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:
Fig. 1. Extract from report in CSV OIM format

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

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.
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.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Members</th>
<th>X-axis</th>
<th>Y-axis</th>
<th>Z-axis</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2c_dim:BL</td>
<td>S2c_LB:x79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2c_dim:DI</td>
<td>S2c_DI:x5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2c_dim:EE</td>
<td>S2c_GA:x24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2c_dim:IZ</td>
<td>S2c_RT:x1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2c_dim:TB</td>
<td>S2c_LB:x107</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2c_dim:VG</td>
<td>S2c_AM:x84</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

- **Dimensions**
- **Members**
- **X-axis**
- **Y-axis**
- **Z-axis**

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

Table: 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.
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.
Hereafter the data model combining report and taxonomy tables. We use colours to distinguish 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.