

## **Consistent Semantics Leads to Automated Rendering Across XBRL Taxonomies – Step 2**

The purpose of this document is to walk through the process of going from an XBRL instance to the consistent renderings shown by the 14 XBRL instances in this blog post:

<http://xbrl.squarespace.com/journal/2010/7/6/consistent-semantics-leads-to-automated-renderings-across-xb.html>

This process is broken down into two main steps:

1. Going from XBRL instance to Info Sets (in this case expressed in XML).
2. Going from Info Sets to Rendering.

### **Step 1 – Going from XBRL instance to Info Sets**

This is by far the most complex part of the process and in all reality must be undertaken by an XBRL processor. In this step, an XBRL processor (or other software which has at least “read only” functionality of a fully compliant XBRL processor) does the following:

- a. Loads an XBRL instance and its related DTS (i.e. all the pieces of the XBRL taxonomy); See section 3.2 which covers “DTS rules of discovery” in the [XBRL Specification](#).
- b. Physically discovers and accumulates all the pieces
- c. Follows the rules of XBRL to turn the base sets into networks (see the XBRL specification if you don’t understand what the term base set and network mean)
- d. Construct the Fact Group and Measure Relation Info Set information by properly putting the pieces of the XBRL instance and XBRL taxonomy together.

The end result are these two info sets for the example I am using in the walk through process:

Fact Groups:

[http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering\\_gaap\\_PropertyPlantEquipmentByComponentFactGroup\\_FactGroups.xml](http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_PropertyPlantEquipmentByComponentFactGroup_FactGroups.xml)

Measure Relations:

[http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering\\_gaap\\_PropertyPlantEquipmentByComponentFactGroup\\_MeasureRelations.xml](http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_PropertyPlantEquipmentByComponentFactGroup_MeasureRelations.xml)

This step is somewhat of a “black box” in this discussion and will not be addressed. It is a complex process and I want to focus on step 2 which starts at the info sets. I may describe this process in another document, but it is incredibly technical and most people won’t relate to it. Technical people can figure the process out by looking at the end result which is expected, the two Info Sets above.

## Step 2 – Going from Info Sets to Rendering

This step takes the Fact Group and Measure Relations and reorganizes them into a human readable form. This step includes:

- a. Reading the Fact Group and it’s related Measure Relations.
- b. Looks at the information and breaks it into slicers, rows, and columns of a rendering.

The end result is a rendering:

[http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering\\_gaap\\_PropertyPlantEquipmentByComponentFactGroup.html](http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_PropertyPlantEquipmentByComponentFactGroup.html)

Note that the rendering here is in static HTML, but it could be in any form and be used for not only consuming the XBRL instance information, but also for creating it. Think pivot table.

## Overview of Renderings

The following is a summary of all the renderings generated from this process described below. These use cases are comprehensive and cover all known use cases that I am aware of (or eventually will, I need to build out the “Business Reporting Use Cases” (see below) but they are only instantiations of the “Metapatterns” section:

Hypercube	URL
<b>Metapatterns</b>	
Sales Analysis, Summary	<a href="http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_SalesAnalysisSummaryFactGroup.html">http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_SalesAnalysisSummaryFactGroup.html</a>
Sales Analysis, by Business Segment	<a href="http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_SalesAnalysisByBusinessSegmentFactGroup.html">http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_SalesAnalysisByBusinessSegmentFactGroup.html</a>
Sales Analysis, by Geographic Area	<a href="http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_SalesAnalysisByGeographicAreaFactGroup.html">http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_SalesAnalysisByGeographicAreaFactGroup.html</a>
Accounting Policies	<a href="http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_AccountingPoliciesFactGroup.html">http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_AccountingPoliciesFactGroup.html</a>

<b>Hypercube</b>	<b>URL</b>
Property, Plant and Equipment; by Component	<a href="http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_PropertyPlantEquipmentByComponentFactGroup.html">http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_PropertyPlantEquipmentByComponentFactGroup.html</a>
Roll Forward of Land	<a href="http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_LandChangesFactGroup.html">http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_LandChangesFactGroup.html</a>
Director Compensation	<a href="http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_DirectorCompensationFactGroup.html">http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_DirectorCompensationFactGroup.html</a>
<b>State Fact Book</b>	
Population Trends	<a href="http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_factBook_PopulationFactGroup.html">http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_factBook_PopulationFactGroup.html</a>
General Information, for Period	<a href="http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_factBook_GeneralInformationPeriodTimeFactGroup.html">http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_factBook_GeneralInformationPeriodTimeFactGroup.html</a>
General Information, at Point in Time	<a href="http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_factBook_GeneralInformationPointInTimeFactGroup.html">http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_factBook_GeneralInformationPointInTimeFactGroup.html</a>
Financial Information, by State	<a href="http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_factBook_AnnualSurveyStateGovernmentFinancesFactGroup.html">http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_factBook_AnnualSurveyStateGovernmentFinancesFactGroup.html</a>
Financial Information, by State, alternative breakdown	<a href="http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_factBook_ExpendituresBreakdownByFunctionFactGroup.html">http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_factBook_ExpendituresBreakdownByFunctionFactGroup.html</a>
<b>Business Reporting Use Cases</b>	
Simple Hierarchy	<a href="http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_pattern_FinancialHighlightsFactGroup.html">http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_pattern_FinancialHighlightsFactGroup.html</a>
<b>Transaction Use Cases</b>	
Transaction Demo	<a href="http://www.xbrlsite.com/Demos/ba/2010-06-30/Rendering_ba_TransactionsFactGroup.html">http://www.xbrlsite.com/Demos/ba/2010-06-30/Rendering_ba_TransactionsFactGroup.html</a>

This is a screen shot of the first rendering "Sales Analysis, Summary". Each rendering works the same way. You can get to the XBRL instance, the Fact Groups in HTML or XML, or the Measure relations in HTML or XML from the HTML link above. Here is an example:

## Intelligent Business Document

Source XBRL Instance: [XBRL Instance](#)

Fact Groups: [Fact Groups HTML](#)

Fact Groups: [Fact Groups XML](#)

Relations: [Relations HTML](#)

Relations: [Relations XML](#)

Fact Group (Combination of Network and Hypercube)	
<b>Network:</b>	<a href="http://xasb.org/gaap/SalesAnalysisSummary">http://xasb.org/gaap/SalesAnalysisSummary</a>
<b>Hypercube:</b>	gaap:SalesAnalysisSummaryFactGroup

Slicers (applies to each fact value in each table cell)	
brm:ReportingEntityMeasure	ACME ( <a href="http://www.ACME.com">http://www.ACME.com</a> )
frta:LegalEntityMeasure	company:ACMECompanyMember
frta:BusinessSegmentMeasure	frta:BusinessSegmentsAllDomain
frta:GeographicAreaMeasure	frta:GeographicAreasAllDomain
brm:Units	iso4217:USD

	brm:CalendarTimeMeasure		
brm:ConceptMeasure	2008-01-01/2008-12-31	2009-01-01/2009-12-31	2010-01-01/2010-12-31
Sales Analysis [Measure Concepts]			
Sales Analysis [Hierarchy]			
Sales	32,465,000	35,805,000	32,038,000

## Walk Through of Step 2

This is a walk through of “Step 2” above. I will use the “Property, Plant and Equipment; by Component” rendering is the data set small, the information is rather easy to understand. Any one of these renderings could have been used, they all work the same.

I am doing this in a Microsoft Access database application, but any application could be used be it Microsoft.Net, Java, Python, or whatever.

### **Starting point:**

To start, an application would read the Fact Groups, picking one Fact Group to work with. This is actually a key concept. If you tried to render all Fact Groups at the same time, you will fail because each Fact Group is of a different “shape” (i.e. different dimensions basically). You can string Fact Groups together and render them in the form of, say, one HTML document; one after another. But I will focus on one Fact Group.

So, using this URL as an example:

[http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering\\_gaap\\_PropertyPlantEquipmentByComponentFactGroup\\_FactGroups.xml](http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_PropertyPlantEquipmentByComponentFactGroup_FactGroups.xml)

...basically you turn this:

```
<?xml version="1.0" encoding="utf-8" ?>
- <FinancialInformationSet>
- <FinancialReport>
- <FactGroup Number="1">
  <Network>http://xasb.org/gaap/SalesAnalysisSummary</Network>
  <HypercubeName>gaap:SalesAnalysisSummaryFactGroup</HypercubeName>
- <Facts>
- <Fact>
- <Measures>
- <Measure>
  <MeasureName>brm:ConceptMeasure</MeasureName>
  <MeasureValueName>gaap:Sales</MeasureValueName>
  </Measure>
- <Measure>
  <MeasureName>brm:ReportingEntityMeasure</MeasureName>
  <MeasureValueName>ACME (http://www.ACME.com)</MeasureValueName>
  </Measure>
- <Measure>
  <MeasureName>brm:CalendarTimeMeasure</MeasureName>
  <MeasureValueName>2010-01-01/2010-12-31</MeasureValueName>
  </Measure>
- <Measure>
  <MeasureName>frta:LegalEntityMeasure</MeasureName>
  <MeasureValueName>company:ACMECompanyMember</MeasureValueName>
  </Measure>
- <Measure>
  <MeasureName>frta:BusinessSegmentMeasure</MeasureName>
  <MeasureValueName>frta:BusinessSegmentsAllDomain</MeasureValueName>
  </Measure>
- <Measure>
  <MeasureName>frta:GeographicAreaMeasure</MeasureName>
  <MeasureValueName>frta:GeographicAreasAllDomain</MeasureValueName>
  </Measure>
  </Measures>
- <Value>
  <NumericValue>32038000</NumericValue>
  <Units>iso4217:USD</Units>
  <Rounding>INF</Rounding>
  </Value>
</Fact>
```

....into this (the Fact Group Info Set):

FactGroup	brm_ConceptMeasure	brm_ReportingEntityMeasure	brm_CalendarTimeMeasure	fta_LegalEntityMeasure	fta_BusinessSegmentMeasure	FactValue	brm_Units	brm_Rounding
gaap:BuildingsNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	244508000	iso4217:USD	INF	
gaap:BuildingsNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	366375000	iso4217:USD	INF	
gaap:OtherPropertyPlantAndEquipmentNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	6702000	iso4217:USD	INF	
gaap:OtherPropertyPlantAndEquipmentNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	6149000	iso4217:USD	INF	
gaap:ComputerEquipmentNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	4169000	iso4217:USD	INF	
gaap:ComputerEquipmentNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	5313000	iso4217:USD	INF	
gaap:FurnitureNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	34000000	iso4217:USD	INF	
gaap:FurnitureNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	34000000	iso4217:USD	INF	
gaap:FurnitureAndFixturesNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	34457000	iso4217:USD	INF	
gaap:FurnitureAndFixturesNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	34457000	iso4217:USD	INF	
gaap:Land	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	5347000	iso4217:USD	INF	
gaap:Land	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	1147000	iso4217:USD	INF	
gaap:Land	ACME (http://www.ACME.com)	2008-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	1147000	iso4217:USD	INF	
gaap:PropertyPlantAndEquipmentNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	295183000	iso4217:USD	INF	
gaap:PropertyPlantAndEquipmentNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	413441000	iso4217:USD	INF	
gaap:FixturesNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	457000	iso4217:USD	INF	
gaap:FixturesNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	fta:ConsolidatedGroupDomain	457000	iso4217:USD	INF	

...and this (the Measure Relations Info Set):

FactGroup.MeasureRelations	MemberName	MemberLabel	SubstitutionGroup	DataType	BaseDataType	Abs	PeriodType	BalanceType	Level
10628	gaap:PropertyPlantEquipmentByComponentFactGroup	Property, Plant and Equipment, by Component [Fact Group]	xbrli:hypercubeItem						1
10639	fta:LegalEntityMeasure	Legal Entity [Measure]	xbrli:dimensionItem						2
10640	fta:LegalEntitiesAllDomain	Legal Entities, All [Domain]	brm:domainMemberItem						3
10641	company:ACMECompanyMember	ACME Company [Member]	brm:domainMemberItem						4
10642	fta:BusinessSegmentMeasure	Business Segment [Measure]	xbrli:dimensionItem						2
10643	fta:ConsolidatedGroupDomain	Consolidated Group [Domain]	brm:domainMemberItem						3
10644	gaap:PropertyPlantEquipmentByComponentMeasureConcepts	Property, Plant and Equipment, by Component, [Measure Concepts]	brm:measureConceptItem						2
10645	gaap:PropertyPlantEquipmentNetRollUp	Property, Plant and Equipment, Net [Roll Up]	brm:rollupModelItem						3
10646	gaap:Land	Land	xbrli:item	xbrli:monetaryItemType	xbrli:monetaryItemType	false	instant	debit	4
10647	gaap:BuildingsNet	Buildings, Net	xbrli:item	xbrli:monetaryItemType	xbrli:monetaryItemType	false	instant	debit	4
10648	gaap:FurnitureAndFixturesNetRollUp	Furniture and Fixtures, Net [Roll Up]	brm:rollupModelItem						4
10649	gaap:FurnitureNet	Furniture, Net	xbrli:item	xbrli:monetaryItemType	xbrli:monetaryItemType	false	instant	debit	5
10650	gaap:FixturesNet	Fixtures, Net	xbrli:item	xbrli:monetaryItemType	xbrli:monetaryItemType	false	instant	debit	5
10651	gaap:FurnitureAndFixturesNet	Furniture and Fixtures, Net	xbrli:item	xbrli:monetaryItemType	xbrli:monetaryItemType	false	instant	debit	5
10652	gaap:ComputerEquipmentNet	Computer Equipment, Net	xbrli:item	xbrli:monetaryItemType	xbrli:monetaryItemType	false	instant	debit	4
10653	gaap:OtherPropertyPlantAndEquipmentNet	Other Property, Plant and Equipment, Net	xbrli:item	xbrli:monetaryItemType	xbrli:monetaryItemType	false	instant	debit	4
10654	gaap:PropertyPlantAndEquipmentNet	Property, Plant and Equipment, Net, Total	xbrli:item	xbrli:monetaryItemType	xbrli:monetaryItemType	false	instant	debit	4

All you are doing is changing syntax from the XML form of the info set to in this case a relational database form of exactly the same info sets. You can do this however you want, that is not what is important. What is important is to understand that the Fact Group Info Set and Measure Relations Info Set has 100% of what you need to generate the rendering.

### **Key point to understand, What Exactly is a Fact Group?**

We are focusing on one Fact Group at a time. But what exactly is a Fact Group? Well, this is not 100% clear in XBRL. There are three options and what I have done is define a Fact Group with the most flexibility to adapt to existing XBRL taxonomies. A Fact Group COULD be any one of the following:

1. **Hypercube:** An XBRL Dimensions hypercube IF and only if (a) every hypercube is unique within an XBRL taxonomy and (b) every concept participates within at least one hypercube. Basically, if every hypercube is unique and every concept participates in a hypercube, the XBRL network can be demoted to a role of only syntax. Also, because every concept will exist in the definition linkbase (i.e. that defines the hypercube), then the "master" network is the definition links. You still need to keep the presentation and calculation concepts consistent if you provide them.
2. **Network:** If you don't use XBRL Dimensions hypercubes, then a Fact Group could be only a **Network**. This has some issues however, for example which network: presentation, calculation or definition?

3. **Network plus Hypercube:** The most flexible approach is to use the combination of XBRL Network (i.e. extended link of a specific role) and XBRL Dimensions Hypercube. In this case, you still need to keep the networks consistent. This is harder because not all the concepts need to be in the definition linkbase.

I won't go into all the details here, but from these three bullet points you should be able to see the issues related to defining what a Fact Group is. As long as an XBRL taxonomy follows those rules consistently, then your Fact Groups will turn out in a rational form. If they are inconsistent, you will have errors in your Fact Group because your data model is inconsistent.

### ***Find the slicers***

A slicer is any value which is the same for every Fact Value in the Fact Group. Consider the Fact Group screen shot again (this is the same as above, adding two circles:

FactGroup	brm_ConceptMeasure	brm_ReportingEntityMeasure	brm_CalendarTimeMeasure	frta_LegalEntityMeasure	frta_BusinessSegmentMeasure	FactValue	brm_Units	brm_Rounding
	gaap_BuildingsNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	244508000	iso4217 USD	INF
	gaap_BuildingsNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	366375000	iso4217 USD	INF
	gaap_OtherPropertyPlantAndEquipmentNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	6702000	iso4217 USD	INF
	gaap_OtherPropertyPlantAndEquipmentNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	6149000	iso4217 USD	INF
	gaap_ComputerEquipmentNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	4169000	iso4217 USD	INF
	gaap_ComputerEquipmentNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	5313000	iso4217 USD	INF
	gaap_FurnitureNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	34000000	iso4217 USD	INF
	gaap_FurnitureNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	34000000	iso4217 USD	INF
	gaap_FurnitureAndFixturesNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	34457000	iso4217 USD	INF
	gaap_FurnitureAndFixturesNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	34457000	iso4217 USD	INF
	gaap_Land	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	5347000	iso4217 USD	INF
	gaap_Land	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	1147000	iso4217 USD	INF
	gaap_PropertyPlantAndEquipmentNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	1147000	iso4217 USD	INF
	gaap_PropertyPlantAndEquipmentNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	295183000	iso4217 USD	INF
	gaap_FixturesNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	413441000	iso4217 USD	INF
	gaap_FixturesNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	457000	iso4217 USD	INF
	gaap_FixturesNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	frta_ConsolidatedGroupDomain	457000	iso4217 USD	INF

Because all the "Reporting Entity Measure"s, "Legal Entity Measure"s, "Business Segment Measure"s, and "Units" are the same, they can be basically removed from the rows and columns of the Fact Group and presented in the upper left corner of the rendering because the same values apply to each cell of the Fact Group rendering. Paper based renderings and even Excel pivot tables do the same thing.

### ***Find the rows and columns***

If something is not a slicer, then it must be either a row or a column because we are trying to render in a two dimensional space, a table. Paper is two dimensional, you have to deal with that reality. Also, many computer software interfaces are two dimensional. Again, think of how a pivot table works and what it does to turn information which has more than two dimensions into something you can work with.

In our case we will simply put the "Concept Measure" in the rows and the "Calendar Time Measure" in the columns. That leaves us with only two more columns: Fact Value and Rounding. Rounding is all the same and I don't what to go into that

discussion as it is just noise in this discussion, basically you can treat it like any other dimensions really. The Fact Value goes into the cells, the intersections of the rows and columns.

## Ordering the rows and columns

Once you figure out the slicers, many times you only have three columns of data to deal with. Even if you have more than three, you can hold one of the columns constant or repeat the Fact Group a number of times to turn any “n-dimensional” Fact Group into three columns: the rows, the columns, and the cells. If you are familiar with SQL (Structured Query Language), you will recognize this as something which nicely fits into a cross tab query. So, this data:

FactGroup		
brm__ConceptMeasure	brm__CalendarTimeMeasure	FactValue
gaap:BuildingsNet	2010-12-31	244508000
gaap:BuildingsNet	2009-12-31	366375000
gaap:OtherPropertyPlantAndEquipmentNet	2010-12-31	6702000
gaap:OtherPropertyPlantAndEquipmentNet	2009-12-31	6149000
gaap:ComputerEquipmentNet	2010-12-31	4169000
gaap:ComputerEquipmentNet	2009-12-31	5313000
gaap:FurnitureNet	2010-12-31	34000000
gaap:FurnitureNet	2009-12-31	34000000
gaap:FurnitureAndFixturesNet	2010-12-31	34457000
gaap:FurnitureAndFixturesNet	2009-12-31	34457000
gaap:Land	2010-12-31	5347000
gaap:Land	2009-12-31	1147000
gaap:Land	2008-12-31	1147000
gaap:PropertyPlantAndEquipmentNet	2010-12-31	295183000
gaap:PropertyPlantAndEquipmentNet	2009-12-31	413441000
gaap:FixturesNet	2010-12-31	457000
gaap:FixturesNet	2009-12-31	457000

Becomes this cross tab query:

FactGroup Crosstab			
brm__ConceptMeasure	2008-12-31	2009-12-31	2010-12-31
gaap:BuildingsNet		366375000	244508000
gaap:ComputerEquipmentNet		5313000	4169000
gaap:FixturesNet		457000	457000
gaap:FurnitureAndFixturesNet		34457000	34457000
gaap:FurnitureNet		34000000	34000000
gaap:Land	1147000	1147000	5347000
gaap:OtherPropertyPlantAndEquipmentNet		6149000	6702000
gaap:PropertyPlantAndEquipmentNet		413441000	295183000

The only problem with cross tab queries and the same situation exists with things like Excel pivot tables, you really don't have a lot of control as to the order of the rows or columns. The best you can do is move them around yourself or sort them by name.

But, XBRL has relations. Those relations can be applied to a Fact Group to organize the Fact Group. For the Fact Group we are looking at, you saw above the Measure Relations Info Set which ultimately ended up in a database table. You use that information to create the rows and columns of the table you create.

Here is a table of information which can help render the rows:



FactGroup_Rows				
RowName	RowLabel	Level	SortOrder	
gaap:PropertyPlantEquipmentByComponentMeasureConcepts	Property, Plant and Equipment, by Component, [Measure Concepts]	2	1	
gaap:PropertyPlantEquipmentNetRollUp	Property, Plant and Equipment, Net [Roll Up]	3	2	
gaap:Land	Land	4	3	
gaap:BuildingsNet	Buildings, Net	4	4	
gaap:FurnitureFixturesNetRollUp	Furniture and Fixtures, Net [Roll Up]	4	5	
gaap:FurnitureNet	Furniture, Net	5	6	
gaap:FixturesNet	Fixtures, Net	5	7	
gaap:FurnitureAndFixturesNet	Furniture and Fixtures, Net	5	8	
gaap:ComputerEquipmentNet	Computer Equipment, Net	4	9	
gaap:OtherPropertyPlantAndEquipmentNet	Other Property, Plant and Equipment, Net	4	10	
gaap:PropertyPlantAndEquipmentNet	Property, Plant and Equipment, Net, Total	4	11	

Here is the same thing for the columns:

FactGroup_Columns				
ColumnName	ColumnLabel	ColumnWidth	SortOrder	
2008-12-31	2008-12-31	160	1	
2009-12-31	2009-12-31	160	2	
2010-12-31	2010-12-31	160	3	

There are some subtleties here, but again, that is more noise than helpful in understanding the big picture which is what I am trying to communicate.

### End result:

Put all of the above together and this is one rendering of what you can come up with:

Fact Group (Combination of Network and Hypercube)			
Network:	http://xasb.org/gaap/PropertyPlantAndEquipmentByComponent		
Hypercube:	gaap:PropertyPlantEquipmentByComponentFactGroup		
Slicers (applies to each fact value in each table cell)			
brm:ReportingEntityMeasure	ACME (http://www.ACME.com)		
frta:LegalEntityMeasure	company:ACMECompanyMember		
frta:BusinessSegmentMeasure	frta:ConsolidatedGroupDomain		
brm:Units	iso4217:USD		
	brm:CalendarTimeMeasure		
brm:ConceptMeasure	2008-12-31	2009-12-31	2010-12-31
Property, Plant and Equipment, by Component, [Measure Concepts]			
Property, Plant and Equipment, Net [Roll Up]			
Land	1,147,000	1,147,000	5,347,000
Buildings, Net		366,375,000	244,508,000
Furniture and Fixtures, Net [Roll Up]			
Furniture, Net		34,000,000	34,000,000
Fixtures, Net		457,000	457,000
Furniture and Fixtures, Net		34,457,000	34,457,000
Computer Equipment, Net		5,313,000	4,169,000
Other Property, Plant and Equipment, Net		6,149,000	6,702,000
Property, Plant and Equipment, Net, Total		413,441,000	295,183,000

While this is HTML and I did not spend a whole lot of time dinking with things like color, column widths, etc...I do think you can see what is possible here. Not only is this approach applicable to consuming information, one can also create information using this same approach, just do it in reverse.

Further, one can make this table dynamic rather than static, more like an Excel pivot table! Or, I speculate that one could also use some business intelligence software applications as both rendering or creation applications.



## Bottom Line

The fact that you can render XBRL in this manner is one aspect of the bottom line. There are two other important pieces to the bottom line.

First, there you can see the areas where things can be mucked up. Here are the big ones:

1. When you create a taxonomy, you really need to be clear what an XBRL Network and an XBRL Dimensions hypercube represents and many times it is also important to express the relation between XBRL Networks and XBRL Dimensions hypercubes. You can see this here very clearly, you can also see this in the inconsistency of how SEC XBRL filers are using Networks and hypercubes.
2. Inconsistency between XBRL Networks can cause problems. If the presentation, calculation, and definition links are inconsistent, which do you believe? Error checking which make sure you don't inadvertently introduce inconsistencies is beneficial. You can resolve some of these problems by doing what the authors of the FINREP taxonomy did: don't provide a presentation linkbase. Many people will think this is nuts, but once they realize that you can generate what you have been using the presentation linkbase for with the definition linkbase relations, they will realize that there are benefits to not having to manage two linkbases when you can simply use one.
3. I used to think that you had to put a lot of stuff into the presentation linkbase to get the information model expressed correctly. That is not the case. There are basically three information models in the entire US GAAP Taxonomy: Hierarchy, Roll up, Roll Forward. You can figure out the information model for each of those quite easily:
  - a. A Hierarchy has no Roll Up or Roll Forward relations. Easy enough to identify those.
  - b. A Roll Up always has calculation relations, that is what defines the roll ups. You don't need to use the presentation relations to explain Roll Ups, the calculation links do everything you need.
  - c. A Roll Forward is a cake walk if you use XBRL Formulas because you will have a formula which shows the relation between the instance's two periods and the one duration, all of which are always present in a Roll Forward. Easy enough. Many people don't use XBRL Formulas. OK, two possible solutions: (a) start using them, even if internally or (b) there are other algorithms you can use to discover if the concepts in a Fact Group appear to be a Roll Forward, use one of those algorithms.

Second, this can be harder to see or realize, but XBRL actually does have a logical model. It is just that the model is not well articulated, in fact there is no standard articulation of that model. As such, different software developers actually could create different models, but if the models were created correctly (i.e. they work), it is quite easy to map any XBRL taxonomy to any other XBRL taxonomy. While this XBRL logical model will not help those trying to create one common architecture which works across XBRL taxonomies. It is kind of like giving two database managers the task of creating a database schema for something. Both will highly likely work, one can be mapped to the other...but you need some other mechanism to allow for an application created to talk to a database to do so effectively with both databases. That takes some sort of standard schema. XBRL is a standard for syntax, not semantics.