

# How to use table Linkbase information to facilitate XBRL report analysis

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**Abstract.** This paper explores the technical challenges and difficulties to cover table Linkbase and dimensions management in case of open axes. These characteristics are mainly present in Solvency II taxonomy, and, to a lesser extent, in CRD IV taxonomies. This exploration started last year when we discovered fact description given by OIM specification. Of course, OIM target is to simplify XBRL reports formatting and exchange. Fact description in OIM highlights clearly the relationship between facts and dimensional information. From our side, this triggers a reflection over the exploitation of dimensional descriptions in the context of data dissemination. In other words, it concerns the way to enrich fact description with taxonomy information to help data analysis.

One of the main expected qualities is to avoid specific development related to the specificity of the XBRL reports. This requires working on the abstract definition of XBRL taxonomies.

In this paper, we will first describe which source of information will be handled, how it will be processed and designed into a database schema. This study is currently relevant for European taxonomies, using table Linkbase specifications, as specified by EIOPA and EBA. .

## 1 What sources of information can be exploited?

Three types of information seem useful for data analysis: (1) aspects of the facts, (2) table characteristics expressed in X-Y-Z axes and in table structure information, and (3) taxonomy specification.

### 1.1 Aspects of the facts

Aspects are immediately available within XBRL reports; simple parsing of XBRL report is enough to retrieve this type of information. Labels can be retrieved from taxonomy specifications.

Here after, we illustrate for a fact from Solvency II report in OIM CSV format:

1	xbrl:concept	value	accuracy	xbrl:eni	xbrl:perio	xbrl:perio	xbrl:unit	s2c_dim:BL	s2c_dim:DI	s2c_dim:EE	s2c_dim:IZ	s2c_dim:TB	s2c_dim:VG
860	s2md_met:mi503	218050	2	scheme	2017-01-0	2017-01-0	iso4217:NOK	s2c_LB:x79	s2c_DI:x5	s2c_GA:x24	s2c_RT:x1	s2c_LB:x28	s2c_AM:x84
861	s2md_met:mi503	51007453	2	scheme	2017-01-0	2017-01-0	iso4217:NOK	s2c_LB:x79	s2c_DI:x5	s2c_GA:x24	s2c_RT:x1	s2c_LB:x107	s2c_AM:x84
862	s2md_met:mi503	0	2	scheme	2017-01-0	2017-01-0	iso4217:NOK	s2c_LB:x79	s2c_DI:x5	s2c_GA:x24	s2c_RT:x1	s2c_LB:x88	s2c_AM:x84
863	s2md_met:mi504	13137520	2	scheme	2017-01-0	2017-01-0	iso4217:NOK	s2c_LB:x79	s2c_DI:x5	s2c_GA:x24	s2c_RT:x1		s2c_AM:x84
864	s2md_met:mi505	38087983	2	scheme	2017-01-0	2017-01-0	iso4217:NOK	s2c_LB:x79	s2c_DI:x5	s2c_GA:x24	s2c_RT:x1		s2c_AM:x84
865	s2md_met:mi503	1037597	2	scheme	2017-01-0	2017-01-0	iso4217:NOK	s2c_LB:x79	s2c_DI:x5	s2c_GA:x24	s2c_RT:x18	s2c_LB:x28	s2c_AM:x84
866	s2md_met:mi503	65575618	2	scheme	2017-01-0	2017-01-0	iso4217:NOK	s2c_LB:x79	s2c_DI:x5	s2c_GA:x24	s2c_RT:x18	s2c_LB:x107	s2c_AM:x84

Fig. 1. Extract from report in CSV OIM format

Here after, the same fact with its XBRL properties (on the left side) and its table presentation (on the right side).

Property		S.05.02.01.01 Home Country - non-life obligations	
label	Metric: Monetary[BC]/Premiums written		
namespace	http://eiopa.europa.eu/xbrl/s2md/dict/met		
name	mi503		
QName	s2md_metmi503		
contextRef	c-189		
entity	9999007LIEEXZKY5804		
scheme	http://standards.iso.org/iso/17442		
instant	2016-12-31		
dimensions	(6)		
s2c_dim:BL Line of business [general]	s2c_LB:x79 Non-life and Health non-SLT		
s2c_dim:DI Instant or duration	s2c_DI:x5 Year to Date		
s2c_dim:EE EEA or not EEA	s2c_GA:x24 Home country		
s2c_dim:IZ Acceptance/cover of risks	s2c_RT:x1 Accepted during the period		
s2c_dim:TB Insurance/reinsurance business	s2c_LB:x107 Proportional reinsurance accepted		
s2c_dim:VG Valuation general	s2c_AM:x84 Statutory accounts		
unitRef	u-02 (NOK)		
measure	iso4217:NOK		
decimals			
precision			
xsrnil	false		
value	51.007.453,00		
rawValue	51007453		
		Sheets	
		Home country	
		C0090	
		Gross - Direct Business	R0110 218.050,00
		Gross - Proportional reinsurance accepted	R0120 51.007.453,00
		Gross - Non-proportional reinsurance accepted	
		Reinsurers' share	R0140 13.137.520,00
		Net	R0200 38.087.983,00
		Gross - Direct Business	R0210 1.037.597,00
		Gross - Proportional reinsurance accepted	R0220 65.575.618,00
		Gross - Non-proportional reinsurance accepted	R0230 0,00
		Reinsurers' share	R0240 17.730.021,67
		Net	R0300 48.883.193,33
		Gross - Direct Business	R0310 -1.263.122,00

Fig. 2. XBRL properties of a fact from Solvency II report in the case of not open table.

## 1.2 Table characteristics of the facts

Facts in reports are only defined by its aspects. For analysis, information over table structure is also relevant. Three types of information over table structure are relevant:

- Ventilation of the dimensions over axes;
- Description of table structure in terms of axes, breakdowns and structural nodes;
- Labels related to concepts, dimensions, members and table structure

**Ventilation of dimensions over axes.** Here is the ventilation of the fact dimensions over the axis of the fact from table S.05.02.01.01; members of the dimensions are defined by the following table Linkbase.

Dimensions	Members	X-axis	Y-axis	Z-axis
S2c_dim:BL	S2c_LB:x79			
S2c_dim:DI	S2c_DI:x5			
S2c_dim:EE	S2c_GA:x24			
S2c_dim:IZ	S2c_RT:x1			
S2c_dim:TB	S2c_LB:x107			
S2c_dim:VG	S2c_AM:x84			

This is a simple case because axes of table S.05.02.01.01 are closed.

Solvency II taxonomy use quite frequently open axes; the most sophisticated situation is present in table S.22.06.01.04 where all the axes X, Y and Z are open. Here follows an illustration of this case.

Property	Value	S.22.06.01.04 Best estimate subject to country and currency volatility adjustment - Total and home country by currency by country (other than home country) and by currency (other than reporting currency)	
label	Metric: Monetary TF/Use of volatility ac		
namespace	http://eiopa.europa.eu/xbrl/s2md/dict		
name	m1830		
QName	s2md_met:m1830		
contextRef	c-2130		
entity	9999007LIEEKZYYS804		
scheme	http://standards.iso.org/iso/17442		
instant	2016-12-31		
dimensions	(7)		
s2c_dim:BL Line of business [general]	s2c_LB:x65 Life and Health SLT		
s2c_dim:EE EEA or not EEA	s2c_GA:x74 Other than home country		
s2c_dim:LG Localization of activity	s2c_GA:DK DENMARK		
s2c_dim:OC Original/exposure currency	s2c_CU:EUR EUR		
s2c_dim:RC Reporting currency	s2c_CU:x4 Other than reporting currenc		
s2c_dim:VG Valuation general	s2c_AM:x80 Solvency II		
s2c_dim:VL Valuation of provisions [gene	s2c_VM:x5 Best estimate		
unitRef	u-02 (NOK)		
measure	iso4217:NOK		
decimals	2		
precision			
xs:nil	false		
value	1.225,00		
rawValue	01225		

		Other than home country		Part of the Best Estimate subject to volatility adjustment written in currencies		
		C0020		C0050	C0050	C0050
Y-axis	Total value of Best Estimate subject to volatility adjustment in countries other than home country	X DENMARK R0040		1.225,00	25,00	
		X FRANCE R0040		256,00	258,00	
		R0040				

Fig. 3. XBRL properties of a fact from Solvency II report in the case of open table.

The ventilation of the fact dimensions over the axis is the following:

Dimensions	Members	X-axis	Y-axis	Z-axis
S2c_dim:BL	S2c_LB:x65			

S2c_dim:EE	S2c_GA:x74			
S2c_dim:LG	S2c_GA:DK			
S2c_dim:OC	S2c_CU:EUR			
S2c_dim:RC	S2c_CU:x4			
S2c_dim:VG	S2c_AM:x80			
S2c_dim:VL	S2c_VM:x5			

In this case, member definitions are coming from the table Linkbase and also from the report fact. In that case, the table Linkbase specifies the allowed set of values.

The third interesting case occurs when the member is defined by the entity in the report. Table S.09.01.01.01 from Solvency II illustrates it; one dimension, XD, is attached to the fact and to Y-axis.

Dimensions	Members	X-axis	Y-axis
S2c_dim:XD	1		

Property	S.09.01.01.01	Income/gains and						
label	Metric: Monetary(TA/Realized and not realized)(V	Line identification ("artificial key") (mandatory)	Asset category	Portfolio	Asset held in unlinked and indexed contracts	Dividends	Interest	
namespace	http://eiopa.europa.eu/xbrl/s2md/dict/miet	C0001	C0040	C0050	C0060	C0070	C0080	
name	mii1118	X	1	2 - Non-life	2 - Neither uni	0.01	6.025.767.03	
QName	s2md_mietmii1118	X	2	Collateralised	2 - Non-life	2 - Neither uni	0.00	4.026.259.87
contextRef	c-230							
entity	9999007LIEEXZYYS804							
scheme	http://standards.iso.org/iso/17442							
instant	2016-12-31							
dimensions	{1}							
s2c_dim:XD S.09.01.zz.01 line id: <s2c_typ:NB> 1 </s2c_typ:NB>								
unitRef	u-02 (NOK)							
measure	iso4217:NOK							

Fig. 4. : XBRL properties of a fact in the case of Y-axis open table with dimension member defined by the entity.

**Table structure in terms of axes, breakdowns and structural nodes.** In addition to the axes description, information over breakdowns and structural nodes are also useful to use the table structure. Breakdowns and structural nodes are defined in table Linkbase specifications.

**Labels.** Data without labels is not useful; labels over table structure can be retrieved within table Linkbase specifications.

## **2 How can it be processed?**

Previous chapter draws the list of wishable information over table structure that can be useful for data analysis. This chapter will describe the organisation of the data (database schema) that we suggest storing reports.

Two sets of data/processing have to be distinct:

- Data/processing related to the taxonomy
- Data/processing related to the report

The processing that we have implemented is based on the technical environment of Arelle project; it means that its processing works on taxonomy specifications only and does not include taxonomy dependent processing.

### **2.1 Data model for the taxonomy**

The information that we retrieve from taxonomy specifications are: taxonomy version, table, breakdown (orientation means axis), structural node, member, domain, dimension and relationship between structural node and member.

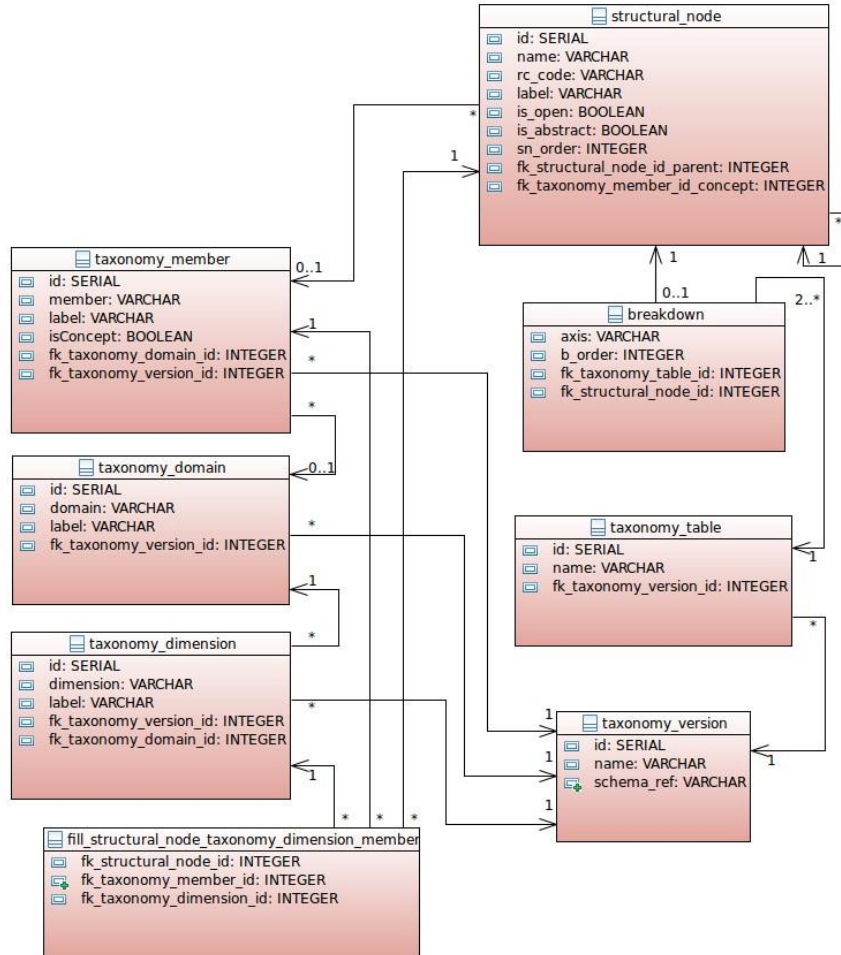


Fig. 5. Data model for the taxonomy.

## 2.2 Data model of the report

Information specific to the report are: report, fact, context, user dimension and relationship between user dimension and context. A lot of links exist between report and taxonomy data; the main are the link between:

- fact and structural node.
- user dimension and taxonomy dimension.
- context and taxonomy dimension and taxonomy member.
- fact and taxonomy member.

Here after the data model combining report and taxonomy tables. We use colours to distinct tables related to taxonomy from tables linked to reports.

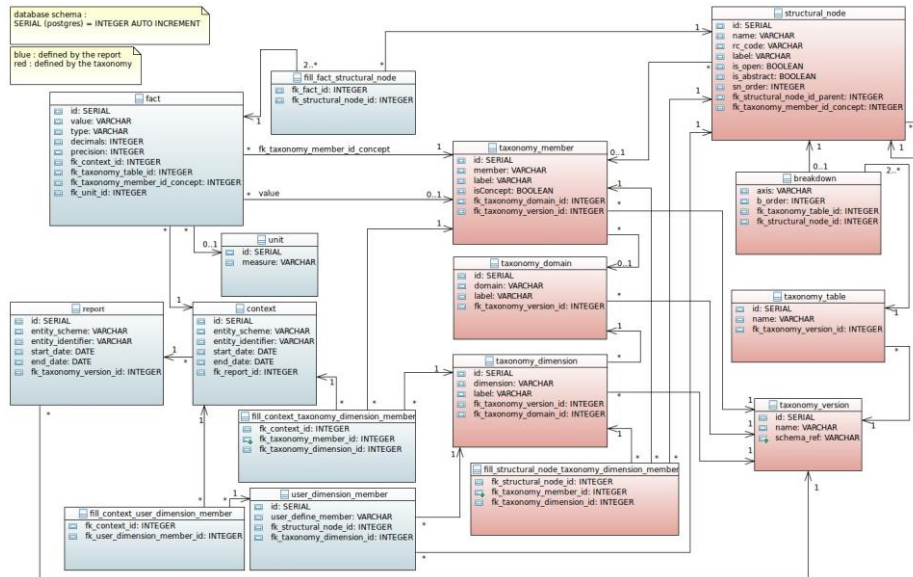


Fig. 6. Data model for taxonomy and report.

### 3 Conclusion

In Europe, the learning processes over new regulations are based on table description of reports such as QRT. Unfortunately, the excellent OIM specification does not include information over that point of view.

Our approach is to enrich the OIM with X-axis, Y-axis and Z-axis information; that table presentation information will mainly be useful to load XBRL reports into database and data warehouse.

This paper tries to show which table information can be extracted from taxonomies and exploited for data analysis. It assumes that table Linkbase specifications are available. The approach presents some limitations:

- Multilingual information is not yet managed; it can be useful for the French RAN taxonomy, the Dutch Specific templates (Verzekeraars Nationale StatenTaxonomy), the Single Resolution Board.
- It does not yet support presentation Linkbase taxonomies.
- Member hierarchies are not explored.