

## 6. Understanding Mechanics of an SEC-type XBRL-based Digital Financial Report

The purpose of this section is to summarize the mechanics of an SEC-style XBRL-based financial report created by public companies which submit their reports to the U.S. Securities and Exchange Commission (SEC).

### 6.1. Introduction

Section 6 of the SEC EDGAR Filer Manual<sup>108</sup> (EFM), the “Tagging Instructions” makes the following statement:

“This approach, though admittedly technical, is intended to provide information that is independent of the various commercially available software applications that filers may use to create their XBRL documents.”

The EFM section on Interactive Data is written for a *technical audience*. This document is written for accounting professional or other business professionals who want to understand SEC-style digital financial reports.

This section builds on your understanding of knowledge engineering ideas, the basic mechanics of a digital financial report, and expands these ideas to include what is required to create an XBRL-based public company financial report which would be submitted to the SEC.

The vast majority of XBRL-based public company financial filings filed with the U.S. Securities and Exchange Commission are consistent with the mechanics and semantics described in this section. Some are not. The primary reason for inconsistency is the lack of rules that describe what such a report should look like when submitted to the SEC and also used to verify that a digital financial report is consistent with that description which would include these mechanics.

### 6.2. Summary of the Basic Mechanics of a Digital Financial Report

The following provides a summary overview of the foundational terminology used to describe machine-readable digital financial reports and the basic mechanics of such reports. Having a consistent understanding of these key terms is important for accounting professionals, information technology professionals, and knowledge management professionals to communicate effectively.

### 6.3. Foundational terms

We will use foundational terminology which is consistent with the state-of-the-art W3C vocabularies for describing the information of a problem domain or area of concern, the Semantic Web<sup>109</sup> terms which is covered in the section knowledge engineering for professional accountants and summarized here:

- **Thing**
- **Individual**

<sup>108</sup> EDGAR Filer Manual (Version 29), <http://www.sec.gov/info/edgar/edgarfm-vol2-v29.pdf>

<sup>109</sup> Semantic Web, <http://www.w3.org/standards/semanticweb/>



- **Class**
- **Property**
- **Relations between individuals**
- **Relations between classes**

## 6.4. Classes

As explained, a class is a set or category of individuals that have one or more distinguishing features in common which differentiates the class from other classes. The following are the classes of a digital financial report:

- **Economic entity:** Economic or accounting entity which creates a report.
- **Report:** A report is created by an economic entity. By report we mean digital financial report.
- **Component:** A report is made up of pieces. The pieces of a report are called a component. A component contains or groups a sets of facts. (Another term for component is Report Fragment<sup>110</sup>.)
- **Characteristic:** Characteristics describe and distinguish facts contained within a component from other facts. (Another term for characteristic is Aspect<sup>111</sup>.)
- **Fact:** A fact is reported and can be organized into components and described by characteristics. Another term for fact is Data Point.
- **Parenthetical explanation:** A parenthetical explanation provides additional descriptive information about a fact.
- **Block:** A block is a part<sup>112</sup> of a component; a component is made up of one to many blocks.
- **Part-whole<sup>113</sup> relation:** A whole-part relations is something composed exactly of their parts and nothing else or more where the parts add up to the whole.
- **Is-a relation:** An is-a relation describes some list but the list does not add up mathematically.
- **Has-property relation:**
- **Properties:** Each economic entity, report, component, characteristic, fact, block, and relation has a finite set of properties.

<sup>110</sup> The US GAAP Taxonomy Architecture uses the term report fragment, <http://xbrl.us/Documents/SECOFM-USGAAPT-Architecture-20080428.pdf>

<sup>111</sup> The XBRL Abstract Model 2.0 uses the term Aspect, <http://www.xbrl.org/Specification/abstractmodel-primary/PWD-2012-06-06/abstractmodel-primary-pwd-2012-06-06.html>

<sup>112</sup> A block is a sub-set of a component. For example, the disclosure Funding Status of Defined Benefit Plans is made up of two roll forwards, a roll up, and a hierarchy each of which is a block of the component, see <http://www.xbrl.org/2013/ReportingTemplates/2013-05-15/Library/730000-003-FundingStatusOfDefinedBenefitPlans/Template.jpg>

<sup>113</sup> Toward Understanding Whole-Part Relations, <http://xbrl.squarespace.com/journal/2015/1/20/toward-understanding-whole-part-relations.html>



No new classes may be added. No properties may be added.

The salient classes of things that make up a financial report fall into that finite set of distinct and identifiable classes. Each of those classes has different but specific slots or openings into which things can be added.

### 6.5. Slots

As mentioned, a slot is simply the idea of an allotted place in an arrangement where something can be logically and sensibly placed.

For example, suppose you wanted to add something to a roll up of property, plant and equipment as shown below:

Property, Plant and Equipment, by Component [Line Items]	Period [Axis]	
	2010-12-31	2009-12-31
<b>Property, Plant and Equipment, by Component [Roll Up]</b>		
Land	1,000,000	1,000,000
Machinery and equipment, gross	2,000,000	2,000,000
Furniture and fixtures, gross	6,000,000	6,000,000
Accumulated depreciation	(1,000,000)	(1,000,000)
Property, plant and equipment, net	8,000,000	8,000,000

Basically, it makes no sense to simply add information randomly or arbitrarily to the roll up. While every slot or opening where it makes sense to add information to the existing information above has not been pointed out, the set of examples provide should help you understand the notion of a slot.

### 6.6. Creating/adding subclasses or individuals into slots

You can never create a new class in the open system of a financial report. Creating new classes is not allowed. You can, however, create new classes in your own system which you understand and control and which you may explain to others and therefore make use of.

But you can add subclasses and individuals. These subclasses and individuals can only be added into specific allowed slots. This maintains system boundaries and the important feature of being able to determine if a financial report is consistent with the prescribed representation description.

As mentioned in the section *Understanding Basic Mechanics of a Digital Financial Report*, the following is a summary of subclasses and individuals which may be added to a digital financial report:

- Adding new economic/accounting entities
- Adding new report
- Adding a new characteristic
- Adding new concept characteristic
- Adding new disclosure (component or block)



- Adding facts
- Adding new parenthetical explanation to fact
- Adding new properties is not allowed

Different systems can have different rules for allowing new classes, subclasses, relations between classes, or properties. System boundaries can be extended by adding new relation patterns. New relation patterns must be consciously and formally added in a controlled and coordinated manner only by system implementers before any new pattern is allowed to be used. System boundaries can be extended by adding new classes or properties. New classes and new properties must be consciously and formally added in a controlled and coordinated manner only.

### 6.7. Patterns

The following types patterns exist in digital financial reports:

- **Concept arrangement pattern**
- **Member arrangement pattern**
- **Network arrangement pattern**

Only identified patterns are allowed. If a new pattern is identified, that pattern can be added. See the appendix *Understanding why adding new patterns is both rare and not a significant constraint* and *Understanding that patterns maintenance is an evolutionary process* and *Understanding that patterns are finite (i.e. not infinite)*.

### 6.8. Block

Because distinguishing a component and a block can be a little tricky, we wanted to provide some additional detail and examples which help make this idea more understandable. Consider the following financial report disclosure represented using XBRL:

Property, Plant and Equipment, by Component [Line Items]	Period [Axis]	
	2010-12-31	2009-12-31
<b>Property, Plant and Equipment, by Component [Roll Up]</b>		
Land	1,000,000	1,000,000
Machinery and equipment, gross	2,000,000	2,000,000
Furniture and fixtures, gross	6,000,000	6,000,000
Accumulated depreciation	(1,000,000)	(1,000,000)
Property, plant and equipment, net	8,000,000	8,000,000

That disclosure is a roll up of the components that make up property, plant, and equipment, net. Basically there is a one-to-one correlation between the concept arrangement pattern (i.e. roll up) and the component.

Similarly, the following component contains one disclosure in one component:



Schedule of Accrued Liabilities [Line Items]	Period [Axis]		
	2013-01-01 - 2013-12-31	2012-01-01 - 2012-12-31	2011-01-01 - 2011-12-31
Balance at beginning of period	26,987,000	12,742,000	8,972,000
Acquisition			3,151,000
Deferral of new extended warranty revenue	20,191,000	22,344,000	8,659,000
Recognition of extended warranty deferred revenue	(12,789,000)	(8,099,000)	(8,040,000)
Balance at end of period	34,389,000	26,987,000	12,742,000

Again, there is a one-to-one correlation between the component and the concept arrangement pattern (i.e. this time a roll forward).

But now consider the component below. In that component you see one component but you see two concept arrangement patterns: a roll forward and then a roll up:

Restructuring Cost and Reserve [Line Items]	Period [Axis]					
	2010-01-01 - 2010-12-31			2009-01-01 - 2009-12-31		
	Restructuring Type [Axis]			Restructuring Type [Axis]		
	Facility Closing [Member]	Severance [Member]	All Restructuring Types [Domain]	Facility Closing [Member]	Severance [Member]	All Restructuring Types [Domain]
<b>Restructuring Reserve [Roll Forward]</b>						
Restructuring reserve, beginning balance	97,000,000	204,000,000	301,000,000	94,000,000	200,000,000	294,000,000
Restructuring charge	(1,000,000)	0	(1,000,000)	(4,000,000)	(4,000,000)	(8,000,000)
Cash payments	(4,000,000)	(4,000,000)	(8,000,000)	(6,000,000)	(6,000,000)	(12,000,000)
Accrual adjustment	0	(1,000,000)	(1,000,000)	(1,000,000)	0	(1,000,000)
Translation adjustment	30,000,000	5,000,000	35,000,000	14,000,000	14,000,000	28,000,000
Restructuring reserve, ending balance	122,000,000	204,000,000	326,000,000	97,000,000	204,000,000	301,000,000
<b>Restructuring Reserve [Roll Up]</b>						
Current portion of restructuring reserve	96,000,000	204,000,000	300,000,000	96,000,000	204,000,000	300,000,000
Long-term portion of restructuring reserve	26,000,000	0	26,000,000	1,000,000	0	1,000,000
Restructuring reserve	122,000,000	204,000,000	326,000,000	97,000,000	204,000,000	301,000,000

In order to maintain a one-to-one correlation between a piece of the report and the concept arrangement pattern used to represent the piece of the report, the notion of the *block* is used.

By thinking of the one component as two blocks, each with a one-to-one relation between the represented information and the concept arrangement pattern, software can help business professionals using and creating the information in many ways.

Accountants have the option of combining information in different ways when they want to present their disclosures. But they have far fewer options when it comes to representing the information in logical, sensible, and mathematically correct ways.

Not understanding the information makes it harder to create and harder to use the information.



## 6.9. Public Company Digital Financial Report Details

This section provides an overview of a financial report (report). A report is created by an economic entity. The report is created at some point in time (report creation date). The report is for a fiscal year, for a fiscal period, it has a current balance sheet date, it has a current year-to-date income statement period, the report has one or more report components, the report components contain facts which are reported. Some reported facts exist in more than one report component (i.e. intersections between report components).

### 6.9.1. Economic entity

An economic entity or accounting entity creates a financial report. An economic entity always has the following properties:

- Entity registrant name (dei:EntityRegistrantName)
- Entity central index key (CIK) (dei:EntityCentralIndexKey)
- Standard industry classification (SIC) (assigned by SEC EDGAR system)
- Current fiscal year end (dei:CurrentFiscalYearEndDate)
- Current reporting status (dei:EntityCurrentReportingStatus)
- Voluntary filer status (dei:EntityVoluntaryFilers)
- Entity filer category (dei:EntityFilerCategory)
- Well known seasoned issuer (dei:EntityWellKnownSeasonedIssuer)
- Public float (dei:EntityPublicFloat) (required for 10-K only)

Economic entities may have additional information, but every public company which submits a digital financial report to the SEC has the information above. The SIC is assigned to an entity but does not appear in the report itself. The public float fact is required only for 10-K report documents.

Economic entities may be broken down into smaller units which is discussed in a subsequent section of this document.

HINT: In an SEC XBRL-based financial report, the entity identifier of the context is identical for every context within the document. The entity identifier must be equal to the CIK number provided in the fact dei:EntityCentralIndexKey.

### 6.9.2. Report document

An economic entity creates a report. An economic entity can create one or many reports. This document covers only financial reports (financial information from a 10-K or 10-Q document). A report document always has the following properties:

- Document type (dei:DocumentType)
- Document period end date (dei:DocumentPeriodEndDate)
- Amendment flag (dei:AmendmentFlag)
- Report fiscal year focus (dei:DocumentFiscalYearFocus)
- Report fiscal period focus (dei:DocumentFiscalPeriodFocus)



**6.9.3. Report creation date**

Each report document has a creation date. The creation date is the acceptance date which is assigned when the report document is accepted by the EDGAR system. If a prior period adjustment is reported for an accounting error or change in accounting principle, then the *Report Date [Axis]* (us-gaap:CreationDateAxis) articulates the report creation date.

HINT: All reported facts have the same report creation date unless a prior period adjustment is reported using the Report Date [Axis] which indicates that some information in a prior report is being adjusted to be some new value.

**6.9.4. Report periods (fiscal year, fiscal period, current balance sheet date, current income statement period)**

Every report is for a fiscal year (e.g. 2013, 2014), is for some fiscal period of that fiscal year (e.g. Q1, Q2, Q3, FY).

Every report has a current balance sheet date. There are three places where the current balance sheet date is reported and all three must be consistent:

- The value of the reported fact with the concept dei:DocumentPeriodEndDate is the current balance sheet date.
- The value of the endDate context which is used on the reported fact with the concept dei:DocumentPeriodEndDate.
- The actual calendar period characteristic value which is used for the balance sheet concepts.

Note that all three of these occurrences of the current balance sheet date must be consistent.

Every report has a current year-to-date income statement period. The current balance sheet date is also the end date of the current year-to-date income statement period. There are two places where the start date of the current year-to-date income statement period must be consistent:

- The value of the startDate context which is used on the reported fact with the concept dei:DocumentPeriodEndDate.
- The actual calendar period characteristic value which is used for the income statement concepts.

Note that the current year-to-date cash flow statement period is the same as the current year-to-date income statement period.

**6.10. Report components**

A report is made up of report components. All reported facts are reported within one or more report components.

HINT: Reported facts are never “free-floating”, they always exist within one or more report components. While it is the case that a fact can be used apart from the report component or components to which it is a member, it is the responsibility of the user of the fact to also bring the appropriate characteristics which describe that reported fact.



The following is a high-level overview of the sequence or ordering of report components within a report as prescribed by the SEC (see EFM section 6.7.12):

- **Report**
  - Document and Entity Information
    - Document information
    - Entity information
  - Statements
    - Statements
    - Statement related Parenthetical
  - Notes (Level 1Text Blocks)
    - Each Level 1 Text Block
  - Policies (Level 2 Text Blocks)
    - Each Level 2 Text Block
  - Disclosures (Level 3Text Blocks)
    - Each Level 3 Text Block
  - Disclosures (Detail)
    - Each Level 4 Detailed Disclosure

HINT: For some reason, the EFM example does not include document and entity information. Most public companies (virtually all really) provide this information in the first report component.

The statements of a financial report are consistently the following:

- Statement of financial position or balance sheet
  - Classified
  - Unclassified
  - Liquidation basis
- Statement of financial condition or income statement
- Statement of comprehensive income (may be combined with income statement)
- Statement of cash flows
- Statement of changes in equity

The disclosures of a company vary based on the transactions, events, and circumstances of the economic entity which is creating a financial report. However, every economic entity must disclose the following information:

- Nature of business/operations
- Basis of presentation/reporting
- Significant accounting policies



Economic entities might call these by slightly different terms but those three disclosures are essentially required in every financial report.

If certain line items show up on the primary financial statements, additional disclosures are expected to exist.

## 6.11. Intersections

A financial report contains facts, those facts are organized within components, and facts can exist within multiple components. For example, consider this balance sheet fragment and the related disclosure of property, plant, and equipment which shows one fact shown in two components:

Reporting Entity [Axis]	000000001 ( <a href="http://www.sec.gov/CIK">http://www.sec.gov/CIK</a> )	
Legal Entity [Axis]	Consolidated Entity [Domain]	
	Period [Axis]	
Balance Sheet [Line Items]	2012-12-31	2011-12-31
<b>Assets [Roll Up]</b>		
<b>Current assets [Roll Up]</b>		
<b>Cash, cash equivalents, and marketable securities [Roll Up]</b>		
Cash and cash equivalents	11,000,000	10,000,000
Marketable securities	9,000,000	10,000,000
Cash, cash equivalents, and marketable securities	20,000,000	20,000,000
Accounts receivable, net of allowance for doubtful accounts of \$1,000 and \$1,000	29,000,000	29,000,000
Inventories	4,000,000	4,000,000
Prepaid expenses	3,000,000	3,000,000
Total current assets	56,000,000	56,000,000
<b>Noncurrent assets [Roll Up]</b>		
Property, plant and equipment, net	82,000,000	82,000,000
Deferred costs	9,000,000	9,000,000
Total noncurrent assets	91,000,000	91,000,000
Total assets	147,000,000	147,000,000
<b>Liabilities and Equity [Roll Up]</b>		
<b>Current liabilities [Roll Up]</b>		
Accounts payable	3,000,000	3,000,000
Accrued liabilities	4,000,000	4,000,000
Current portion of long-term debt	22,000,000	22,000,000
Product warranty accrual, current portion	26,000,000	26,000,000

Contrast the balance sheet to the disclosure below which shows the property, plant, and equipment breakdown:



Reporting Entity [Axis]		0000000001 ( <a href="http://www.sec.gov/CIK">http://www.sec.gov/CIK</a> )	
Legal Entity [Axis]		Consolidated Entity [Domain]	
		Period [Axis]	
Property, Plant and Equipment [Line Items]	Property, Plant and Equipment, Type [Axis]	2012-12-31	2011-12-31
<b>Property, Plant and Equipment, Net, by Type [Roll Up]</b>			
Property, plant and equipment, gross	Land [Member]	40,000,000	40,000,000
	Machinery and equipment [Member]	50,000,000	50,000,000
	Furniture and fixtures [Member]	7,000,000	7,000,000
	Property, Plant and Equipment, All Types [Domain]	97,000,000	97,000,000
Accumulated depreciation	Property, Plant and Equipment, All Types [Domain]	(15,000,000)	(15,000,000)
Property, plant, and equipment, net	Property, Plant and Equipment, All	<b>82,000,000</b>	82,000,000

The fact is the same. In both cases the fact is “property, plant, and equipment, net” which has the value 82,000,000. However the characteristics which describe the fact are different. On the balance sheet, there is no property, plant and equipment type [Axis], but in the disclosure there is. This is because the component which represents the disclosure needs to be able to differentiate the concepts.

It is challenging to show<sup>114</sup> the notion of an intersection and how useful it is in software applications without using software. This is best experienced to be fully appreciated.

HINT: A good way to view intersections is using the free Firefox XBRL plug-in<sup>115</sup> or the XBRL Cloud Viewer.

An intersection is where a fact in one component also exists in another component creating in essence a link between the two components, an intersection.

## 6.12. Reported facts

Finally we get to the essence of what a report does which is to report facts.

A fact is reported. A fact defines a single, observable, reportable piece of information contained within a financial report, or fact value, contextualized for unambiguous interpretation or analysis by one or more distinguishing characteristics. A fact value is one property of a fact. Every fact has exactly one fact value. The set of characteristics which describes the fact is also a property of the fact.

<sup>114</sup> This video walks you through the notion of an intersection, <https://www.youtube.com/watch?v=INPjwKy2Obs>

<sup>115</sup> To get the Firefox plug-in See <http://xbml.squarespace.com/journal/2010/10/29/game-changer-xbml-viewer-add-on-for-firefox.html>



Reporting entity	Legal entity	Period	Concept	Fact Value
ABC Company	Consolidated entity	January 1, 2011 to December 31, 2011	Revenues	2000
ABC Company	Consolidated entity	January 1, 2010 to December 31, 2010	Revenues	2500
ABC Company	Consolidated entity	January 1, 2009 to December 31, 2009	Revenues	2300
ABC Company	Consolidated entity	January 1, 2011 to December 31, 2011	Cost of revenues	1800
ABC Company	Consolidated entity	January 1, 2010 to December 31, 2010	Cost of revenues	1700
ABC Company	Consolidated entity	January 1, 2009 to December 31, 2009	Cost of revenues	1600
ABC Company	Consolidated entity	January 1, 2011 to December 31, 2011	Gross profit	200
ABC Company	Consolidated entity	January 1, 2010 to December 31, 2010	Gross profit	800

HINT: An all too common mistake which public companies make is that a fact is reported and it is represented with characteristics which have nothing to do with the reported fact.

### 6.13. Structural Pieces of a Digital Financial Report

The following structural pieces are used to organize the contents of a digital financial report. These structural pieces are used to represent the structure (model structure) of a digital financial report.

#### 6.13.1. Networks

Networks have no specific semantics other than to separate a digital financial report into pieces. At times the pieces are desired. At other times the pieces are required in order to avoid conflicts in the relations between report elements.

While XBRL networks have one label (role definition), the SEC breaks that one label into three parts (EFM section 6.7.12): {SortCode} - {Type} - {Title}

- **SortCode:** Alphanumeric value which is used to sequence networks.
- **Type:** Describes the type of network and must be one of the following values: Document, Statement, Disclosure, Schedule
- **Title:** Describes what the network contains.

The following are the rules related to the ordering and content of networks which are contained in a report:

1. Document and entity information is generally the first network(s).
2. Each primary financial statement (and statement related parenthetical information immediately following the statement); the order of the statements must match human readable versions provided to the SEC.
3. Level 1 Text Blocks (note level text blocks) which contain information for each note follow immediately after each statement, one note per network.
4. Level 2 Text Blocks (policy level text blocks) must follow immediately after the note text blocks.
5. Level 3 Text Blocks (disclosures level text blocks) must follow immediately after the policy text blocks.



- 6. Level 4 Detail (disclosure detail level) must follow immediately after the disclosure level text blocks)

The following example is provided in the EFM (EFM section 6.7.12):

Example link:definition Text	Type of Facts in Presentation Links			
	Each Footnote as a Text Block	Each Accounting Policy as a Text Block	Each Table in a Footnote as a Text Block	Individual Values or Narratives
01 - Statement - Statement of Income				Yes
02 - Statement - Balance Sheet				Yes
03 - Statement - Balance Sheet (Parenthetical)				Yes
04 - Statement - Cash Flows				Yes
05 - Statement - Changes in Equity				Yes
06 - Statement - Comprehensive Income				Yes
07 - Disclosure - Accounting Policies	Yes			
08 - Disclosure - Inventories	Yes			
09 - Disclosure - Earnings per Share	Yes			
10 - Disclosure - Unearned Revenue	Yes			
11 - Disclosure - Equity	Yes			
12 - Disclosure - Accounting Policies, by Policy		Yes		
13 - Disclosure - Inventories (Tables)			Yes	
14 - Disclosure - Unearned Revenue (Tables)			Yes	
15 - Disclosure - Equity, Share Repurchases (Table)			Yes	
16 - Disclosure - Equity, Dividends (Table)			Yes	
17 - Disclosure - Inventories (Detail)				Yes
18 - Disclosure - Unearned, by Component (Detail)				Yes
19 - Disclosure - Unearned, by Segment (Detail)				Yes
20 - Disclosure - Equity, Share Repurchases (Detail)				Yes
21 - Disclosure - Equity, Dividends (Detail)				Yes

**6.13.2. Report elements**

The US GAAP Taxonomy Architecture<sup>116</sup> section 4.5 *Implementation of Tables* describes the relations between [Table], [Axis], [Member], [Line Items], Concept, and [Abstract] report elements.

Software was used to query the mechanical structure of 6,674 XBRL-based public company 10-K filings for primarily fiscal year 2013 and the following results were obtained:

<sup>116</sup> US GAAP Taxonomy Architecture, [http://www.fasb.org/cs/ContentServer?c=Document\\_C&pagename=FASB%2FDocument\\_C%2FDocumentPage&cid=1176163689810](http://www.fasb.org/cs/ContentServer?c=Document_C&pagename=FASB%2FDocument_C%2FDocumentPage&cid=1176163689810)



		Parent						
		Network 477,041	Table 232,230	Axis 386,912	Member 1,216,391	Lineltms 232,690	Abstract 732,409	Concept 3,165,249
Child	Network	0	0	0	0	0	0	0
	Table	1,261	1	0	0	45	230,899	24
	Axis	1	386,888	0	0	3	20	0
	Member	3	0	450,091	766,221	4	72	0
	Lineltms	183	232,181	0	0	107	217	2
	Abstract	474,310	22	0	1	113,059	144,471	546
	Concept	46	26	11	137	1,222,427	1,929,257	13,346

In the columns are the mechanical class of pieces which serve as the parent for some child mechanical class of piece: Network, Table, Axis, and so on. In the rows are the child mechinacal pieces: Network, Table, Axis, and so on. The cells show the number of relations which exist in the set of 6,674 digital financial reports.

This second graphic of the same information will better help you to interpret and understand the results:

		Parent						
		Network 477,041	Table 232,230	Axis 386,912	Member 1,216,391	Lineltms 232,690	Abstract 732,409	Concept 3,165,249
Child	Network	0	0	0	0	0	0	0
	Table	1,261	1	0	0	45	230,899	24
	Axis	1	386,888	0	0	3	20	0
	Member	3	0	450,091	766,221	4	72	0
	Lineltms	183	232,181	0	0	107	217	2
	Abstract	474,310	22	0	1	113,059	144,471	546
	Concept	46	26	11	137	1,222,427	1,929,257	13,346

What the graphic says about the relationships between the structural pieces of the digital financial reports is the following:

- Of the 386,912 [Axis] which exist in the report, there are ZERO occasions where a parent [Axis] has a child [Axis].
- Of the 232,690 [Line Items] which exist in the report, there are 1,222,427 occasions where the parent [Line Items] has a child which is a Concept.

Without going into a lot of detail, the following graphic shows what the above graphic means: the allowed and disallowed relations between the mechanical building blocks: Network, Table, Axis, Member, LineItems, Abstract and Concept.



		Parent						
		Network	Table	Axis	Member	LinItems	Abstract	Concept
Child	Network	Illegal XBRL						
	Table	OK	Disallowed	Disallowed	Disallowed	Disallowed	OK	Disallowed
	Axis	Disallowed	OK	Disallowed	Disallowed	Disallowed	Disallowed	Disallowed
	Member	Disallowed	Disallowed	OK	OK	Disallowed	Disallowed	Disallowed
	LinItems	Disallowed	OK	Disallowed	Disallowed	Disallowed	Disallowed	Disallowed
	Abstract	OK	Disallowed	Disallowed	Disallowed	OK	OK	Not advised
	Concept	Not advised	Disallowed	Disallowed	Disallowed	OK	OK	Not advised

You need to reconcile the mechanical representation with an implementation of the mechanical representation in software<sup>117</sup>. While it is beyond the scope to do a detailed reconciliation between the semantics use in this document, the terms use by software and the US GAAP XBRL Taxonomy and SEC, and the XBRL technical syntax specification; it is necessary to provide an overview because we need to shift terminology slightly. This is that overview which reconciles terminology:

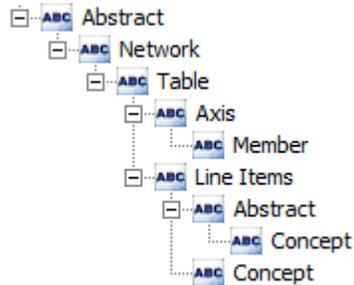
Term used in this document	Term used by software
Economic or accounting entity	Reporting Entity CIK (XBRL context entity identifier)
Report	XBRL instance document + XBRL taxonomy
Component	XBRL <b>Network</b> + [ <b>Table</b> ]
Characteristic (other than concept)	[ <b>Axis</b> ] + [ <b>Member</b> ]
Characteristic (concept)	[ <b>Line Items</b> ] + <b>Concept</b>
Fact	Fact
Block	Network + [ <b>Table</b> ] + Concept Arrangement Pattern
Relations pattern	Member arrangement pattern

That is a rough explanation of the terms we use to describe the mechanics of a financial report and terms use by software applications, SEC filings, and the US GAAP XBRL Taxonomy. A complete reconciliation of terminology is beyond the scope of this document and would cause more confusion and complexity that most business professionals would tolerate.

<sup>117</sup> Reconciliation of Financial Report Semantics and Dynamics Theory, to US GAAP XBRL Taxonomy Architecture and SEC implementation, to XBRL technical syntax, see <http://www.xbrl.com/2012/Library/SemanticObjectReconciliation.pdf>



To keep this simple, the implementation of the mechanics can be distilled down to the following classes of report elements: Network, Table, Axis, Member, Line Items, Abstract and Concept. They are roughly related as follows:



The point here is not to have a debate about what should be allowed and what should not be allowed. While that debate and perhaps even a theoretical or philosophical discussion about the merits of allowing or disallowing relations could prove useful, that is not the point.

The point is this: First, if a profound majority of XBRL-based financial reports are represented in a certain way, it is very difficult to say that the approach is wrong. Not impossible because the majority could be incorrect in certain occasions.

But second, and most importantly, if rules can be created and enforced by software and it is possible to have 100% agreement then why is that not done?

Look at the graphic again. Notice that there are ZERO occasions where a Network is a child of any other mechanical structure. Why is that? The reason that there are ZERO is that the XBRL technical specification states that such relations are not allowed, and the XBRL consistency suite tests to make sure software does not make this mechanical mistake.

And so an obvious question is this: why are not other mechanical aspects not enforced in this manner?

### 6.13.3. Properties

The following is a summary of the relevant properties for each class of report element:

- Report
  - Collection of components
- Component
  - Collection of report elements
- Network
  - Name
  - Label (SortCode + Type + Title)
- Table
  - Name



- Label
- Axis
  - Name
  - Label
- Member
  - Name
  - Label
- Line Items
  - Name
  - Label
- Abstract
  - Name
  - Label
- Concept
  - Name
  - Label
  - Data Type
  - Period Type
  - Balance Type
- Fact
  - Collection of characteristics
  - Fact value
  - Collection of parenthetical explanations
  - Units (numeric facts only)
  - Decimals (numeric facts only)

Note that while the XBRL technical syntax might require other properties (implemented as an attribute of an element), the properties are meaningless in terms of semantics. For example, a Table is required to have a data type of string, a period type of duration, and an abstract value of true; but that information is not relevant to the meaning of a Table.

While all report elements are required to have an ID attribute, that ID attribute is always identical to the namespace prefix plus “\_” plus the name of the report element. Machines can automatically manage the ID.

#### **6.13.4. Components and blocks**

A component, referred to as a “report fragment” by the US GAAP Taxonomy Architecture and defined as “a portion of a financial report that includes one or more reported facts”, is defined as follows



- **Component:** A component is a set of facts which go together (tend to be cohesive and share a certain common nature) for some specific purpose within a financial report. For example, a "balance sheet" is a component. "Maturities of long-term debt" is a component. A component can also be broken down into blocks.
- **Block:** A block is a set of facts within one component which are part of the same concept arrangement pattern.

A component contains one or more blocks. Each block has exactly one concept arrangement pattern, but shares the same member arrangement pattern as every other block.

A component is a combination of one network and one implied table or explicitly defined [Table].

### 6.14. Relations between Structural Pieces of a Financial Report

Pieces of a report can be related to other pieces of a report. This is a summary of key relations.

#### 6.14.1. Economic entity and parts of economic entity

An economic entity or accounting entity creates a financial report. That economic entity could be broken out into numerous different pieces of the economic entity. To use the information within a financial report, you need to discover the root economic entity. Software has to be able to identify that root economic entity. From that root economic entity, information about other parts of the economic entity can then be obtained.

To make this point clear we use the following example pointed out in the *Wiley GAAP 2011, Interpretations and Applications of Generally Accepted Accounting Principles*, Bragg, page 46:

The Parent Holding Company <i>Owens subsidiaries, land and headquarters building that they all use</i>						
Subsidiary 1 <i>Division a Business i</i>	Subsidiary 2 <i>Business iv</i>	Subsidiary 3 <i>Business v 2 Product Lines</i>	Subsidiary 4 <i>2 Similar Businesses Business vi</i>	Subsidiary 5 <i>2 Similar Businesses Business viii</i>	Subsidiary 6 <i>Business ix</i>	Subsidiary 7 <i>2 Nonsimilar Businesses Business x</i>
Asset Group (a)	Asset Group (d) with Primary Asset	Asset Group (e) and Disposal Group (f)	Asset Group (g)	Asset Group (i)	Asset Group (j)	Asset Group (k) Reporting Unit (6)
Reporting Unit (1)	Reporting Unit (2)	Reporting Unit (3)	Reporting Unit (4)	Reporting Unit (5)		Business xi
<i>Division b</i>			Business vii			Asset Group (l) Reporting Unit (7)
Business ii	Business iii		Asset Group (h)			
Asset Group (b)	Asset Group (c)					
Operating Segment A		Operating Segment B	Operating Segment C	Operating Segment D		Operating Segment E
Reportable Segment I			Reportable Segment II	Reportable Segment III		Reportable Segment IV

#### 6.14.2. Current balance sheet date and other balance sheet dates

Financial reports contain information for the current balance sheet date but also for prior balance sheet dates and perhaps balance sheets of some sub-part of the



economic entity reporting. Software analyzing a financial report must be able to discover the current balance sheet date.

From the current balance sheet date, other “as of” dates can be determined such as the prior period balance sheet information.

#### **6.14.3. Current year-to-date income statement period and other periods**

Financial reports contain information for the current year-to-date income statement period but also for prior income statements, other periods, and information for sub-parts of the economic entity. As such, software making use of a financial report needs to be able to discover the current year-to-date income statement period. That same period is used on the cash flow statement.

From the current year-to-date income statement period, other periods can be determined.

#### **6.14.4. Primary financial statement line items and line item breakdowns**

The primary financial statement line items tend to be a high-level summary of the information in a financial report. The primary financial statements can be seen as the first layer of a financial report.

The disclosures are used to break down the line items of a financial report into more detail. The breakdown could be a roll up of the components of some primary financial report line item or a roll forward of a line item.

Some disclosures do not physically tie to the primary financial statements. For example, information about subsequent events generally does not tie to the primary financial statements.

#### **6.14.5. Fundamental accounting concepts and relations between concepts**

Certain relations in a financial report never change. For example:

- $\text{Assets} = \text{Liabilities and Equity}$  (the accounting equation)
- $\text{Assets} = \text{Current Assets} + \text{Noncurrent Assets}$  (classified balance sheet only)
- $\text{Equity} = \text{Equity Attributable to Parent} + \text{Equity Attributable to Noncontrolling Interest}$
- $\text{Liabilities} = \text{Current Liabilities} + \text{Noncurrent Liabilities}$  (classified balance sheet only)
- $\text{Liabilities and Equity} = \text{Liabilities} + \text{Temporary Equity} + \text{Equity}$
- $\text{Current Assets} = \text{Assets} - \text{Noncurrent Assets}$  (classified balance sheet only)
- $\text{Current Liabilities} = \text{Liabilities} - \text{Noncurrent Liabilities}$  (classified balance sheet only)
- $\text{Noncurrent Assets} = \text{Assets} - \text{Current Assets}$  (classified balance sheet only)
- $\text{Noncurrent Liabilities} = \text{Liabilities} - \text{Current Liabilities}$  (classified balance sheet only)
- $\text{Gross Profit} = \text{Revenues} - \text{Cost Of Revenue}$  (Multi-step approach only)



- Operating Income (Loss) = Gross Profit - Operating Expenses + Other Operating Income (Multi-step approach only)
- Income (Loss) from Continuing Operations after Tax = Income (Loss) from Continuing Operations Before Tax - Income Tax Expense (Benefit)
- Net Income (Loss) = Income (Loss) from Continuing Operations After Tax + Income (Loss) from Discontinued Operations, Net of Tax + Extraordinary Items, Gain (Loss)
- Net Income (Loss) = Net Income (Loss) Attributable to Parent + Net Income (Loss) Attributable to Noncontrolling Interest
- Net Income (Loss) Available to Common Stockholders, Basic = Net Income (Loss) Attributable to Parent - Preferred Stock Dividends and Other Adjustments
- Comprehensive Income (Loss) = Comprehensive Income (Loss) Attributable to Parent + Comprehensive Income (Loss) Attributable to Noncontrolling Interest
- Comprehensive Income (Loss) = Net Income (Loss) + Other Comprehensive Income (Loss)
- Operating Income (Loss) = Revenues - Costs And Expenses + Other Operating Income (Single-step approach)
- Costs And Expenses = Cost Of Revenue + Operating Expenses (Single-step approach)
- Net Cash Flow = Net Cash Flows, Operating + Net Cash Flows, Investing + Net Cash Flows, Financing + Exchange Gains (Losses)
- Net Cash Flows, Continuing = Net Cash Flows, Operating, Continuing + Net Cash Flows, Investing, Continuing + Net Cash Flows, Financing, Continuing
- Net Cash Flows, Discontinued = Net Cash Flows, Operating, Discontinued + Net Cash Flows, Investing, Discontinued + Net Cash Flows, Financing, Discontinued
- Net Cash Flows, Operating = Net Cash Flows, Operating, Continuing + Net Cash Flows, Operating, Discontinued
- Net Cash Flows, Investing = Net Cash Flows, Investing, Continuing + Net Cash Flows, Investing, Discontinued
- Net Cash Flows, Financing = Net Cash Flows, Financing, Continuing + Net Cash Flows, Financing, Discontinued

Remember that the statement that these relations must be true have nothing to do with whether an economic entity is required to report a concept. For example, many economic entities do not report "Noncurrent assets". However, just because that line item is not explicitly reported does not invalidate the relationship. Noncurrent assets can be easily imputed by taking values which were reported. So, the value can be implied to be:  $\text{Noncurrent assets} = \text{Assets} - \text{Current assets}$ .

HINT: These relations truly never change. If it is the case that they do change, then a new reporting pallet or report frame is created. (See the section on report pallets.) The process of adding report pallets can continue until a set of relations exist which do not change.



### **6.15. Primary financial statement roll ups**

Every balance sheet is a roll up of assets and of liabilities and equity; therefore every balance sheet should have business rules describing these relations. Every income statement is a roll up of net income (loss) and therefore every income statement should have business rules describing those relations. Every cash flow statement is a roll forward; that roll forward contains a roll up of net cash flow; and therefore every cash flow statement must provide business rules which describes those relations.

### **6.16. Reporting units**

Every financial report has some base reporting units which it uses. For the vast majority of public company financial reports filed to the SEC those base reporting units are US Dollars. However, not all economic entities report using US Dollars. As such, the reporting units must be determined and it may even need to be discovered of more than one reporting units is used in the report.

### **6.17. Relations between text block, text blocks and detail**

The SEC requires different levels of information to be reported using Level 1 Text Blocks (note level), Level 2 Text Blocks (policy level), Level 3 Text Blocks (disclosure level) and Level 4 Detail (disclosure level).

There are relations between text blocks and relations between text blocks and detailed information. The following is a summary of these relations:

- **Level 1 Text Blocks represent all notes:** Each note provided by a reporting entity is represented by one Level 1 Text Block.
- **Significant accounting policies:** One of the Level 1 Text Blocks contains the significant accounting policies of an economic entity. Those significant accounting policies are detailed in one set of Level 2 Text Blocks which represent the individual policies.
- **Level 3 Text Blocks provide details of specific Level 1 Text Blocks:** There is a relation between a Level 3 Text Block and a Level 1 Text Block. Said another way, some set of Level 3 Text Blocks go with some Level 1 Text Block.
- **Level 4 Detail relates to Level 3 Text Block:** Each Level 3 Text Block has one or more Level 4 Detail disclosures which provides equivalent information.

HINT: The SEC, for some reason, does not require text blocks for the primary financial statements or document and entity information. If they did, the 100% of the contents of a financial report would be provided in similar form to the HTML version of the financial report. As such, it would make a lot of sense to provide text blocks for the primary financial statements.

HINT: Software should be able to convert detailed disclosures into text blocks, eliminating the need to manually create text blocks.



## 6.18. Workflow and Process Related to Financial Reports

There is a workflow and/or process related to submitting, having the reports accepted by the EDGAR system, and so forth. We don't want to get into this workflow/process in detail. However, the following workflow or process related items are important to note.

### 6.18.1. Amended reports

An economic entity may submit a report to the SEC EDGAR system, have that report become available, and then amend the submitted report; replacing it with an amended report.

When an amended report is submitted, a different document type is used. Rather than 10-K, the document becomes a 10-K/A. Rather than a 10-Q, the document becomes a 10-Q/A. The amended flag value is switched from false to true. If the amended flag is true, indicating an amended report, an amendment description is provided.

When a report is amended, applications querying information should generally ignore the original submission and use the amended submission instead.

## 6.19. Consequences of Implementation Choices

The SEC made implementation choices when it implemented XBRL-based financial filings within its EDGAR system. Understanding the consequences of these choices helps business users better understand how the system operates.

### 6.19.1. Consequences of using non-unique and non-explicit tables

A consequence of non-unique and non-explicit tables being used is that in order to identify a component of a report you must use both the Network and [Table] (implied or explicit) in order to uniquely identify any component within an XBRL-based public company filing to the SEC.

Said another way, because the [Table] named *us-gaap:StatementTable* could be used to represent a balance sheet, and income statement, a cash flow statement, or literally any other component in an XBRL-based digital financial report; the name of the table is insufficient to uniquely identify report components.

For example, Microsoft uses *us-gaap:StatementTable* to represent their balance sheet, income statement, and cash flow statement (among other uses). As such, the network is necessary to differentiate the report components.

Network	Table
103 - Statement - INCOME STATEMENTS	us-gaap:StatementTable
106 - Statement - BALANCE SHEETS	us-gaap:StatementTable
108 - Statement - CASH FLOWS STATEMENTS	us-gaap:StatementTable



118 - Disclosure - GOODWILL	us-gaap:StatementTable
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Contrast that to what this might look like if unique and explicit [Table]s were used:

Network	Table
103 - Statement - INCOME STATEMENTS	us-gaap:IncomeStatement
106 - Statement - BALANCE SHEETS	us-gaap:BalanceSheet
108 - Statement - CASH FLOWS STATEMENTS	us-gaap:CashFlowStatement
118 - Disclosure - GOODWILL	us-gaap:Goodwill

The [Table]s above are not in the US GAAP XBRL Taxonomy, rather they were created to make a point. Suppose those [Table]s did exist in the US GAAP XBRL Taxonomy and suppose that every public company used those concepts. Suppose an investor wanted to locate the balance sheet of every public company. The query would be as simple as looking for the [Table] *us-gaap:BalanceSheet*.

The balance sheet is only provided as an example. This situation exists for every disclosure of every financial report of every public company.

And so an alternative to the design choice of non-unique and non-explicit [Table]s would be to have unique and explicit [Table]s which would make querying information easier.

This is not to say that querying information is impossible. The current approach only makes things harder. It is still quite possible to query information using prototype theory<sup>118</sup>.

#### **6.19.2. Consequences of not employing explicit concept class relations**

There are two salient consequences of not employing explicit concept class relations in public company XBRL-based financial reports to the SEC. The first consequence is that reporting entities can in essence use any concept in any way that it chooses without being aware that they have changed the explicit definition of a concept.

The second consequence is that because no mechanism exists to explicitly define class and subclass relations, when extension concepts are created by an economic entity there is no way for the entity to indicate what concept from the US GAAP XBRL Taxonomy they are extending.

Examples will make these consequences clear. The vast majority of reporting entities use the concept named *us-gaap:AssetsNoncurrent* to represent both what the name suggests and the document of the concept explicitly states: total noncurrent assets of a reporting entity. Yet a minority of reporting entities use that

<sup>118</sup> *Understanding Prototype Theory and How it Can be Useful in Analyzing and Creating SEC XBRL Filings*, <http://www.xbrlsite.com/2013/Library/UnderstandingPrototypeTheory.pdf>



concept to report what amounts to a line item which is included in *Other noncurrent assets*.

A second example is that economic entities generally use the concept *us-gaap:Revenue* or some fairly obvious subclass of *us-gaap:Revenue*, indicated by the XBRL calculation relations between revenues concepts provided in the US GAAP XBRL Taxonomy. Some economic entities do not find a concept in that list which satisfies their needs and they create some extension concept, for example *my:Revenues*. While humans may be able to deduce the fact that the extension concept articulates information about revenues, machine-based processes cannot reach that conclusion. However, if the reporting entity were required to state in essence “The extension concept which I created *my:Revenues* is a subclass of the concept *us-gaap:Revenue* but the definition is tweaked slightly to indicate that ...” This mechanism already exists in XBRL<sup>119</sup>.

### **6.19.3. Consequences of not requiring explicit business rules for roll forwards and member aggregations**

One common mathematical relationship in public company XBRL-based financial filings is a roll up. Balance sheets are roll ups, as are income statements and cash flow statements have roll ups also. While most public companies provide the XBRL calculation relations required to represent and verify the consistency of these relations, a few do not.

Another common mathematical relation which also exists in public company XBRL-based financial filings are roll forwards. A roll forward reconciles a beginning balance to an ending balance by showing the changes between the beginning and ending balances. (e.g. Beginning balance + Additions – Subtractions = Ending balance) A cash flow statement, a statement of changes in equity, and a change in benefit obligation are all examples of roll forwards.

Not requiring public companies to articulate these roll forward relations has the consequence of allowing mathematical error in the digital financial reports of public companies.

Another common mathematical relation is many times referred to as a member aggregation. An example of a member aggregation is a breakdown of revenues by business segment or a breakdown of long-lived assets by geographic area. A member aggregation is very similar to a roll up but it aggregates values across some [Axis].

Neither a roll forward nor a member aggregation relationship can be represented using XBRL calculation relations. However, both of these types of mathematical relations can be represented using XBRL Formula.

A consequence of not requiring these relations to be represented by public companies providing XBRL-based financial reports to the SEC are data quality errors.

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<sup>119</sup> Basically an XBRL definition linkbase relation is created between the extension concept and the existing US GAAP XBRL Taxonomy concept using the “essence-alias” (<http://www.xbrl.org/2003/arcrole/essence-alias>) relation.

