

Publishing XBRL as Linked Open Data

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Introduction

- **Contribute** to Web of Linked Open Data
- Public **financial data** available as XBRL
 - XML Business Reporting Language
 - E.g. SEC's EDGAR voluntary¹ program
- **Reuse** this data, **map** XBRL to RDF
 - Apply generic mapping: [ReDeFer](#)
 - XSD2OWL, XML2RDF
- Publish LOD using [Rhizomer](#)

¹ From 2009, 3 year phased-in schedule, by **end 2011 all U.S. public companies** plus 8,000 mutual funds



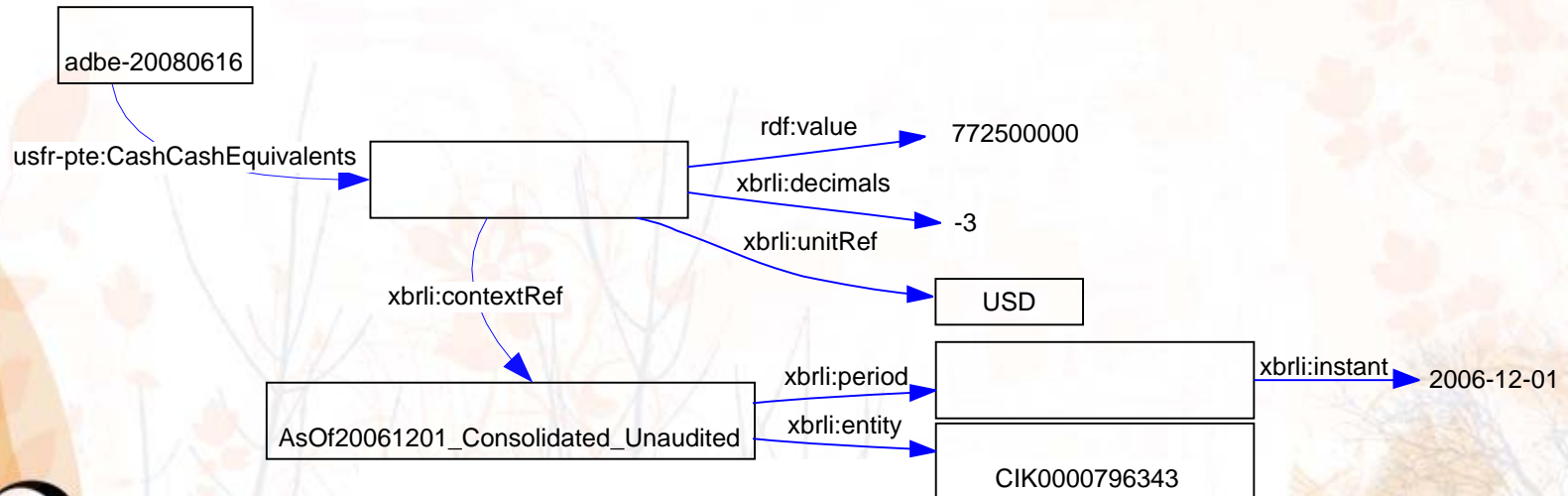
XBRL

- Instance data
 - **Facts:** e.g. “the long term debt is 350,000”, plus *contextRef* and *unitRef*
 - **Contexts:** entity (company or individual), time, [scenario]
 - **Units:** unit of measure
 - **References:** link to schema defining taxonomy of facts



XBRL XML to RDF

- ReDeFer [XML2RDF](#),
model XML tree using triples
 - xsd:element and xsd:attribute → rdf:Property
 - xbrli:id and xbrli:identifier → rdf:Resource ID
 - Other resources, anonymous

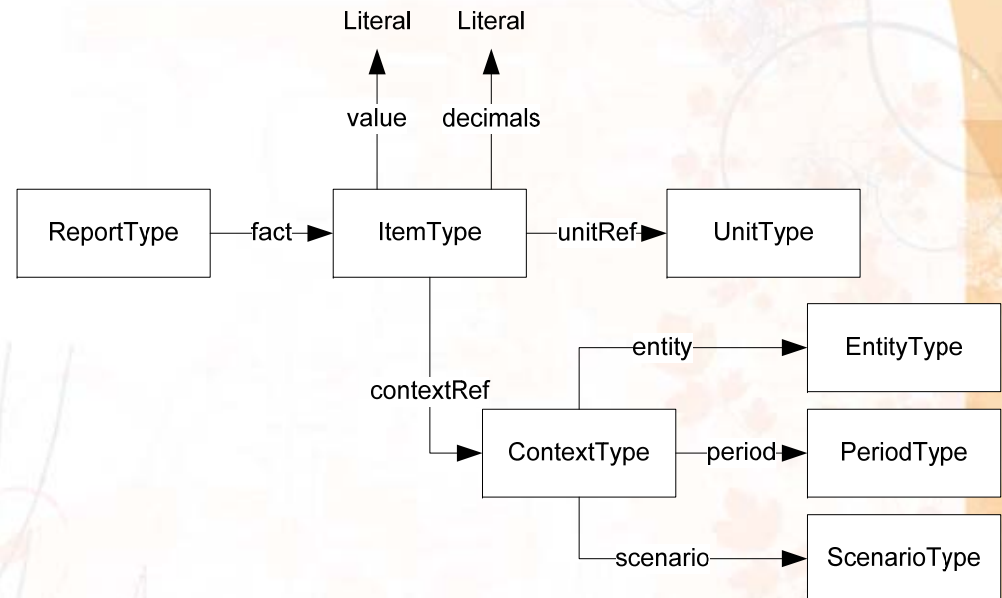


XBRL XSDs to OWL

- EDGAR Schemas: XBRL 2.1, US GAAP¹,...
- ReDeFer [XSD2OWL](#)

XSD2OWL mappings

XML Schema	OWL
element attribute	rdf:Property owl:DatatypeProperty owl:ObjectProperty
element@substitutionGroup	rdfs:subPropertyOf
element@type	rdfs:range
complexType	owl:Class
complexType//element	owl:Restriction
extension@base restriction@base	rdfs:subClassOf
@maxOccurs, @minOccurs	owl:maxCardinality, owl:minCardinality
sequence, choice	owl:intersectionOf, owl:unionOf



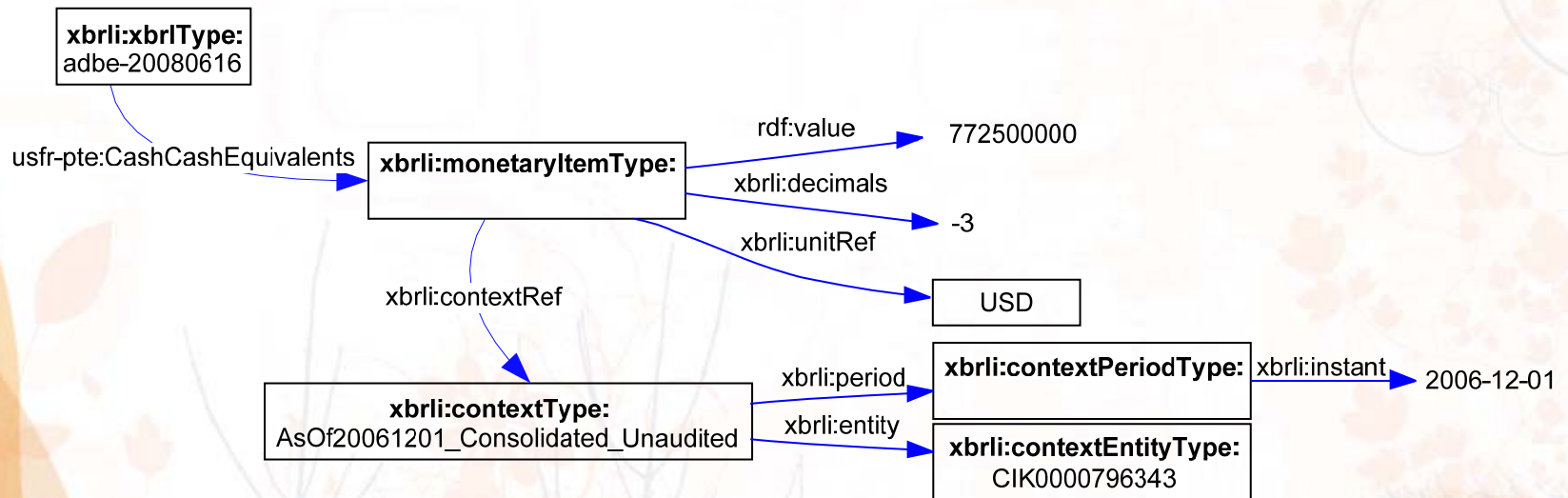
Core classes and properties for XBRL Instance

¹Generally Accepted Accounting Principles



XML2RDF plus XSD2OWL

- Resources typed with classes in ontologies corresponding to their XSD *complexType*:

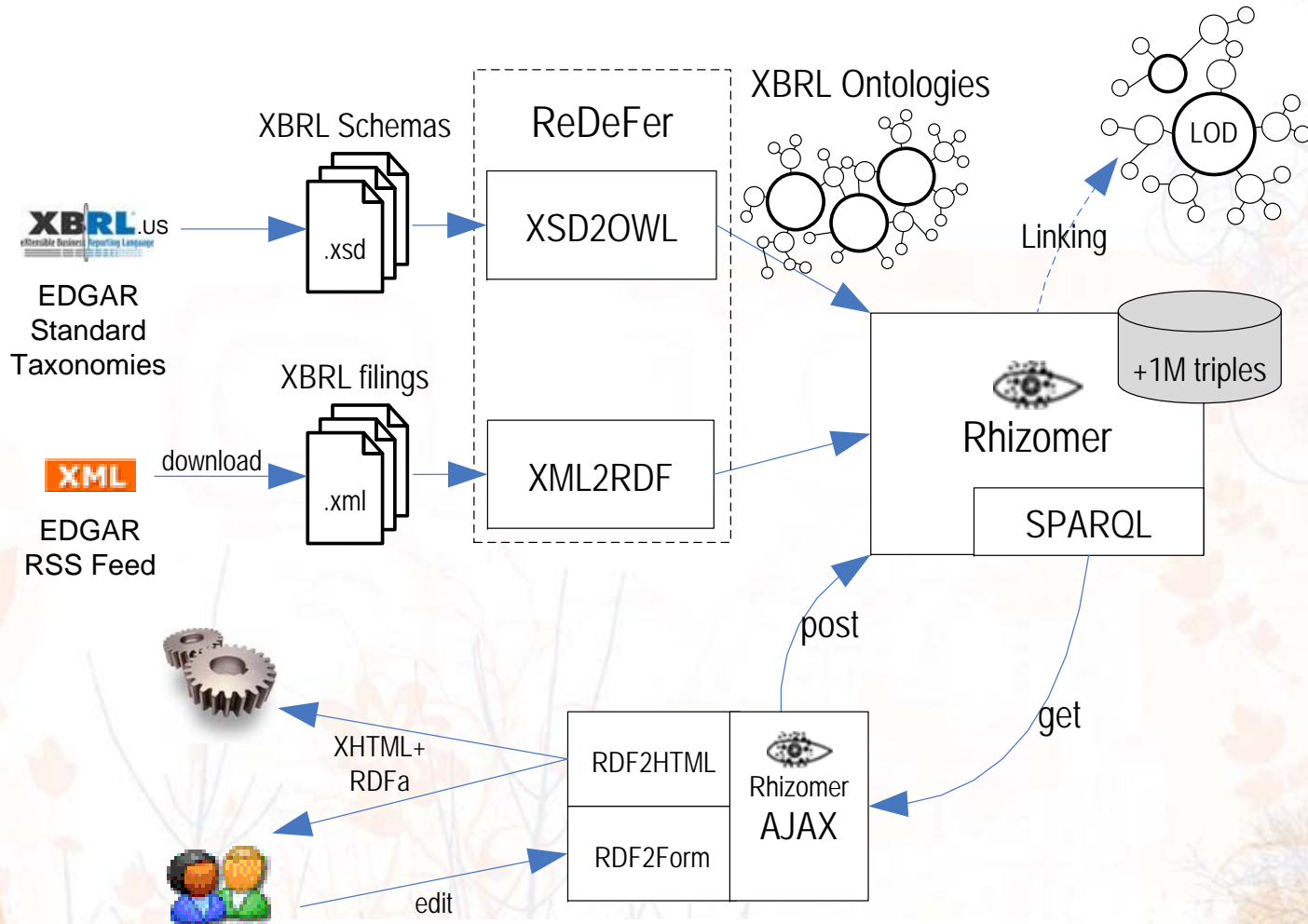


Semantic XBRL

- Dataset size
 - April 2009: **1,34 million triples** from **612 XBRL filings**.
- Links to LODW:
 - Entities: companies in DBPedia, use name or Central Index Key (CIK)
 - Units: e.g. USD →
http://dbpedia.org/resource/United_States_dollar



Architecture



Publishing XBRL as Linked Open Data Linked Open
Data Workshop – WWW'2009



Prototype Demo

- **Rhizomer:** publish, query, browse, edit and mashup (map, timeline,...) Linked Data:
 - Ex.1: get a context description from its URL
 - [Link](#), [Capture](#)
 - Ex.2: get all mentions of entity CIK796343
 - [Link](#), [Capture](#)
 - Ex.3: all *Investment[In]LeaseReceivable* integrated from different filings
 - [Link](#), [Capture](#)



Conclusions and Future Work

- **Straightforward** mapping XBRL to LOD
- Resulting RDF is too “XML-styled”...
...rules/CONSTRUCT to **tailor** to needs
 - E.g. facts as resources instead of properties facilitate querying and browsing
- Semantic **mappings** might facilitate **cross-querying** financial data...
 - Across filings, companies, accounting principles,...





Thank you for your attention

Roberto García González
<http://rhizomik.net/~roberto>



Get a context description from its URL



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From20071201 - To20081128 None None StatementOperatingActivitiesSegmentAxis KnowledgeWorkerSolutions a contextType

entity CIK0000796343

a contextPeriodType

period endDate 2008-11-28
startDate 2007-12-01

[Referrers](#)



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Get all mentions of entity CIK796343

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a ResultSet

resultVariable entity	
solution	binding value CIK0000796343 variable entity
solution	binding value CIK0000796343 variable entity
solution	binding value CIK0000796343 variable entity
solution	binding value CIK0000796343 variable entity
solution	binding value CIK0000796343 variable entity
solution	binding value CIK0000796343 variable entity
solution	binding value CIK0000796343 variable entity
solution	binding value CIK0000796343 variable entity



Get all *Investment[In]LeaseReceivable*

<u>adbe-20080616</u> edit - new - del	
InvestmentLeaseReceivable	a monetaryItemType
	contextRef AsOf20080530 Consolidated Unaudited
	decimals -3
	unitRef USD
value 207239000	
InvestmentLeaseReceivable	a monetaryItemType
	contextRef AsOf20071130 Consolidated Unaudited
	decimals -3
	unitRef USD
value 207239000	
Re ferrers	

<u>adbe-20080916</u> edit - new - del	
InvestmentInLeaseReceivable	a monetaryItemType
	contextRef AsOf20071130
	decimals -3
	unitRef USD
value 207239000	
InvestmentInLeaseReceivable	a monetaryItemType
	contextRef AsOf20080829
	decimals -3
	unitRef USD
value 207239000	
Re ferrers	

<u>adbe-20090227</u> edit - new - del	
InvestmentInLeaseReceivable	a monetaryItemType
	contextRef BalanceAsOf 28Nov2008 Unaudited
	decimals -3
	unitRef USD
value 207239000	
InvestmentInLeaseReceivable	a monetaryItemType
	contextRef BalanceAsOf 27Feb2009 Unaudited
	decimals -3
	unitRef USD
value 207239000	
Re ferrers	

