

Porting the xEBR Taxonomy of XBRL-Europe to a Linked Data Representation

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On Behalf of the Prêt-à-LLOD project (<https://www.pret-a-llod.eu/>)

Based on former work by Thierry Declerck and Dagmar Gromann

Porting the xEBR Taxonomy to a Linked Open Data compliant Format

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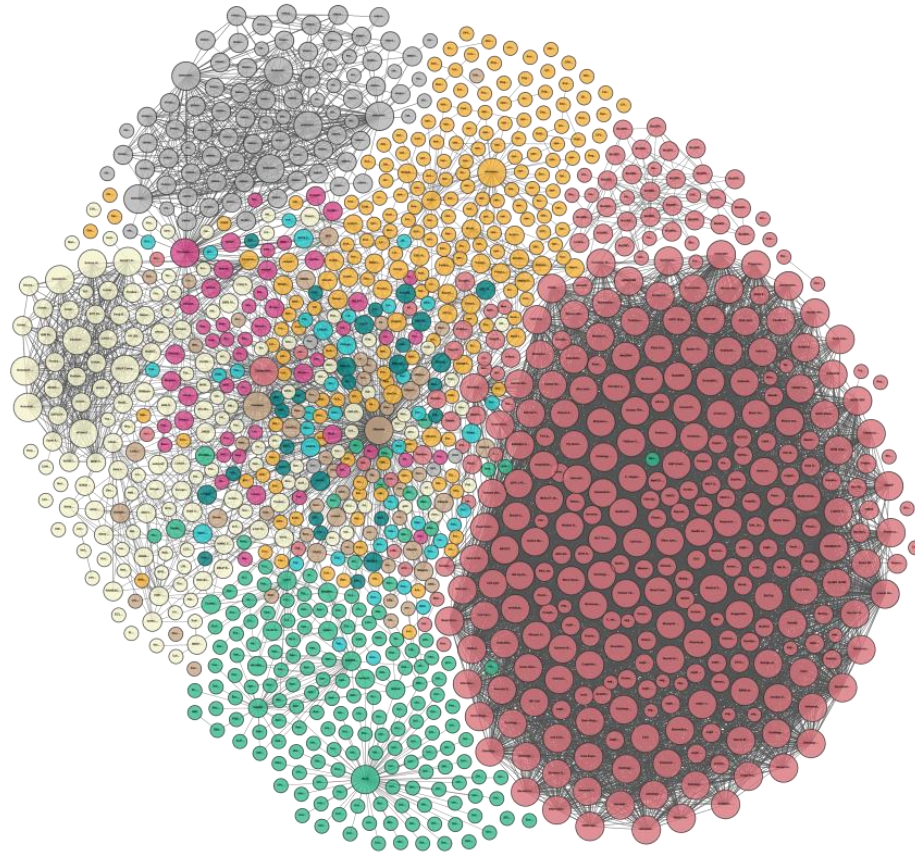
²Artificial Intelligence Research Institute,
Barcelona

Motivation

- Porting the xEBR Core Reference Taxonomy to a Linked Open Data (LOD) compliant format, in order to enable the use of semantic technologies, beyond the syntactic interoperability offered by the xEBR Taxonomy.
- Linking to other resources for analysts, also considering the data sets in the Linked (Open) Data cloud-

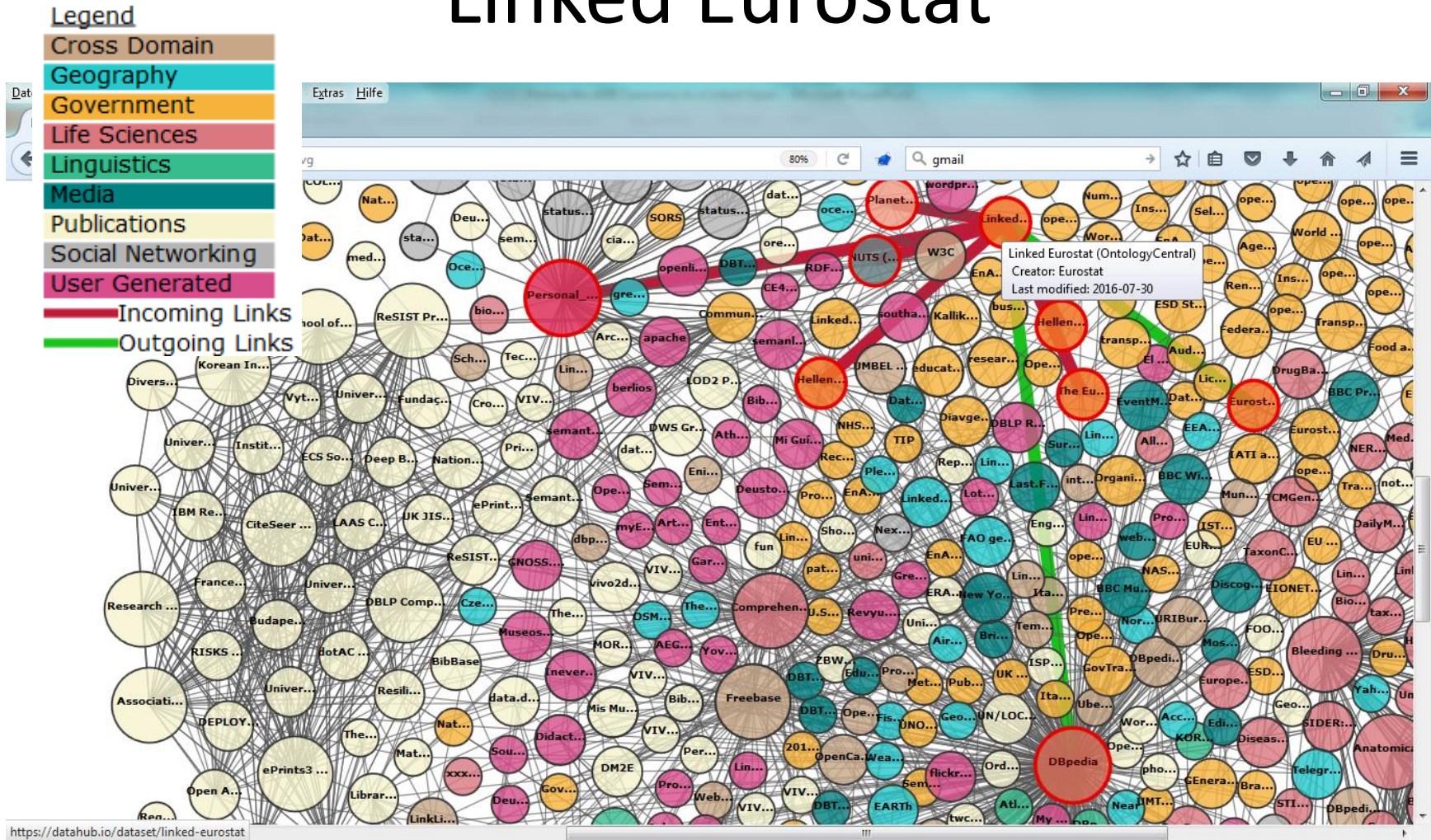
Linked Open Data cloud

<http://lod-cloud.net/>



A closer Look to the LOD cloud (1)

Linked Eurostat



A closer Look to the LOD cloud (2)

Linked Eurostat

The screenshot shows a web browser window displaying the DataHub website. The browser's address bar shows the URL <https://datahub.io/dataset/linked-eurostat>. The website header includes the DataHub logo, navigation links for Datasets, Organizations, About, Blog, and Help, and a search bar. The main content area is titled "Linked Eurostat (OntologyCentral)" and features a description: "A mediator that translates original Eurostat files to RDF at lookup time. Total dataset size approx. 40 million triples. Updated twice daily." Below the description is a "Download Data Package" button. The page also lists "Data and Resources" with three entries: "Example (RDF/XML)", "Example (RDF/XML)", and "Geographical URIs", each with a "More information" and "Go to resource" button. On the left side, there is a sidebar for the "planet-data" organization, showing a follower count of 1 and the organization's logo and description.

datahub
The easy way to get, use and share data

Log in Register

Datasets Organizations About Blog Help Search

Home / Organizations / planet-data / Linked Eurostat ...

Linked Eurostat (OntologyCentral)

Followers
1

Organization

planet-data
The goal of the PlanetData project is the creation of a durable community around large-scale data management

Dataset Groups Activity Stream

Linked Eurostat (OntologyCentral)

A mediator that translates original Eurostat files to RDF at lookup time. Total dataset size approx. 40 million triples. Updated twice daily.

Includes visualisation demos at <http://estatwrap.ontologycentral.com/>

Download Data Package

Data and Resources

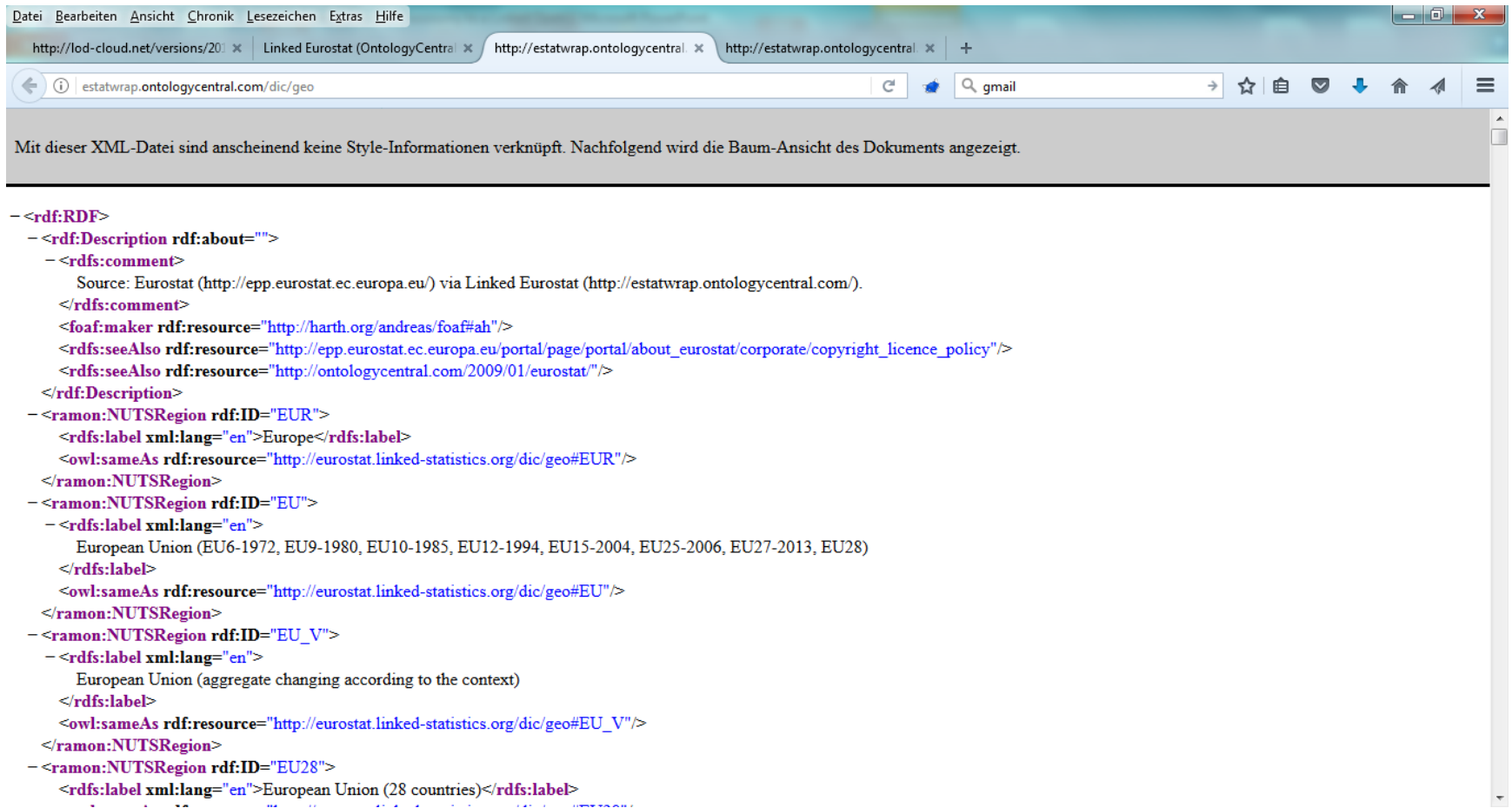
Example (RDF/XML)
Example (RDF/XML) More information Go to resource

Example (RDF/XML)
Example (RDF/XML) More information Go to resource

Geographical URIs
Geographical URIs More information Go to resource

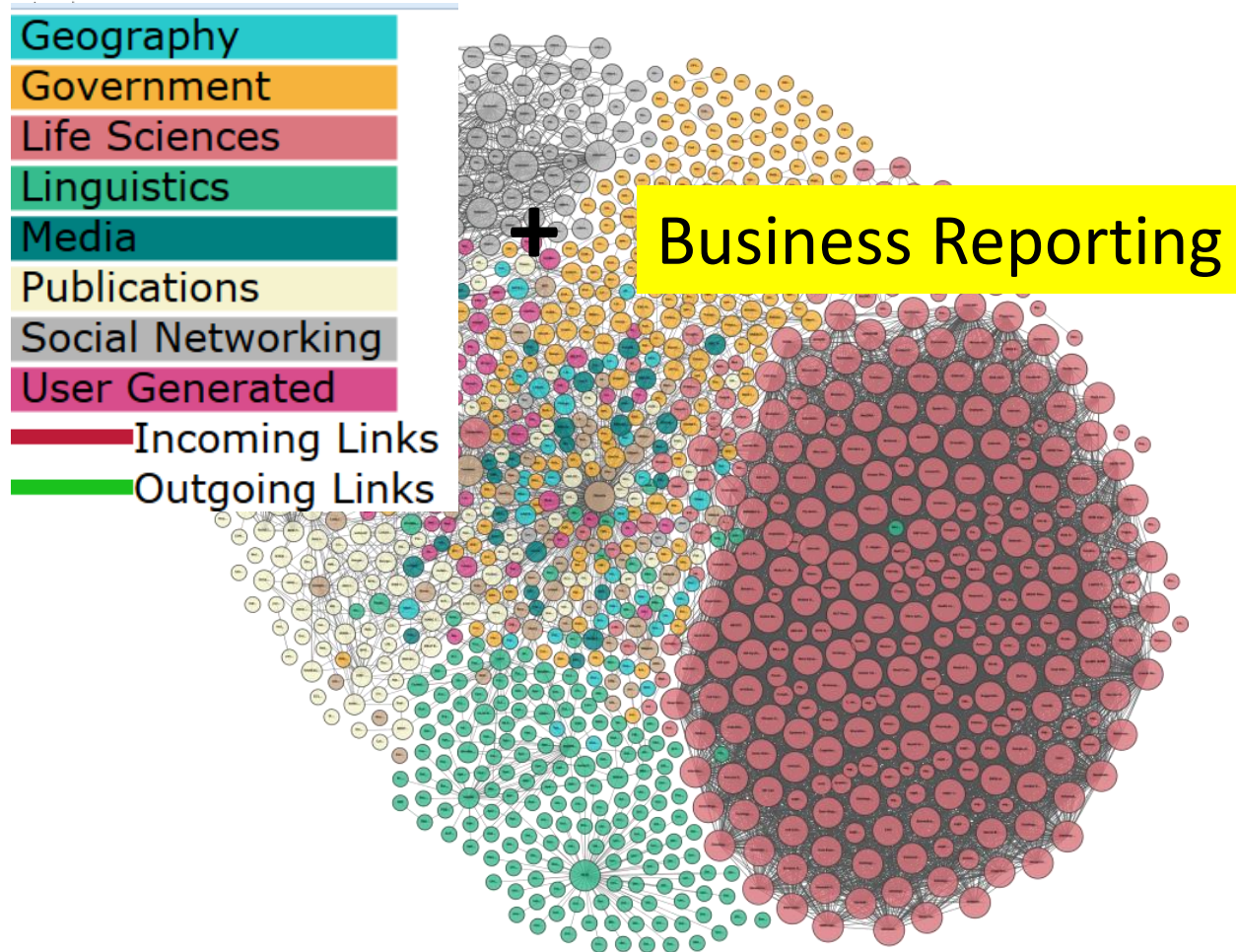
A closer Look to the LOD cloud (1)

Linked Eurostat (geo URIs)



```
-<rdf:RDF>
- <rdf:Description rdf:about="">
- <rdfs:comment>
  Source: Eurostat (http://epp.eurostat.ec.europa.eu/) via Linked Eurostat (http://estatwrap.ontologycentral.com/).
</rdfs:comment>
<foaf:maker rdf:resource="http://harth.org/andreas/foaf#ah"/>
<rdfs:seeAlso rdf:resource="http://epp.eurostat.ec.europa.eu/portal/page/portal/about_eurostat/corporate/copyright_licence_policy"/>
<rdfs:seeAlso rdf:resource="http://ontologycentral.com/2009/01/eurostat"/>
</rdf:Description>
- <ramon:NUTSRegion rdf:ID="EUR">
  <rdfs:label xml:lang="en">Europe</rdfs:label>
  <owl:sameAs rdf:resource="http://eurostat.linked-statistics.org/dic/geo#EUR"/>
</ramon:NUTSRegion>
- <ramon:NUTSRegion rdf:ID="EU">
  <rdfs:label xml:lang="en">
    European Union (EU6-1972, EU9-1980, EU10-1985, EU12-1994, EU15-2004, EU25-2006, EU27-2013, EU28)
  </rdfs:label>
  <owl:sameAs rdf:resource="http://eurostat.linked-statistics.org/dic/geo#EU"/>
</ramon:NUTSRegion>
- <ramon:NUTSRegion rdf:ID="EU_V">
  <rdfs:label xml:lang="en">
    European Union (aggregate changing according to the context)
  </rdfs:label>
  <owl:sameAs rdf:resource="http://eurostat.linked-statistics.org/dic/geo#EU_V"/>
</ramon:NUTSRegion>
- <ramon:NUTSRegion rdf:ID="EU28">
  <rdfs:label xml:lang="en">European Union (28 countries)</rdfs:label>
```

Towards a Business Reporting Node in the LOD Infrastructure?



Our Departure Point for the study: xEBR Excel file with preliminary version 8

	A	B	C	D	E	F	G	H	I	J
1	LABEL (en) & HIERARCHY						NAME SPACE	ELEMENT NAME	ABSTRACT / TYPE	
2	COMPANY BALANCE SHEET, HORIZONTAL LAYOUT [REPORT]						xebr	CompanyBalanceSheetHorizontalLayoutReport	role	
3	Assets [Presentation]						xebr	AssetsPresentation	abstract	
4				Subscribed capital unpaid [Presentation]			xebr	SubscribedCapitalUnpaidPresentation	abstract	
5				Subscribed capital unpaid [Total]			xebr	SubscribedCapitalUnpaidTotal	monetary	
6				Subscribed capital unpaid: Of which there has been called (if not in current assets)			xebr	SubscribedCapitalUnpaid:OfWhichThereHasBeenCalledIfNotInCurrentAssets	monetary	
7				Formation expenses [Presentation]			xebr	FormationExpensesPresentation	abstract	
8				Formation expenses [Total]			xebr	FormationExpensesTotal	monetary	
9				Fixed assets [Presentation]			xebr	FixedAssetsPresentation	abstract	
10				Intangible assets [Presentation]			xebr	IntangibleAssetsPresentation	abstract	
11				Costs of development			xebr	CostsOfDevelopment	monetary	
12				Concessions, patents, licences, trade marks and similar rights and assets			xebr	ConcessionsPatentsLicencesTradeMarksAndSimilarRightsAndAssets	monetary	
13				Goodwill			xebr	Goodwill	monetary	
14				Payments on account			xebr	PaymentsOnAccount	monetary	
15				Intangible assets [Total]			bach	IntangibleAssetsTotal	monetary	
16				Tangible assets [Presentation]			xebr	TangibleAssetsPresentation	abstract	
17				Property, plant, and equipment [Presentation]			xebr	PropertyPlantAndEquipmentPresentation	abstract	
18				Land and buildings			xebr	LandAndBuildings	monetary	
19				Plant and machinery			xebr	PlantAndMachinery	monetary	
20				Property, plant, and equipment [Total]			xebr	PropertyPlantAndEquipmentTotal	monetary	
21				Other fixtures, fittings and tools			xebr	OtherFixturesFittingsAndTools	monetary	
22				Payments on account and tangible assets in the course of construction			xebr	PaymentsOnAccountAndTangibleAssetsInTheCourseOfConstruction	monetary	
23				Tangible assets [Total]			bach	TangibleAssetsTotal	monetary	
24				Financial assets [Presentation]			xebr	FinancialAssetsPresentation	abstract	
25				Shares in affiliated undertakings			bach	SharesInAffiliatedUndertakings	monetary	
26				Loans to affiliated undertakings			xebr	LoansToAffiliatedUndertakings	monetary	

Our Departure Point for the study: xEBR Excel file with preliminary version 8 (2)

Zwischenablage												Schriftart				Ausrichtung				Zahl		Formatvorlagen				Zellen		Bearbeiten	
I2												=WECHSELN(WECHSELN(WECHSELN(X2;" ";"");[";"];",";""))																	
	K	L	M	N	O	P	Q	R	S	T	U	V	Y	Z	AA	AB	AC	AD											
1	BALANCE	PERIOD	NILLABLE	ID				BACH Code	2013/34/EU Ref	BE:seq	BE:ns	BE:tag	DE:seq	DE:ns	DE:tag														
2				HBS	0	0	0	0	0	0	-	-	X					Konzernbilanz											
3				HBS	1	0	0	0	0	0	-	-	=		Actif														
4				HBS	1	1	0	0	0	0	-	-	X																
5	debit	instant	true	HBS	1	1	1	0	0	0	-	(A) A.	X					Rückständige Einzahlungen											
6	debit	instant	true	HBS	1	1	1	1	0	0	-	(A) D.II.5 & A.1.	X					Rückständige Einzahlungen											
7				HBS	1	2	0	0	0	0	-	-	X																
8	debit	instant	true	HBS	1	2	1	0	0	0	-	(A) B.	=		FraisDEtablissement			Aufwendungen für die Ingangsetzu											
9				HBS	1	3	0	0	0	0	-	-	X																
10				HBS	1	3	1	0	0	0	-	-	X																
11	debit	instant	true	HBS	1	3	1	1	0	0	-	(A) C.I.1.	X					Selbst geschaffene gewerbliche Sc											
12	debit	instant	true	HBS	1	3	1	2	0	0	-	(A) C.I.2.	X					entgeltlich erworbene Konzessionen											
13	debit	instant	true	HBS	1	3	1	3	0	0	-	(A) C.I.3.	X					Geschäfts- oder Firmenwert											
14	debit	instant	true	HBS	1	3	1	4	0	0	-	(A) C.I.4.	X					geleistete Anzahlungen (immateri											
15	debit	instant	true	HBS	1	3	1	5	0	0	A11	(A) C.I.	=		ImmobilisationsIncorporelles			Immaterielle Vermögensgegenstär											
16				HBS	1	3	2	0	0	0	-	-	X																
17				HBS	1	3	2	1	0	0	-	-	X																
18	debit	instant	true	HBS	1	3	2	1	1	0	-	(A) C.II.1.	=		TerrainsEtConstructions			Grundstücke, grundstücksgleiche R											
19	debit	instant	true	HBS	1	3	2	1	2	0	-	(A) C.II.2.	=		InstallationsMachineEtOutillage			technische Anlagen und Maschine											
20	debit	instant	true	HBS	1	3	2	1	3	0	-	-	X																
21	debit	instant	true	HBS	1	3	2	2	0	0	-	(A) C.II.3.	<		AutresImmobilisationsCorporelles			andere Anlagen, Betriebs- und Ges											
22	debit	instant	true	HBS	1	3	2	3	0	0	-	(A) C.II.4.	=		ImmobilisationsEnCoursEtacomptesVerses			geleistete Anzahlungen und Anlag											
23	debit	instant	true	HBS	1	3	2	4	0	0	A12	(A) C.II.	=		ImmobilisationsCorporelles			Sachanlagen											
24				HBS	1	3	3	0	0	0	-	-	X																

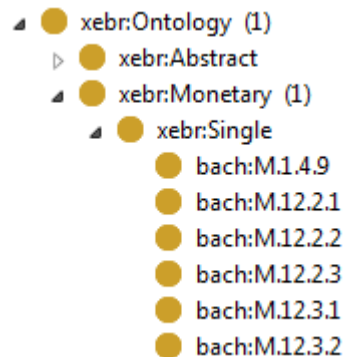
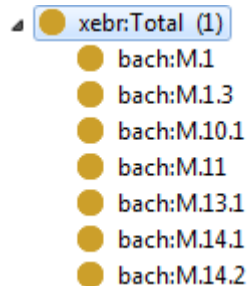
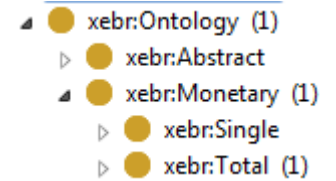
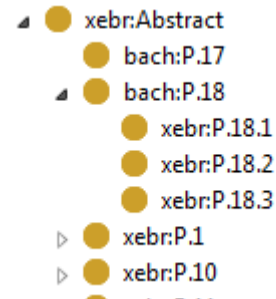
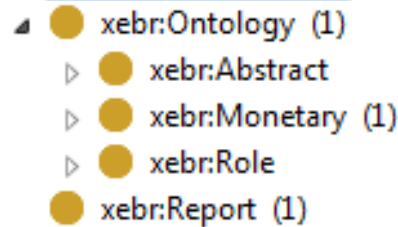
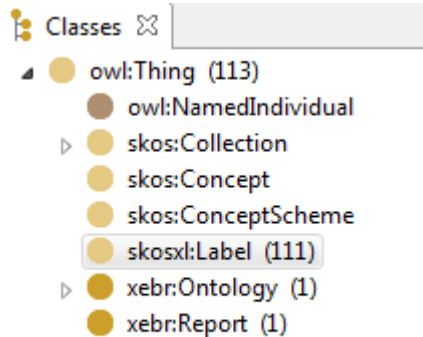
Porting the Taxonomy to an Ontology

- Use of W3C Standards in the Ontology:
 - Representation languages: OWL, RDF(s), RDF
 - Related Vocabularies : SKOS and SKOS-XL, DC
- Using thus a representation language that is originally suited for dealing with graphs, instead of trees (XML can also represent and process graphs, but in my opinion in a very cumbersome manner: better use a language natively conceived for dealing with graphs.
- Why using graphs – I think those are more compact, and their elements easily re-usable

Porting the Taxonomy to an Ontology

- Elements of xEBR now in a class hierarchy, together with a few set of properties for expressing relations between classes (and their potential instances, described in a class called “Report”)
- Multilingual labels now expressed with the help of SKOS-XL
- We consider Role, Abstract and Monetary as Classes, as they suggest a central characteristics of the elements listed in xEBR with this type.
- We consider differently the types tuple, date, string, url, boolean, as those are more about the xsd types the value of an element can take.
 - But still to think about tuple!! Could be a class as it implies a complex value object

Screen Shots from the current state of the suggested xEBR ontology (Class Hierarchy)



Details for Classes (1): Presentation type

The screenshot displays a software window titled "xebr:P.18.1" with a toolbar containing a home icon, a user icon, and a "Quick" button. The main content area is titled "Class Form" and contains the following details:

- Name:** xebr:P.18.1
- Annotations:**
 - rdfs:comment:** A class of type Presentation, subclass of <http://www.bach.banque-france.fr#P.18> {@en}
 - rdfs:label:** Company address, Details [Presentation] {@en}
- Class Axioms:**
 - rdfs:subClassOf:** bach:P.18
 - owl:equivalentClass:**
 - owl:disjointWith:**
 - owl:hasKey:**
- Other Properties:**
 - rdf:type:** owl:Class
 - skos:prefLabel:** xebr:L.18.1

Details for Classes (1): Presentation type; internal OWL, RDF(s), RDF coding

```
<http://www.dfki.de/It/onto/xebr.owl#P.18.1>  
  rdf:type owl:Class ;  
  rdfs:comment "A class of type Presentation, subclass of  
<http://www.bach.banque-france.fr#P.18>"@en ;  
  rdfs:label "Company address, Details [Presentation]"@en ;  
  rdfs:subClassOf <http://www.bach.banque-france.fr#P.18> ;  
  skosxl:prefLabel  
<http://www.dfki.de/It/onto/xebr.owl#L.18.1> ;  
  .
```

Very compact representation, easing re-usability

Details for Classes (2): Monetary type

The screenshot shows a web browser window with the address bar displaying 'xebr:P.18.1'. The main content area is titled 'Class Form' and displays the following details for the class 'xebr:P.18.1':

- Name:** xebr:P.18.1
- Annotations:**
 - rdfs:comment:** A class of type Presentation, subclass of <http://www.bach.banque-france.fr#P.18> {@en}
 - rdfs:label:** Company address, Details [Presentation] {@en}
- Class Axioms:**
 - rdfs:subClassOf:** bach:P.18
 - owl:equivalentClass:**
 - owl:disjointWith:**
 - owl:hasKey:**
- Other Properties:**
 - rdf:type:** owl:Class
 - skos:prefLabel:** xebr:L.18.1

Details for Classes (2): Monetary type, internal code

```
<http://www.dfki.de/lt/onto/xebr.owl#M.1.4>  
  rdf:type owl:Class ;  
  xebr:isMonetaryPartOf  
<http://www.dfki.de/lt/onto/xebr.owl#P.1.4> ;  
  rdfs:comment "A class of type Monetary, subclass of  
xebr:Total"@en ;  
  rdfs:label "Current assets [Total]"@en ;  
  rdfs:subClassOf xebr:Total ;  
  skosxl:prefLabel  
<http://www.dfki.de/lt/onto/xebr.owl#L.1.4> ;
```

.

Details for Labels

- Labels are objects on their own in the ontology (have their own URI)
- They are encoded using alphanumeric indices URIs).
- We make use of SKOS-XL for this, and linking to different other objects.
- Full support of multilingualism and terminological variants

Labels: the whole picture

The screenshot displays the TopBraid Composer FE interface for editing the ontology `xEBR`. The central editor shows the source code for the class `xEBR.L1`:

```
<http://www.dfki.de/lt/onto/xebr.owl#L.1>  
rdf:type skosxl:Label ;  
rdfs:comment "English Pref_Label of <http://www.bach.banque-france.fr#M.1>"@en ;  
rdfs:comment "English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#P.1>"@en ;  
skosxl:literalForm "Assets"@en ;
```

The left sidebar shows the class hierarchy, including `owl:Thing`, `skos:Collection`, `skos:Concept`, `skos:ConceptScheme`, `skosxl:Label`, and `xebr:Ontology` with its subclasses.

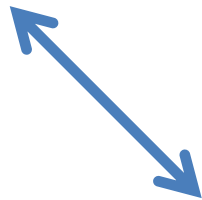
The right sidebar shows the properties panel for `skosxl:Label`, listing properties such as `owl:topObjectProperty`, `rdfs:isPartOf`, `rdfs:partOf`, `skos:hasTopConcept`, `skos:inScheme`, `skos:member`, `skos:memberList`, `skos:semanticRelation`, `skos:altLabel`, `skos:hiddenLabel`, `skos:labelRelation`, and `skos:prefLabel`.

The bottom panel shows a table of instances for the `skosxl:Label` class:

[Resource]	rdf:type	rdfs:label	rdfs:comment
xebr:L1	skosxl:Label		English Pref_Label of <http://www.bach.banque-france.fr#M.1>. En...
xebr:L.1.1	skosxl:Label		English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#M.1.1> ...
xebr:L.1.1.1	skosxl:Label		English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#M.1.1.1>
xebr:L.1.2	skosxl:Label		English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#M.1.2> ...
xebr:L.1.3	skosxl:Label		English Pref_Label of <http://www.bach.banque-france.fr#M.1.3>, ...
xebr:L.1.3.1	skosxl:Label		English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#M.1.3.1>
xebr:L.1.3.10	skosxl:Label		English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#M.1.3.1...
xebr:L.1.3.2	skosxl:Label		English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#M.1.3.2>
xebr:L.1.3.3	skosxl:Label		English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#M.1.3.3>
xebr:L.1.3.4	skosxl:Label		English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#M.1.3.4>
xebr:L.1.3.5	skosxl:Label		English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#M.1.3.5>
xebr:L.1.3.6	skosxl:Label		English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#M.1.3.6>
xebr:L.1.3.7	skosxl:Label		English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#M.1.3.7>
xebr:L.1.3.8	skosxl:Label		English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#M.1.3.8>
xebr:L.1.3.9	skosxl:Label		English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#M.1.3.9>

Labels: Details -- Linking Abstract and Monetary classes to prefLabels:

```
<http://www.bach.banque-france.fr#M.1>  
rdf:type owl:Class ;  
xebr:isMonetaryPartOf <http://www.dfki.de/lt/onto/xebr.owl#P.1> ;  
rdfs:comment "A class of type Total, subclass of Monetary"@en ;  
rdfs:label "Assets [Total]"@en ;  
rdfs:subClassOf xebr:Total ;  
skosxl:prefLabel <http://www.dfki.de/lt/onto/xebr.owl#L.1> ;
```



```
<http://www.dfki.de/lt/onto/xebr.owl#L.1>  
rdf:type skosxl:Label ;  
rdfs:comment "English Pref_Label of <http://www.bach.banque-france.fr#M.1>"@en ;  
rdfs:comment "English Pref_Label of <http://www.dfki.de/lt/onto/xebr.owl#P.1>"@en ;  
skosxl:literalForm "Assets"@en ;
```

UI interface showing the Turtle code editor and a table of instances.

Format: RDF/XML-ABBREV RDF/XML TURTLE N-TRIPLE JSON-LD

Also show imported triples (editing will be disabled)

Form

Imports

[Resource]	rdf:type	rdfs:label
xebr:L.1	skosxl:Label	
xebr:L.1.1	skosxl:Label	

Labels: Still to come

- Waiting for the full XBRL version of xEBR for including labels in other languages.
- Designing a full terminological framework in the context of SKOS-XL
- Collecting term variants from annual reports, in many languages

An Instance for Report: Very toy for now

- owl:Thing (113)
- owl:NamedIndividual
- skos:Collection
- skos:Concept
- skos:ConceptScheme
- skosxl:Label (111)
- xebr:Ontology (1)
- ▷ ● xebr:Abstract
- ▷ ● xebr:Monetary (1)
- ▲ ● xebr:Role
 - xebr:R.1
 - xebr:R.2
 - xebr:R.3
 - xebr:R.4
 - xebr:R.5
 - xebr:R.6
 - xebr:R.7
 - xebr:R.8
- xebr:Report (1)



```
xebr:EON_AR_2016
  rdf:type xebr:Report ;
  xebr:end "2016-12-31"^^xsd:date ;
  xebr:start "2016-01-01"^^xsd:date ;
  rdfs:comment "Annual Report of EON for 2016"@en ;
  rdfs:label "Report"@en ;
.
```

RDF/XML-ABBREV RDF/XML TURTLE N-TRIPLE JSON-LD

Also show imported triples (editing will be disabled)

Form Source Code

Imports Instances Domain Relevant Properties Err

[Resource]	rdf:type
xebr:EON_AR_2016	xebr:Report

“Details” of the Report Instance

The screenshot displays a software interface with two main panels. The left panel, titled 'Classes', shows a hierarchical list of classes. The class 'xebr:M.1.4 (1)' is selected and highlighted. The right panel, titled 'xEBR_test.ttl', shows the Turtle representation of the selected class. Below the Turtle code, there are radio buttons for different RDF formats: RDF/XML-ABBREV, RDF/XML, TURTLE (selected), N-TRIPLE, and JSON-LD. There is also a checkbox for 'Also show imported triples (editing will be disabled)'. At the bottom, there are tabs for 'Imports', 'Instances', 'Domain', 'Relevant Properties', and 'Error Log'. The 'Instances' tab is active, showing a table with two columns: '[Resource]' and 'rdf:type'. The table contains one row: 'xebr:M.1.4_EON_AR_2016' with the type 'xebr:M.1.4'. A blue arrow points from the 'xebr:M.1.4 (1)' class in the left panel to the 'xebr:M.1.4_EON_AR_2016' instance in the table.

Classes

- xebr:M.1.1
- xebr:M.1.2
- xebr:M.1.4 (1)
- xebr:M.1.5
- xebr:M.10
- xebr:M.11.1
- xebr:M.11.2
- xebr:M.12
- xebr:M.12.2
- xebr:M.12.3
- xebr:M.13
- xebr:M.13.2
- xebr:M.14
- xebr:M.2
- xebr:M.3
- xebr:M.4
- xebr:M.6
- xebr:M.6.2
- xebr:M.6.3
- xebr:M.7
- xebr:M.8

xEBR_test.ttl

```
<http://www.dfki.de/lt/onto/xebr.owl#M.1.4_EON_AR_2016>  
  rdf:type <http://www.dfki.de/lt/onto/xebr.owl#M.1.4> ;  
  xebr:hasMonetaryAmount 1000000 ;  
  xebr:hasMonetaryCurrency "EUR" ;  
  xebr:hasMonetaryValue "17,403"^^xsd:monetary ;  
  xebr:isIncludedIn xebr:EON_AR_2016 ;  
  rdfs:comment "A position in the EON 2016 Annual Report" ;  
  rdfs:label "EON AR 2016 CurrentAssets Total" ;  
  .
```

RDF/XML-ABBREV RDF/XML TURTLE N-TRIPLE JSON-LD

Also show imported triples (editing will be disabled)

Form Source Code

Imports Instances Domain Relevant Properties Error Log

[Resource]	rdf:type
xebr:M.1.4_EON_AR_2016	xebr:M.1.4

Thanks for your attention !