Proof of Concept, XBRL report vs. RDBMS.

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1. Summary.

The XBRL reports entail that a large number of companies, economic and financial institutions have to spend a large amount of resources on Information Technology (IT). There is also a pressing need for these reports to be interoperable. This presentation presents a mapping between the XBRL data model, and the Relational data model. Our proposal is to automate this process. A XBRL instance document is transformed to a XBRL RDBMS, through the definitions of the XBRL language, and its taxonomy. And in same way from a XBRL database will be transformed to a XBRL instance document. We discuss both models, moreover, its structure and its semantic rules are defined. In addition, with this proposal, this complex language is simplified. We map the XBRL data model to Relational model. We propose a proof of concept, and it explains the set of phases of this mapping. As example we use an instance of the FINREP taxonomy[1] of the last draft. In this paper the UML data model will be explain, its transformation to the Relational data model. The set of programmes, some consults that the business user need, and some transformations to Access are shown.

Next section the architecture is shown.

2. Architecture.

The architecture in two steps is based. The first phase is to extract the data model, and the second is to load the report in a RDBMS. The core of this architecture is Arelle, through Arelle the taxonomies are obtained. We use a RDBMS very common that is MS SQL Server 2008 R2, however the transformation to other managements as Oracle, DB2, MySQL, and so on, is very easy. The language used for extraction and population is Visual Basic Script. We understand that there are other languages, other compilers, but Vbs is easy, and many people know how to use, including business users. Another tool that we use and it is very common among business users is Excel. In this case we use Windows 7 as operative system. Although, we think that this platform is easily to change to other platforms.

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[1] http://www.eurofiling.info/finrepTaxonomy/taxonomy2012.html.

UML Data Model of a Document Instance FINREP 2012.
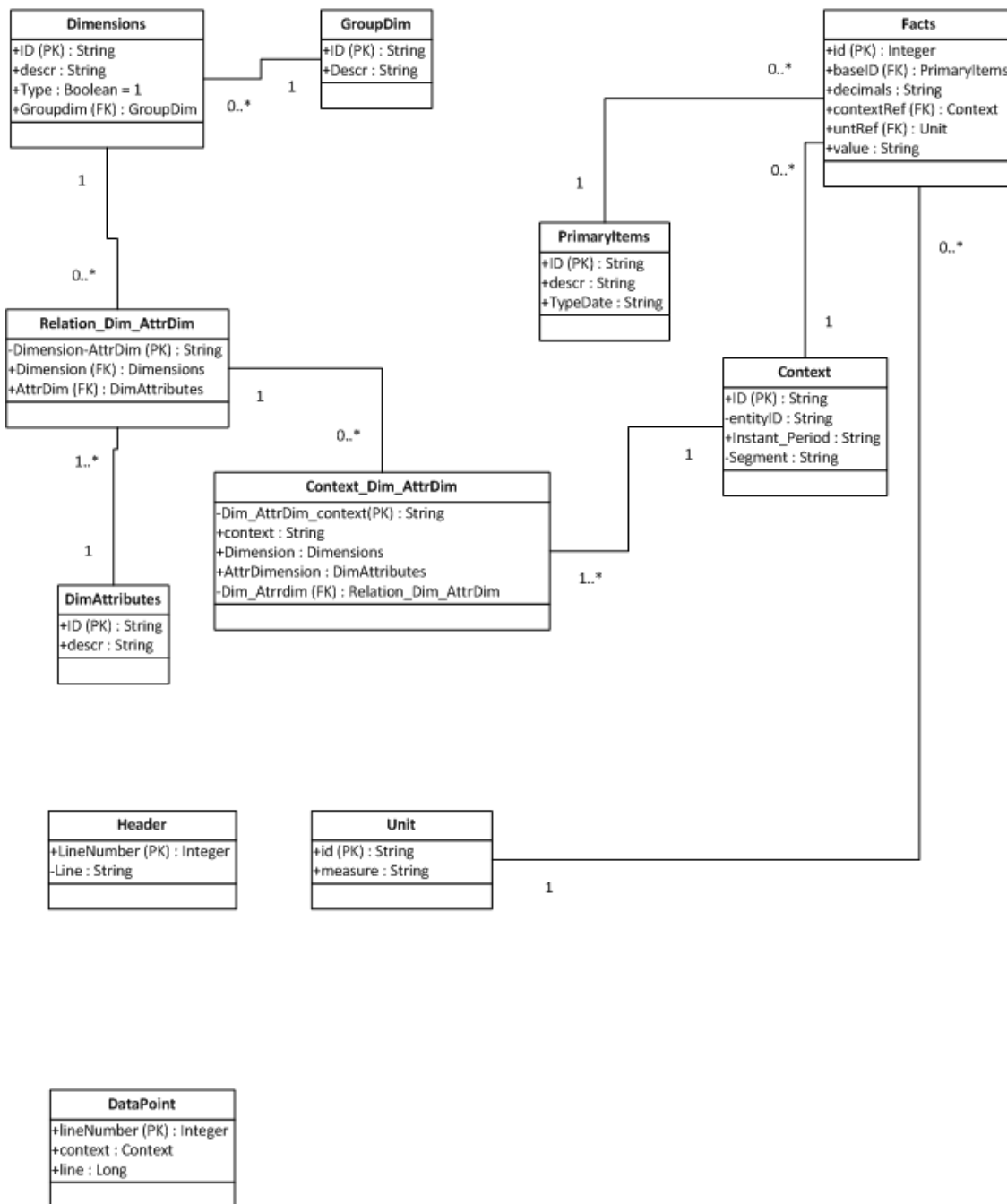(XBRL proof of concept.
Release, 2011-06-12).

Figure 1.- Relational data model of XBRL data model.

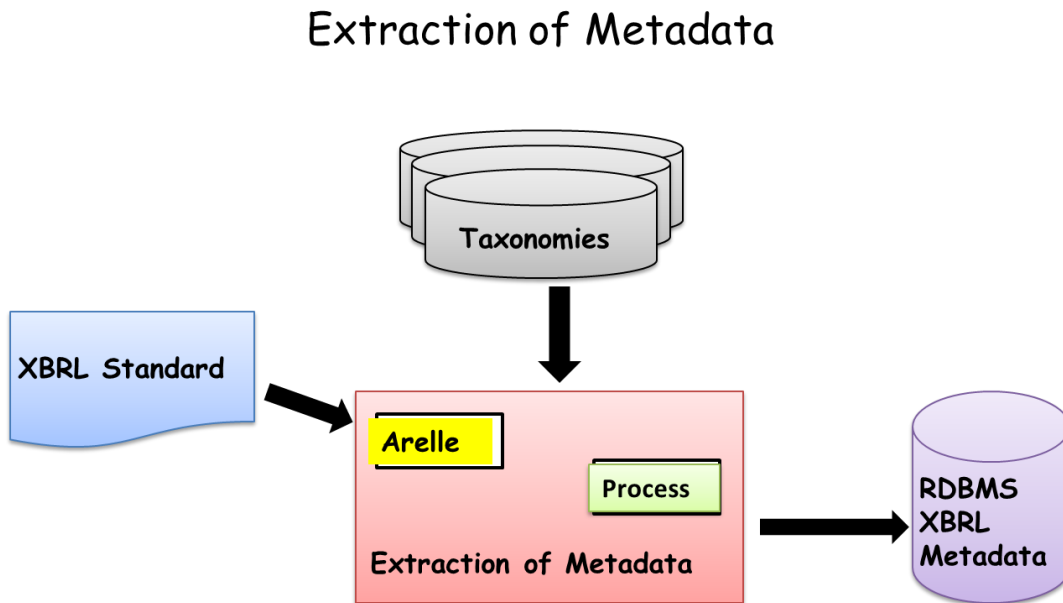### 3. **Extraction of the metadata.**

Firstly, we have to create the structure of metadata in the database. For this we have to do:

- We create the database. In our case is "TXBRL_Report".

- We execute in T-SQL the script "xbrls001_create.sql".

The data model of the RDBMS is shown in figure 1.

3.1. **Transformation XBRL data model to SQL data model.**

Extraction of Metadata

Figure 2.- Extraction of metadata.

In figure 2 is shown the process of obtaining the metadata.

We obtain a file from Arelle with the metadata, that is to say, dimensions, primary items, and so on.

We execute the command in the Windows console: "xbrls001.cmd"[2]. This command executes a vbs and it needs four parameters:

- "exitArelle_1.txt", file obtained from Arelle with the metadata.
- "xbrls001.log", file with a log.
- "xbrls001_insert.sql", file with the SQL sentences for loading the data model.
- "TXBRL_Report", name of the database en MS SQL Server, this database has to be created before.

We have some queries for consulting the database as: "selectgroupDimDimensions.sql", "selectgroupDim.sql",

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[2] You have to change the path.

"selectPrimaryItems.sql", "selectRelation_Dim_AttrDim.log", and so on. However, these queries can be obtained through "Management Studio" of Microsoft.

Now, we have to populate the database with the metadata. For that we have to execute the T-SQL "xbrls001_insert.sql"[3].

4. Populating the database.

Population of Database
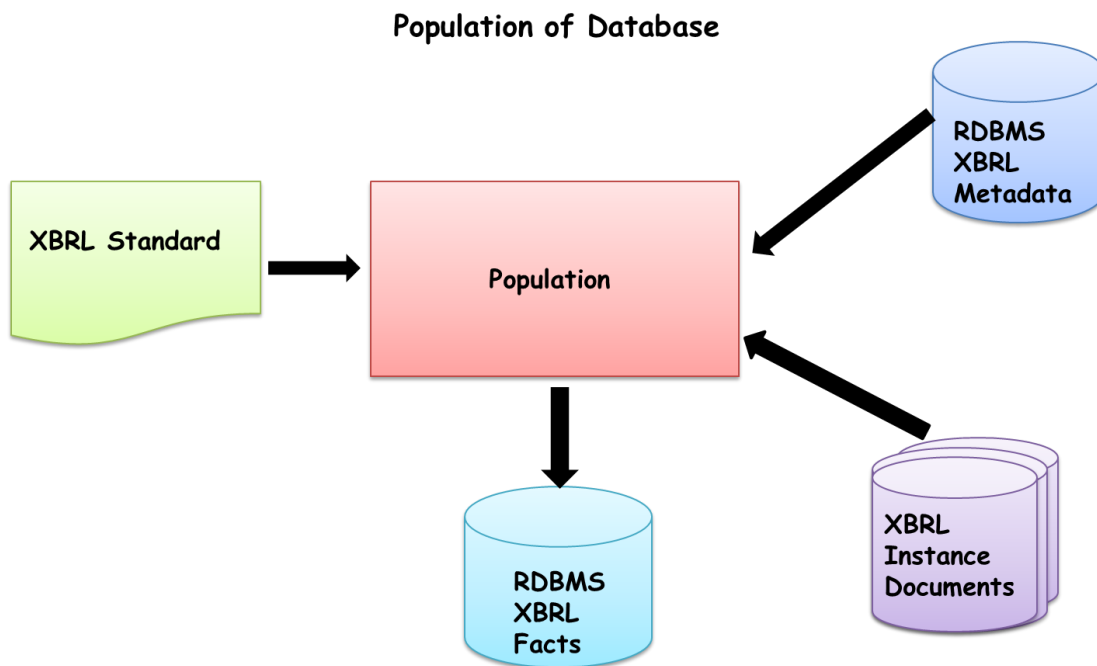
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Figure.-3 Population of database.

For this step, shown in figure 3, we execute the command in the Windows console: "xbrls002.cmd"[4]. This command executes a vbs and it needs three parameters:

- "xbrls002.log", file with a log.
- "xbrls002_insert.sql", file with the SQL sentences for creating the structure of database.
- "TXBRL_Report", name of the database en MS SQL Server, this database has to be created before.

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[3] We obtain a normal error, which we ought to ignore. This error is "Cannot insert duplicate key".
[4] You have to change the path.

Now, we have to populate the database with the data. For that we have to execute the T-SQL "xbrls002_insert.sql" generated in the script through Management Studio.

We have some queries for consulting the database as: "selectContext.sql", "selectContext_Dim_AttrDim.sql", "selectfacts.sql", and so on. However, these queries can be obtained through "Management Studio" of Microsoft.

5. Queries and transformations.

In the section, we show a way of transform our data from database to another format easier for the business user (figure 4).
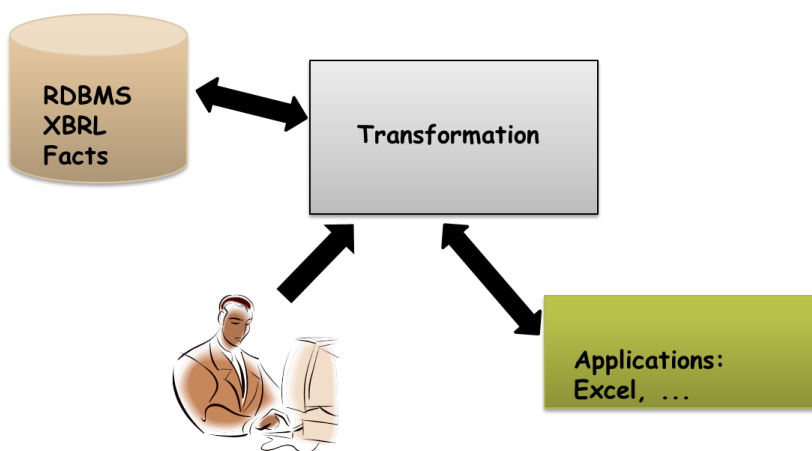

Figure 4.- From database to Access, and in the opposite direction.

If we suppose that the business user wants to fact table in the format cell/value, that is to say cell, primary item, number of decimals, unit ref, entity, time period, fact, and dimension attributes (members in XBRL language), as is shown in figure 5. For this can execute the T-SQL script "xbrls003_insert.sql", and we create the dimension groups, this is not clear, if this can be obtain of the taxonomies or the data point model. Before have to create the structure of tables and we have to summit the script "xbrls003_create.sql". After, we create a table with the view, and we execute the T-SQL script "xbrls004_insert.sql".

And now through, we export the table to Excel.

cell	Base	Decimals	UnitRef	entityID	instantPeriod	Fact	AT	BA	CD	CI	CL	CT	CU	GA	MA	PL	RP	RS	RT
2	220 mi1		0	EUR	abc	12/06/2011	78	dAT:x3					dCT:x11	dCU:eur	dGA:emu		dPL:x10		dRS:x1	
3	222 mi1		0	EUR	abc	12/06/2011	78	dAT:x3					dCT:x11	dCU:x2	dGA:emu		dPL:x10		dRS:x1	
4	224 mi1		0	EUR	abc	12/06/2011	312	dAT:x3					dCT:x11		dGA:eu		dPL:x10		dRS:x1	
5	226 mi1		0	EUR	abc	12/06/2011	472	dAT:x3					dCT:x11				dPL:x10		dRS:x1	
6	221 mi1		0	EUR	abc	12/06/2011	78	dAT:x3					dCT:x11	dCU:eur	dGA:x2		dPL:x10		dRS:x1	
7	223 mi1		0	EUR	abc	12/06/2011	78	dAT:x3					dCT:x11	dCU:x2	dGA:x2		dPL:x10		dRS:x1	
8	225 mi1		0	EUR	abc	12/06/2011	160	dAT:x3					dCT:x11		dGA:x4		dPL:x10		dRS:x1	
9	206 mi1		0	EUR	abc	12/06/2011	16	dAT:x3					dCT:x13	dCU:eur	dGA:emu		dPL:x16		dRS:x1	
10	208 mi1		0	EUR	abc	12/06/2011	16	dAT:x3					dCT:x13	dCU:x2	dGA:emu		dPL:x16		dRS:x1	
11	210 mi1		0	EUR	abc	12/06/2011	64	dAT:x3					dCT:x13		dGA:eu		dPL:x16		dRS:x1	
12	212 mi1		0	EUR	abc	12/06/2011	114	dAT:x3					dCT:x13				dPL:x16		dRS:x1	
13	207 mi1		0	EUR	abc	12/06/2011	16	dAT:x3					dCT:x13	dCU:eur	dGA:x2		dPL:x16		dRS:x1	
14	209 mi1		0	EUR	abc	12/06/2011	16	dAT:x3					dCT:x13	dCU:x2	dGA:x2		dPL:x16		dRS:x1	
15	211 mi1		0	EUR	abc	12/06/2011	50	dAT:x3					dCT:x13		dGA:x4		dPL:x21		dRS:x1	
16	235 mi1		0	EUR	abc	12/06/2011	9	dAT:x3					dCT:x17				dPL:x3		dRS:x1	
17	237 mi1		0	EUR	abc	12/06/2011	4	dAT:x3					dCT:x17				dPL:x6		dRS:x1	
18	236 mi1		0	EUR	abc	12/06/2011	5	dAT:x3					dCT:x17				dPL:x21		dRS:x1	
19	232 mi1		0	EUR	abc	12/06/2011	13	dAT:x3					dCT:x19				dPL:x3		dRS:x1	
20	234 mi1		0	EUR	abc	12/06/2011	6	dAT:x3					dCT:x19				dPL:x6		dRS:x1	
21	233 mi1		0	EUR	abc	12/06/2011	7	dAT:x3					dCT:x19				dPL:x11		dRS:x1	
22	139 mi1		0	EUR	abc	12/06/2011	4	dAT:x18					dCT:x22				dPL:x11		dRS:x1	
23	119 mi1		0	EUR	abc	12/06/2011	32	dAT:x18					dCT:x22				dPL:x11		dRS:x1	
24	143 mi1		0	EUR	abc	12/06/2011	4	dAT:x18					dCT:x22				dPL:x11		dRS:x1	
25	135 mi1		0	EUR	abc	12/06/2011	4	dAT:x18					dCT:x22				dPL:x11		dRS:x1	
26	123 mi1		0	EUR	abc	12/06/2011	4	dAT:x18					dCT:x22				dPL:x11		dRS:x1	
27	131 mi1		0	EUR	abc	12/06/2011	4	dAT:x18					dCT:x22				dPL:x11		dRS:x1	
28	127 mi1		0	EUR	abc	12/06/2011	4	dAT:x18					dCT:x22				dPL:x11		dRS:x1	
29	147 mi1		0	EUR	abc	12/06/2011	4	dAT:x18					dCT:x22				dPL:x11		dRS:x1	
30	151 mi1		0	EUR	abc	12/06/2011	4	dAT:x18					dCT:x22				dPL:x11		dRS:x1	
31	138 mi1		0	EUR	abc	12/06/2011	4	dAT:x19					dCT:x22				dPL:x11		dRS:x1	
32	118 mi1		0	EUR	abc	12/06/2011	32	dAT:x19					dCT:x22				dPL:x11		dRS:x1	
33	142 mi1		0	EUR	abc	12/06/2011	4	dAT:x19					dCT:x22				dPL:x11		dRS:x1	
34	134 mi1		0	EUR	abc	12/06/2011	4	dAT:x19					dCT:x22				dPL:x11		dRS:x1	
35	122 mi1		0	EUR	abc	12/06/2011	4	dAT:x19					dCT:x22				dPL:x11		dRS:x1	
36	130 mi1		0	EUR	abc	12/06/2011	4	dAT:x19					dCT:x22				dPL:x11		dRS:x1	

Figure 5.- Figure in a friendly way for the business user.

6. Conclusions and future work.

This proof of concept has a set of general processes. It has a low cost. And we can transformation to other platforms in an easy way. Our target is that we can use any taxonomy and to do an automatic generation of a map between XBRL data model and Relational Model. And that we can use N reports, and N taxonomies.

7. Questions.

Please for questions or comments, please to write to Ignacio Santos (ignacio.santos@bde.es) or Elena Castro (ecastro@inf.uc3m.es).