Metadata in the wild
– the laborious creation of a new international standard for describing learning resources

Tore Hoel

Oslo University College

vice chair CEN WS-LT

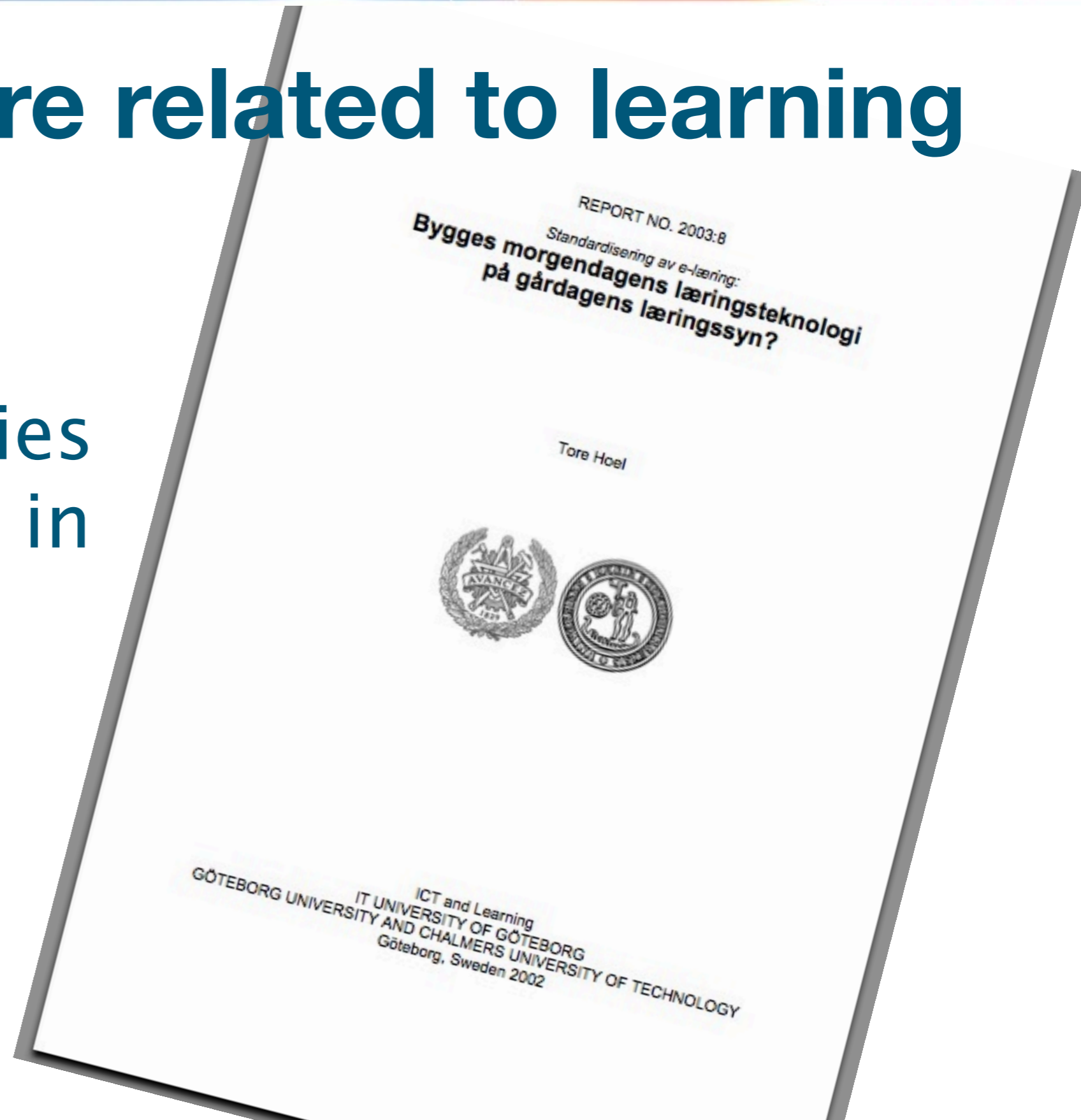co-editor ISO MLR Part 5 Educational

Vienna 2009-11-12

oslo university college

www.hio.no

Me (and where I am, related to metadata)

- Vice chair CEN WS–LT

- Work Package co–leader Dissemination & Roadmapping ICOPER
  (EU funded project on competency–based learning)

- Co–editor MLR Part 5 Educational of ISO/IEC JTC1 SC36 WG4

- Worked on metadata since 2002 (same year WG4 was established)

Standards are related to learning theories!

- 2002: What learning theories are embedded in IEEE LOM and SCORM?

REPORT NO. 2003:8

Standardisering av e-læring:
Bygges morgendagens læringsteknologi
på gårdagens læringssyn?

Tore Hoel

ICT and Learning
IT UNIVERSITY OF GÖTEBORG
GÖTEBORG UNIVERSITY AND CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden 2002

Me, You, Us – in context

Brian Lamb at WCET

04:13 / 10:00 HQ

Brian Lamb
Emerging Technologies Discoordinator, OLT UBC http://olt.ubc.ca/
Vancouver Canada

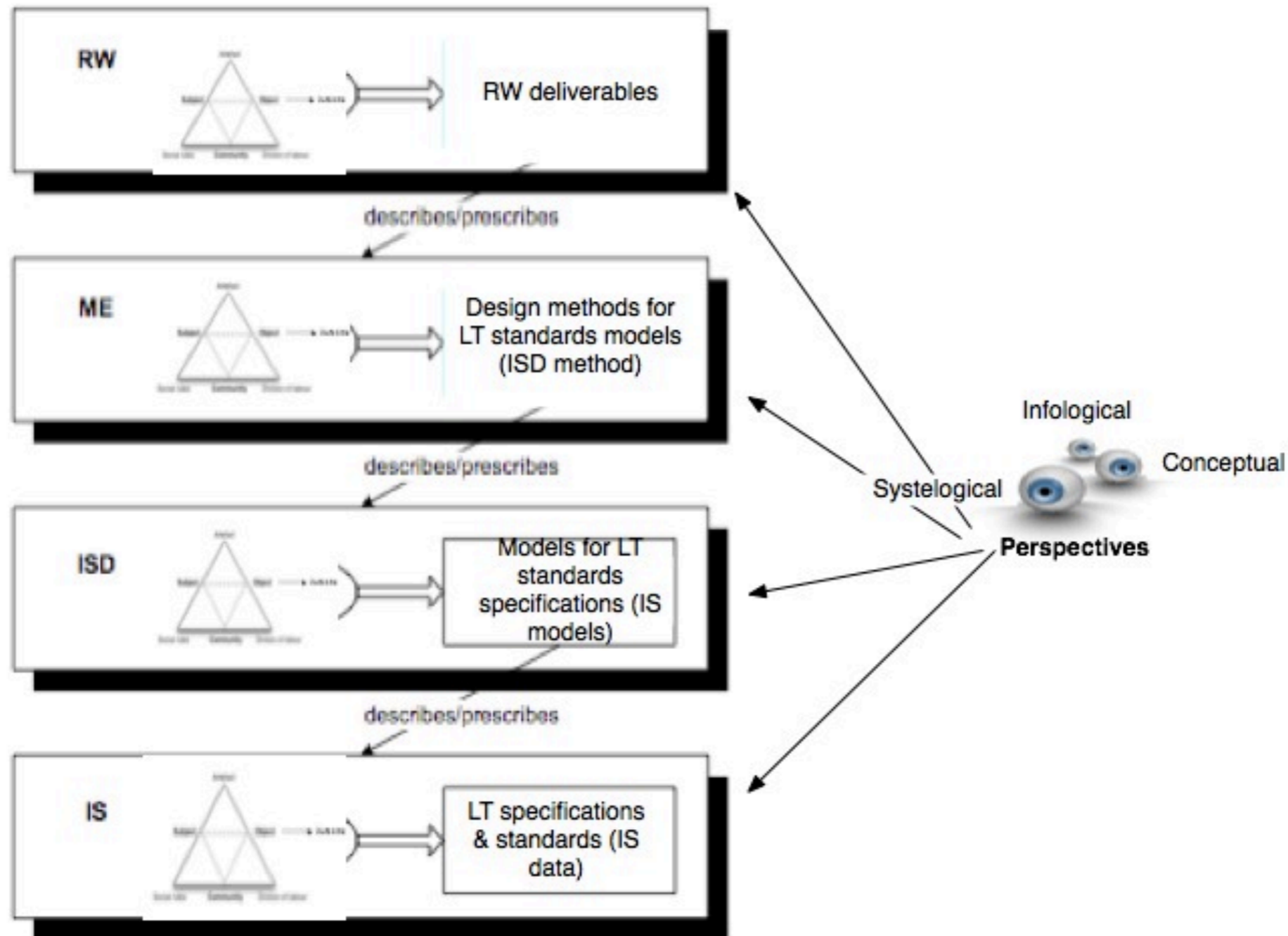# Me, You, Us – in context

- Extinct concepts:
  - Learning object
  - Repositories
  - Metadata records
- Now: We just search for it

Brian Lamb at WCET

04:13 / 10:00

Brian Lamb
Emerging Technologies Discoordinator, OLT UBC http://olt.ubc.ca/
Vancouver Canada

Perspectives on metadata

The MLR story: International standardisation gone wild

- MLR = Metadata for Learning Resources
- What is an international standard?
- The process
  - The personalities
  - Formalisms, often for the sake of formalism
- What problems are the standard supposed to solve?

Polish – repeated

Lessons from another SC36 project

What we did …

- Take some proven specifications
- Convert them to an ISO/IEC standard
- Produce common vocabularies

and now we will

- Produce more parts
- Provide guidance on how to use them
- Disseminate the results …

Source: Presentation Australian expert SC36 WG7 document 2008

Lessons from another SC36 project

What we did ... (really)

- Take some proven ~~specifications~~ applications
- Convert them to ISO/IEC ~~standard~~ speak
- Produce common ~~vocabularies~~ words

and now we will

- Produce more parts
- Provide guidance on how to use them
- Disseminate the results ...

Source: Presentation Australian expert SC36 WG7 document 2008

ISO Standardisations should be based on

- Proven practice from the field
- Tested specifications
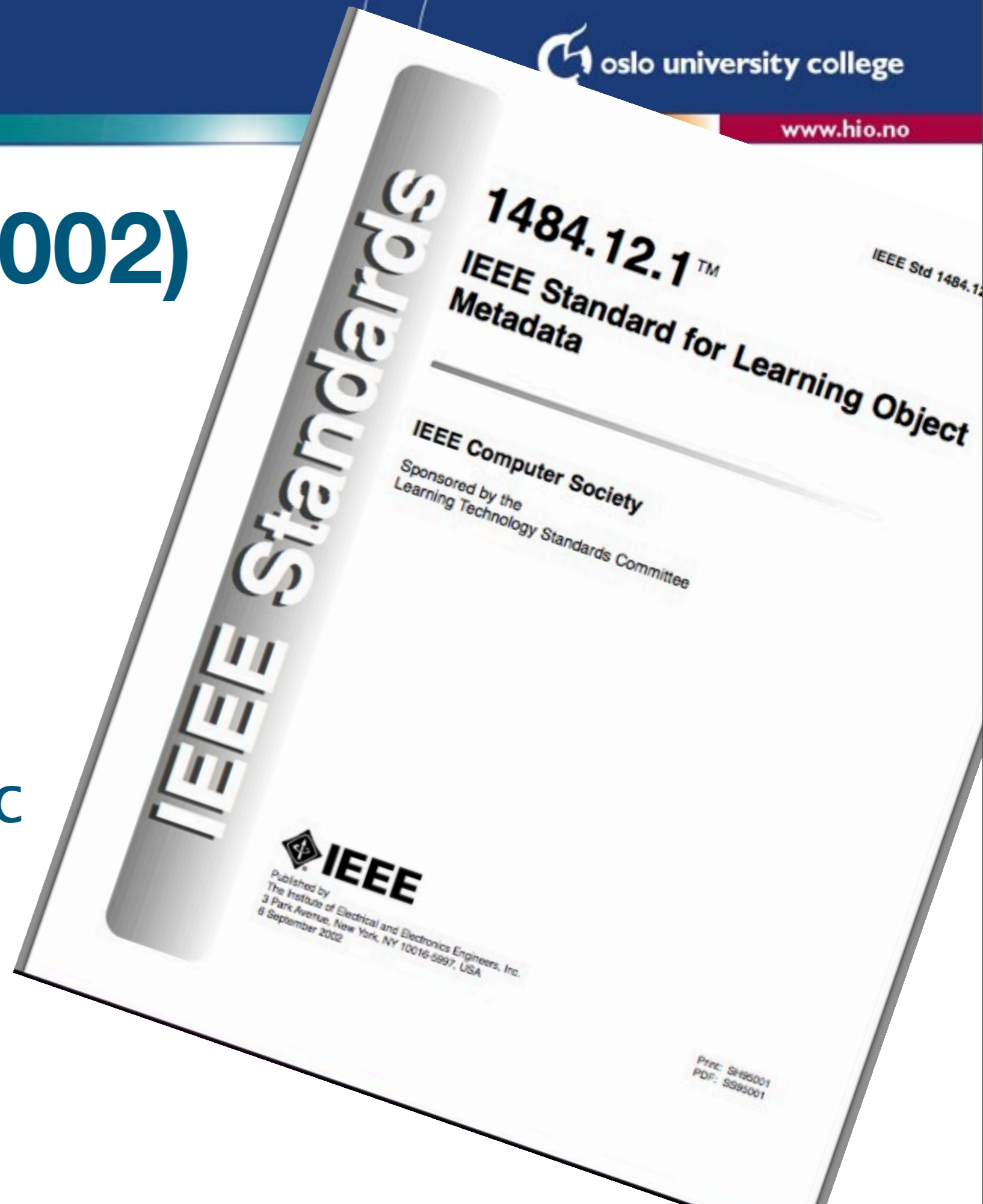- Stakeholder needs and commitment

ISO Standardisations should be based on

- Proven practice from the field
- Tested specifications
- Stakeholder needs and commitment

What was the case for learning technologies?

IEEE LOM (2002)

- Our first e-learning standard!

- Superseded IMS LR metadata spec

- Should it be fast-tracked as an ISO standard?

1484.12.1 ™
IEEE Standard for Learning Object Metadata

IEEE Computer Society

Sponsored by the
Learning Technology Standards Committee

IEEE Std 1484.12

IEEE Standards

IEEE

Published by
The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA
6 September 2002

Print: SH95001
PDF: SS95001

Dublin Core

- Developed since mid 1990 – describing all kinds of web resources
- 2009 a ISO standard (16836)
  - (But only the Simple Dublin Core – 15 elements)

INTERNATIONAL STANDARD

ISO 15836

Second edition
2009-02-15

Information and documentation — The Dublin Core metadata element set

Information et documentation — L'ensemble des éléments de métadonnées Dublin Core

INTERN BRUK

Reference number
ISO 15836:2009(E)

© ISO 2009

ISO/IEC JTC1 SC36 WG4 on Management and Delivery for Learning, Education, and Training

- Sept 2002: New WG4 established
- 2003: New Work Item on Metadata for Learning Resources (MLR)
  - 13 approve; 1 no (Sweden)
    - "Still, Sweden is of the opinion that the SC36 version of LOM is a compromise that hardly fits as a standard to build on for future needs.
    - Sweden believes future work within SC36 should be based on a fully new approach on metadata modeling."

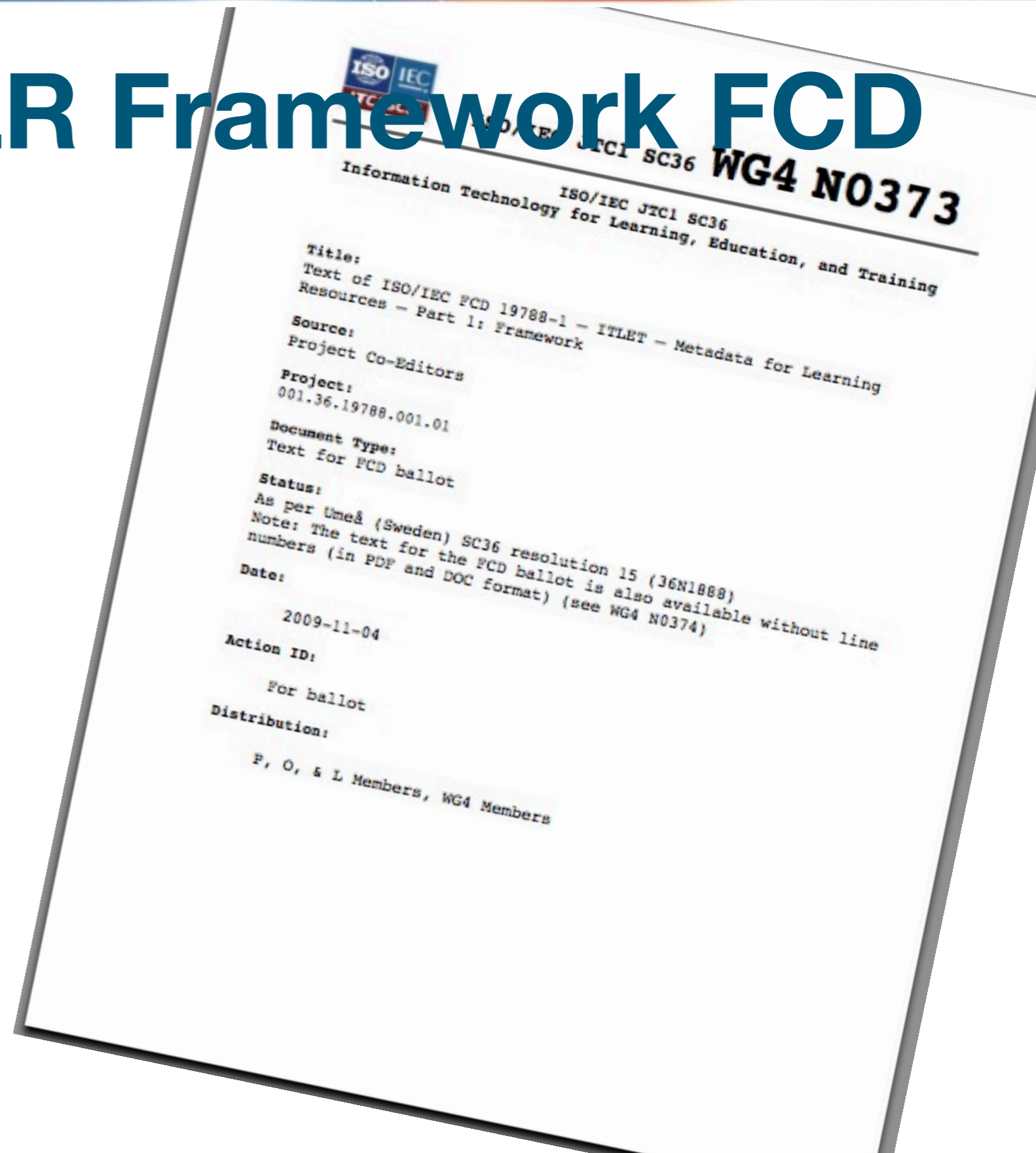# 2003: What motivated Sweden's no vote?

SC36_WG4_N0007.pdf (page 22 of 22)

The report has introduced a number of angles on metadata and metadata management. It is perfectly clear that, from a metadata perspective, data management and conceptual modelling appears to be new, at the same time as it is fairly conventional from a data perspective. All current trends indicate that a description of the resources that can be found and managed over the Internet will play a key role in the growth of the next web generation, one that presently goes under the name of the "Semantic Web". To this end established and generally accepted conceptual modelling languages will be needed by which presumably an almost endless number of conceptual models may be created.
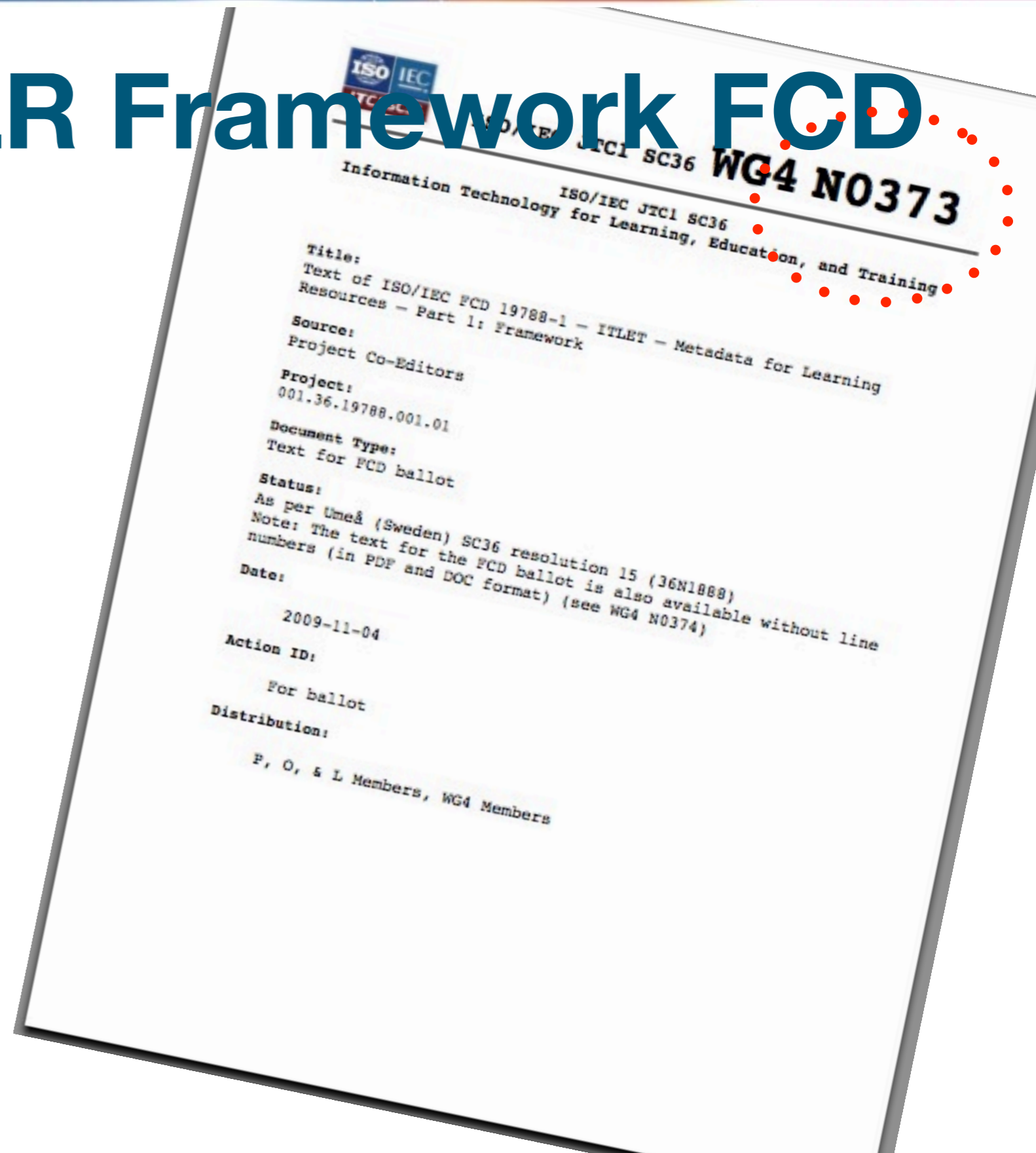
WG4 Working document No 7 of 2003-01-16
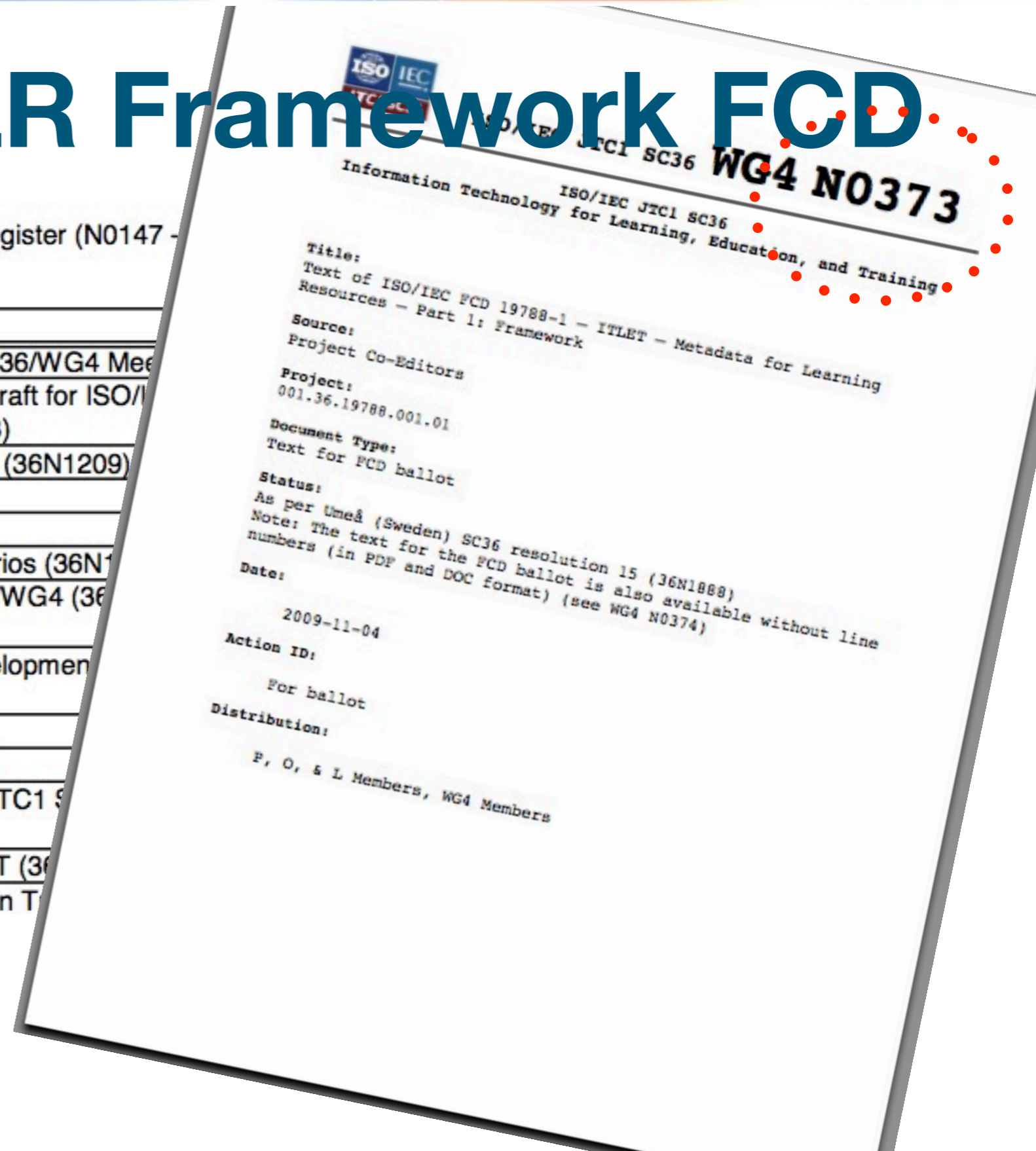
Nov 2009: MLR Framework FCD

Nov 2009: MLR Framework FCD

Nov 2009: MLR Framework FCD

ISO/IEC JTC1 SC36 **WG4 N0373**

ISO/IEC JTC1 SC36
Information Technology for Learning, Education, and Training

Title:
Text of ISO/IEC FCD 19788-1 – ITLET – Metadata for Learning
Resources – Part 1: Framework

Source:
Project Co-Editors

Project:
001.36.19788.001.01

Document Type:
Text for FCD ballot

Status:
As per Umeå (Sweden) SC36 resolution 15 (36N1888)
Note: The text for the FCD ballot is also available without line
numbers (in PDF and DOC format) (see WG4 N0374)

Date:
2009-11-04

Action ID:
For ballot

Distribution:
P, O, & L Members, WG4 Members

Nov 2009: MLR Framework FCD

Document_Register (N0147 -

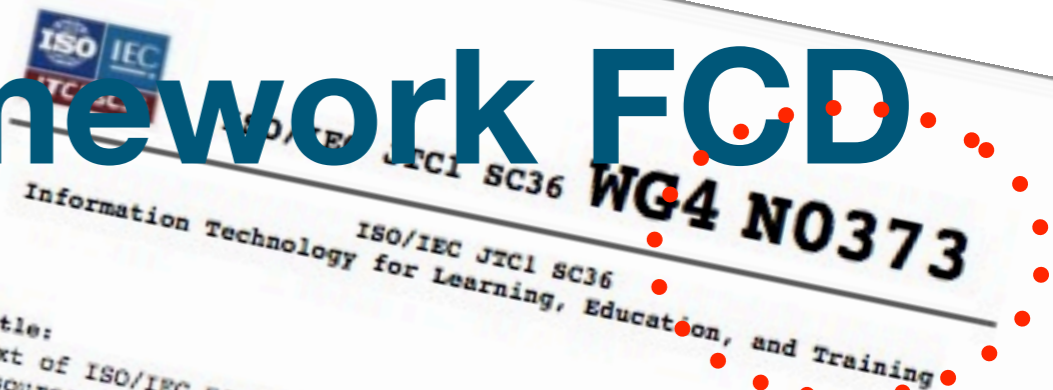| WG4 #	Title
N0147	Resolutions of the 2006-03 ISO/IEC JTC1 SC36/WG4 Mee
N0148	DCMI Comments on WG4 N0145: Working Draft for ISO/I Resources – Part 2: Data Elements (36N1203)
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N0154	Contribution to "Principles governing the Developmen (36N1233)
N0155	Flexible Hierarchy For Metadata (36N1235)
N0156	Hierarchy Attributes For Metadata (36N1236)
N0157	Final Draft Agenda for the 2006-03 ISO/IEC JTC1 S (36N1253)
N0158	Aviation Industry Metadata Description DRAFT (36
N0159	SC36 Plenary Report of SC36/WG4 Meeting in T

ISO/IEC JTC1 SC36

WG4 N0373

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N0155	Flexible Hierarchy For Metadata (3)…
N0156	…

ISO/IEC JTC1 SC36

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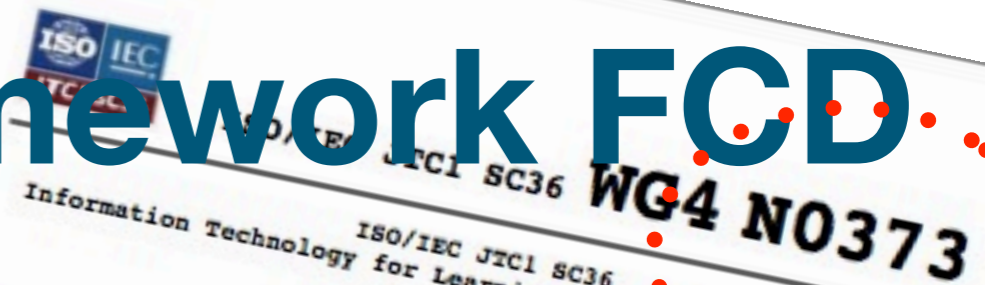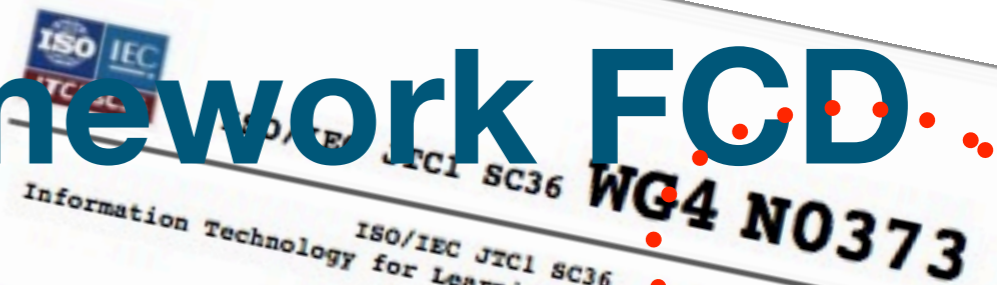
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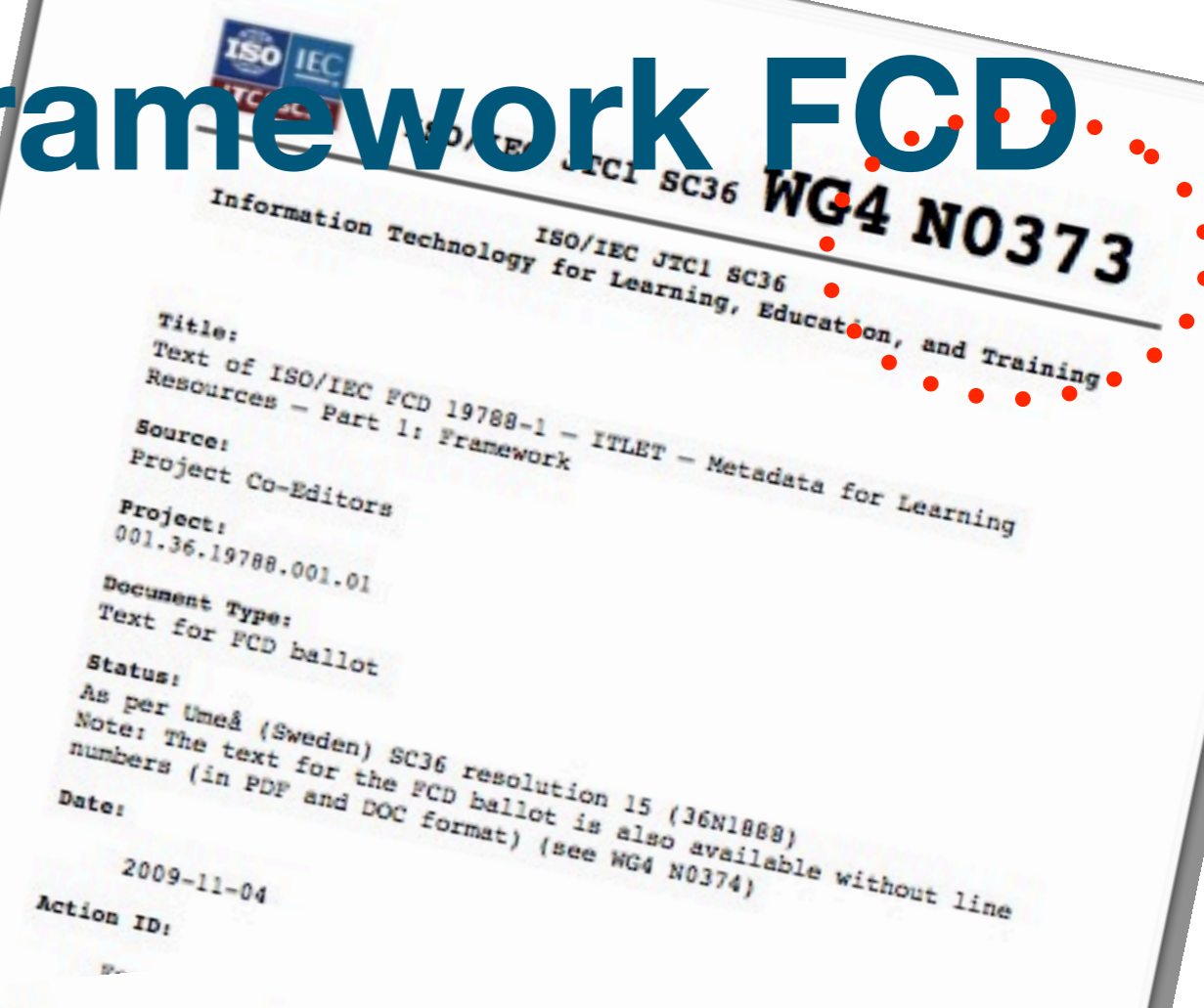
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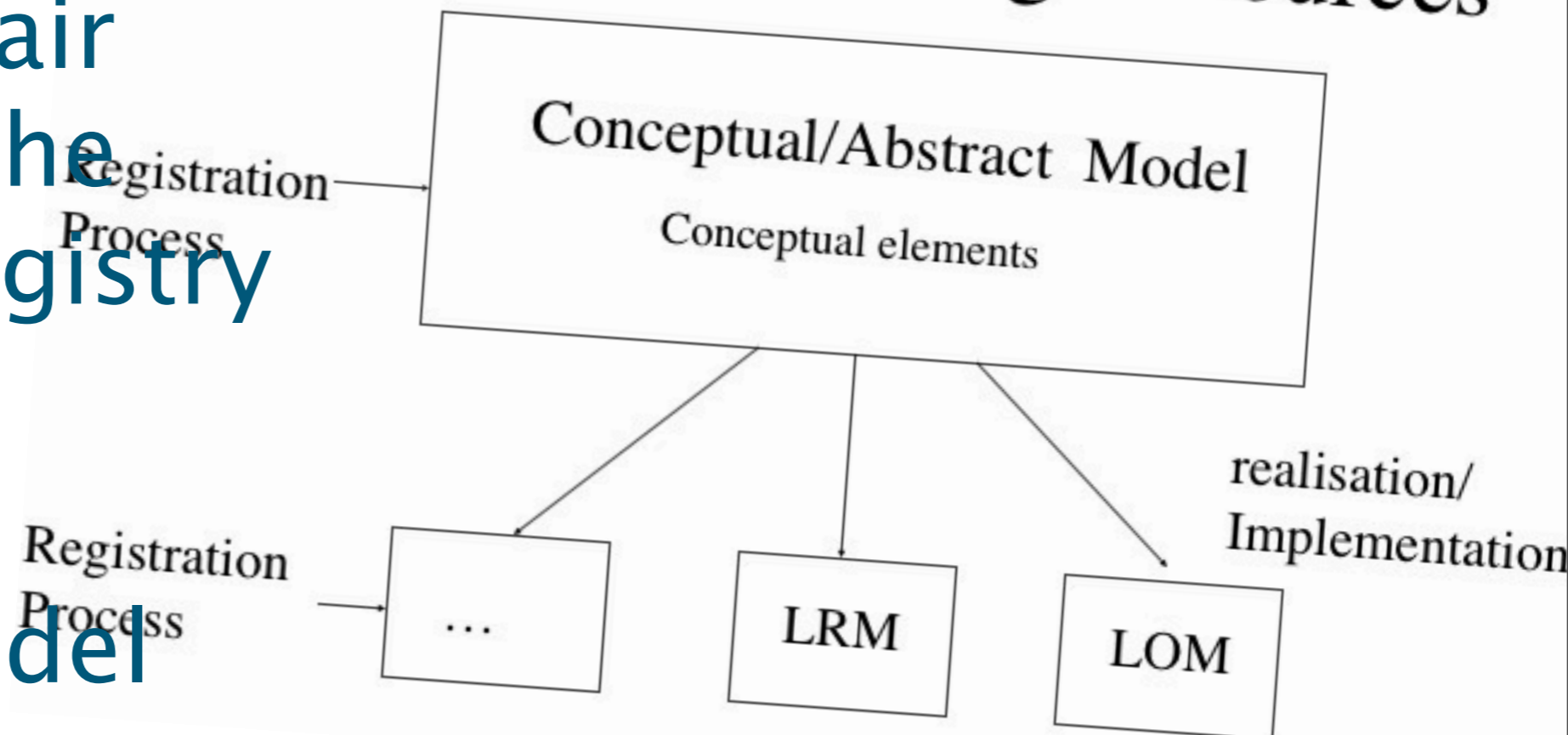
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Nov 2009: MLR Framework FCD

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Information Technology for Learning, Education, and Training

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MLR first years

- The WG4 chair champions the Metadata Registry (ISO 11179) approach
- Abstract model necessary

Metadata for Learning Resources

Registration Process → Conceptual/Abstract Model

Conceptual elements

Registration Process → ...

LRM

LOM

realisation/ Implementation

LOM survey 2003

Conclusion

The general, preliminary findings of this survey --themselves a product of interpretation-- invite further interpretation and speculation about the LOM and the way it tends to be implemented. However, it seems clear that a number of these findings support the conclusion that fewer and better defined elements might be more effective than the range of choice and interpretive possibilities currently allowed by the LOM. This seems to be especially the case regarding educational elements, which are surprisingly underutilized for metadata that it ostensibly and primarily educational. The need for a smaller number of elements is further supported by the common identification of Dublin Core element equivalents in the application profiles surveyed. There are also a number of findings supporting the conclusion that clear and easily-supported means of working with local, customized vocabularies would also be very valuable --and that the means of retaining a minimum of interoperability between these variant vocabularies would also be important. Finally, it also seems useful to ensure that structures are provided to accommodate complex but more conventional aspects of resource description. These would include multiple title versions, as well as multilingual descriptions and values.

WG4 document N0057 2003-09-03

The document mill

- 2003: Work started
- During 2004: 135 documents
- End of 2005: 145
- End of 2006: 180
- End of 2007: 233
- End of 2008: 305
- And now 2009: 373 WG4 documents + all the other SC36 documents

The exhausting MLR process – what is it about?

- IEEE LOM / DC compatibility
  - Interoperability – how is it understood?
- A global metadata standard – what is it?
  - Application profiles – which role do they play?
- What is the metamodel (Abstract model) of the standard?
- And then again, the personalities' role in standardisation

Interoperability

- Full compatibility with both DC and LOM is not possible (ref the strive for a RDF binding of LOM)
- LOM elements not usable in combination with DCMI elements (e.g. Dublin Core APs)
  - The concept of "element" differ substantially between the two standards
  - Surface interoperability:
    - XML namespaces
    - RDF
  - ...but the interpretation of these expressions differ

Application profiles – DC view

Application profiles – DC view

Application Profile

Usage Guidelines

annotate

Functional Requirements ← built on — Domain Model ← built on — Description Set Profile ← built on — Syntax Guidelines and Data Formats

Domain standards

uses → Community Domain Models

uses → Metadata Vocabularies

built on → DCMI Abstract Model ← built on — DCMI Syntax Guidelines

Foundation standards

built on → RDF/S — built on → RDF

built on

3.1
application profile (in MLR)
defined structured collection of **data element specification**s (from the various Parts of the ISO/IEC 19788 multipart standard and from other sources) chosen to satisfy the particular needs of a Community, or communities

Interpreting metadata between two DC applications
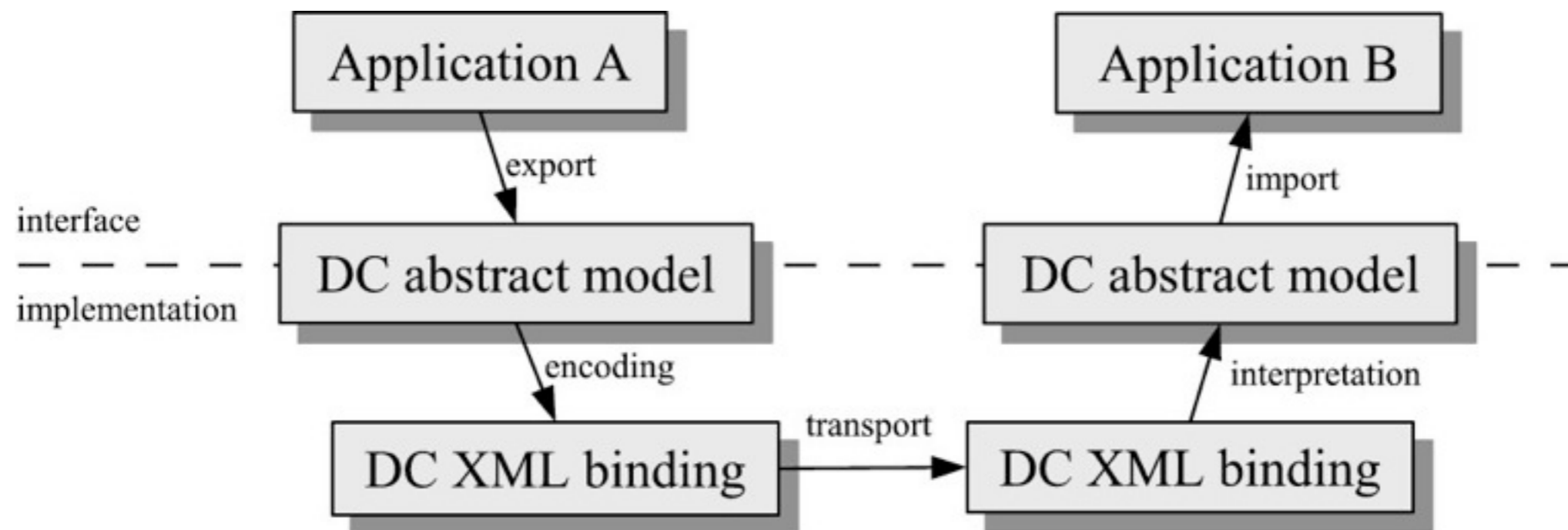
Combining XML fragments from DC and LOM
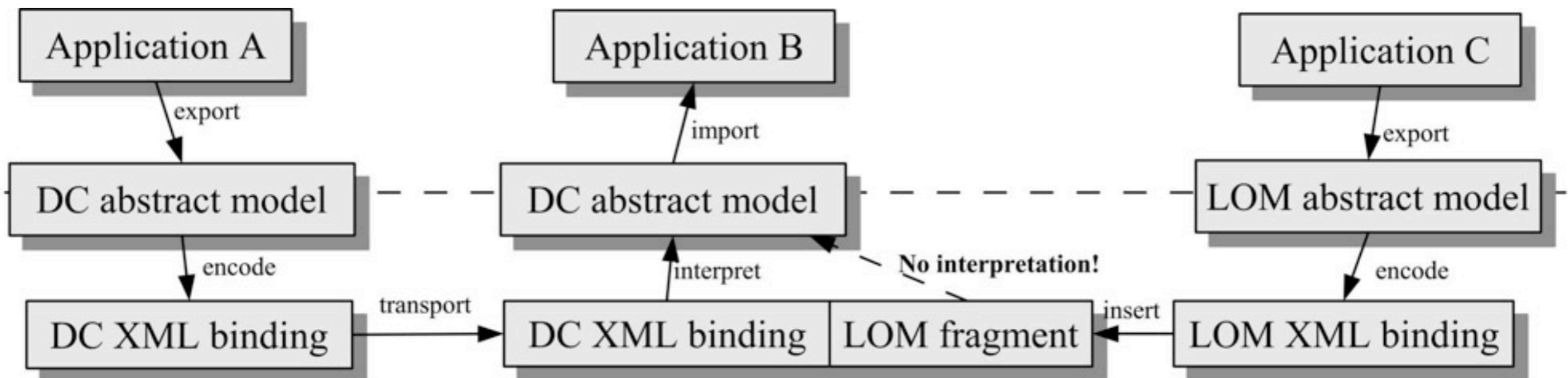
Combining RDF fragments
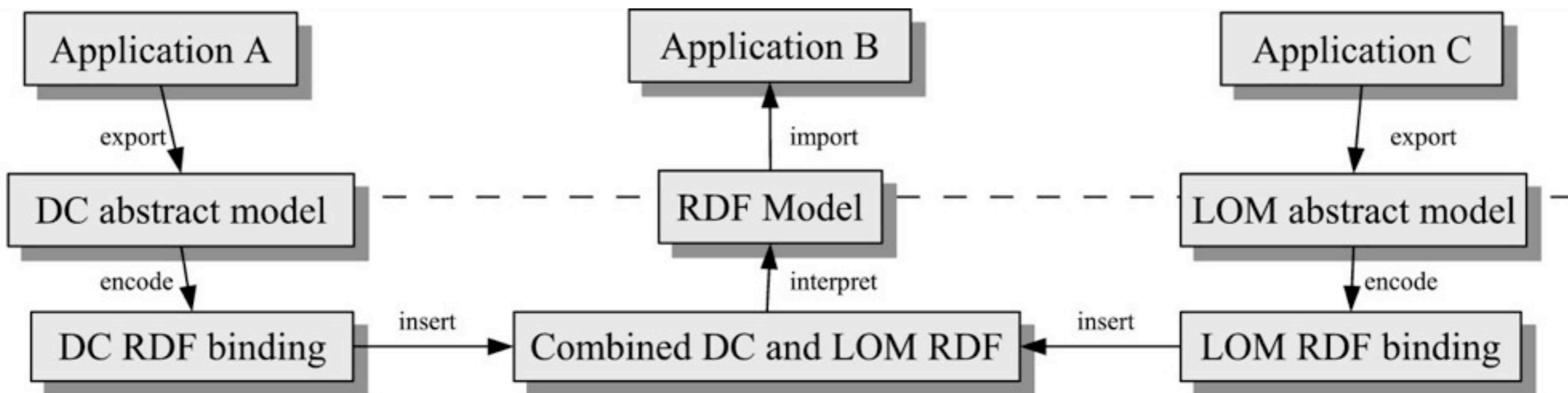
What is wrong with LOM?

- Too complex
  - (the "semantic density"is to high?)
- Identification of data elements done by referring to names (labels)
- Lots of "hidden" semantics in the structure of the elements
- Use of compounds – (boxes within boxes)

The MLR U-turn –
the "Semantization project"

- Document WG4_N0278
- Late 2007 – 2008
  - Co-ordinated efforts
  - The importance of written expert contributions (if views not in a N document, do not count)
- Btw, where was Google at that time?

Introductory slide of Mikael Nilsson Stuttgart Sept 2008

- Islands of metadata interoperability, for example
  - The "LOM island" – IEEE LOM and LOM–based profiles
  - The "MODS island"
  - The "MPEG–7 island"
  - The "Dublin Core & RDF island"
- Two approaches to Application Profiles
  - Base standard – profiles customise the base
  - (LOM, MODS, MPEG–7)
  - Framework only, profiles combine terms arbitrarily (Dublin Core, RDF)   <-- MLR wants to be here (?)

25
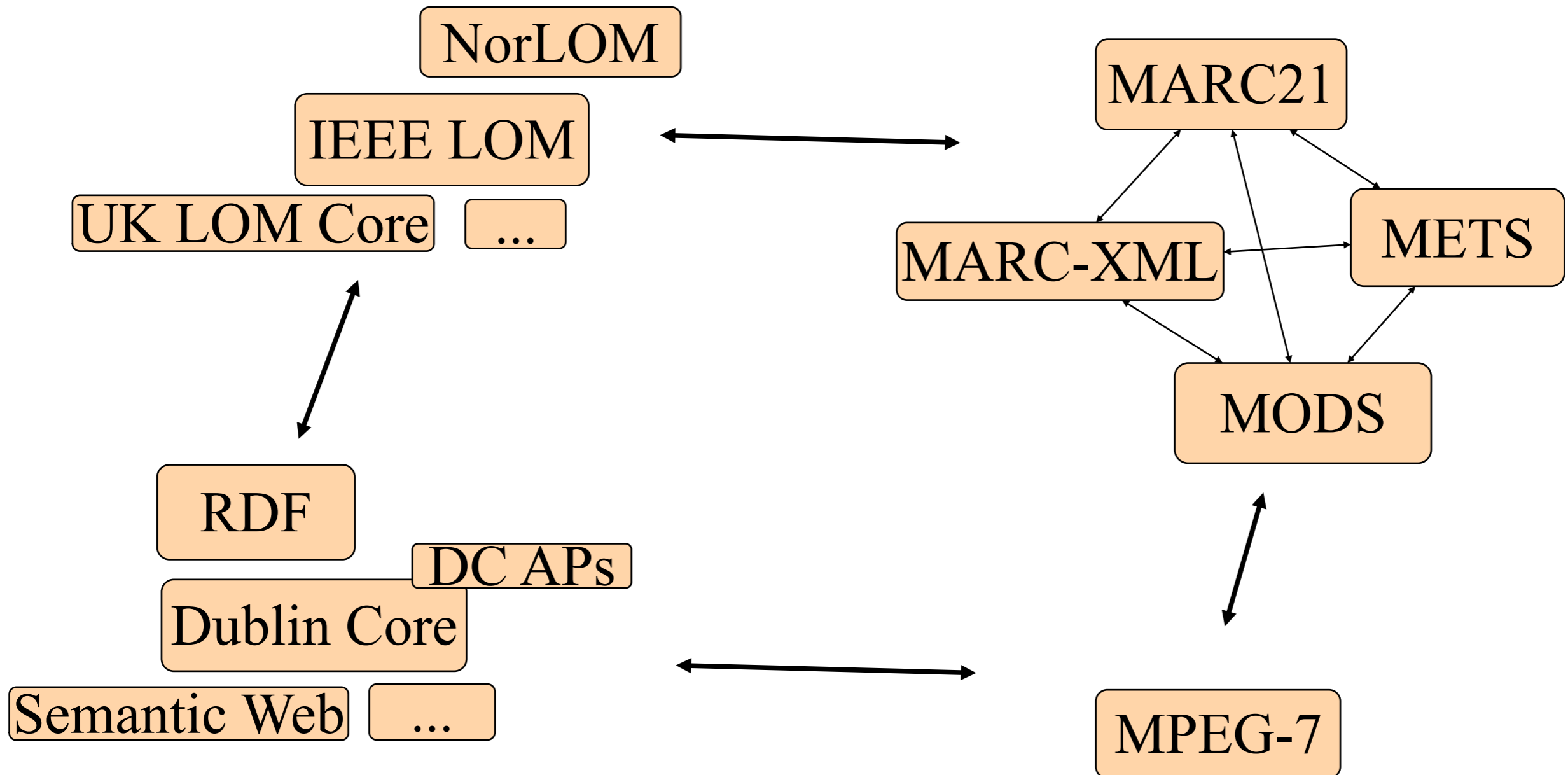
Metadata interoperability vision

Education
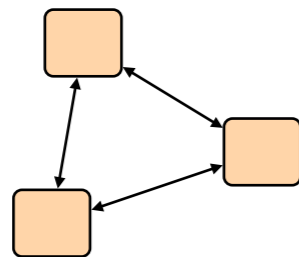
Libraries
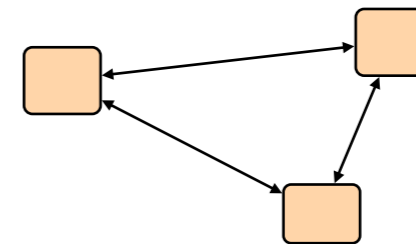
Government
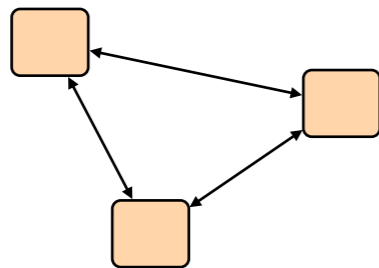
Multimedia
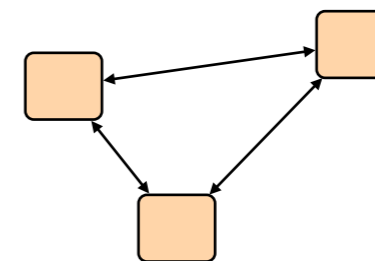
Semantic Web

Levels of interoperability

- Human interoperability – **words**
  - Use the same definition of words, regardless of technical framework
- Semantic interoperability – **the cloud**
  - Machines apply the same processing to terms whereever they appear
  - This is the purpose of RDF
- Profile interoperability – **the domain**
  - Domain-specific interoperability based on shared profiles, vocabularies, etc.
  - Quality control, syntax validation etc.

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Proposal for MLR

- DON'T create a new metadata island
  - DON'T create a need for more crosswalks
- DO use a framework–based approach
  - DO allow for application profiles combining terms from other sources
- DON'T reinvent the framework
  - DON'T require others to redefine their terms for use in MLR
- DO base the framework on the RDF model

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"Follow your nose"

http://xmlns.com/foaf/0.1/knows

http://example.com/persons#john

http://example.com/persons#gordon

HTML

RDF Schema
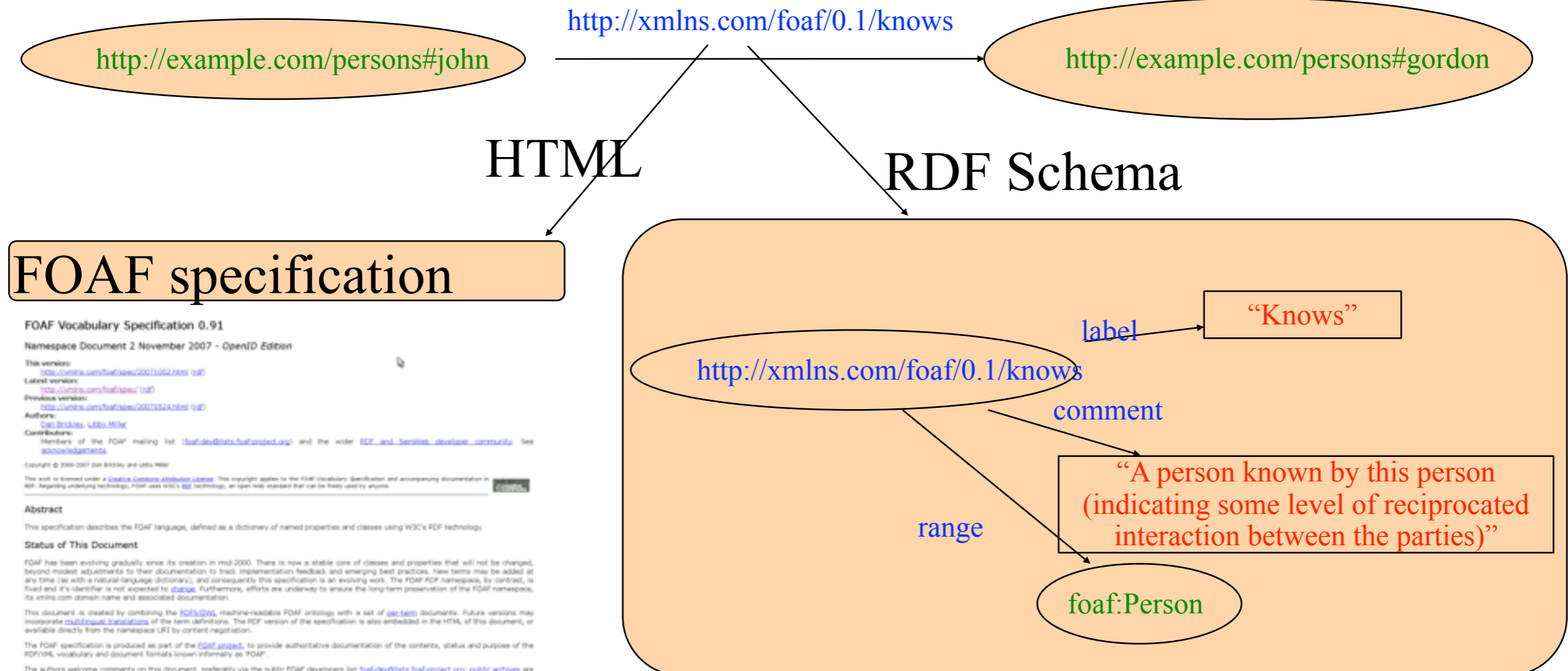
FOAF specification

FOAF Vocabulary Specification 0.91

Namespace Document 2 November 2007 - *OpenID Edition*

This version:
   http://xmlns.com/foaf/spec/20071002.html (rdf)
Latest version:
   http://xmlns.com/foaf/spec/ (rdf)
Previous version:
   http://xmlns.com/foaf/spec/20070524.html (rdf)
Authors:
   Dan Brickley, Libby Miller
Contributors:
   Members of the FOAF mailing list (foaf-dev@lists.foaf-project.org) and the wider RDF and Semantic developer community. See acknowledgements.

Copyright © 2000-2007 Dan Brickley and Libby Miller

This work is licensed under a Creative Commons Attribution License. The copyright applies to the FOAF Vocabulary Specification and accompanying documentation in RDF. Regarding underlying technology, FOAF uses W3C's RDF technology, an open Web standard that can be freely used by anyone.

Abstract

This specification describes the FOAF language, defined as a dictionary of named properties and classes using W3C's RDF technology.
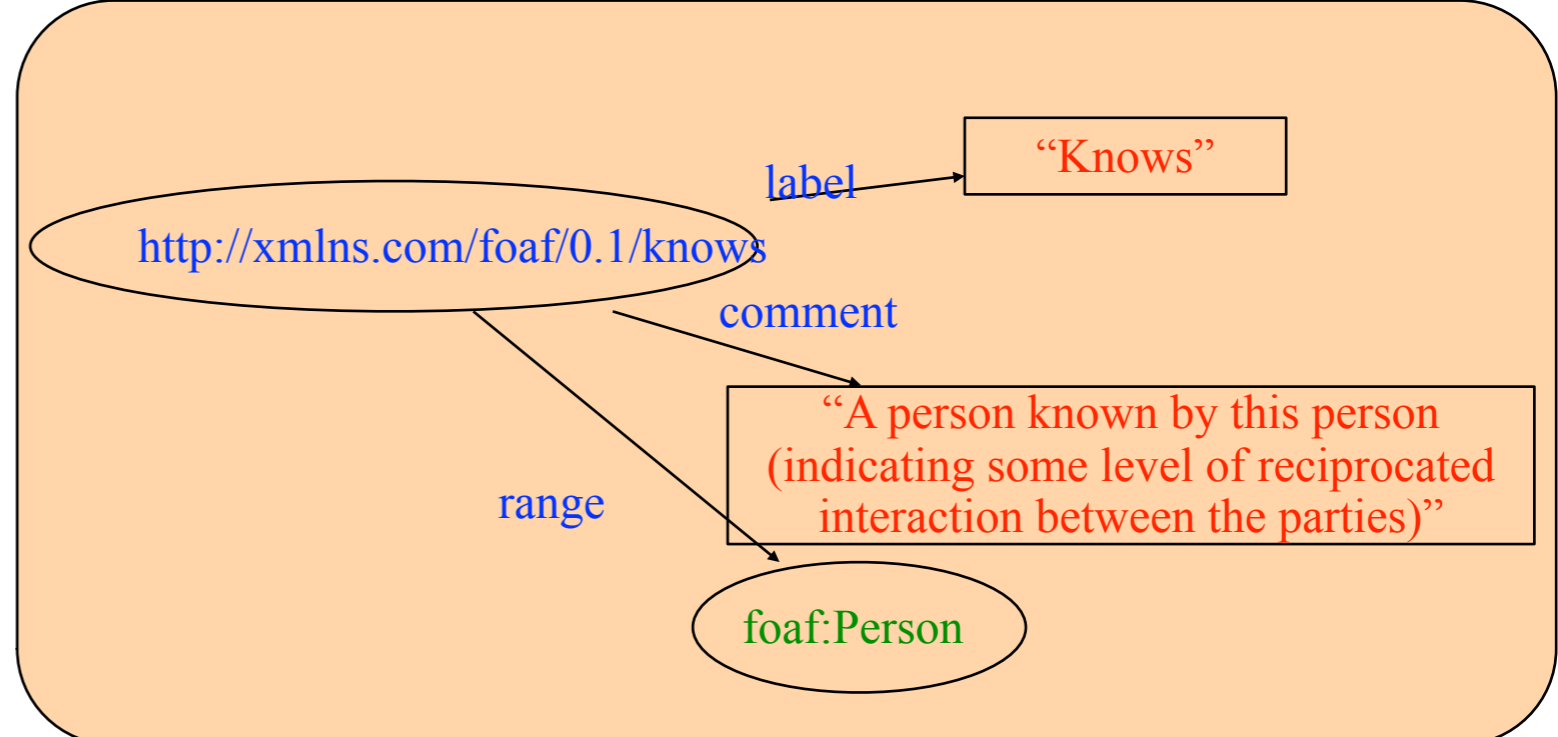
Status of This Document

FOAF has been evolving gradually since its creation in mid-2000. There is now a stable core of classes and properties that will not be changed, beyond modest adjustments to their documentation to track implementation feedback and emerging best practices. New terms may be added at any time (as with a natural-language dictionary), and consequently this specification is an evolving work. The FOAF RDF namespace, by contrast, is fixed and it's identifier is not expected to change. Furthermore, efforts are underway to ensure the long-term preservation of the FOAF namespace, its xmlns.com domain name and associated documentation.

This document is created by combining the RDFS/OWL machine-readable FOAF ontology with a set of per-term documents. Future versions may incorporate multilingual translations of the term definitions. The RDF version of the specification is also embedded in the HTML of this document, or available directly from the namespace URI by content negotiation.

The FOAF specification is produced as part of the FOAF project, to provide authoritative documentation of the contents, status and purpose of the RDF/XML vocabulary and document formats known informally as 'FOAF'.

The authors welcome comments on this document, preferably via the public FOAF developers list foaf-dev@lists.foaf-project.org, public archives are available. A historical backlog of known technical issues is acknowledged, and available for discussion in the FOAF_wiki. Proposals for resolving these issues are welcomed, either on foaf-dev or via the wiki. Further work is also needed on the explanatory text in this specification and on the FOAF website; progress towards this will be measured in the version number of future revisions to the FOAF specification.

http://xmlns.com/foaf/0.1/knows

label → "Knows"

comment

"A person known by this person (indicating some level of reciprocated interaction between the parties)"
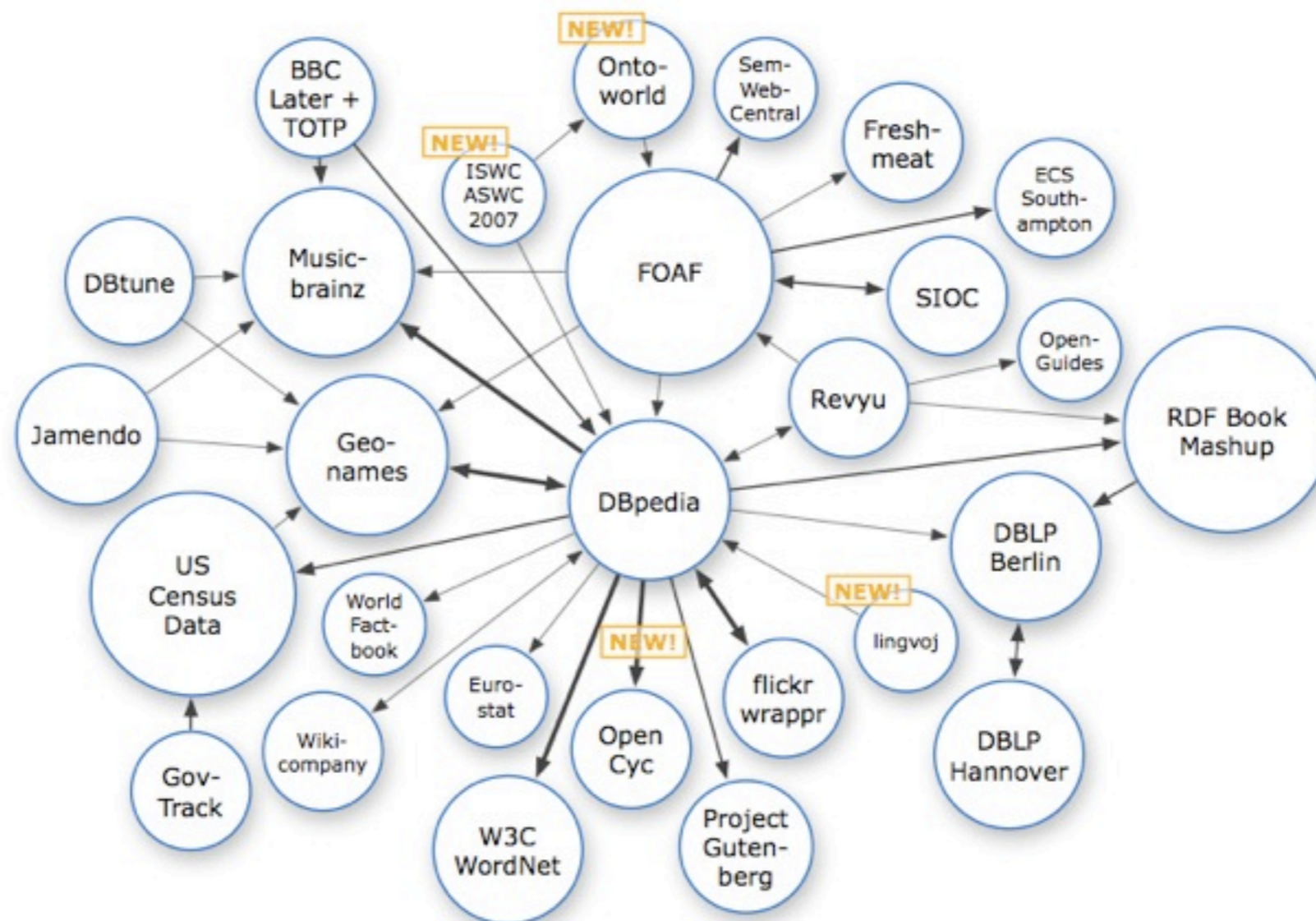
range

foaf:Person

```
<rdf:Property rdf:about="http://xmlns.com/foaf/0.1/knows"
vs:term_status="testing" rdfs:label="knows" rdfs:comment="A person known by this
person (indicating some level of reciprocated interaction between the parties).">
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#ObjectProperty"/>
    <rdfs:domain rdf:resource="http://xmlns.com/foaf/0.1/Person"/>
    <rdfs:range rdf:resource="http://xmlns.com/foaf/0.1/Person"/>
    <rdfs:isDefinedBy rdf:resource="http://xmlns.com/foaf/0.1/"/>
</rdf:Property>
```
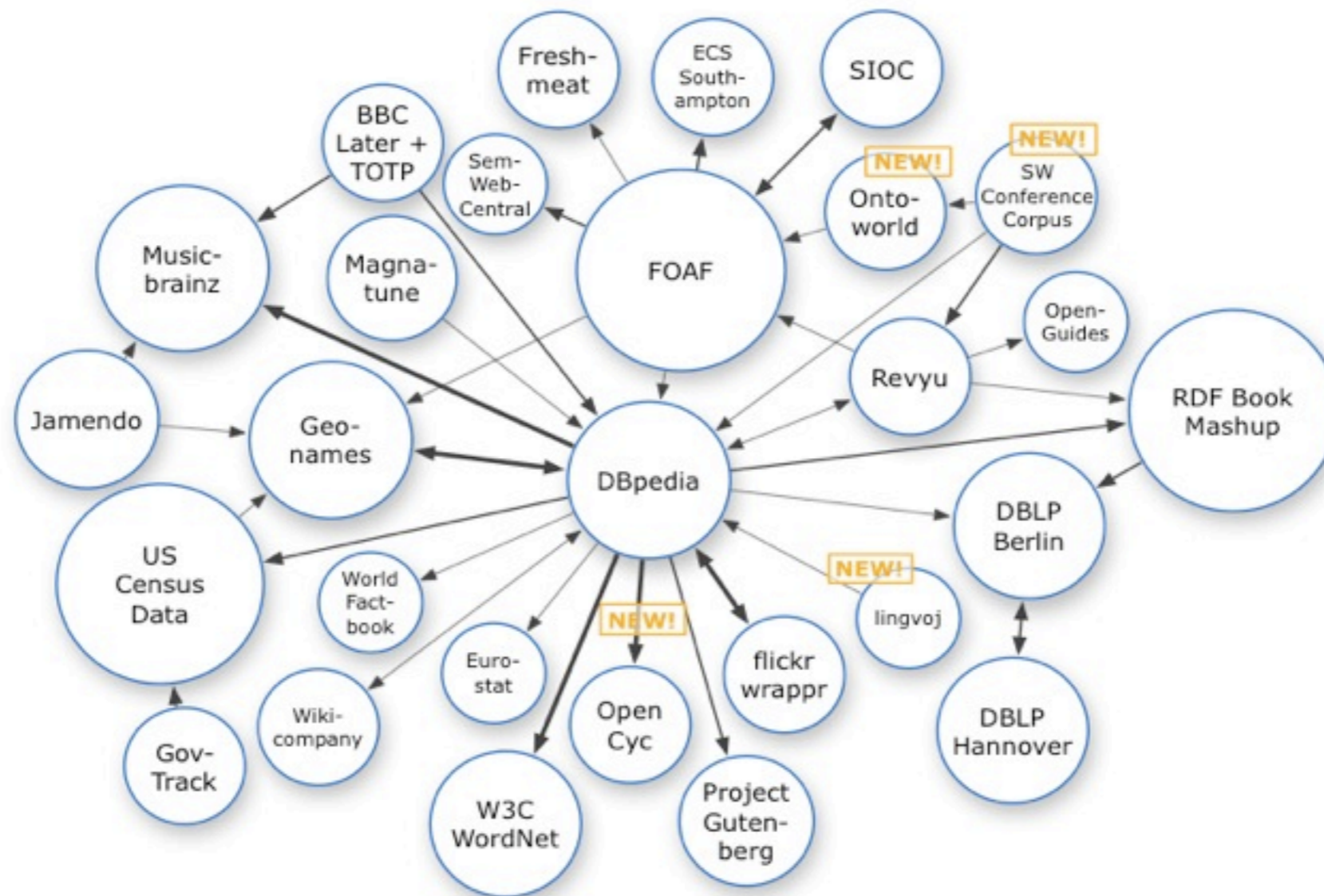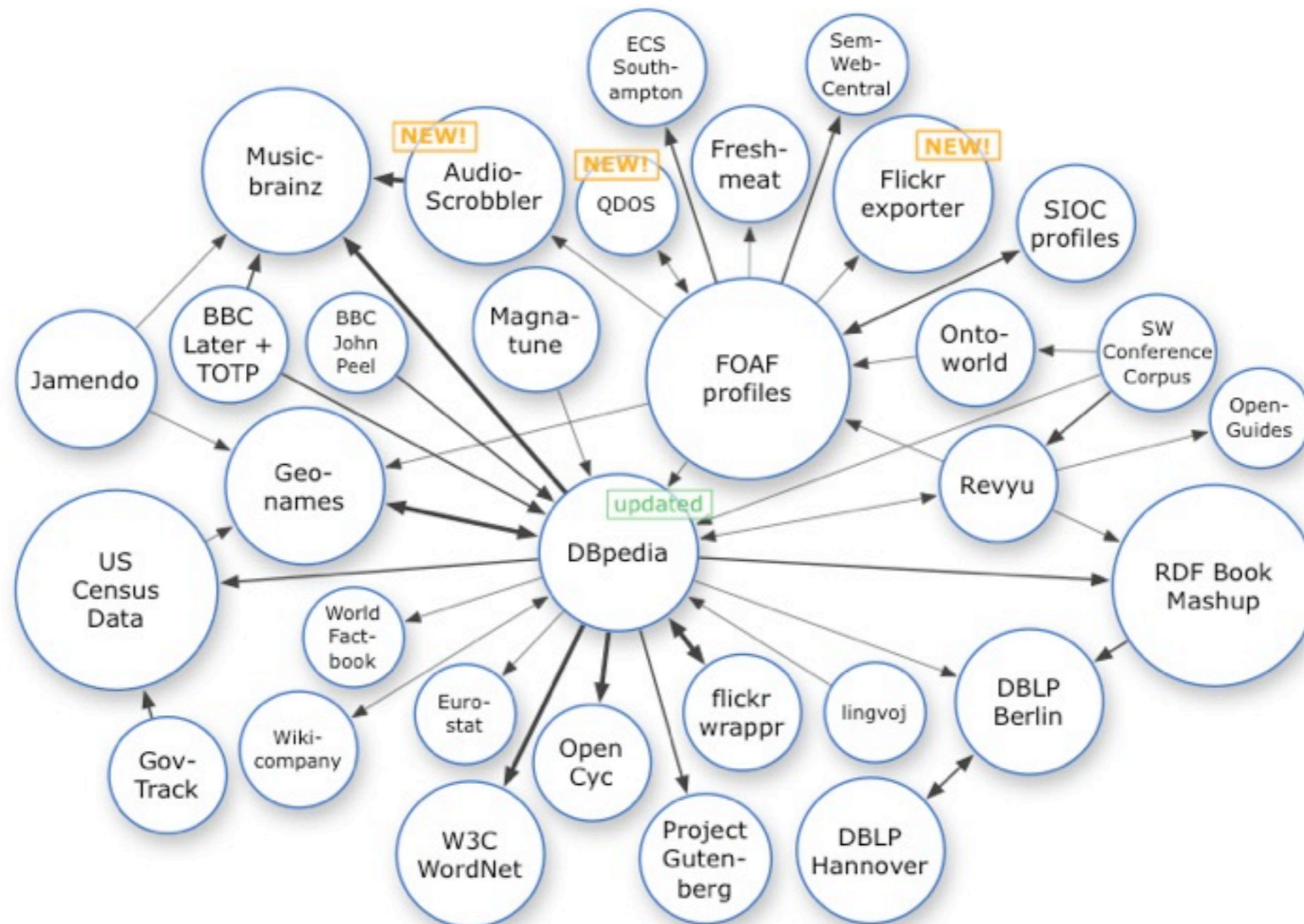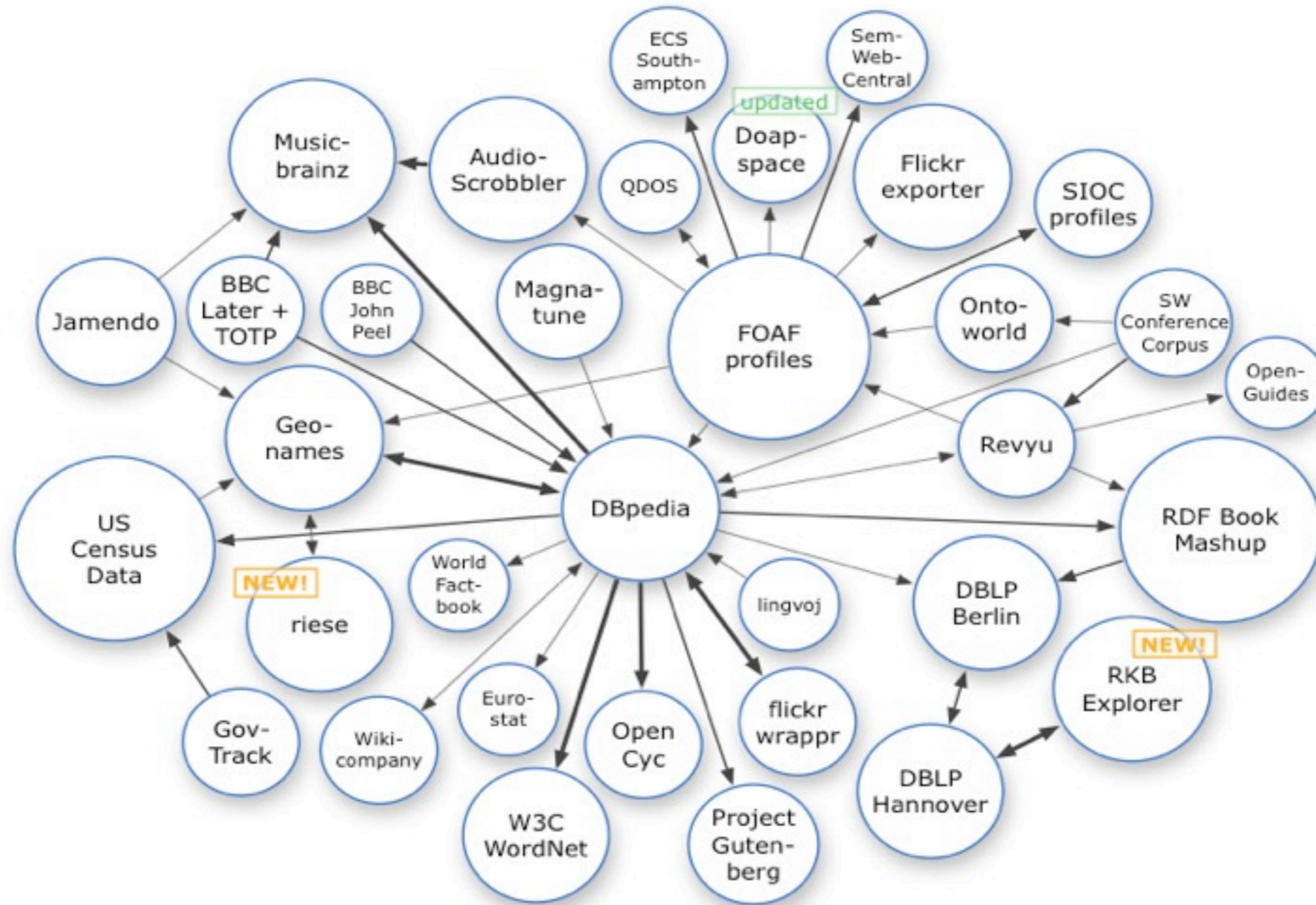
30

Linked data, October 2007

31
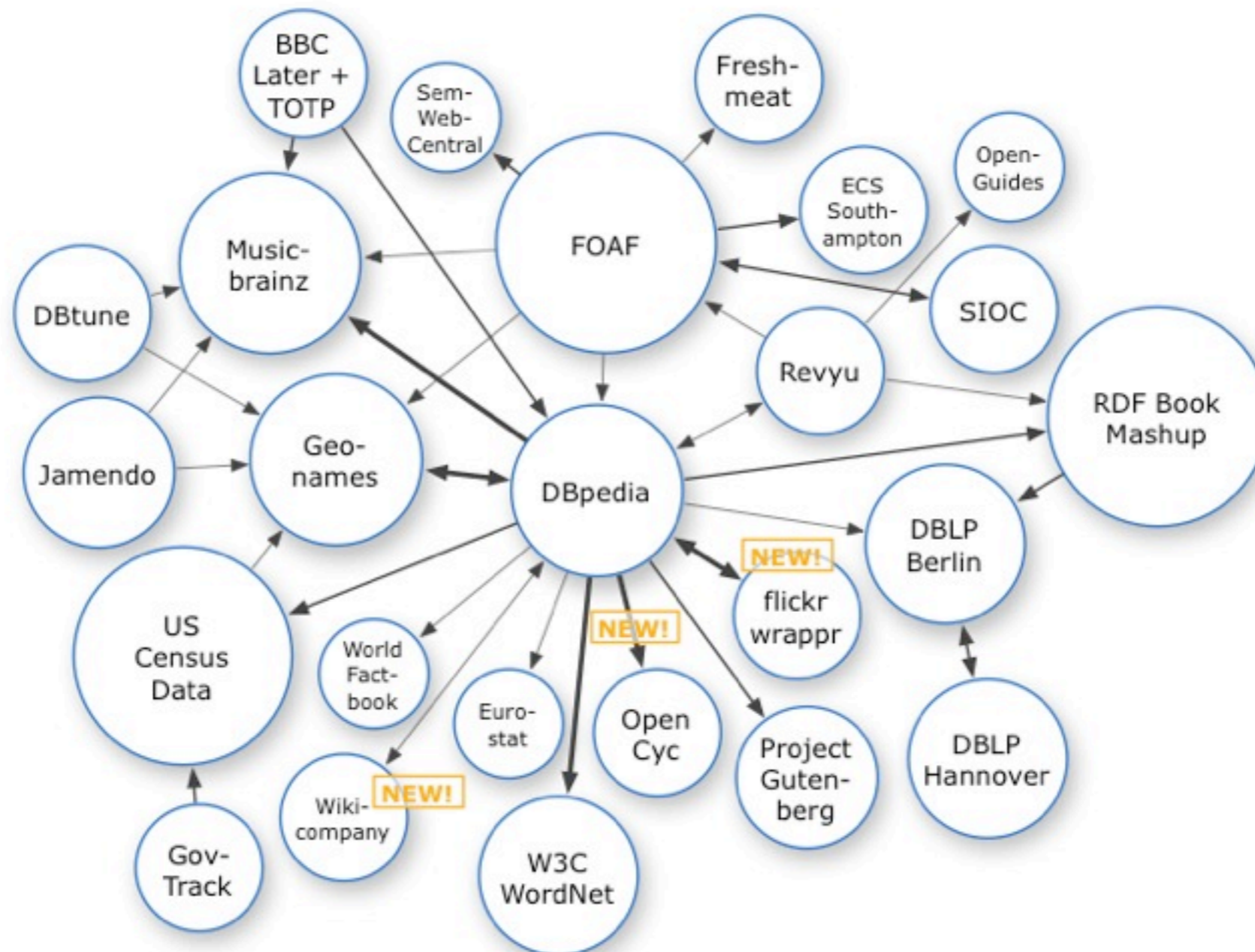
Linked data, November 2007

Linked data, December 2007

Linked data, February 2008

Linked data, March 2008

Linked data, September 2008

As of September 2008

As of March 2009

As of July 2009

58
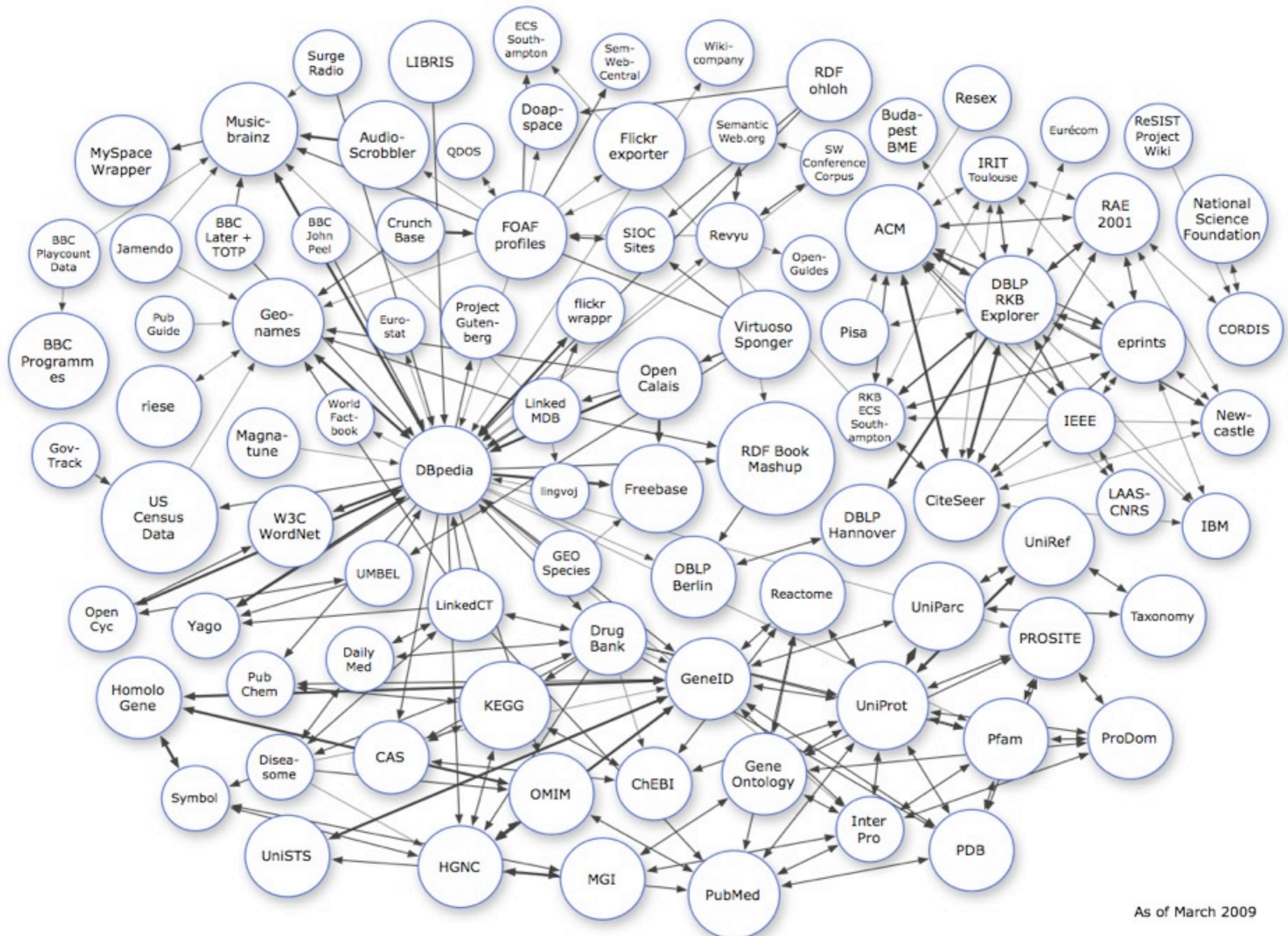
Linking Open Data

- Global set of connected open databases
- ca 5 billion RDF triples
- W3C project

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BBC been there a while – and now the New York Times....

- 2009–10–30: The New York Times has started to publish parts of its subject headings as Linked Data under a CC BY license.

New York Times SemTech Announcement

▶ 1:00 / 3:33 HQ YouTube

The "semantic task force" Summary for MLR

- Semantic technologies allow for
  - Large-scale interoperability (triples, AP-independent, follow-your-nose, linked data)
  - Ontology support
  - Reuse of existing standards
  - Collaboration between standards bodies
  - Reuse of existing tools
  - Implementation in many environments
    - From mobile or AJAX applications
    - Through HTML (RDFa) and RSS
    - To multi-billion-triples RDF stores

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Requirements for Reusability

- The components must be **unambiguously identified**

- The components must **adhere to compatible abstract models**.

- A metadata format must be used that allows for **consistent interpretation** of the components with respect to their respective abstract models.

Metadata – not just an index

- Metadata is not always objective information
  - It must allow for subjective expressions & opinions.
- Metadata is not produced "once and for all"
  - an eco-system of metadata.
- Metadata is not just a document
  - But a globals network of information.
- Metadata is much more than just a digital catalog.
- Metadata is not just for machines
  - We need conceptual metadata for people!

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Four rules for exposing information on the web

- Use URIs as names for things
- Use HTTP URIs so that people can look up those names.
- When someone looks up a URI, provide useful information.
- Include links to other URIs, so that they can discover more things.

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The "new" MLR

- Final Committee Draft still to be balloted (before March 2010)
- MLR-1 Framework showing how MLR elements are mapped to RDF
- Identifiers that enables URIs
- Easy to produce the new parts (Educational, Technical, Rights, etc.)

Where do metadata live?

In centralized or distributed
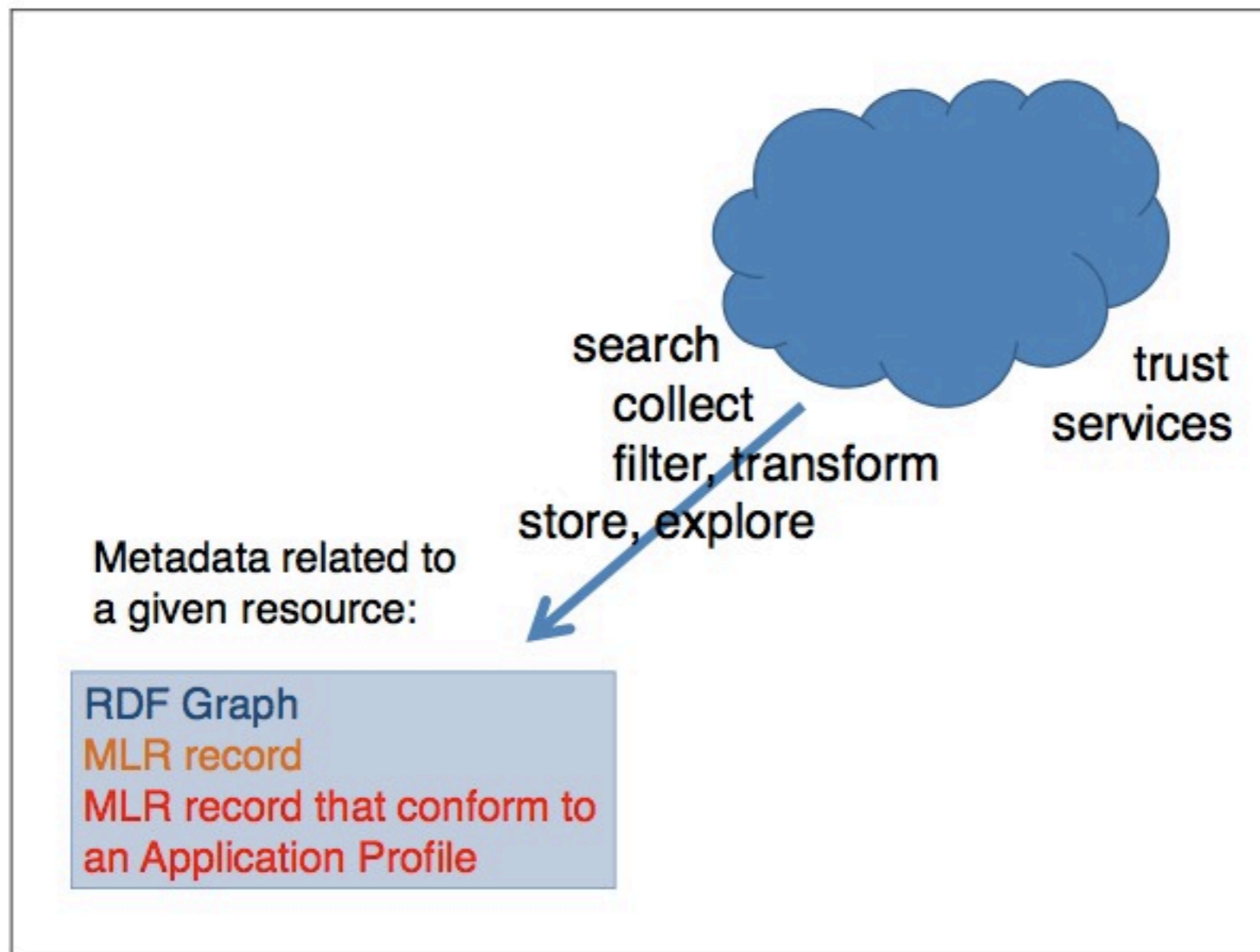Learning Object Repositories
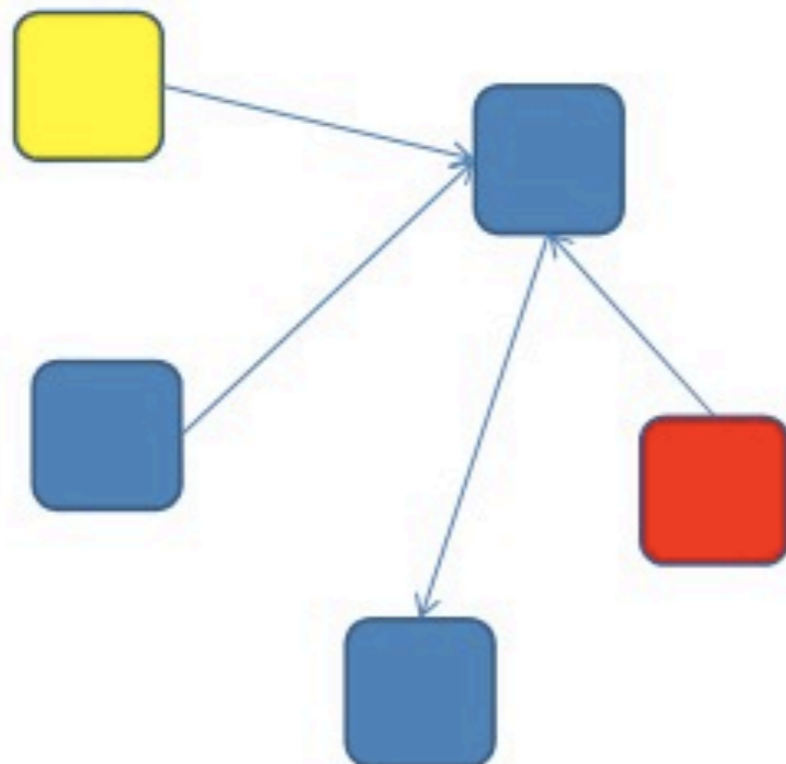
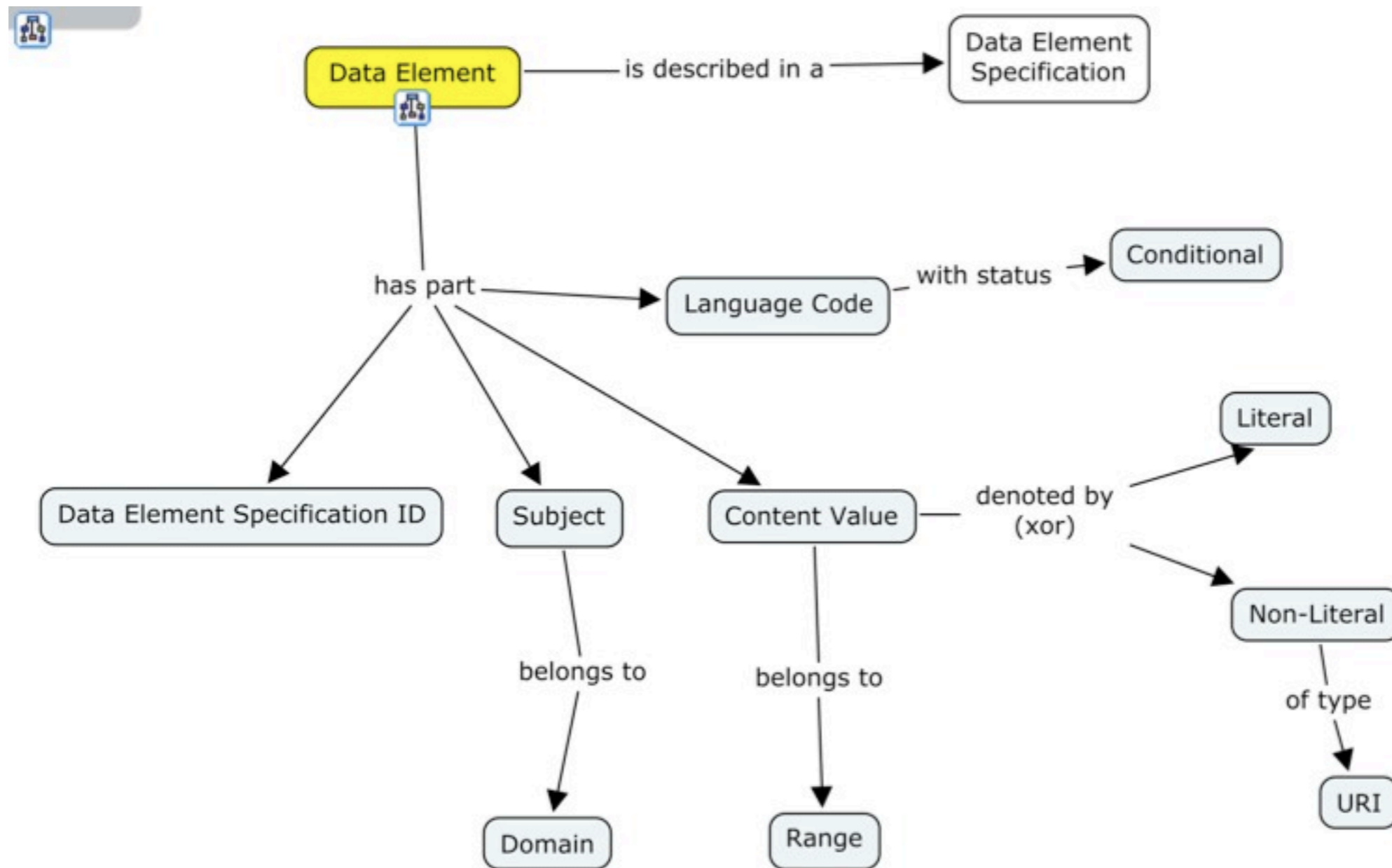Free in the Web

Who contributes metadata
for a learning resource?

Source: ISO/IEC JTC1 SC36 WG4 N0340

The MLR response

search
collect
filter, transform
store, explore

trust
services

Metadata related to
a given resource:

RDF Graph
MLR record
MLR record that conform to
an Application Profile

Source: ISO/IEC JTC1 SC36 WG4 N0340

Conceptual modelling

Concept map for Data Elements from FCD of MLR-1

More transparent processes

- MLR Educational
  - Open online meetings
  - Concepts maps
  - Consultations with the DC community and stakeholder groups
- MLR Educational and Dublin Core Ed is going to exchange maps (as of this morning :-))

First lesson to be learnt: Understand your domain!

- Is Learning, Education and Training (LET) best supported by an eBusiness approach or a web architecture approach?

- Is LET about exactness or fuzziness?

- Is LET about truth or points of views?

- Is LET a well or a ill-defined domain?

Google for New York Times and see what you get

Lessons to be learnt?

- Don't embark on a standards project without a metamodel and methodology
- When you cannot do much about the personalities...
  - ... make sure you control the tools
  - ... learn the process and use it for you own purpose
  - ... foster transparency
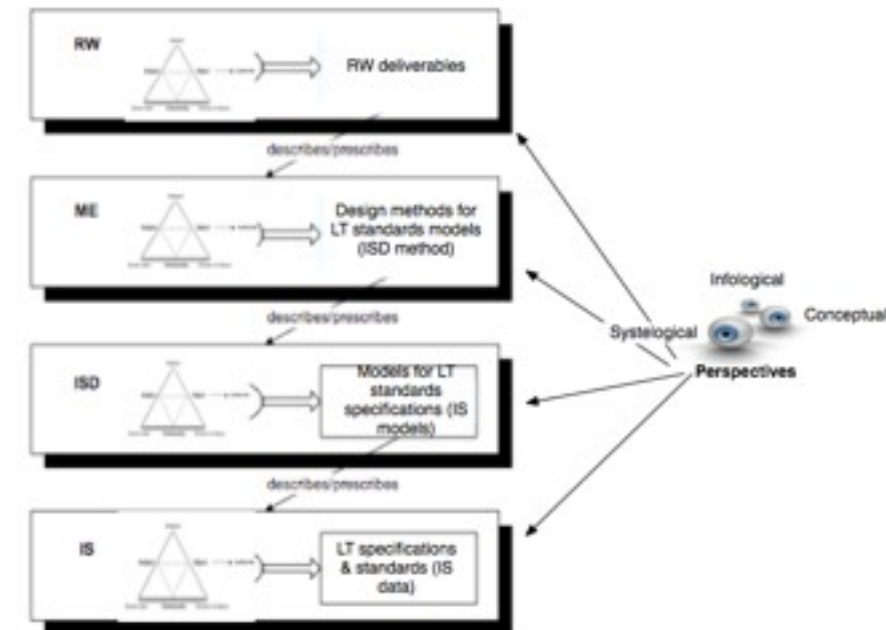
Thanks & More Information

- Thanks to Mikael Nilsson for allowing reuse of his slides
- For more information:
  - tore.hoel@hio.no
  - www.icoper.org
  - www.hoel.nu/wordpress