XBRL Analytics that Just Makes Sense

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Excellence in Business Intelligence

Introduction

Why does analytics and data modelling belong together?

- How is data analysed?
- Through semantics / characteristics / properties
  - Enable conclusions
  - Provide different contexts / views on the data
  - Receive micro and macro picture
- Analytical methods based on semantics
  - combining, grouping, separating facts
  - showing them next to each other
  - Time series
  - …
- Successful analytics depends on semantics as a key component

Introduction

Why does analytics and data modelling belong together?

- XBRL is known as carrier of semantics
- Most of the semantics are defined in the meta framework (taxonomy)
  - Label-, reference-, presentation-, definition-, calculation-, formula-, rendering / table linkbase
- Some are also defined in the instance
  - Period, entity name / identifier, typed dimensions, unit, period

- XBRL Spec is very flexible
- Flexibility increases the cost factor of implementing IT systems
- Constrain this flexibility through taxonomy architecture documents, filing manuals and other guidelines

- XBRL taxonomy architecture choices
  - **meaning of data** (reference to underlying standard in reference vs. dimensional split)
  - **Presentation of data** (Mirror presentation and definition + inlineXBRL vs. rendering linkbase vs. table linkbase)?
  - **Validations** (Calculation vs. Formula)

Introduction

Why does analytics and data modelling belong together?

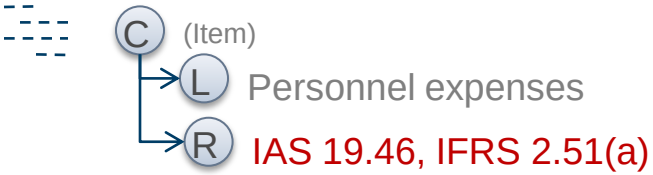
- XBRL taxonomy architecture choices (cont.)
  - **Syntactical rules**
  - **Supported languages**
  - **Typed dimensions** (simple xml schema type vs. complex xml schema type, semantic meaning, important for analysis?)
  - Grouping of information (tuples vs. dimensions)
  - Extensions (yes/no)

Introduction

Why does analytics and data modelling belong together?

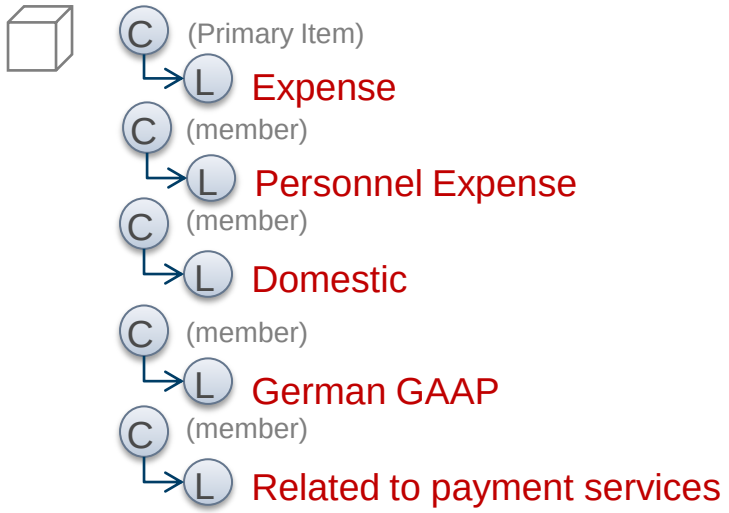
- Providing meaning to concepts

Non-dimensional data modelling



- semantics is sitting indirect in the reference

Dimensional data modelling



- Semantics is expressed explicitly through dimensions / members

Introduction

Why does analytics and data modelling belong together?

- Architectural decisions result in a data model of XBRL taxonomy which does effect the ways in which data can be analyzed afterwards!

- Many taxonomy creators are not aware of that
  - Express semantics as explicit as possible

- General approach taken by taxonomy creators:

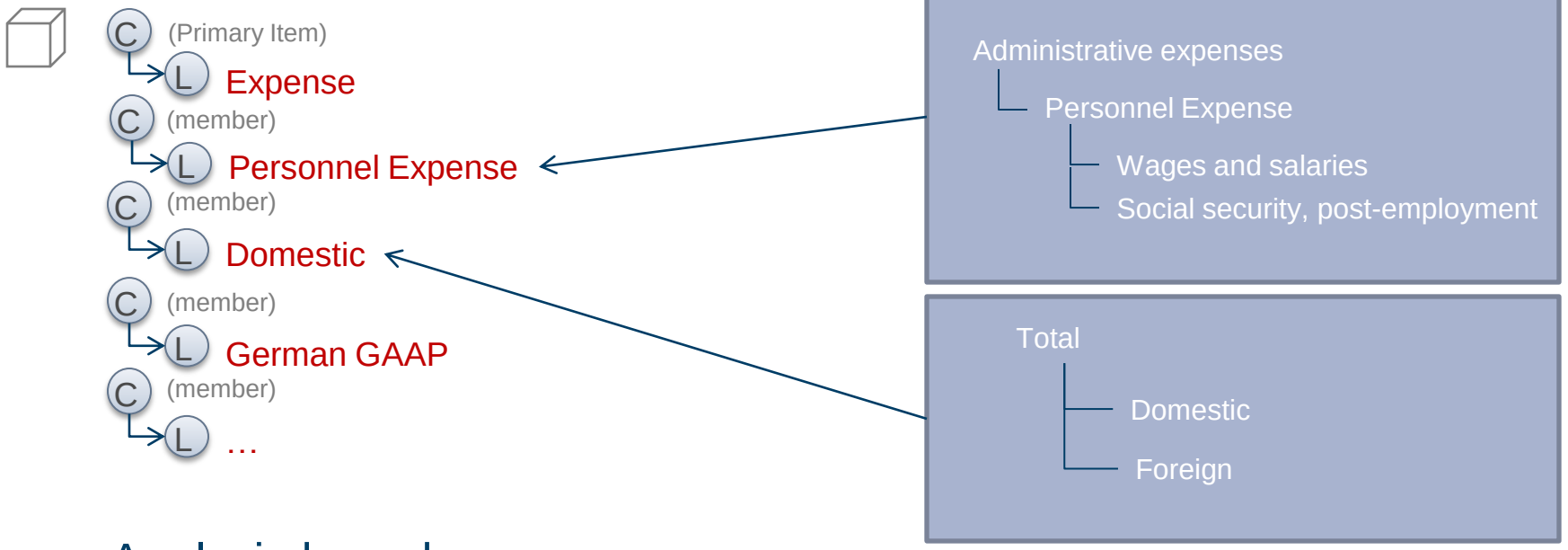
- Not included in the taxonomy development process
  - Analytical aspects (analytical scenario, queries, reports)
    - Issue: Literature is not a requirements document for analysis process
    - Lately questions did arise in the XBRL world: Who is using the data? And how can it be used?
  - If taxonomy creators (mostly regulators) do not have a strategy for analyzing the data and reflect that in the data model of the taxonomy stakeholders (mostly themselves) have a much harder time to analyze it

Data Modelling approaches for taxonomies

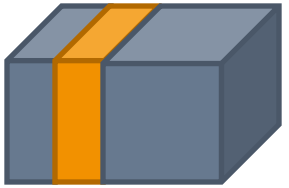
How to analyse the data?

- Dimensional approach – huge advantage – more semantics separatly modelled

Dimensional data modelling



- Analysis based on
  - Members in different dimension (slicing and dicing)
  - Along hierarchies of members within one dimension



Data Modelling approaches for taxonomies

How to analyse the data?

- improved tracking of changes in meaning of concepts

Non-dimensional data modelling

C (Item)
L Personnel expenses
R IAS 19.46, IFRS 2.51(a)

Dimensional data modelling

C (Primary Item)
L Expense
C (member)
L Personnel Expense
C (member)
L Domestic
C (member)
L German GAAP
C (member)
L Related to payment services

Non-dimensional data modelling

C (Item)
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Dimensional data modelling

C (Primary Item)
L Expense
C (member)
L Personnel Expense
C (member)
L Domestic
C (member)
L German GAAP
C (member)
L Related to payment services **and others**

Presentation of data

- **Inline XBRL**
  - Through HTML very flexible in the way to present something
  - Not very good in terms of aggregations (grouping)

- **Table linkbase**
  - Enables common view on data (like forms: EBA, EIOPA, other regulators which are heavily based on forms)
    - Cluster Data by topic
    - Improved usability for business users (hide complexety)
    - Enables talking about table, column, row
    - Define the data points which „are valid“ in multi dimensional cube

    ⇒ mapping between simple table oriented view and highly dimensional data model

  - Different types of forms:
    - Open tables (unspecified lines of rows)
    - Table split - Changes of dimensional combination within one table
    - Grouping of tables (master data table + data part)

  ⇒ enables masterdata aggregation in a single form

  ⇒ forms as tools to create link between easy input and dimensional combination for regulatory reporting (for taxonomies with large number of dimensions)

Validation

- **Calculation linkbase**
  - Simple
  - Does not cover a lot of validation scenarios (especially multidimensional taxonomies)
- **Formula linkbase**
  - Complex
  - not easy / impossible to reverse engineer validation rules -> does force filers to by XBRL processor or derive rules from non XBRL source (like Excel on regulators webpage)
  - Requires regulator to build conversion tool or manually create formulas (Maintenance ?)

- Error messages
  - calculation – XBRL processor driven
  - Formula messages – Should be business user driven!

Other aspects

- **syntactical rules**: (@names, @table_ids, @xlink:arcroles, @costum_attributes)
  - Pattern (semantics?, length?)
  - **Supported languages**
    - Enables those languages in BI
  - **Typed dimensions**
    - Hard to analyse data with typed dimension – depending on business semantics (linked to entity?)
  - **Grouping of information**
    - Tuples hard to analyse – potentially as master data container ? Usually master data deriving from other sources than XBRL
  - **Extensions**
    - Entity specific analysis possible, cross entity analysis not possible

Primary Items

- Primary Items
  - As Data type (instance, monetary, percentage, boolean, string)
  - As Dimension
    - With hierarchy (just another dimension)
    - Without hierarchy

⇒ Depends on the analytics scenario

⇒ Which numbers should be aggregated in the BI tool?

⇒ What kind of data ís required in the BI System? Text ?!?

⇒ Important: How should data behave?

Hierarchies

- Hierarchies
  - Taxonomies define hierarchies (presentation, definition, calculation)
  - But just relation is not helpful for BI
    - Required to define specific business semantics
    - For multidimensional taxonomies (definition linkbase) does include +, - ,<, >, <=, >= relationships
    - Mostly done without a specific analytical scenario

⇒ For analysis only those relationships are considered as useful which can be expressed in BI / BW system (generally only „+“ relationships)

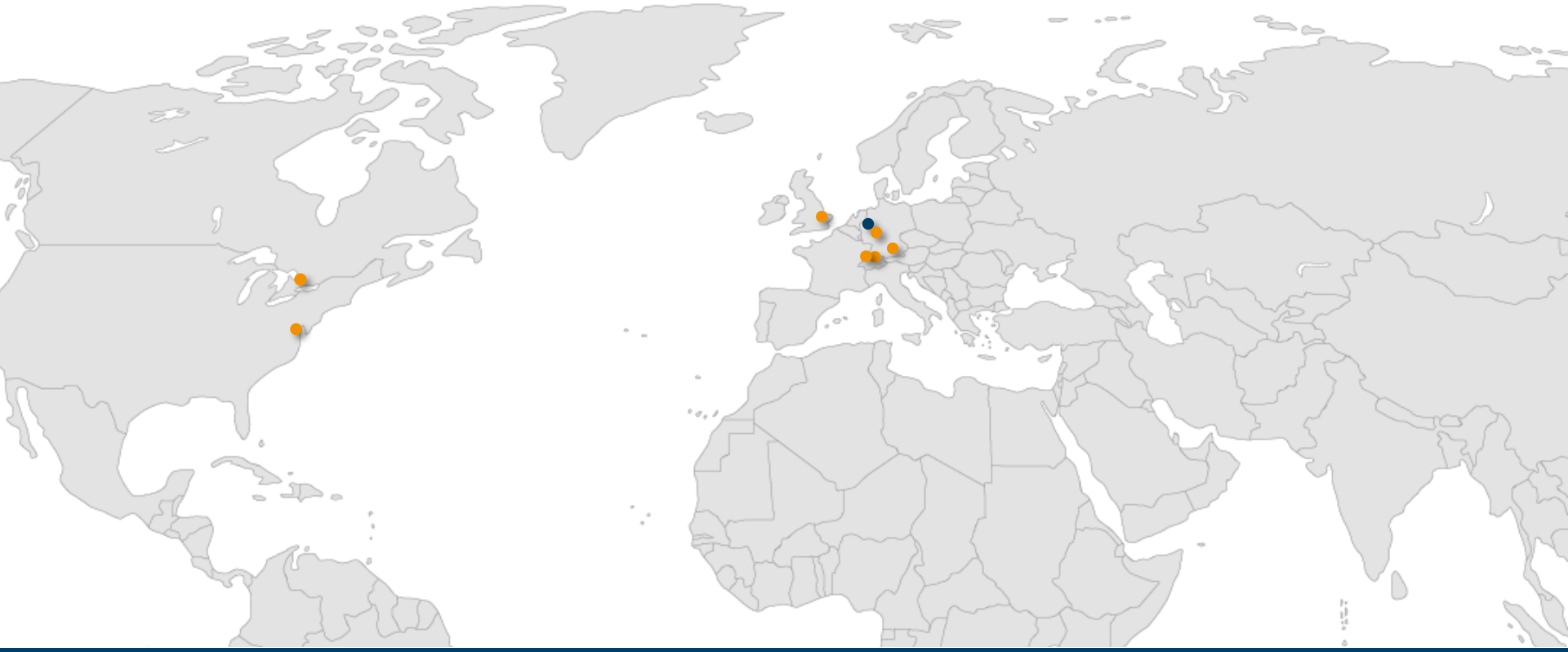
⇒ In the overall context signs on these hierarchies must not differ on the same items. (no negation attributes allowed on definition arcs)

Data Modelling approaches for taxonomies

How to analyse the data?

- Multidimensional taxonomies
  - EBA Taxonomies (Corep / Finrep)
  - EIOPA Taxonomies (Solvency II)

- cundus AG is developing the
  "*Taxonomy driven data analysis approach*"
  on large scale BI Systems for regulators like Bundesbank (Germany)



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