external resources holds the risk of loosing accountability ownership.

Combining/integrating the possibilities of CRIS with new, emerging technologies (big data analysis, visualisations, ...).
Conclusions

euroCRIS has developed a (metad)data model – CERIF - that covers most aspects of research information.

This data model is widely being accepted and implemented as the standard for registration and interoperability of research information in European countries.

Given the broad coverage and the architecture of CERIF, CRIS can perform a pivotal or “spider in the web” (interoperability) function in the research information ecosystem

Apart from being an “interoperability engine”, CERIF-CRIS can perform multiple services to the various stakeholders or use cases in the RI domain, including the aspect of metrics and impact measurement.
Thank you for your attention!

And be welcomed to cooperate with or become a member of euroCRIS

www.eurocris.org

First step: to CERIF-y the STAR Metrics?