

Business Semantics and Business Reporting Logical Model Semantics to SEC XBRL Syntax Mapping

This document articulates a mapping from Business Semantics to the XBRL syntax used by the SEC XBRL implementation (*and a cross reference to the Business Reporting and Financial Reporting Logical Models*). Please refer to the mind map of the Business Reporting Logical Model and Financial Reporting Logical Model components:

<http://www.xbrlsite.com/Demos/FRTA/2010-06-15/ LogicalModels.pdf>

This mind map will be converted into a UML model which communicates these relations in a more standard form understandable by software developers.

This mind map is basically the Business Reporting and Financial Reporting Logical Models **adjusted to be the SEC semantic components**.

<http://www.xbrlsite.com/Demos/FRTA/SECModel/SEC-LogicalModel-2010-06-24.pdf>

The following resources are helpful in understanding the SEC XBRL Implementation:

- US GAAP Taxonomy: <http://taxonomies.xbrl.us/us-gaap/2009/index.html>
- US GAAP Taxonomy Architecture: <http://xbrl.us/Documents/SECOFM-USGAAPT-Architecture-20080428.pdf>
- SEC EDGAR Filer Manual: <http://www.sec.gov/info/edgar/edmanuals.htm>
- SEC Interactive Data Test Suite: http://www.sec.gov/spotlight/xbrl/interactive_data_test_suite.shtml

Business Reporting and Financial Reporting Logical Model Semantics to XBRL Syntax Mapping as implemented by the SEC/US GAAP Taxonomy:

SEC Semantics and (<i>Logical Model Object Class</i>) Cross Reference	SEC XBRL Syntax Instantiation	Comments, explanations, observations
sec: Report Set (<i>brm: Report Set</i>)	Proprietary RSS/ATOM Feed: http://www.sec.gov/Archives/edgar/usgaap.rss.xml	The SEC RSS feed uses a number of RSS elements which are proprietary to the SEC EDGAR system. The RSS feed also only provides the last 100 SEC XBRL filings. This makes it more difficult to implement systems to get to other than the last 100 SEC XBRL filings. Note that XBRL Cloud has a proprietary way of articulating a list of XBRL instances, see: http://edgardashboard.xbrlcloud.com/edgar-rss-index.xml That proprietary approach has a number of things from which the SEC would benefit including: all filings (not just the top 100), SIC code, public float of the filer, etc.
sec: Business Report (<i>brm: Business Report</i>)	Implemented as an XBRL instance and its Discoverable Taxonomy Set (DTS). See: http://www.xbrlsite.com/Demos/RTA/2010-06-15/company-instance.xml http://www.xbrlsite.com/Demos/RTA/2010-06-15/company_TreeView.html This application can be used to generate an XBRL instance: http://www.xbrlsite.com/Demos/RTA/2010-06-15/InstanceCreator.zip	

SEC Semantics and (<i>Logical Model Object Class</i>) Cross Reference	SEC XBRL Syntax Instantiation	Comments, explanations, observations
company: Business Rule (<i>brm: Business Rule</i>)	Implemented XBRL calculations only.	XBRL Formula and therefore more sophisticated Business rules are not allowed, XBRL calculations are allowed. This does not preclude a company creating their own Business Rules however, and simply not submitting those rules to the SEC.
sec: Report Flow (<i>brm: Report Flow</i>)	Implemented by using extended link role definitions (Network definitions), leveraging a number put within each Network (extended link) which allows for sorting by the number.	This requires SEC filers and the US GAAP Taxonomy to put numbers into extended links to enable the sorting. Further, extension taxonomies cannot modify the definitions of extended link roles.
Not implemented by SEC XBRL (<i>brm: Schedule</i>)	No such functionality	The SEC does not implement Schedules and therefore cannot leverage this feature in their rendering. Filers can implement this either internally or there is nothing in the Edgar Filer Manual which prevents this from being done even in the actual filings to the SEC.

SEC Semantics and (Logical Model Object Class) Cross Reference	SEC XBRL Syntax Instantiation	Comments, explanations, observations
sec: Network / [Table] (brm: Fact Group)	Implemented using one of the following options: A) An XBRL extended link (Network) (i.e. no [Table] is used) B) A [Table] within an extended link (Network) with [Table]s being used to mean different things (i.e. same [Table] used to represent different hypercubes (i.e. each hypercube is NOT unique) C) A [Table] within an extended link (Network) with each [Table] being unique (i.e. each hypercube is unique) D) A [Table] nested within another [Table] (there are a few of these in the US GAAP Taxonomy) XBRL Dimensions Hypercube; XBRL element with the substitutionGroup value of "xbrldt:hypercube"; members to be on the <segment>; Typed members are not allowed; NOTE: When [Table]s are not used, there are still implicit dimensions for the <entity><identifier> and <period> that every fact has. NOTE: There tend to be inconsistencies between the definition and presentation linkbases.	It is possible to create unique hypercubes within SEC XBRL filings, noting prohibits that. In fact, the SEC rendering engine would quite possibly work better for XBRL filings which do this. US GAAP Taxonomy extended links, particularly the disclosures, tend to be quite large. By breaking down the large pieces into a larger number of smaller pieces, they would likely be easier for filers to work with and likely easier for the SEC XBRL rendering engine to render. The four different ways SEC filers have (see to the left) of implementing Fact Groups in their taxonomies makes it easier for the SEC rendering engine to render all the different possible permutations and combinations which are being thrown at it. This will be seen more and more as filers do detailed tagging. The rendering engine can work, but the SEC has to throw significantly more programming resources at the problem because of all the different possible permutations and combinations because of the options. By contrast, if the SEC required that every hypercube be unique, used hypercubes alone to drive renderings, it seems this would be vastly easier to create a rendering engine. Further, while the definition linkbase actually drives the hypercubes, the presentation linkbase seems to be used to drive the SEC rendering engine. If there are inconsistencies between the definition linkbase and the presentation linkbase, which one is deemed correct? The bottom line on all this is that all this variability makes it more challenging to create a rendering engine and will make it more challenging to build software to do comparisons between different SEC filers financial information. If the variability were reduced, rendering and comparisons would be significantly easier. See US GAAP Taxonomy Architecture, section 4.5, Implementation of Tables, page 34: http://xbrl.us/Documents/SECOFM-USGAAPT-Architecture-20080428.pdf

SEC Semantics and (<i>Logical Model Object Class</i>) Cross Reference	SEC XBRL Syntax Instantiation	Comments, explanations, observations
<i>xbrl: Fact</i> <i>(brm: Fact)</i>	Not applicable	<i>This is abstract in the logical model.</i> This is basically exactly the same as the logical model.
<i>xbrl: Value (xbrl:item)</i> <i>(brm: Value)</i>	Not applicable	<i>This is abstract in the logical model.</i> This is basically exactly the same as the logical model.
<i>xbrl: Numeric Fact Value</i>	XBRL simple fact (item) which contains a "unitRef" attribute and "decimals" attribute. Fractions are not allowed. Precision attribute is not allowed, only decimals attribute.	<i>This is abstract in the logical model.</i> This is basically exactly the same as the logical model.
<i>xbrl: Non-numeric Fact Value</i>	XBRL simple fact (item) which does NOT contain a "unitRef" attribute or "decimals" attribute.	<i>This is abstract in the logical model.</i> This is basically exactly the same as the logical model.
xbrl: Amount	Value of the simple fact XBRL item in the XBRL instance. Tuples are not allowed by the US GAAP Taxonomy Architecture, therefore all facts are xbrli:item. Nor are tuples allowed by the SEC. Fractions are not allowed by the US GAAP Taxonomy or by the SEC	This is the value of the fact within an XBRL instance. This will always be an xbrl:item. I am not 100% certain about this, I don't know what I have seen anything explicitly excluding them; but I know none exist in the US GAAP Taxonomy and I have never run across fact in an SEC XBRL filing yet.
xbrl: Unit	Value of the <measure> for the unitRef contained on the item for the fact.	I think that multiple measures are allowed in SEC XBRL filings, but not 100% sure. This is not really a big deal.
xbrl: decimals	Value of the decimals attribute of the item for the fact. US GAAP Taxonomy suggests using decimals, SEC requires use of decimals.	The SEC has data showing misuse of this attribute with values such as "7" which are not used very often and downright strange. Most of the time the value is "INF" (what you see is what you get) or "2" (hundredths) or "-3" (thousands) or "-6" (millions). Restrictions on the appropriate values for decimals would solve this issue.

SEC Semantics and (<i>Logical Model Object Class</i>) Cross Reference	SEC XBRL Syntax Instantiation	Comments, explanations, observations
sec: Text, Narrative, Prose	Text and escaped XHTML are used.	The SEC uses escaped XHTML in "text blocks" (was intended for text, now seems like everyone is using escaped XHTML. The data type is still text. Validation seems to enforce the escaped XHTML nicely.
<i>xbri: Footnote</i>	XBRL footnotes are allowed, but no specific roles are defined to differentiate one class of footnotes from another class.	<i>This is abstract in the logical model.</i>
<i>us-gaap: [Axis] and [Line Items] Relations</i>	This is implemented by allowing presentation relations, calculation relations, and definition relations. However, there is no requirement for the different linkbases to be consistent and there are no rules as to what to do if the different linkbases are inconsistent.	The US GAAP Taxonomy auto-generates the definition linkbase from the presentation linkbase. Inconsistencies in SEC XBRL filings make it clear that SEC filers are not taking this same approach. Further, presentation relations of SEC filers do not follow the information model of the US GAAP Taxonomy because there are no rules put in place by the SEC to require this. As such, this makes it even more challenging and causes additional potential for inconsistencies. The FINREP taxonomy does not provide a presentation linkbase at all. If a presentation linkbase were not provided, and if the definition linkbase were used to express relations; creating consistent SEC XBRL filings would actually be easier. However, most XBRL tools are so complicated to use to create dimensional relations that people tend to detest having to create XBRL Dimensions. However, if the software applications were built to leverage the semantics of even the XBRL Dimensions specification or even better to leverage the logical models, then software would not allow users to create the wrong definition linkbase, creating the information would be vastly easier for business users, and there would be far fewer errors due to the enforced consistency. Further, because of the consistency, the presentation relations could be auto-generated from the definition relations if required. Calculations are a little more of an issue because one may still need to tweak the weight on calculation relations. However, if XBRL Formula were used, this would not be an issue. Basically having to keep presentation, calculation, and definition relations synchronized is a headache which does not need to exist.

SEC Semantics and (<i>Logical Model Object Class</i>) Cross Reference	SEC XBRL Syntax Instantiation	Comments, explanations, observations
us-gaap: Hierarchy (<i>brm: Hierarchy</i>)	Not specifically identified within the US GAAP Taxonomy or SEC XBRL filings. However, this could be gleaned from reading existing relations. The fact that no calculations exist is easy to use to help identify 100% of the hierarchies.	Whereas it would be perhaps better to specifically identify a Hierarchy, this information can be gleaned from the taxonomy with 100% accuracy by reading relations. It is possible to have inconsistencies between the definition linkbase and the presentation linkbase if [Axis] exist.
us-gaap: Roll Up (<i>brm: Roll Up</i>)	Specifically identified in the US GAAP Taxonomy and SEC XBRL filings by the existence of XBRL calculation relations. Calculations are identified in the presentation linkbase by the organization of the information model (i.e. relations between concepts).	It is possible to identify 100% of Roll Ups in an SEC XBRL filing by looking at the XBRL calculation linkbase. There is a possibility of, and my SEC XBRL filings have, inconsistencies between the presentation, calculation, and definition linkbase (if in a [Table]). Whereas the presentation and definition linkbase could be auto-generated from the calculation relations, eliminating the possibility of all inconsistencies.
us-gaap: Roll Forward (<i>brm: Roll Forward</i>)	Specifically identified in the US GAAP Taxonomy and SEC XBRL filings with a [Roll Forward] in the information model in the presentation relations.	Not sure if the SEC is requiring consistency within the [Roll Forward] information model. No XBRL Formulas exist or are even allowed by the SEC to enforce this computation which is not enforceable by using XBRL calculations. Filers could create an XBRL Formula to test the computations easily by auto-generating it from the [Roll Forward] relations in the presentation linkbase. If XBRL Formulas were used, the presentation linkbase would not be needed to identify them as the existence of the XBRL Formula provides ample evidence that something is a [Roll Forward]
Not implemented (<i>brm: Other Relations</i>)	Not specifically identified in the US GAAP Taxonomy or SEC XBRL Filings. However, can be gleaned from the fact that the information model is a Hierarchy and XBRL Formulas exist (if XBRL Formulas were allowed).	XBRL Formula is not allowed, so all other relations must be a Hierarchy. Company XBRL Formulas can be used, but not submitted to the SEC.

SEC Semantics and (<i>Logical Model Object Class</i>) Cross Reference	SEC XBRL Syntax Instantiation	Comments, explanations, observations
us-gaap: [Axis] (brm: Measure)	Implemented in the US GAAP Taxonomy and SEC XBRL filings using the [Axis].	<i>This is abstract in the logical model.</i> See the US GAAP Taxonomy Architecture, section 4.5, Implementation of Tables, page 34 for more information: http://xbrl.us/Documents/SECOFM-USGAAPT-Architecture-20080428.pdf
us-gaap: [Line Items] (brm: Measure-Concept)	Implemented in the US GAAP Taxonomy and SEC XBRL filings using the [Line Items].	<i>This is abstract in the logical model.</i> The inconsistent use of [Line Items] within filings shows that this, while consistent in the US GAAP Taxonomy, is not being enforced by the SEC validation and as such this is inconsistent in SEC XBRL filings. However, making these consistent within a filing is valid XBRL per the SEC, therefore no SEC rules are needed to allow this, only to make SEC filings consistent.
xbrl: Concept (xbrl:item) (brm: Concept)	XBRL element (i.e. contains a substitutionGroup value of "xbrli:item" or something which resolves to xbrli:item)	Basically, if something does not have a substitutionGroup xbrldt:hypercube, xbrldt:dimension, link:part or have a type of us-types:domainItemType; then it is an xbrli:item.
xbrl: Context (brm: Measure-Context)	No equivalent. A class of Measure.	<i>This is abstract in the logical model.</i>
xbrl: Period (brm: Calendar Time [Measure])	Implemented as an XBRL context as <period> element of an XBRL instance context.	Note that there is no way to express labels or references on a <period> in XBRL 2.1. Do we want to allow generic linkbase labels and/or references? Note that there is no "domain" for calendar time defined. Note that there is no "Measure relations" for calendar time.
xbrl: Entity (brm: Reporting Entity [Measure])	Implemented as an XBRL context as <entity> <identifier>. Reporting entity is the combination of the schema attribute and the <identifier> value.	Note that there is no way to express labels or references on a <identifier> in XBRL 2.1. Do we want to allow generic linkbase labels and/or references? Note that there is no "domain" for reporting entity defined. Note that there is no "Measure relations" for reporting entity.

SEC Semantics and (<i>Logical Model Object Class</i>) Cross Reference	SEC XBRL Syntax Instantiation	Comments, explanations, observations
us-gaap: [Axis] (brm: Measure)	Implemented as an [Axis] which is basically an XBRL Dimensions dimension.	<i>This is abstract in the logical model.</i> Typed members are not allowed in this implementation. Typed members are not allowed in the US GAAP/SEC XBRL implementation. Simple typed members are not really a problem, they have two negative characterises when compared to explicit members: (1) typed member cannot have a hierarchy, they are a flat list; (2) typed members cannot have a label or labels in different languages. There are two advantages that typed members provide: (1) they make it so no physical extension taxonomy needs to be created; (2) if the list of members is really long type members provide an advantage because you don't have to articulate the complete list; rather you only articulate the "pattern" of the member in a schema. There is zero difference between the semantics of typed members and explicit members, this all boils down to the characteristics of the implemented syntax.
Various [Axis] in US GAAP Taxonomy; some implemented, some not (frta: Report Date [Measure], frta: Fiscal Period [Measure], frta: Legal Entity [Measure], frta: Business Segment [Measure], frta: Operations Breakdown [Measure], frta: Measurement Basis [Measure], frta: Restatement [Measure], frta: Reporting Scenario [Measure], frta: Third Party Verification [Measure], frta: Other Properties of Measure)	Implemented as an [Axis] which is basically an XBRL Dimensions dimension. XBRL Dimension (i.e. XBRL concept which contains a substitutionGroup value of "xbrldt:dimension")	While all of these measures are not required, they are allowed and implemented in many cases. While consistently implemented in the US GAAP Taxonomy, not required to be consistent in an SEC XBRL filing. Could be required, and individual filers can implement this consistently should they choose to do so. As such, can be 100% compliant to the logical model.
xbrl: Footnote (i.e. General Comment)	Implemented as a general XBRL footnote.	See Value Attribute above. Could create a custom footnote arcrole and role, but would be unique per implementation. This is not inconsistent with SEC XBRL filer rules and allowable, but is not optimal.

SEC Semantics and (<i>Logical Model Object Class</i>) Cross Reference	SEC XBRL Syntax Instantiation	Comments, explanations, observations
Not specifically implemented (<i>brm: Reason Not Reported</i>)	Implemented as a general XBRL footnote.	See Value Attribute above. Could create a custom footnote arcrole and role, but would be unique per implementation. This is not inconsistent with SEC XBRL filer rules and allowable, but is not optimal.
Not specifically implemented (<i>brm: Reclassification</i>)	No specific implemtnation.	See Value Attribute above. Could create a custom footnote arcrole and role, but would be unique per implementation. This is not inconsistent with SEC XBRL filer rules and allowable, but is not optimal.
xbrl: Domain (<i>brm: Domain</i>)	Implemented in the US GAAP Taxonomy by assigning the value of "us-types:domainItemType" to the data type.	Same semantics as logical model, different syntax. Note that a Measure implemented as a context <entity> or <period> does not have a Domain. Note that the Measure Concept does not have a Domain.
xbrl: Member (<i>brm: Member</i>)	Implemented in the US GAAP Taxonomy by assigning the value of "us-types:domainItemType" to the data type.	Same semantics as logical model, different syntax. This is the name of the XBRL Dimension member, the value of the <entity><identifier> and <identifier scheme=""/>, the value of the <period><startDate> or <endDate> or <instant> or <forever>; or the name of the XBRL element which is a primary item.