

Constraining Fact Values

Consider the XBRL instance which drives this rendering:

Property, Plant and Equipment; by Component	http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_PropertyPlantEquipmentByComponentFactGroup.html
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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)	
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

If you put the XBRL instance information into a relational database table, such as what I used for Fact Groups, you get something that looks like this:

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:Land	ACME (http://www.ACME.com)	2008-12-31	company:ACMECompanyMember	frta:ConsolidatedGroupDomain	1147000	iso4217:USD	INF	
gaap:PropertyPlantAndEquipmentNet	ACME (http://www.ACME.com)	2010-12-31	company:ACMECompanyMember	frta:ConsolidatedGroupDomain	295183000	iso4217:USD	INF	
gaap:PropertyPlantAndEquipmentNet	ACME (http://www.ACME.com)	2009-12-31	company:ACMECompanyMember	frta:ConsolidatedGroupDomain	413441000	iso4217:USD	INF	
gaap:FixturesNet	ACME (http://www.ACME.com)	2010-12-31	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	

I never realized this until about three or four months ago, but the facts are constrained in two different ways in XBRL:

1. By XBRL networks
2. By XBRL Dimensions hypercubes

As I point out [in this blog post](#), Fact Groups could be defined using two different mechanisms in XBRL: XBRL networks (i.e. extended links of a particular role) or XBRL Dimensions hypercubes. These mechanisms work in two different ways under two different sets of rules.

I have always referred to facts which show up in a network when you are trying to use from an XBRL instance as “stray values”, you don’t want them but the rules of XBRL say that they belong to the network, so an XBRL processor showing you the information provides you with the fact value. The value for Land in 2008 does not belong in the rendering for Property, Plant and Equipment, by Component above.

That fact value shows up because the fact with that context shows up in another network for another Fact Group rendering in that same document, the Roll Forward of Land. You can see that here if you want to look at it:

http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_LandChangesFactGroup.html

Part of me says that you would never have this situation in the “real world”. In my document I create a roll forward for only one component of PP&E, Land. One could argue, and I have argued myself, that a correctly created XBRL instance would have a roll forward for every class of PPE, not just land. This is not really the point of this though, the point is that XBRL has two mechanisms to determine which fact values show up in a Fact Group, and they work differently.

This explains those mechanisms and how they work.

XBRL Networks

One mechanism is the XBRL Network, also known as an extended link of a particular role. These “filter” the concepts which show up in the network. For example, a presentation network for the balance sheet has only concepts for the balance sheet, not ones for the income statement.

Some interesting things here. First, when I say network, you really have two things to consider: (a) the extended link role of the network as mentioned above, (b) the type of network (meaning presentation, calculation, or definition linkbases).

Networks filter only one thing: concepts. What I mean by this is that they don't filter the XBRL context at all. This will make more sense when you contrast that to an XBRL Dimensions hypercube which does filter contexts as we will discuss in a moment, but keep this in the back of your mind.

Here is the context for that concept Land that I did not want to show up in my rendering of PP&E by component from above:

```
- <context id="I-2008">
- <entity>
  <identifier scheme="http://www.ACME.com">ACME</identifier>
  - <segment>
    <xbrldi:explicitMember dimension="frta:LegalEntityMeasure">company:ACMECompanyMember</xbrldi:explicitMember>
    <xbrldi:explicitMember dimension="frta:BusinessSegmentMeasure">frta:ConsolidatedGroupDomain</xbrldi:explicitMember>
  </segment>
</entity>
- <period>
  <instant>2008-12-31</instant>
</period>
</context>
```

Note the pieces of the context: entity identifier, segment, and period.

Here is the XBRL instance fact which refers to that context:

```
<gaap:Land contextRef="I-2008" unitRef="U-Monetary" decimals="INF">1147000</gaap:Land>
```

The bottom line here is that any concept of whatever context participates in a network, basically everything in the context influences what facts appear in the set you will receive from an XBRL processor. Also, when I say network, you have to specify two things: which extended link role and what type of network, presentation, calculation or definition.

XBRL Dimensions Hypercubes

XBRL Dimensions hypercubes filter the facts which show up differently but they are also influenced by two things which do not show up in a hypercube: entity identifier and period. Also, hypercubes don't care what type of network you are talking about (presentation, calculation, definition) because they relate to only one type of network: definition.

When you use XBRL Dimensions hypercubes to constrain what can be put into a context, you can fine tune what can show up in the XBRL instance for that hypercube. Where the network filtering mechanism does not consider any pieces of the context, XBRL dimensions does not only concern itself with what dimensions can show up, but also you can constrain the value of the dimension. This provides more precise control as to what can show up in the context of the facts used in that hypercube.

There is one catch though. XBRL Dimensions does NOT have any control over the entity identifier or the period. This is why, for example, while I do use a hypercube

in the Property, Plant and Equipment; by Component rendering above, it does not constrain the unwanted value of "2008-12-31" from showing up in the hypercube.

You can understand what I am saying here if you were to create your own XBRL dimension for your taxonomy called "My Period [Measure]". You would need to create a domain and that could or might not even have any real meaning, I will call the domain "All Periods [Domain]". And now create three members for the domain, "December 31, 2008 [Member]", "December 31, 2009 [Member]", "December 31, 2010 [Member]". Now, if you used that dimension in your hypercube, you would NOT get any stray values showing up as you get precise control over the dimensions and their allowed values.

There is yet another thing which a hypercube allows you to do: specify the values that you desire.

Consider these three Fact Groups from the set of sample XBRL instances:

Sales Analysis, Summary	http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_SalesAnalysisSummaryFactGroup.html
Sales Analysis, by Business Segment	http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_SalesAnalysisByBusinessSegmentFactGroup.html
Sales Analysis, by Geographic Area	http://www.xbrlsite.com/Demos/FRTA/Renderings/Rendering_gaap_SalesAnalysisByGeographicAreaFactGroup.html

In the past I had created this sales analysis pattern in this way, see the XBRLS business use cases: (see BUC21 here <http://www.xbrlsite.com/Patterns/2008-04-18/Viewer.htm>)

Basically, I created one extended link and put everything relating to the sales analysis into that single extended link. But look at the information that I am trying to represent:

	2007	2006	2005
Sales, all Business Segments, all Geographic Areas	32,038	35,805	32,465
Breakdown by Business Segment:			
Pharmaceuticals	20,181	18,150	15,275
Generics	2,433	1,973	1,823
Consumer Health	6,675	6,514	5,752
Other Segments	2,749	9,168	9,615
Breakdown by Geographic Area:			
US and Canada	10,214	12,649	10,137
Europe	11,901	10,374	10,398
Asia	5,639	4,371	3,210
Other regions	4,284	8,411	8,722

That is not one hypercube, that is actually three different hypercubes: the summary at the top calling for the domains, then a breakdown by business segment holding the geographic area constant at the domain, and the next showing the breakdown by geographic area, holding the business segment constant at the domain.

Basically, the three hypercubes gives you more clarity in the taxonomy of what you desire from the XBRL instance. Hypercubes allow you to be more explicit. If you contrast that to most taxonomies, they tend to be more general and you cannot ever really tell how many periods they desire from looking only at the XBRL taxonomy.

Bottom Line

This document is not making any value judgment as to whether networks or hypercubes are better for constraining the facts of an XBRL instance; it simply points out that there are two mechanisms and those mechanisms work differently. A conscious understanding of this will allow you to create better XBRL taxonomies.