The Structure of the COREP Template Taxonomies

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The Structure of a COREP Template Taxonomy

Aims of the presentation

- Understand the structure of a template taxonomy
- Get a basic understanding of Dimensions in XBRL
  - get to know terms and principles
  - basis for further studies
- Be able to create own Template Taxonomies
  - exercises and sample solutions contained on the CD
  - this presentation wants to be some kind of a „helping guide“
The Structure of a COREP Template Taxonomy

Roadmap of the presentation

- Purpose and Structure of a Template Taxonomy
- Excursus: Dimensions in XBRL
- Example I: Creation of a taxonomy of a simple template (MKR SA EQU)
- Example II: Creation of a taxonomy of a more complex template (CR EQU IRB)
The Structure of a COREP Template Taxonomy

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**Purpose and Structure of a Template Taxonomy**

- **Primary Elements**: Represented in **one** primary taxonomy

- **Dimensional Elements**: Represented in **four** dimensional taxonomies

**Template = Primary Elements + Dimensional Elements + Additional Information**
Purpose and Structure of a Template Taxonomy

Template Taxonomy = Primary Taxonomy + Dimensional Taxonomy + Additional Information

XML import:
- access to all elements
- access to the linkbases
Purpose and Structure of a Template Taxonomy

A template taxonomy imports all necessary primary and dimensional taxonomies, depending on the according template. Therefore it can „access“ all the information contained in the imported taxonomies. It adds additional information related to the template, namely the information which cells are white (allowed) and which are grey (not allowed).
Purpose and Structure of a Template Taxonomy

Naming Conventions of the COREP Template Taxonomies

- **Name of the taxonomy:**
  \[t-xx-2005-12-31.xsd\] (xx abbreviation of the template)

- **Target namespace:**
  \[http://www.c-ebs.org/eu/fr/esrs/corep/2005-12-31/t-xx-2005-12-31\]

- **IDs of the elements:**
  \[t-xx_<elementName>\]

- **All elements in the template taxonomy are abstract**
  (explanation later)
Purpose and Structure of a Template Taxonomy

„Additional information“
- what exactly does that mean?

Combination of
primary item: „Of Which: Arising from counterparty credit risk“
and
dimensional item from Exposures dimension: „Total Exposures“

VALID

Combination of
primary item: „Of Which: Arising from counterparty credit risk“
and
dimensional item from Exposures dimension: „Total Exposures“
and
dimensional item from Exposure Type dimension: „On Balance Sheet Items“

INVALID
Roadmap of the presentation

- Purpose and Structure of a Template Taxonomy
- **Excursus: Dimensions in XBRL**
- Example I: Creation of a taxonomy of a simple template (MKR SA EQU)
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Until July 2005, no formal support of Dimensions in XBRL

July 2005: XBRL Int. released first Public Working Draft (PWD) about Dimensions, implemented by COREP taxonomies 0.6.1

November 2005: XBRL Int. released second PWD titled „Dimensions 1.0“, implemented by COREP taxonomies 1.0

January 2006: „Dimensions 1.0“ became a Candidate Recommendation (CR), implemented by COREP taxonomies 1.0

Dimensions in XBRL

Basic terms (1)

- Each **dimension** consists of **domain member**. In the definition linkbase, these form a **domain member network**.

- Examples:

  **Dimension**

  Exposures
d-ex-2005-12-31.xsd

  • Total Exposures
  • Originator: Total Exposures
  • Investor: Total Exposures
  • Sponsor: Total Exposures
  • ...

  **Dimension**

  Several **domain member**.
  The **domain member network** is expressed in the definition linkbase of the dimensional taxonomies (arcrole http://xbrl.org/int/dim/arcrole/domain-member)

  **Dimension**

  Exposure Type
d-et-2005-12-31.xsd

  • On Balance Sheet Items
  • Off Balance Sheet Items
  • Derivatives
  • From Contractual Cross Product Netting
  • ...


Dimensions in XBRL

Basic terms (2)

- Each domain member is a special characteristic of a dimension.
- As a whole, the domain member are called the domain of a dimension.
Dimensions in XBRL – what do we know by now?

- Each dimension always has one domain.
- The domain consists of all the elements ("characteristics") of this dimension. The elements themselves are called domain member.
Model of Dimensions in XBRL (1)

- **Dimension I**
  - Domain
    - Domain Member I
    - Domain Member II
    - Domain Member III

- **Dimension II**
  - Domain I
    - Domain Member I
    - Domain Member II
  - Domain II
    - Domain Member I
Basic terms (3)

- Necessity of a term to combine multiple dimensions.
- This is called a hypercube. A hypercube always consists of one or multiple dimensions.
- A hypercube is a possibility to express combinations of arbitrary dimensions.
Model of Dimensions in XBRL (2)

- Hypercube
  - Dimension I
    - Domain
      - Domain Member I
      - Domain Member II
      - Domain Member III
  - Dimension II
    - Domain I
      - Domain Member I
      - Domain Member II
    - Domain II
      - Domain Member I
Dimensions in XBRL

How is this model implemented in XBRL?

- The model lets us think:
  - „A hypercube is linked to one or more dimensions.“
  - „A dimension is linked to one or more domains.“
  - „A domain is linked to one or more domain member.“

- Dimensional relationships are expressed in a linkbase, namely in the definition linkbase of the template taxonomy.

- To link everything together, we need elements representing a hypercube, a dimension, a domain and domain member.
Dimensions in XBRL

Necessary elements

- The element representing the **hypercube** must be created (abstract element of the template taxonomy)
- The element representing the **dimension** must be created (abstract element of the template taxonomy)
- The element representing the **domain** can be taken from the imported dimensional taxonomy
- The element representing the **domain member** can be taken from the imported dimensional taxonomy

Elements must be created in template taxonomy

Elements can be taken from imported dimension taxonomies
## Dimensions in XBRL

### Necessary arcrroles in the definition linkbase

- **Hypercube**
  - **Dimension**
  - **Domain**
    - Domain Member I
    - Domain Member II
    - Domain Member III

- **Link from hypercube element to dimension element:**
  - http://xbrl.org/int/dim/arcrole/hypercube-dimension

- **Link from dimension element to domain element:**
  - http://xbrl.org/int/dim/arcrole/dimension-domain

- **Link from domain element to domain member element and between domain member elements:**
  - http://xbrl.org/int/dim/arcrole/domain-member
Dimensions in XBRL

Summary

- In the template taxonomy, abstract elements for hypercubes and dimensions must be created.
- Elements representing the domain and the domain member are taken from the imported dimensional taxonomies.
- The necessary links are then created in the definition linkbase.
- Is this everything?
Dimensions in XBRL

Hypercubes and primary items (1)

- Remember: A template defines which combination of dimensions is allowed and which is not allowed \textbf{for a primary item}.
- To express this in XBRL, the created hypercubes must be linked to the according primary items. This is also done in the definition linkbase of a template taxonomy.
- The primary items are taken from the imported primary taxonomy.
Hypercubes and primary items (2)

Specific primary item (element from imported primary taxonomy)

Hypercube (abstract element in template taxonomy)

Dimension (abstract element in template taxonomy)

Domain (element from imported dimension taxonomy)

Domain Member I (element from imported dimension taxonomy)

Domain Member II

Domain Member III

• Now there is a relationship between a primary item and a hypercube (= combination of dimensions)
• The arcrole of this link defines the nature of the relationship:
  • http://xbrl.org/int/dim/arcrole/all means the combination of dimensions is allowed for this primary item
  • http://xbrl.org/int/dim/arcrole/notAll means the combination of dimensions is not allowed for this primary item
• Multiple hypercubes assigned to the same primary item are always combined using a logical AND
**Dimensions in XBRL**

**Hypercubes and primary items (3)**

Statement: X might be reported for

\[(a \text{ or } b \text{ of } \text{Dimension1}) \text{ AND } (A \text{ or } B \text{ or } C \text{ of } \text{Dimension2}) \text{ AND NOT } (a \text{ or } b \text{ of } \text{Dimension1}) \text{ AND } C \text{ of } \text{Dimension2}) \]

- **possible is:**
  - a of Dimension1 and B of Dimension2
  - b of Dimension1 and A of Dimension2
  - ...

- **NOT possible is:**
  - a of Dimension1 and C of Dimension2
  - b of Dimension1 and C of Dimension2
**Dimensions in XBRL**

**Hypercubes and primary items (4)**

Primary Item X

- Hypercube1
  - Dimension1
    - Domain
    - a
    - b
  - Dimension2
    - Domain
    - A

Combination is allowed (arcrole ".../all")

- Hypercube2
  - Dimension1
    - Domain
    - a
    - b
  - Dimension2
    - Domain
    - C

Combination is allowed (arcrole ".../all")

Statement: X might be reported for

\[(a \text{ or } b \text{ of Dimension1 AND } A \text{ of Dimension2}) \text{ AND } (a \text{ or } b \text{ of Dimension1 AND } C \text{ of Dimension2})\]

Never possible: X cannot be reported for A and C of Dimension2 at the same time!
Typed dimensions (1)

- Until now, all dimensions had a discrete, countable number of elements (the domain, consisting of domain member).
- These dimensions are called explicit dimensions.
- Dimensions with an unknown or infinite domain are called typed dimensions.
- How can they be modelled in XBRL?
Typed dimensions (2)

- Like with explicit dimensions, there must be an abstract element in the template taxonomy representing the typed dimension.
- Describe the form of the possible characteristics of the dimension in a formal way: in an XML Schema.

(template) dimension element

additional attribute for dimension element: xbrldt:typedDomainRef="schema.xsd#id_element"

Template Taxonomy

<element id="id_element">
  <!-- formal description -->
</element>

XML Schema file (schema.xsd)

- Hypercube is formed in exactly the same way: Link from hypercube element to (typed) dimension element, but now there is no link from the dimension element to a domain element.
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Example I

MKR SA EQU Template

- primary taxonomy: p-me-2005-12-31.xsd
- explicit dimension taxonomy: d-ri-2005-12-31.xsd
- typed dimension: National Market (has no dimensional taxonomy)
Example I

How to create a Template Taxonomy Step By Step

- Create a new taxonomy
  - Exercise in directory 01
- Import all necessary primary and dimensional taxonomies.
  - Exercise in directory 02
- Create the abstract elements for the dimensions.
  - Exercise in directory 03 and 04
- Identify the necessary hypercubes and create the abstract elements for them.
  - Exercise in directory 05
- Build the links between the hypercubes and the according dimensions in the definition linkbase.
  - Exercise in directory 06
- Link the hypercubes to the according primary items.
  - Exercise in directory 07
Example I

Step I: Create a new taxonomy

- File → New Taxonomy; File → Save As
Example I

Step II: Import all necessary primary and dimensional taxonomies

• File → Import Taxonomy

• Choose the taxonomies you wish to import
Step III: Create the abstract elements for the dimensions (1)

There are two dimensions:

- **Explicit dimension** Equities in Trading Book
- **Typed dimension** National Markets

So two different abstract elements are needed:

- t-me_EquitiesTradingBookDimension
- t-me_NationalMarketDimension

**prefix of the template, name of the dimension**

- type: xbrli:stringItemType
- substitutionGroup: xbrldt:dimensionItem
- periodType: instant
- abstract and nillable: true
- English label always ends with „(dimension)“
Exercise I

Step III: Create the abstract elements for the dimensions (2)

• Remember: Typed dimension needs a formal description of its characteristics

Template Taxonomy

(typed) dimension element

additional attribute for dimension element:
xbrlt:typedDomainRef="schema.xsd#id_element"

XML Schema file (schema.xsd)

• Since a taxonomy IS an XML schema file, the formal description is done in the taxonomy itself
Exercise I

Step III: Create the abstract elements for the dimensions (3)

- Create a schema element which describes characteristics of National Market dimension

  - id: t-me_NationalMarket
  - type: xsd:string
Exercise I

Step III: Create the abstract elements for the dimensions (4)

Select National Market (dimension) and choose tab „Other Attributes“ ...

... then add a new attribute!
Exercise I

Step IV: Identify the necessary hypercubes and create the abstract elements for them (1)

Three Steps How To Identify Hypercubes:

• Identify all cells within a template which refer to the same dimensions (NOT depending on the specific domain member)

• Within this choice, identify blocks which refer to the same domain of each dimension (depends on position of white and grey cells)

• Every block found is a hypercube!
Exercise I

Step IV: Identify the necessary hypercubes and create the abstract elements for them (2)

- Identify all cells within a template which refer to the same dimensions (NOT depending on the specific domain member)

  • EVERY cell in this template refers to the same dimensions. EVERY cell ALWAYS refers both to the Equities in Trading Book dimension AND to the National Market dimension!
Step IV: Identify the necessary hypercubes and create the abstract elements for them (3)

• Within this choice, identify blocks which refer to the same domain of each dimension (depends on position of white and grey cells)

• Possibility 1 (three hypercubes)
• All the cells within one hypercube belong to the same domain!
Exercise I

Step IV: Identify the necessary hypercubes and create the abstract elements for them (4)

- Within this choice, identify blocks which refer to the same domain of each dimension (depends on position of white and grey cells)

- Possibility 2 (three hypercubes)
  - One cube spans over the whole template, and only the grey cells are excluded. This is possible since multiple hypercubes can be assigned to one primary item!
  - ➔ This is the COREP solution within the t-me taxonomy!
Step IV: Identify the necessary hypercubes and create the abstract elements for them (5)

- **Create three abstract elements for the hypercubes:**
  - t-me_hcSectionAll
  - t-me_hcExcludedStockIndexFutures
  - t-me_hcExcludedOtherNonDeltaRisksOptions
  - the name of a hypercube in COREP taxonomies always starts with „hc“
  - type: xbrli:stringItemType
  - substitutionGroup: xbrldt:hypercubeltem
  - periodType: instant
  - Abstract and nillable: true
  - English label always ends with „(hypercube)“
Step V: Build the links between the hypercubes and the according dimensions in the definition linkbase (2)

- Each hypercube is modelled within its own extended link role.
- Naming convention of the extended link roles:
  - xx is the abbreviation of the template
  - <hypercube> is the name of the hypercube defined in this extended link role
- Any element of the dimensional taxonomy can represent the domain.
Step V: Build the links between the hypercubes and the according dimensions in the definition linkbase (1)

**Exercise I**

**Hypercube t-me_hcSectionAll:**
- refers to two dimensions:
  - Equities in Trading Book
    - Domain are all the elements in the first column of the template
  - National Market Dimension
    - Has no domain since this is a typed dimension
Exercise I

Step V: Build the links between the hypercubes and the according dimensions in the definition linkbase (3)

Hypercube t-me_hcSectionAll:
- refers to two dimensions:
  - Equities in Trading Book
    - Domain are all the elements in the first column of the template
  - National Market Dimension
    - Has no domain since this is a typed dimension

![Diagram of hypercube and dimensions]
**Exercise I**

**Step V: Build the links between the hypercubes and the according dimensions in the definition linkbase (4)**

<table>
<thead>
<tr>
<th>Hypercube t-me_hcExcludedStockIndexFutures:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• refers to two dimensions:</td>
</tr>
<tr>
<td>• Equities in Trading Book</td>
</tr>
<tr>
<td>• Domain are two elements in the first column of the template</td>
</tr>
<tr>
<td>• National Market Dimension</td>
</tr>
<tr>
<td>• Has no domain since this is a typed dimension</td>
</tr>
</tbody>
</table>
Step V: Build the links between the hypercubes and the according dimensions in the definition linkbase (5)

Hypercube $hc_{ExcludedStockIndexFutures}$:
- refers to two dimensions:
  - Equities in Trading Book
  - Domain are two elements in the first column of the template
  - National Market Dimension
    - Has no domain since this is a typed dimension

Extended link role
- hypercube
- National Market dimension
- Equities in Trading Book dimension
  - domain of Equities in Trading Book dimension
    ($=\text{domain member network}$)
Step V: Build the links between the hypercubes and the according dimensions in the definition linkbase (6)

Hypercube t-me_hcExcludedOtherNonDeltaRisksOptions:
  • refers to two dimensions:
    • Equities in Trading Book
      • Domain is one element in the first column of the template
    • National Market Dimension
      • Has no domain since this is a typed dimension
Exercise I

Step V: Build the links between the hypercubes and the according dimensions in the definition linkbase (7)

Hypercube hcExcludedOtherNonDeltaRisksOptions:
• refers to two dimensions:
  • Equities in Trading Book
    • Domain is one element in the first column of the template
  • National Market Dimension
    • Has no domain since this is a typed dimension

![Diagram of hypercube and dimensions](http://www.c-eps.org/2006/corep/viewer/hcExcludedOtherNonDeltaRisksOptions)

- extended link role
- hypercube
- National Market dimension
- Equities in Trading Book dimension
domain of Equities in Trading Book dimension
( = domain member network)
Exercise I

Step VI: Link the hypercubes to the according primary items (1)

Important things to consider when linking hypercubes to primary items:

- As in dimension taxonomies, there is also a domain member network of primary items in primary taxonomies (built in the definition linkbase).
- This domain member network is available in the default link role of the template taxonomy (since the template taxonomy imports the primary taxonomy).
- A hypercube assigned to one primary item is inherited to all child elements in the domain member network of the primary items.
- An individual extended link role with a separate primary domain member network and the according hypercubes is called a section in the template.
Step VI: Link the hypercubes to the according primary items (2)

- Hypercube \textit{hcSectionAll} is linked to all primary items (using the "/all" arcrole).
- Hypercube \textit{hcExcludedStockIndexFutures} is linked to two primary items (using the "/notAll" arcrole).
- Hypercube \textit{hcExcludedOtherNonDeltaRisksOptions} is linked to six primary items (using the "/notAll" arcrole).

⇒ This must all be done within the same extended link role. In this case, use the default link role.
Exercise I

Step VI: Link the hypercubes to the according primary items (3)

Where are all the links of the hypercubes in the default link role?
Exercise I

Step VI: Link the hypercubes to the according primary items (4)

- The links of the hypercubes already exist in the other extended link roles (we built them in step V).
- Existing links in the definition linkbase do not have to be rebuilt in different extended link roles.
- Instead, link from one extended link role to the one which already contains the necessary links.
  - ➔ Links can be reused!
- This is done by the `xbrldt:targetRole` attribute of the arc.

In the COREP taxonomies, this technique is used for hypercubes and domain member networks.
Step VI: Link the hypercubes to the according primary items (5)

Additional attributes of the arc:
- `xbrldt:targetRole`: link to other extended link role
- `xbrldt:contextElement`: scenario if dimensional information is in the `<scenario>` element of an instance, segment if dimensional information is in the `<segment>` element of an instance
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Part of CR IRB template used in this example

<table>
<thead>
<tr>
<th>Exposure Dimension</th>
<th>IRB Exposure Class Dimension</th>
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<table>
<thead>
<tr>
<th>Primary Items</th>
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<tr>
<th>Exposure Type Dimension</th>
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<th>CR IRB</th>
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<tr>
<th>Exposure Class Dimension</th>
<th>Own estimates of LGD/Conversion factors Dimension</th>
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<th>Exposure Type Dimension</th>
<th>Primary Items</th>
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<th>On balance sheet items</th>
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<tr>
<td>Off balance sheet items</td>
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<tr>
<td>Securities Financing Transactions</td>
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<tr>
<td>In/Long Settlement Transactions</td>
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<td>Derivatives</td>
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<td>From/Contractual Cross Product Noting</td>
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<th>impairment of credit quality of LGD</th>
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<td>other estimates of LGD/Conversion factors</td>
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Exercise II

Step I: Create a new taxonomy
- t-ci-2005-21-31.xsd

Step II: Import all necessary primary and dimensional taxonomies
- Import one primary taxonomy
- Import four dimensional taxonomies

Step III: Create the abstract elements for the dimensions
- Create four abstract elements
- t-ci_ExposureDimension
- t-ci_ExposureTypeDimension
- t-ci_ExposureClassDimension
- t-ci_OwnEstimatesLGDConversionFactorsDimension
Step IV: Identify the necessary hypercubes and create the abstract elements for them

- Identify all cells within a template which refer to the same dimensions (NOT depending on the specific domain member)

Cells belong to **3** different dimensions
- Exposure Dimension
- Exposure Class Dimension
- Own Estimates … Dimension

Cells belong to **4** different dimensions
- Exposure Dimension
- Exposure Type Dimension
- Exposure Class Dimension
- Own Estimates … Dimension
Exercise II

Step IV: Identify the necessary hypercubes and create the abstract elements for them

• Within this choice, identify blocks which refer to the same domain of each dimension (depends on position of white and grey cells)

In the first choice, all the elements belong to the same domain
⇒ According hypercube is called hcSectionExposures

In the second choice, two cubes are modelled: One cube spans over the complete choice, the other cube only includes the grey cells
⇒ Similar to Exercise I
⇒ According hypercubes are called hcSectionExposureTypes and hcExcludedBalanceSheetItems
Step V: Build the links between the hypercubes and the according dimensions in the definition linkbase (1)

<table>
<thead>
<tr>
<th>Coordination Exposures</th>
<th>Exposure Dimension</th>
<th>Total Exposures</th>
<th>Exposure Class Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete domain member network</td>
<td>Own estimates ... Dimension</td>
<td>Complete domain member network</td>
<td></td>
</tr>
</tbody>
</table>
Exercise II

Step V: Build the links between the hypercubes and the according dimensions in the definition linkbase (2)

- **hcSectionExposureTypes**
  - Exposure Dimension
  - Total Exposures
  - Exposure Type Dimension
  - Five domain member
  - Exposure Class Dimension
  - Complete domain member network
  - Own estimates … Dimension
  - Complete domain member network
Exercise II

Step V: Build the links between the hypercubes and the according dimensions in the definition linkbae (3)
Step VI: Link the hypercubes to the according primary items

True for COREP taxonomies: Within one extended link role, two hypercubes which refer to different dimensions are never linked to the same primary item.

Therefore two different extended link roles are needed:

• One for `hcSectionExposures` and `hcExcludedBalanceSheetItems`
  • [http://www.c-ebs.org/2006/corep/eu/t-ci/SectionExposures](http://www.c-ebs.org/2006/corep/eu/t-ci/SectionExposures)
  • [http://www.c-ebs.org/2006/corep/eu/t-ci/SectionExposureTypes](http://www.c-ebs.org/2006/corep/eu/t-ci/SectionExposureTypes)
Thank you for your attention

Please visit
http://www.xbrl.org
and
http://www.corep.info
for more information

See COREP Documentation

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