1. Reference Implementation of XBRL-based Public Company Financial Filing to SEC

This reference implementation of an XBRL-based public company financial filing to the SEC[1] builds on the concept arrangement patterns, member arrangement patterns, business use cases, comprehensive example, and disclosure templates. It is like the comprehensive example in that the US GAAP SEC reference implementation puts all business use cases together to be sure they interact with one another correctly.

The reference implementation endeavours to create a digital financial report which adheres to the filing rules specified by the SEC within the Edgar Filer Manual (EFM). It uses the 2016 US GAAP taxonomy. It follows the modelling principles and practices shown in other parts of this resource.

The reference implementation focuses on the interrelations of the detailed facts that are reported. As such, the Level 1, Level 2, and Level 3 text blocks required for SEC filings are not includes at this point (i.e. I might include them later). The rational is to focus on the Level 4 detailed disclosures.

The ultimate goal of the reference implementation is to create an XBRL-based digital financial report which is a true and fair representation of a financial report which complies with all EFM filing rules that is readable by humans and by machines and has no logical, mechanical, or mathematical inconsistencies. All mathematical computations are shown to properly cross cast and foot. All the pieces of the reference implementation property tick and tie.

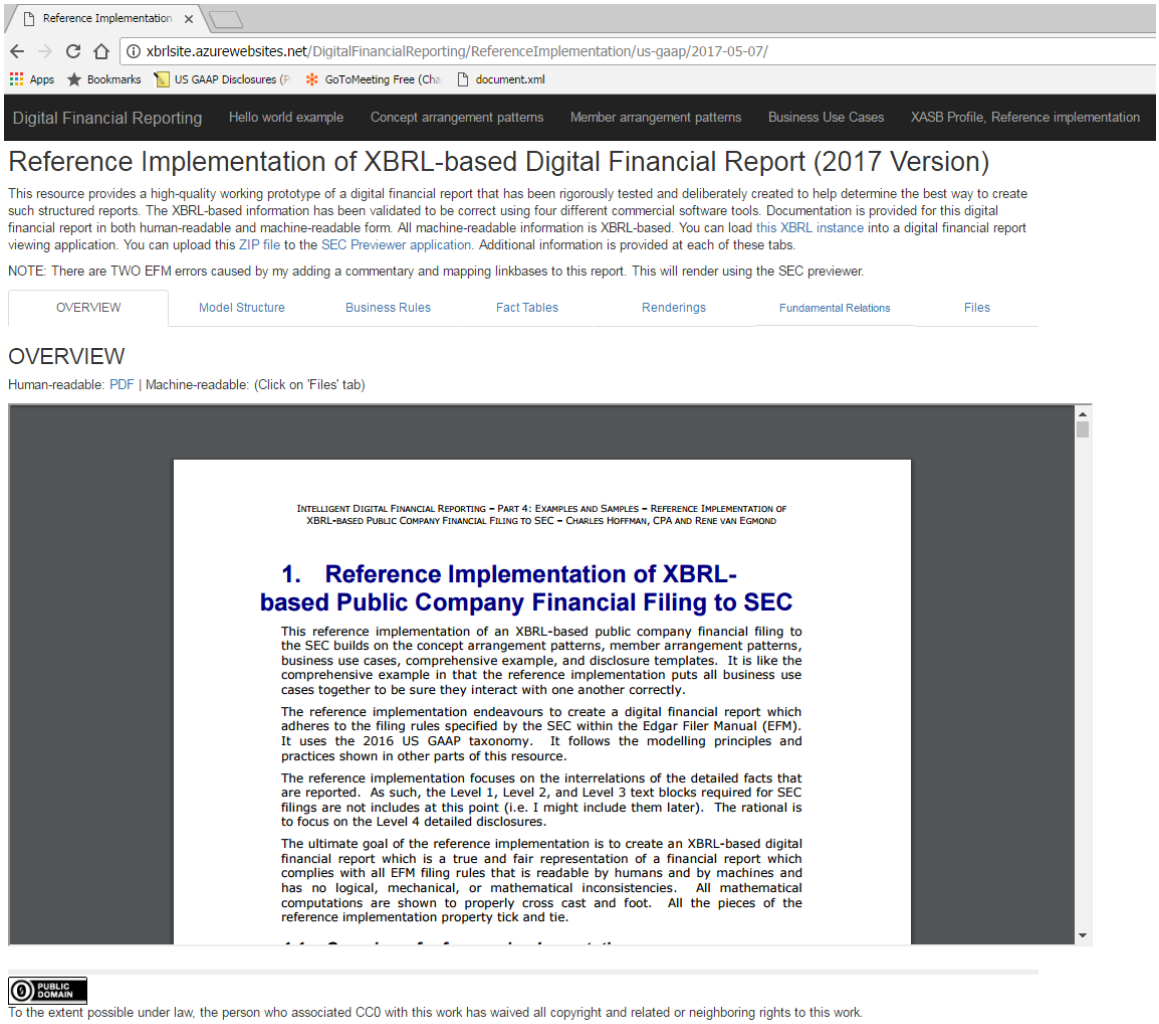
1.1. Overview of reference implementation

The *Reference Implementation* of an SEC XBRL financial filing can be found at the following URL:

http://xbrlsite.azurewebsites.net/DigitalFinancialReporting/ReferenceImplementation/us-gaap/2017-05-07/

At that URL you will see an index page which is similar to the index pages of the concept arrangement metapatterns, member arrangement patterns, and business use cases and looks like the following:

[1] US GAAP, SEC, Reference Implementation Example, http://xbrlsite.azurewebsites.net/DigitalFinancialReporting/ReferenceImplementation/us-gaap/2017-05-07/



The purpose of the reference implementation is to bring to light in the form of physically instantiated examples key considerations related to representing financial information in a structured format such as XBRL. The primary focus of this reference implementation is two specific areas. The first area is the intersections *between* different report components or fragments which make up a financial statement. The second area is the notion of integrity *within* each report component or fragment.

The document describes each financial report component which is represented within the full reference implementation, provides visual representation of the component as a point of reference, describes the key characteristics of the report component, articulates the business rules of the component, and how the component intersects with other financial report components.

The ultimate goal of this reference implementation of a digital financial report is to better understand such reports, learn about such reports, and communicate information helpful in determining the appropriate way or ways to use mediums, such as structured XBRL, to express financial information digitally.

Ultimately the financial reporting supply chain will need to determine the most appropriate approach. It is hoped that this information contributes to the financial

reporting supply chain's understanding of the mechanics of technologies used such as XBRL.

1.2. How to read component information

The underlying technical syntax of XBRL is difficult for the typical business professionals to understand. Using some software application created to create or edit information at the XBRL technical syntax level is likewise challenging to understand.

This documentation tries to strike a balance between meeting the needs of business professionals and in particular professional accountants which understand the information being represented but have less of an understanding of the XBRL technical syntax.

The software used to work with this XBRL-based structured information was XBRL Cloud's *Evidence Package*. The following information explains how to read the information provided by the XBRL Cloud Evidence Package for each component by providing a detailed explanation of one component. This same process can be used to understand each of the components of the reference implementation of a digital financial report. Other software representations of this information can be used, the same general ideas apply.

The best starting point for looking at a financial report component is by looking at its **rendering**. The rendering displays all information about the reported facts for a component provided within a financial report. From the rendering, business professionals can click on any fact and see the **fact properties** of any reported fact. You can likewise click on any report element used within that component and get information as to the **report element properties**. If parenthetical explanations exist, they can also be navigated to using the rendering view.

The following is an example of the rendering view for the "Inventory Components" section of the reference implementation financial report. It shows the details which make up the individual components of inventory and the total amount of inventory which intersects with the balance sheet.

Inventory components:

Component: (Network and Table)	
Network	5040 - Disclosure - **Inventory Components** (http://www.abc.com/role/InventoryComponents)
Table	Inventory Components [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Inventory Components [Line Items]	Period [Axis]	
	2016-12-31	2015-12-31
Inventory, Net [Roll Up]		
Finished Goods	1,000,000	1,000,000
Work in progress	1,000,000	1,000,000
Raw materials	1,000,000	1,000,000
Other	1,000,000	1,000,000
Total inventories, net	4,000,000	4,000,000

Another useful view of the report component is the SEC interactive viewer rendering or **SEC preview**. One down side is that the SEC preview does not display 100% of the information about report elements or reported facts. Here is the SEC preview of the Inventory Components component.

Inventory Components (USD $) In Thousands, unless otherwise specified	Dec. 31, 2016	Dec. 31, 2015
Inventory, Net [Roll Up]		
Finished Goods	$ 1,000	$ 1,000
Work in progress	1,000	1,000
Raw materials	1,000	1,000
Other	1,000	1,000
Total inventories, net	$ 4,000	$ 4,000

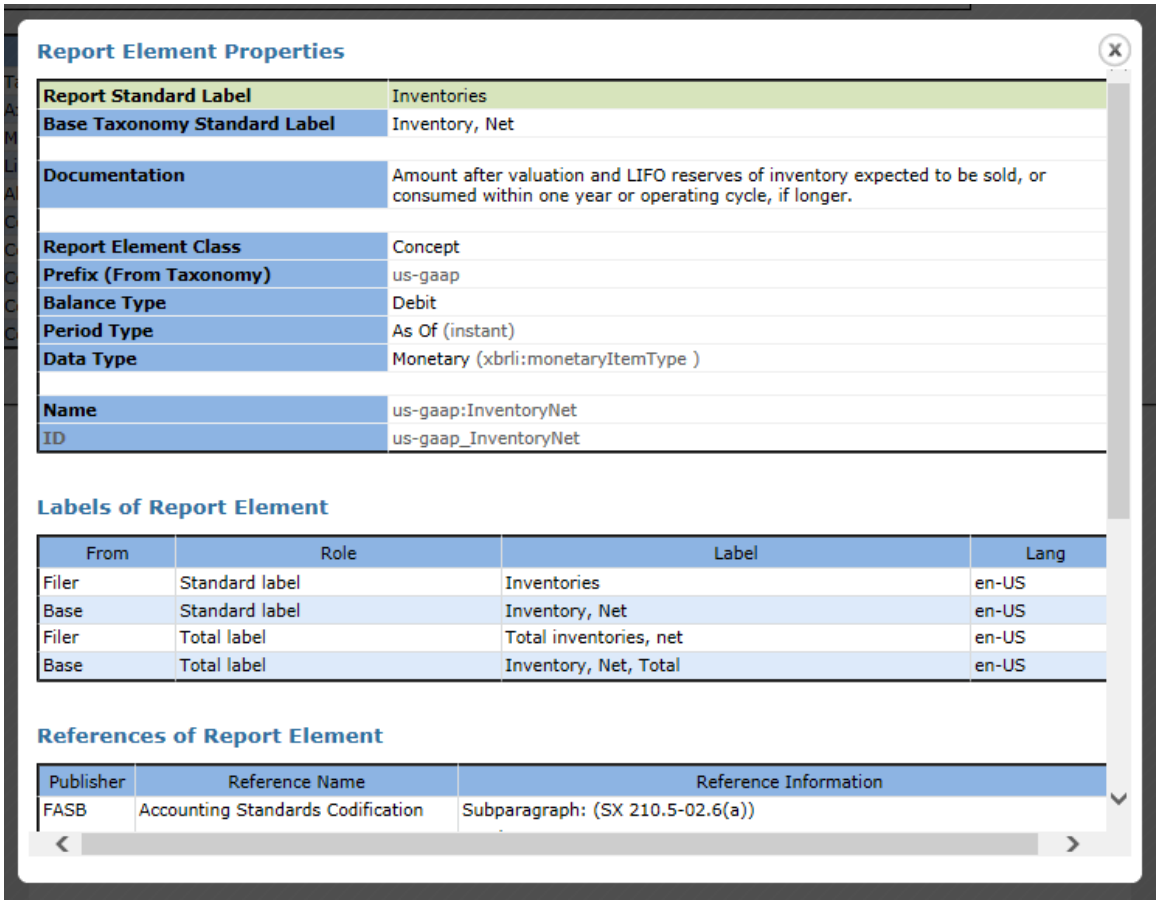
Another view of a report component is the **model structure**. The model structure shows the relations between report elements which work together to model a financial report component. Report elements are grouped together in helpful groupings, or report element classes, to make working with the information easier. Here is the model structure of the Inventory Components component.

Component: (Network and Table)	
Network	5040 - Disclosure - **Inventory Components** (http://www.abc.com/role/InventoryComponents)
Table	Inventory Components [Table]

#	Label	Report Element Class	Period Type	Balance	Name
1	**Inventory Components [Table]**	[Table]			abc:InventoryComponentsTable
2	**Legal Entity [Axis]**	[Axis]			dei:LegalEntityAxis
3	Consolidated Entity [Domain]	[Member]			dei:EntityDomain
4	**Inventory Components [Line Items]**	[Line Items]			abc:InventoryComponentsLineItems
5	*Inventory, Net [Roll Up]*	[Abstract]			us-gaap:InventoryNetAbstract
6	Finished Goods	[Concept] Monetary	As Of	Debit	us-gaap:InventoryFinishedGoods
7	Work in progress	[Concept] Monetary	As Of	Debit	us-gaap:InventoryWorkInProcess
8	Raw materials	[Concept] Monetary	As Of	Debit	us-gaap:InventoryRawMaterials
9	Other	[Concept] Monetary	As Of	Debit	us-gaap:OtherInventorySupplies
10	Total inventories, net	[Concept] Monetary	As Of	Debit	us-gaap:InventoryNet

If you click on the name of any report element, the **report element properties** of that report element are shown in a popup window. Below the report element

properties for the concept "Total inventories, net" are shown and as you can see it provides all properties for that specific report element:



Report Element Properties

Report Standard Label	Inventories
Base Taxonomy Standard Label	Inventory, Net
Documentation	Amount after valuation and LIFO reserves of inventory expected to be sold, or consumed within one year or operating cycle, if longer.
Report Element Class	Concept
Prefix (From Taxonomy)	us-gaap
Balance Type	Debit
Period Type	As Of (instant)
Data Type	Monetary (xbrli:monetaryItemType)
Name	us-gaap:InventoryNet
ID	us-gaap_InventoryNet

Labels of Report Element

From	Role	Label	Lang
Filer	Standard label	Inventories	en-US
Base	Standard label	Inventory, Net	en-US
Filer	Total label	Total inventories, net	en-US
Base	Total label	Inventory, Net, Total	en-US

References of Report Element

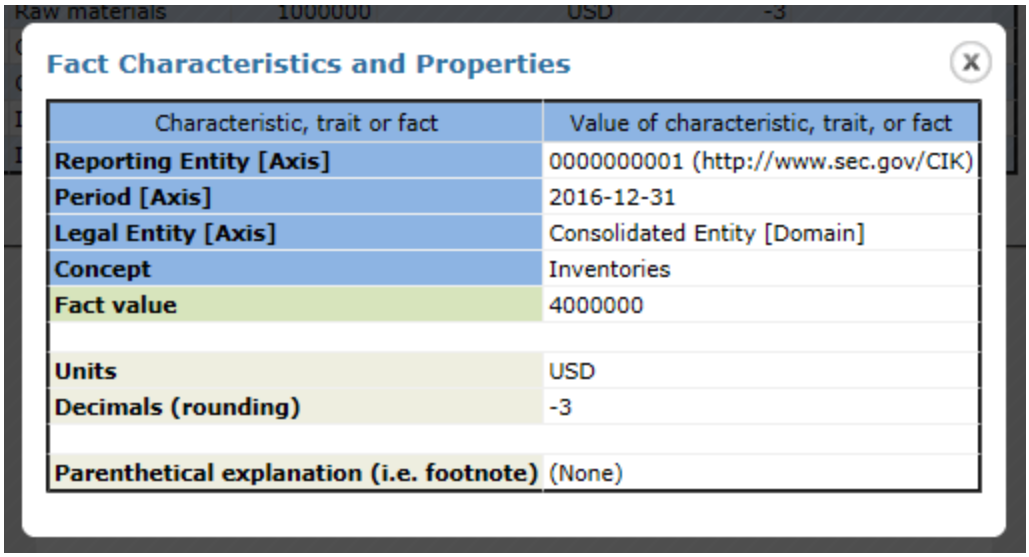
Publisher	Reference Name	Reference Information
FASB	Accounting Standards Codification	Subparagraph: (SX 210.5-02.6(a))

The raw information for reported facts which exist within a reported component is summarized within the **fact table** view of a component. The fact table view shows each fact, the characteristics of each fact, the value of each fact, and for numeric facts it shows the units and rounding of the fact. If any parenthetical explanations (i.e. XBRL footnotes) exist for the fact, you can navigate to those from this view. This is the fact table view of the Inventory Components component.

Component: (Network and Table)	
Network	5040 - Disclosure - **Inventory Components** (http://www.abc.com/role/InventoryComponents)
Table	Inventory Components [Table]

#	Reporting Entity [Axis]	Period [Axis]	Legal Entity [Axis]	Concept	Fact Value	Unit	Rounding	Parenthetical Explanations
1	0000000001 (http://www.sec.gov/CIK)	2015-12-31	Consolidated Entity [Domain]	Finished Goods	1000000	USD	-3	
2	0000000001 (http://www.sec.gov/CIK)	2016-12-31	Consolidated Entity [Domain]	Finished Goods	1000000	USD	-3	
3	0000000001 (http://www.sec.gov/CIK)	2016-12-31	Consolidated Entity [Domain]	Work in progress	1000000	USD	-3	
4	0000000001 (http://www.sec.gov/CIK)	2015-12-31	Consolidated Entity [Domain]	Work in progress	1000000	USD	-3	
5	0000000001 (http://www.sec.gov/CIK)	2015-12-31	Consolidated Entity [Domain]	Raw materials	1000000	USD	-3	
6	0000000001 (http://www.sec.gov/CIK)	2016-12-31	Consolidated Entity [Domain]	Raw materials	1000000	USD	-3	
7	0000000001 (http://www.sec.gov/CIK)	2016-12-31	Consolidated Entity [Domain]	Other Inventory	1000000	USD	-3	
8	0000000001 (http://www.sec.gov/CIK)	2015-12-31	Consolidated Entity [Domain]	Other Inventory	1000000	USD	-3	
9	0000000001 (http://www.sec.gov/CIK)	2016-12-31	Consolidated Entity [Domain]	Inventories	4000000	USD	-3	
10	0000000001 (http://www.sec.gov/CIK)	2015-12-31	Consolidated Entity [Domain]	Inventories	4000000	USD	-3	

By clicking on any fact, you can see all the **fact properties** for that individual fact. For example, here is the fact properties for fact # 6 which is "Inventories" for 2016:



Fact Characteristics and Properties

Characteristic, trait or fact	Value of characteristic, trait, or fact
Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Period [Axis]	2016-12-31
Legal Entity [Axis]	Consolidated Entity [Domain]
Concept	Inventories
Fact value	4000000
Units	USD
Decimals (rounding)	-3
Parenthetical explanation (i.e. footnote)	(None)

Finally, any business rules defined for the fact can be seen in the **business rules** view. If a business rule exists, you should see that rule and the rule should pass the business rule. Business rules include rules expressed using XBRL calculations technical syntax or XBRL Formula technical syntax. For example, here are the business rules which show that the roll up of inventories properly foots for both 2015 and 2016:

XBRL Calculations

Network	5040 - Disclosure - Inventory Components (http://www.abc.com/role/InventoryComponents)

Reporting Entity	0000000001 (http://www.sec.gov/CIK)
Period	2016-12-31
Unit	USD
Legal Entity [Axis]	Consolidated Entity [Domain]

Label	Rendered		Reported	Calculated	Balance	Decimals	Message
Inventories [Roll Up]							
Finished Goods	1,000,000	+	1,000,000	1,000,000	DR	-3	
Work in progress	1,000,000	+	1,000,000	1,000,000	DR	-3	
Raw materials	1,000,000	+	1,000,000	1,000,000	DR	-3	
Other Inventory	1,000,000	+	1,000,000	1,000,000	DR	-3	
Inventories	4,000,000		4,000,000	4,000,000	DR	-3	OK

Network	5040 - Disclosure - Inventory Components (http://www.abc.com/role/InventoryComponents)

Reporting Entity	0000000001 (http://www.sec.gov/CIK)
Period	2015-12-31
Unit	USD
Legal Entity [Axis]	Consolidated Entity [Domain]

Label	Rendered		Reported	Calculated	Balance	Decimals	Message
Inventories [Roll Up]							
Finished Goods	1,000,000	+	1,000,000	1,000,000	DR	-3	
Work in progress	1,000,000	+	1,000,000	1,000,000	DR	-3	
Raw materials	1,000,000	+	1,000,000	1,000,000	DR	-3	
Other Inventory	1,000,000	+	1,000,000	1,000,000	DR	-3	
Inventories	4,000,000		4,000,000	4,000,000	DR	-3	OK

While other information is provided within the XBRL Cloud Evidence Package, the information shown in the reports above provide everything which is necessary to understand the financial information expressed by the components of a digital financial report.

You can view information for this component within the XBRL Cloud Evidence Package here:

http://xbrlsite.azurewebsites.net/2016/ReferenceImplementation/2016-04-15/evidence-package/contents/index.html#Rendering-InventoryComponents-abc_InventoryComponentsTable.html

Any other report component of the reference implementation can likewise be viewed.

1.2.1.Understanding the notion of intersections

A notion which is important to understand is that of an intersection. An intersection is basically an object of a report which is used in more than on location. For example, the line item "Inventories" is reported on the balance sheet and that same fact "Inventories" is the total of the inventory components breakdown in the notes. That fact, "Inventories" is an intersection between the balance sheet and the inventory components disclosure.

Understanding intersections is important for two specific reasons. The primary reason for understanding intersections is to both avoid creating duplicate information and realizing that it is the fact that the intersection can be expressed and if properly expressed avoids such duplicate information.

For example, the balance sheet component has a line item "Inventories" and values for 2016 and 2015 as can be seen below:

Balance Sheet [Line Items]	[AXIS] 2016-12-31	2015-12-31
Assets [Roll Up]		
Current assets [Roll Up]		
Cash, cash equivalents, and marketable securities [Roll Up]		
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
Noncurrent assets [Roll Up]		
Property, plant and equipment, net	[illegible]	[illegible]

The line item "Inventories" also exists in the inventories components component where these same two values exist as can be seen here:

Component: (Network and Table)	
Network	5040 - Disclosure - **Inventory Components** (http://www.abc.com/role/InventoryComponents)
Table	Inventory Components [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Inventory Components [Line Items]	Period [Axis]	
	2016-12-31	2015-12-31
Inventory, Net [Roll Up]		
Finished Goods	1,000,000	1,000,000
Work in progress	1,000,000	1,000,000
Raw materials	1,000,000	1,000,000
Other	1,000,000	1,000,000
Total inventories, net	4,000,000	4,000,000

This is one type of intersection, the same facts which exist within more than one component. Likewise the characteristics of the fact are used within both components, such as the concept, the legal entity, the period, and the reporting entity.

The main focus on intersections in this document is the intersections of facts in this financial report.

A secondary reason for understanding intersections is that it enables interesting software features. Not all software applications currently take advantage of such features; however, more software will leverage intersections and those expressing models should understand and provide good models which enable such functionality as opposed to bad models which mask such intersections. Intersections, when correctly created, help software users navigate between sections within a financial report.

Other specific examples of intersections will be provided throughout this document; here we simply wanted to explain the notion of an intersection.

1.2.2.Reference implementation components

A financial report has many components. A component is simply a piece of a financial report, a fragment of a report. A component is defined as being a set of facts which go together for some specific purpose within a financial report.

The reference implementation has approximately 30 components or report fragments. Each component is provided for two reasons. The first reason is to provide examples of how to model different components of a financial report. The second is to show how the components of a financial report and that the components fit together. The reference implementation tries to strike a balance of providing too little information and providing too much information.

On the one hand, the reference implementation digital financial report should look like a financial report. On the other hand, real financial reports can be quite large,

repeat the same sorts of things many times, and be an overwhelming example to work with because of its size. The reference implementation looks enough like a financial report and has the pieces of a typical financial report and therefore will not confuse professional accountants which understand what a financial report should look like. But the reference implementation also has all the moving pieces which need to interact with one another correctly and therefore exercise those moving pieces.

Everything in the reference exists for a specific reason. Accounting is well understood and the reference is not about accounting and not about changing accounting or financial reporting.

The reference is about figuring out how to use structured mediums such as XBRL to articulate information which is expressed today using unstructured mediums such as paper and electronic paper-type mediums such as HTML, PDF, or Microsoft Word. The reference is about figuring out what a digital financial report should look like, all things considered.

The reference implementation "works correctly" by one definition of works correctly. Each aspect of "correctly" can be shown and also "incorrectly" can be pointed out because "correct" is so explicitly defined. (This is as opposed to the situation where correct is not well defined and therefore it is hard to figure out if something is, or is not, correct.) If a modelling approach is changed in one area of the reference implementation which breaks the model in another area, that modelling option is not considered as an option because it cannot be made to work in both areas of the report.

It is the objective balancing of all the allowable options and the fact that when used together the financial report works correctly from a financial reporting perspective and from a technical perspective which decides whether some modelling approach is appropriate or inappropriate. The intent here is to minimize subjectivity. When multiple options work, the option which seems to work the best, all things considered, is used.

1.2.3.Defining "correct" or "best modelling approach"

While the reference implementation is correct, by the author's definition of correct; other definitions of correct are possible and other definitions of "best modelling approach" are possible. That other approach could be a slight tweaking of this reference implementation or it could be a totally overhauled version. However, any other version of any digital financial report should be able to pass the criteria established for this reference implementation.

Others may have additional criteria which a digital financial report must have. Perhaps the author missed something or for some other reason neglected to include an important aspect of a digital financial report. If that is the case, the reference implementation should be tested against that criteria. On the other hand, any other implementation of a digital financial report should either be able to (a) pass the author's criteria or (b) show why the author's criteria are incorrect.

The criteria which were used to judge the reference implementation are enumerated here. These are the self-imposed criteria which were used to evaluate this reference implementation and define what we mean by "correct":

1. **Every model structure is logical and consistent**. Meaning there are no inconsistent and therefore perhaps confusing or potentially misinterpreted modeling situations. All pieces of the model structure act consistently and how they interact with other pieces is well understood and predictable.
2. **Every computation is expressed and proven to work correctly**. Every computation must be proven to work correctly by passing one or more business rules. If a computation relation exists and it is not expressed, then there is no way to tell if the computation works correctly per the XBRL medium.
3. **No duplicate facts**. Duplicate facts result from modeling errors and therefore should not exist.
4. **All reported information is consistent and does not contradict other information**. If there is no specific reason for an inconsistency which can be articulated which justifies the inconsistency or contradiction; then you are being inconsistent and one of the approaches must be dropped. Inconsistencies cause additional training costs and additional burden, and unnecessary, burden on the user to somehow rationalize the inconsistency. Each report fragment should be correct and should interact appropriately with other report fragments.
5. **Each property is correct**. Each property of any component, fact, report element, or parenthetical explanation must be correct from a business meaning or semantics perspective.
6. **Meaning can be logically explained to a business professional**. The meaning of each and every aspect of the digital financial report can be explained, logically, to a business professional. If the meaning cannot be explained, then it cannot be considered to be correct.
7. **True and fair representation of financial information**. In all other ways the information expressed is correct, complete, accurate, and consistent.

The reference implementation strives to get all the accounting information correct however some aspects of the report are simplified for the purpose of focusing in expressing the accounting information digitally. As such, some disclosures are left out. The reference implementation strives to look enough like a financial report as not to distract the accounting users but keep in mind that the ultimate goal is to prove the digital expression of financial information.

These same types of representation approaches can be used to represent every other area of a financial report, even complex areas. There would be no difference in the approach, only in the complexity of what is being represented.

We will now walk through each individual report component.

1.3. Document information

Document information is a hierarchy of facts related only in that they all provide information about the *document* being submitted. There are no mathematical relations.

The document information section of a financial report is required by the SEC and provides basic information about the document itself.

Component: (Network and Table)	
Network	1100 - Document - **Document Information** (http://www.abc.com/role/DocumentInformation)
Table	Document Information [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Document Information [Line Items]	Period [Axis] 2016-01-01 - 2016-12-31
Document information [Hierarchy]	
Document type	10-K [1]
Amendment flag	false
Document period end date	2016-12-31
Document fiscal year focus	2016
Document fiscal period focus	FY

Key Points:

- Document information is different than entity information and entity listing information.
- There are no intersections of facts between the document information component and other components of a financial report.
- Note that the document information does not have a "Class of Stock [Axis]", that characteristic makes no sense for any of the concepts reported by this component.
- The relation between the concepts within a document information component is that of a hierarchy as there are no numeric relations between the concepts.
- Note the parenthetical explanation.

Business Rules:

- There are no numeric concepts; therefore there are no computation-type business rules.
- A number of the facts are required to be reported; therefore a business rule is provided to assure that the required fact is reported. For example, a business rule is provided to check for the existence of the "Document Type" fact within the report.

1.4. Entity information

Entity information is a hierarchy of facts related only in that they provide information about the *entity* submitting the financial report.

Entity information related to the reporting entity which submits a financial report is required by the SEC and provides basic information about the entity which submits the report.

Component: (Network and Table)	
Network	1200 - Document - **Entity Information** (http://www.abc.com/role/EntityInformation)
Table	Entity Information [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Entity Information [Line Items]	Period [Axis]
	2016-01-01 - 2016-12-31
Entity information [Hierarchy]	
Entity registrant name	ABC Company, Inc.
Entity central index key (CIK)	0000000001
Entity well-known seasoned issuer	No
Current fiscal year end date	--12-31
Entity current reporting status	Yes [1]
Entity voluntary filers	No
Entity filer category	Large Accelerated Filer [1]
Entity public float	114,824,600

Key Points:

- Entity information is different than document information and entity listing information.
- There are no intersections between the entity information component facts and other components of a financial report.
- Note that the entity information does not have a "Class of Stock [Axis]", that characteristic makes no sense for any of the concepts reported by this component. For example, "Entity Registrant Name" is in no way related to a class of stock.
- The relation between the concepts within the entity information component is that of a hierarchy as there are no numeric relations between the concepts.
- Note the one parenthetical explanation which relates to two facts.

Business Rules:

- There are no numeric concepts; therefore there are no computation-type business rules.

- A number of the facts are required to be reported, therefore a business rule is provided to assure that the required fact is reported. For example, a business rule is provided to check for the existence of the "Entity Registrant Name" fact within the report.

QUESTION: It is unclear to me whether Entity Public Float is reported per entity or per listing.

1.5. Entity listing information

Entity listing information is a hierarchy of facts related only in that the facts provide information about the *listings of an entity*.

Entity listing information related to each listing of the reporting entity which submits a financial report and is required by the SEC.

Component: (Network and Table)	
Network	1300 - Document - **Entity Listings Information** (http://www.abc.com/role/EntityListingsInformation)
Table	Entity Listings [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Entity Listings [Line Items]	Period [Axis]	
	2016-01-01 - 2016-12-31	
	Class of Stock [Axis]	
	Common Class A [Member]	Common Class B [Member]
Listing [Hierarchy]		
Trading symbol	abc	abc
Entity common stock shares outstanding	50,000	40,000

Key Points:

- Entity listing information is different than document information and entity information.
- There is an intersection between the listings and the class of stock reported on the balance sheet, earnings per share computations, and other information reported which relates to a specific class of stock.
- Note that the entity listing information does have a "Class of Stock [Axis]".
- The relation between the concepts within a entity listing information component is that of a hierarchy as there are no numeric relations between the concepts.

Business Rules:

- There are no numeric relations. It makes no sense to aggregate the shares of class A and class B common stock.
- The "Entity Common Stock, Shares Outstanding" is required to be reported within this component and therefore a business rule exists to test for this fact.

QUESTION: What is the difference between this "Entity Common Stock, Shares Outstanding" and the common stock shares outstanding concept which is used on the balance sheet? It seems to me that this is a duplicate concept.

HINT: Mismatched [Axis] and [Line Items] cause "empty cells" and are generally a sign of a modelling error.

If you look at the "Document and Entity Information" as reported by most SEC filers, that one component combines the three separated components modelled in the reference model implementation: document information, entity information, and entity listing information. This results in numerous "blank cells". Blank cells such as this is generally a sign of an incorrect or at least less than optimal modelling.

For example, an "Entity Registrant Name" would never have a class of stock associated with it. Same thing for other reported facts. Assigning the wrong [Axis] within a model results in empty cells which could never be filled with reported information. This is a clue that the model has been created incorrectly.

Document and Entity Information (USD $)	12 Months Ended			
	Dec. 31, 2011	Jun. 30, 2011	Jan. 19, 2012 Class A Common Stock	Jan. 19, 2012 Class B Common Stock
Document Information [Line Items]				
Document Type	10-K			
Amendment Flag	false			
Document Period End Date	Dec. 31, 2011			
Document Fiscal Year Focus	2011			
Document Fiscal Period Focus	FY			
Trading Symbol	[illegible]			
Entity Registrant Name	[illegible]			
Entity Central Index Key	[illegible]			
Current Fiscal Year End Date	--12-31			
Entity Well-known Seasoned Issuer	Yes			
Entity Current Reporting Status	Yes			
Entity Voluntary Filers	No			
Entity Filer Category	Large Accelerated Filer			
Entity Public Float		$ 114,824,568,582		
Entity Common Stock, Shares Outstanding			257,960,636	67,175,694

Compare this modelling above with the previously shown modelling of *document information*, *entity information*, and *entity listing information* and not how those have no empty cells at all.

HINT: Document information, Entity Information, and Entity Listing Information should be three separate report components; not one.

Most public companies create one network/Table for the combined document information, entity information, and entity listing information. A better way to represent this information is using three distinct components. A clued that this is correct is all those "empty cells" that tend to be in the combined report component. Another clue is that in the SEC DEI taxonomy, all three of those are distinct, separate [Table]s and separate [Text Block]s.

1.6. Balance sheet

Balance sheets are two independent roll ups: assets, liabilities and equity. Each roll up foots and the two roll ups must be of the same value (i.e. balance sheets balance[2]).

Balance sheets are essentially two roll ups: assets and liabilities & equity. Numerous other components intersect with the balance sheet, which are pointed out below in the key points. Roll ups always have business rules in the form of XBRL calculations that are used to enforce the roll up.

Balance Sheet [Line Items]	Period [Axis]	
	2016-12-31	2015-12-31
Assets [Roll Up]		
Current assets [Roll Up]		
Cash, cash equivalents, and marketable securities [Roll Up]		
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
Noncurrent assets [Roll Up]		
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
Liabilities and Equity [Roll Up]		

[2] Wikipedia, *Accounting equation*, https://en.wikipedia.org/wiki/Accounting_equation

Liabilities and Equity [Roll Up]		
Current liabilities [Roll Up]		
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
Total current liabilities	55,000,000	55,000,000
Noncurrent liabilities [Roll Up]		
Product warranty accrual, noncurrent portion	32,000,000	32,000,000
Long-term debt	19,000,000	19,000,000
Other	1,000,000	1,000,000
Total noncurrent liabilities	52,000,000	52,000,000
Commitments and contingencies	0	0
Stockholders' Equity [Roll Up]		
Stockholders' equity attributable to parent [Roll Up]		
Preferred stock, $1 par, 10,000 shares authorized, issued and outstanding	10,000,000	10,000,000
Class A and Class B common stock, $1 par, 110,000 shares authorized (Class A 60,000, Class B 50,000), 90,000 shares issued and outstanding (Class A 50,000, Class B 40,000)	20,000,000	20,000,000
Additional paid-in capital	1,000,000	1,000,000
Treasury stock, 10,000 shares	(2,000,000)	(2,000,000)
Accumulated other comprehensive income	1,000,000	1,000,000
Retained earnings	6,000,000	6,000,000
Stockholders' equity attributable to parent	36,000,000	36,000,000
Stockholders' equity attributable to noncontrolling interest	4,000,000	4,000,000
Total stockholders' equity	40,000,000	40,000,000
Total liabilities and equity	147,000,000	147,000,000

Key Points:

- Balance sheets universally[3] report "assets" and "liabilities and equity". There are two common exceptions to this rule which are not violations of the general rule rather they are different rules. If the net assets approach is used, which tends to be rare in public company filings to the SEC, then "assets", "liabilities" and "net assets" are reported rather than "assets" and "liabilities and equity".
- Balance sheets foot. Assets foot. Liabilities and equity foot.
- Balance sheets balance.

[3] A liquidity-based statement of financial position that reports net assets is a different class of statement of financial position

- One of the most common modeling errors when creating a balance sheet is to erroneously mix modeling approaches. Generally balance sheets are modeled by providing a set of [Line Items] for the balance sheet. Some filers sometimes switch to articulating what would be and could be modeled as [Line Items] as [Member]s of an [Axis]. Mixing these approaches is a modeling error.
- One of the more common [Line Items] which causes inappropriate modeling is common stock when a reporting entity has more than one class of common stock. In the modeling above, note that there are two classes of stock; but the balance sheet still foots. This modeling approach is copied from Google's approach to modeling two classes of common stock. See the HINT related to modeling classes of stock below.
- While all balance sheets have assets, a majority have current assets and current liabilities. While there is a domain business rule that balance sheets have assets; there is an industry business rule which says that specific industries provide a classified balance sheet and therefore report current assets and liabilities while other reporting entities in other industries report unclassified balance sheets and do not.
- FASB CON 6 defines the elements of a financial report and one of those elements is "equity". Equity can be described using different preferred labels including stockholders equity, owners' equity, partner capital, member equity; but all of those concepts are equity which is just labeled differently for different types of reporting entities.

Business Rules:

- Assets exist on the balance sheet.
- Liabilities and equity exists on the balance sheet.
- Assets = Liabilities and equity.
- Assets foot.
- Liabilities and equity foot.
- Equity exists on the balance sheet.

QUESTION: Why is it that XBRL US decided that if noncontrolling interest exists, then the concept which represents equity changes; yet the concept "Assets" does not change if there is or if there is not a current/noncurrent breakdown? Also, how do you keep filers from accidentally switch the two equity concepts and use them backwards?

HINT: Approaches for providing details of balance sheet items.

There are two approaches for providing details of balance sheet items.

The first is to create one or more [Line Items] which are used to articulate those detailed items. An example of this approach is provided in the inventory components component of this reference model.

The second is to create an [Axis] which is used to express the "types" or "classes" of the detailed items, [Member]s for each type/class, and only one [Line Item] which is used by each of those types/classes. An example of this approach is the property, plant, and equipment components.

Each approach has its set of pros and cons. In general, the use second approach whereby an [Axis] and a set of [Member]s provides the better functionality, all things considered. There are occasions when all that functionality is not necessary. However, using only one approach also has its benefits.

Currently, the US GAAP Taxonomy provides for both approaches. There is a lack of clarity as to which approach should be used when.

HINT: Equity does not change if you do or do not report a noncontrolling interest.

FASB Con 6 defines the elements of a financial report and one of those elements is equity. Based on a best practice articulated by XBRL US, equity changes depending whether a reporting entity does, or does not, have a noncontrolling interest.

Another way to look at this situation is to view "equity" as not changing and view the situation as providing a subtotal for "equity attributable to parent" as a concept which should be added to a financial report should the concept "equity attributable to noncontrolling interest" should be required. This approach certainly cannot be considered wrong.

In fact, there are two specific reasons why the notion that equity should NOT be allowed to change is a better approach. The first reason is to model a financial report without a noncontrolling interest, and then add a noncontrolling interest and notice all the pieces of the model which would need to change. The second is ability to reverse the total equity concept and the equity attributable to parent concept, basically using them backwards.

If a simple business rule were created "equity must exist" and then enforced, the potential to accidentally reverse these concepts essentially becomes zero. Whereas, simply trying to write that business rule given XBRL US' best practice provides yet and additional clue that this best practice is not the best approach.

NOTE: The reason that this point is important is that it impacts many, many other areas of the taxonomy and how things should be modelled. It is reasonably easy to overcome this poor choice; but to have to modify software to deal with this type of situation over, and over, and over should be avoided in my view. It seems that people who set these rules don't understand these sorts of ramifications of the decisions they are making.

1.7. Balance sheet parenthetical, general

Balance sheet parenthetical information can be grouped together into related groups, all the information is not related other than the fact that each component is parenthetical information related to the balance sheet. General parenthetical information here contains only one fact, allowance for doubtful accounts.

Component: (Network and Table)	
Network	2002 - Statement - **Balance Sheet Parenthetical, General** (http://www.abc.com/role/BalanceSheetParentheticalGeneral)
Table	Balance Sheet Parenthetical, General [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Balance Sheet Parenthetical, General [Line Items]	Period [Axis]	
	2016-12-31	2015-12-31
Balance Sheet Parenthetical General [Hierarchy]		
Allowance for doubtful accounts	1,000,000	1,000,000

Key Points:

- Concept is a hierarchy.
- Numerous different concept might be reported as parenthetical information but generally they are unrelated.

Business Rules:

- If trade receivables exist, then an allowance for doubtful accounts must exist.

1.8. Balance sheet parenthetical, preferred stock

Preferred stock parenthetical information is numerous facts all of which relate to preferred stock. (Note that common stock and preferred stock are not related and should not be represented together which causes poor renderings.)

Component: (Network and Table)	
Network	2003 - Statement - **Balance Sheet Parenthetical, Preferred Stock** (http://www.abc.com/role/BalanceSheetParentheticalPreferredStock)
Table	Stock by Class [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Class of Stock [Line Items]	Period [Axis]			
	2016-12-31		2015-12-31	
	Class of Stock [Axis]		Class of Stock [Axis]	
	Preferred Class A [Member]	Class of Stock [Domain]	Preferred Class A [Member]	Class of Stock [Domain]
Class of Preferred Stock [Hierarchy]				
Par value	1.00			
Shares authorized	10,000			
Shares issued	10,000			
Shares outstanding	10,000			
Preferred stock amount outstanding	10,000,000	10,000,000	10,000,000	10,000,000

Key Points:

- Component is a hierarchy.
- The component intersects with the balance sheet amount of preferred stock outstanding.

Business Rules:

- The class of preferred stock must exist and is articulated using an [Axis].
- Par value (if appropriate), shares authorized, shares issued, shares outstanding, and amount must each exist.
- Shares authorized must be greater than or equal to the amount issued.
- Shares issued must be greater than or equal to the amount outstanding.
- Amount of each class must foot to total of all classes.

1.9. Balance sheet parenthetical, common stock

Common stock parenthetical information is numerous facts all of which relate to preferred stock.

Component: (Network and Table)	
Network	2004 - Statement - **Balance Sheet Parenthetical, Common Stock** (http://www.abc.com/role/BalanceSheetParentheticalCommonStock)
Table	Stock by Class [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Class of Stock [Line Items]	Period [Axis]					
	2016-12-31			2015-12-31		
	Class of Stock [Axis]			Class of Stock [Axis]		
	Common Class A [Member]	Common Class B [Member]	Class of Stock [Domain]	Common Class A [Member]	Common Class B [Member]	Class of Stock [Domain]
Class of Common Stock [Hierarchy]						
Par value	1.00	1.00				
Shares authorized	60,000	50,000				
Shares issued	50,000	40,000				
Shares outstanding	50,000	40,000				
Common stock amount outstanding	10,000,000	10,000,000	20,000,000	10,000,000	10,000,000	20,000,000

Key Points:

- Component is a hierarchy.
- The component intersects with the balance sheet amount of common stock outstanding.

Business Rules:

- The class of common stock must exist and is articulated using an [Axis].
- Par value (if appropriate), shares authorized, shares issued, shares outstanding, and amount must each exist.
- Shares authorized must be greater than or equal to the amount issued.
- Shares issued must be greater than or equal to the amount outstanding.
- Amount of each class must foot to total of all classes.

1.10. Balance sheet parenthetical, treasury stock

Treasury stock parenthetical information is numerous facts all of which relate to treasury stock.

Component: (Network and Table)	
Network	2005 - Statement - **Balance Sheet Parenthetical, Treasury Stock** (http://www.abc.com/role/BalanceSheetParentheticalTreasuryStock)
Table	Class of Treasury Stock [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Equity, Class of Treasury Stock [Line Items]	Period [Axis]			
	2016-12-31		2015-12-31	
	Class of Stock [Axis]		Class of Stock [Axis]	
	Common Class A [Member]	Class of Stock [Domain]	Common Class A [Member]	Class of Stock [Domain]
Class of Treasury Stock [Hierarchy]				
Shares	10,000			
Treasury stock amount	2,000,000	2,000,000	2,000,000	2,000,000

Key Points:

- Component is a hierarchy.
- The component intersects with the balance sheet amount of treasury stock outstanding.

Business Rules:

- Amount must exist.
- Shares must exist.
- Amount of all classes must foot.

QUESTION: Currently, there is only one axis for all stock, "Class of Stock [Axis]", and that is used for preferred, common, and treasury stock. Is this appropriate, or should each type of stock have its own axis; "Class of Preferred Stock [Axis]", "Class of Common Stock [Axis]", "Class of Treasury Stock [Axis]"? What is the general rule which should be applied as to when one [Axis] should be created and shared as opposed to when multiple [Axis] created. For example, why does property, plant, and equipment have its own [Axis] (Property, Plant and Equipment Type [Axis]), cash and cash equivalents have its own [Axis] (Cash and Cash Equivalents Type [Axis]), marketable securities have a more general [Axis] (Instrument [Axis]). What is the general rule?

QUESTION: If you consider the component for common stock you will note that there are two classes of common stock. The sum of the amount of both classes of common stock foots to the total amount for all classes which ties to the balance sheet. If you contrast this to preferred stock which has one class this is modeled precisely the same way. However, what if there were only one class of common stock? How would, or should, the modeling change? Why would the modeling change. What I mean is that if there is only one class of stock, it seems to be implied that the "domain" and the "class of stock" are the same thing. This assumption would need to be stated for every case where there is some "list" and that list has only one member. By contrast, if one models this as this reference model has modeled this information, there is no need for making any specific

assumption and all components of the US GAAP taxonomy or any financial report created using the US GAAP taxonomy would each work in exactly the same way. Certainly the modeling approached used by this reference model cannot be considered wrong. The question is, should the approach most filers seem to use be considered right? It is not a question that it is or is not considered "right" currently; but rather is this a good approach, all things considered?

1.11. Income statement

Income statements are four components. The first component is a roll up of net income (loss). The second is a roll up (breakdown) of net income (loss) between the amount attributable to the parent company and the amount attributable to a noncontrolling interest. The third section is a hierarchy of net income per share information. The forth is a hierarchy of weighted average share information.

Component: (Network and Table)	
Network	2006 - Statement - **Income Statement** (http://www.abc.com/role/IncomeStatement)
Table	Income Statement [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Income Statement [Line Items]	Period [Axis]		
	2016-01-01 - 2016-12-31	2015-01-01 - 2015-12-31	2014-01-01 - 2014-12-31
Net Income (Loss) [Roll Up]			
Income from Continuing Operations Before Tax [Roll Up]			
Operating Income (Loss) [Roll Up]			
Gross Profit [Roll Up]			
Revenues	10,000,000	10,000,000	10,000,000
Cost of revenues	4,000,000	4,000,000	4,000,000
Gross profit	6,000,000	6,000,000	6,000,000
Operating Expenses [Roll Up]			
Selling, general and administrative expenses	1,000,000	1,000,000	1,000,000
Research and development expenses	500,000	500,000	500,000
Marketing expense	250,000	250,000	250,000
Other operating cost and expenses	100,000	100,000	100,000
Total operating expenses	1,850,000	1,850,000	1,850,000
Operating income (loss)	4,150,000	4,150,000	4,150,000
Nonoperating income (expense)	6,200,000	7,800,000	4,200,000
Interest and debt expense	(3,000,000)	(2,000,000)	(4,000,000)
Income (loss) from continuing operations before taxes	7,350,000	9,950,000	4,350,000
Provision for income taxes	2,000,000	2,500,000	3,000,000
Net income (loss)	5,350,000	7,450,000	1,350,000

Net Income (Loss) Attributable to [Roll Up]			
Net income (loss) attributable to parent	4,815,000	6,705,000	1,215,000
Net income (loss) attributable to noncontrolling interest	535,000	745,000	135,000
Net income (loss)	5,350,000	7,450,000	1,350,000
Earnings Per Share [Hierarchy]			
Basic	96.30	134.10	24.30
Diluted	53.50	74.50	13.50
Weighted average common shares outstanding [Hierarchy]			
Basic	50,000	50,000	50,000
Diluted	90,000	90,000	90,000

Key Points:

- Component is a roll up.
- Net income must exist (although based on current practices this could take a number of different forms, unsure if this is a good or bad thing).
- Additionally, hierarchies are provided for net income per share and weighted average common shares outstanding.
- The breakdown for net income attributable to parent and noncontrolling interest is a roll up

Business Rules:

- Net income must exist.
- Net income must foot.
- Earnings per share must exist.

QUESTION: The IFRS taxonomy provides the concept which is similar to "Net income attributable to noncontrolling interest" as a credit, whereas the US GAAP taxonomy provides this concept as a debit. It is not logical that these two taxonomies would or should do this differently. The modeling of the breakdown of net income to the parent and noncontrolling interest can logically be modeled as it is above, or similar to the approach used on the statement of comprehensive income. It is unclear how the modeling of net income attributable to noncontrolling interest impacts other things such as the statement of changes in equity. (I don't understand all the moving pieces here to be 100% sure I am seeing this correctly.)

QUESTION: Why would the concept which represents net income change depending on whether a reporting entity has or does not have a noncontrolling interest or preferred stock? This is not the same question as to whether a separate concepts are needed to articulate such a breakdown, this question relates to trying to issues related to comparing or obtaining the correct concept which expresses net income for a reporting entity.

1.12. Statement of comprehensive income

Statements of comprehensive income are two components. The first is a roll up of comprehensive income (loss). The second is a roll up (breakdown) of comprehensive income (loss) between the amount attributable to the parent and to the noncontrolling interest.

Component: (Network and Table)	
Network	2007 - Statement - **Comprehensive Income** (http://www.abc.com/role/ComprehensiveIncome)
Table	Comprehensive Income [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Comprehensive Income [Line Items]	Period [Axis]		
	2016-01-01 - 2016-12-31	2015-01-01 - 2015-12-31	2014-01-01 - 2014-12-31
Comprehensive Income Attributable to Parent [Roll Up]			
Comprehensive Income [Roll Up]			
Net income (loss)	5,350,000	7,450,000	1,350,000
Other comprehensive income [Roll Up]			
Change in foreign currency translation adjustment	3,650,000	1,550,000	7,650,000
Other comprehensive income (loss)	3,650,000	1,550,000	7,650,000
Comprehensive income (loss)	9,000,000	9,000,000	9,000,000
Noncontrolling interest	2,000,000	5,000,000	5,000,000
Parent	7,000,000	4,000,000	4,000,000

Key Points:

- Component is a roll up.
- Component intersects with the income statement (net income (loss)) and statement of changes in equity (other comprehensive income).

Business Rules:

- Other comprehensive income must exist.
- Comprehensive income must exist.
- Other comprehensive income must foot.
- Comprehensive income must foot.

1.13. Cash flow statement

Cash flow statements are three components. The first is a roll up of net cash flow which must foot. The second is a roll forward of cash and cash equivalents which should both reconcile and tie to the balance sheet. The third is a hierarchy of supplemental cash flow disclosures.

Cash Flow Statement [Line Items]	Period [Axis]		
	2016-01-01 - 2016-12-31	2015-01-01 - 2015-12-31	2014-01-01 - 2014-12-31
Cash and Cash Equivalents [Roll Forward]			
Net Increase (Decrease) in Cash and Cash Equivalents [Roll Up]			
Operating activities [Roll Up]			
Net income (loss)	5,350,000	7,450,000	1,350,000
Adjustments to reconcile to cash provided by operations [Roll Up]			
Noncash charges and credits [Abstract]			
Depreciation	500,000	500,000	500,000
Deferred income tax	80,000	80,000	80,000
Other noncash charges and credits	(10,000)	(10,000)	(10,000)
Changes in working capital items [Abstract]			
Accounts receivable	0	0	0
Inventories	0	0	0
Accounts payable	0	0	0
Accrued liabilities	0	0	0
Product warranty accrual	0	0	0
Adjustments to reconcile to cash provided by operations	570,000	570,000	570,000
Cash provided by operating activities	5,920,000	8,020,000	1,920,000
Investing activities [Roll Up]			
Payments to acquire property, plant and equipment	(10,000,000)	(10,000,000)	(10,000,000)
Proceeds from sale of property, plant, and equipment	23,000,000	20,000,000	27,160,000
Other investing activities	2,000,000	2,000,000	2,000,000
Cash provided by (used in) investing activities	15,000,000	12,000,000	19,160,000
Financing activities [Roll Up]			
Proceeds from issuance of long-term debt	20,000,000	20,000,000	20,000,000
Repayments of long-term debt	(32,000,000)	(32,000,000)	(32,000,000)
Payment of common stock dividends	(9,000,000)	(9,000,000)	(9,000,000)
Other financing activities	1,000,000	1,000,000	1,000,000
Cash provided by (used in) financing activities	(20,000,000)	(20,000,000)	(20,000,000)
Effect of exchange rate on cash and cash equivalents	80,000	980,000	(80,000)
Net increase (decrease) in cash and cash equivalents	1,000,000	1,000,000	1,000,000
Cash and cash equivalents, beginning balance	10,000,000	9,000,000	8,000,000
Cash and cash equivalents, ending balance	11,000,000	10,000,000	9,000,000
Supplemental cash flow disclosures [Hierarchy]			
Interest paid	500,000	500,000	500,000
Income taxes paid	1,000,000	1,000,000	1,000,000

Key Points:

- Component is a roll forward of cash and cash equivalents with an embedded roll up which aggregates all of the concepts which make up the change, or net cash flow, of the roll forward.
- Additionally, the supplemental cash flow disclosures is a hierarchy.
- Cash and cash equivalents intersects with the balance sheet.
- Net income intersects with the income statement.
- Numerous other intersections exist.

Business Rules:

- Some concept for cash and cash equivalents must exist.
- Net cash flow must exist.
- Generally, cash flows from operating, investing, and financing activities all exist; however, one or more of those categories might not exist if the reporting entity has no activities in those areas.
- Roll up of net cash flow must foot.
- Roll forward of cash and cash equivalents must foot.
- Changes in working capital items must reconcile with changes in related balance sheet item.

QUESTION: Why would the concept "net cash flow" change if the balance sheet account which is used for cash changes? Generally, most filers us "Cash and cash equivalents" and "Cash and cash equivalents, period increase (decrease)" or us-gaap:CashAndCashEquivalentsPeriodIncreaseDecrease. However, other filers simply use "Cash" on the cash flow statement and balance sheet and still use the concept named us-gaap:CashAndCashEquivalentsPeriodIncreaseDecrease, yet others use us-gaap:CashPeriodIncreaseDecrease. This is somewhat like changing the concept "Assets" depending upon which set of balance sheet line items which exist. Is this necessary? Is it appropriate? Why the need to differentiate what amounts to net cash flow depending on what the cash account is? You know what the cash account is by simply looking at the cash account.

1.14. Prior period adjustment of total equity

Focusing on the prior period adjustment for a moment you will note that a prior period adjustment reconciles an *originally stated balance* as of a specific balance sheet date to a *restated balance* as of that same balance sheet date. What changes between the originally stated and restated balance is the report date associated with the fact.

Component: (Network and Table)	
Network	2009 - Statement - **Prior Period Adjustment** (http://www.abc.com/role/PriorPeriodAdjustment)
Table	Changes in Stockholders' Equity [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Changes in Stockholders' Equity [Line Items]	Report Date [Axis]	Period [Axis] 2015-12-31
Increase (Decrease) in Stockholders' Equity [Adjustment]		
Stockholders' equity, origionally stated	Origionally Stated Report Date [Member]	40,000,000
Correction of a prior period error	Restated Report Date [Domain]	2,000,000
Effect of mandatory change in accounting policy for adoption of FAS XXX	Restated Report Date [Domain]	(2,000,000)
Stockholders' equity, restated	Restated Report Date [Domain]	40,000,000

Key Points:

- Component is an adjustment. (Recall that an adjustment reconciles an originally stated balance to a restated balance.)
- The balance being reconciled, in this case retained earnings, is always required to exist.
- The characteristic of retained earnings which changes in this adjustment is its report date. The originally stated balance is as of one report date, the adjustments and the restated balance are as of a different report date.
- Although the presentation of an adjustment looks similar to that of a roll forward, the dynamics of the facts is different. In a roll forward, it is the period of the reconciling item which changes, rather than the report date as is the case within and adjustment.

Business Rules:

- The concept being adjusted, in this case retained earnings, is required to exist within the component.
- The adjustment is required to properly reconcile (i.e. originally stated balance + adjustments = restated balance).

1.15. Total stockholders' equity

Focusing on a single piece of the entire statement of changes in equity, total stockholders' equity, note that a change in equity is a roll forward. The entire statement of changes in equity is nothing more than a number of roll forwards, one for item contained within equity on the balance sheet. Additionally, roll forwards are

provided for changes in share amounts, where appropriate. Whether the statement of equity is presented vertically or horizontally does not change the model.

Component: (Network and Table)	
Network	2010 - Statement - **Changes in Total Stockholders' Equity** (http://www.abc.com/role/ChangesInTotalStockholdersEquity)
Table	Changes in Stockholders' Equity [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Changes in Stockholders' Equity [Line Items]	Period [Axis]		
	2016-01-01 - 2016-12-31	2015-01-01 - 2015-12-31	2014-01-01 - 2014-12-31
Increase (Decrease) in Stockholders' Equity [Roll Forward]			
Stockholders' equity, beginning balance	40,000,000	40,000,000	40,000,000
Net income (loss)	5,350,000	7,450,000	1,350,000
Dividends	(9,000,000)	(9,000,000)	(9,000,000)
Other comprehensive income (loss)	3,650,000	1,550,000	7,650,000
Stockholders' equity, ending balance	40,000,000	40,000,000	40,000,000

Key Points:

- Component is a roll forward.
- The concept total stockholders' equity ties to the balance sheet.

Business Rules:

- The concept being rolled forward, in this case total stockholders' equity, must exist.
- The roll forward must properly reconcile.

1.16. Statement of changes in equity

[CSH: This statement is not complete yet. Currently, only the roll forward of total equity is provided. Other roll forwards will be provided at a later date.]

Statements of changes in equity are a set of multiple roll forwards each of which ties to the balance sheet equity section except for the share roll forwards.

	Preferred stock	Class A common stock	Class B common stock	Additional paid-in capital	Treasury stock	Accumulated other compre-hensive income	Retained earnings	Stockholders' equity attributable to parent	Stockholders' equity attributable to non-controlling interest	Stockholders' equity
Balance, December 31, 2009	$ 10,000	$ 10,000	$ 10,000	$ 1,000	$ (2,000)	$ 1,000	$ 6,000	$ 36,000	$ 4,000	$ 40,000
Net income							1,350	1,350	3,000	1,350
Dividends							(9,000)	(9,000)		(9,000)
Other comprehensive income (loss)						1,000				7,650
Balance, December 31, 2010, originally stated	10,000	10,000	10,000	1,000	(2,000)	2,000	(1,650)	28,350	7,000	40,000
Correction of prior period error							2,000	2,000	—	2,000
Effect of voluntary change in accounting policy							(2,000)	(2,000)		(2,000)
Balance, December 31, 2010, restated	10,000	1,000	1,000	1,000	(2,000)	2,000	(1,650)	28,350	7,000	40,000
Net income							1,350	1,350	3,000	7,450
Dividends							(9,000)	(9,000)		(9,000)
Other comprehensive income (loss)						1,000				1,550
Balance, December 31, 2011	10,000	1,000	1,000	1,000	(2,000)	3,000	(9,300)	20,700	10,000	40,000
Net income							1,350	1,350	3,000	5,350
Dividends							(9,000)	(9,000)		(9,000)
Other comprehensive income (loss)						1,000				3,650
Balance, December 31, 2012	$ 10,000	$ 1,000	$ 1,000	$ 1,000	$ (2,000)	$ 4,000	$ (16,950)	$ 13,050	$ 13,000	$ 40,000

Additionally, in the rare case where a prior period adjustment exists, a statement of changes in equity also can contain an adjustment which reconciles the originally stated balance to the restated balance for certain specific accounts.

As roll forwards and prior period adjustments are significantly different from a modelling perspective, they are shown separately. From a presentation perspective these can be combined.

In the representation we use above the statement of changes in equity is presented with the balance sheet equity accounts across the top and the changes to those accounts presented within the rows of the presentation. Alternatively, statements of changes in equity are sometimes presented with the changes across the top and the balance sheet equity accounts within the rows of the presentation. How the statement is presented does not impact the model of the component.

This statement of changes in equity is a set of 10 roll forwards, one for each item within the equity section of the balance sheet.

Key Points:

- Component is a set of individual roll forwards. Additionally, a set of adjustment components also exists to model this statement of changes in equity presentation.

- The roll forwards tie together as do the items which make up the equity section of the balance sheet, which is a roll up. It is that roll up which ties together each set of balances for each period.
- Net income attributable to parent, net income attributable noncontrolling interest, and total net income per the income statement is the identical fact which is reported on the income statement.
- Other comprehensive income in total, attributable to parent, and attributable to noncontrolling interest is the same facts which exist on the statement of comprehensive income.

Business Rules:

- Each concept for each individual roll forward which is being rolled forward must exist.
- Each roll forward must reconcile correctly (i.e. in the presentation above, each roll forward must foot).
- All roll forward information must cross cast (i.e. the roll up for each item shown in the visual presentation must add up correctly).

HINT: Most statements of changes in equity are incorrectly modelled.

Most SEC XBRL financial reports have statements of changes in equity which are incorrectly modelled which result in duplicate concepts. This is particularly true if the reporting entity has a noncontrolling interest.

1.17. Nature of business

Nature of business is a hierarchy of generally one and perhaps more facts. In this case there is one fact. Nature of business is not a significant accounting policy, although many reporting entities combine the two disclosures from a presentation perspective.

Component: (Network and Table)	
Network	4010 - Disclosure - **Nature of Business** (http://www.abc.com/role/NatureOfBusiness)
Table	Nature of Business [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Nature of Business [Line Items]	Period [Axis] 2016-01-01 - 2016-12-31
Nature of business [Text Block]	Duis fermentum. Nullam dui orci, scelerisque porttitor, volutpat a, porttitor a, enim. Sed lobortis. Maecenas scelerisque ullamcorper libero. Aliquam porta leo imperdiet pede. In semper, elit vel elementum auctor, lectus purus rhoncus arcu, lacinia sollicitudin justo odio et nunc. Phasellus sagittis fringilla risus. Curabitur iaculis sagittis orci. Ut malesuada libero nec nulla molestie vestibulum. Suspendisse lectus massa, ullamcorper at, tincidunt eget, bibendum vel, risus. Curabitur imperdiet. Suspendisse accumsan, arcu vel ornare interdum, magna tellus porta mauris, in porta mi lacus sodales felis. Pellentesque dapibus, leo non sollicitudin consequat, lectus orci fringilla felis, non interdum leo libero sed augue. Sed magna. Maecenas ante ipsum, congue ut, sodales a, pulvinar ut, dui. Suspendisse mauris massa, sollicitudin et, hendrerit eget, placerat id, orci. Donec molestie magna. Sed mauris. Nulla facilisi. Fusce tristique posuere ipsum. Nulla facilisi. Aliquam viverra risus vitae ante. Sed rhoncus mi in wisi. Nullam nibh dui, molestie vitae, imperdiet non, ornare at, elit. Aenean nec justo. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Duis sodales.

Key Points:

- Component is a text block or single reported fact.
- Nature of business is not a significant accounting policy.

Business Rules:

- Nature of business is a required disclosure.

HINT: Organization, Consolidation and Presentation of Financial Statements Disclosure and Significant Accounting Policies; Combining Disclosure Facts.

The US GAAP Taxonomy provides a concept "Organization, Consolidation and Presentation of Financial Statements Disclosure and Significant Accounting Policies [Text Block]" which, in essence, combines multiple disclosures into one fact. The taxonomy also provides numerous permutations and combinations of the many possible ways to combine this, and many other disclosures (i.e. this is only provided as an example of a more generally occurring theme). This approach is likely used because, in practice, many reporting entities do in fact combine this information from a presentation perspective in multiple different ways. This applies to textual-type disclosures and numeric-type disclosures and even line items which appear on the primary financial statements.

Is this a desired approach? Is this approach optimal for use of the information by analysts which desire to consume a financial report? An alternative approach is to not make the multiple permutations and combinations available in the US GAAP Taxonomy and make only the specific disclosures available and no matter how they are combined for presentation purposes; digital disclosure of the information would provide only the pieces which users of the information can combined how they see fit.

This idiosyncrasy is a characteristic of digital financial reporting or reporting information in a structured way. Contrasting this to disclosing information in an unstructured way (really more structured for presentation but not structured from the disclosure perspective). What this means is that accountants can be forced to put information into some sort of specific "box". If this is not done appropriately the richness and perhaps even the meaning of the information could be limited or even change.

How to approach this issue is a choice the accounting profession and others within the financial reporting supply chain will need to grapple with and decide what is best, all things considered. Today, the choice which has been made is to provide as many permutations and combinations as possible; this choice is reflected in the current instantiation of the US GAAP Taxonomy. How reporting entities use the US GAAP Taxonomy, however, is also a choice reporting entities must make.

1.18. Significant accounting policies

The significant accounting policies component is a hierarchy of facts related only in that they are accounting policies disclosed by a reporting entity. Policies can be put into two groups: one fact to one policy and multiple facts to one policy. Here is a set of policies which is a hierarchy of individual policies:

Component: (Network and Table)	
Network	4020 - Disclosure - **Significant Accounting Policies** (http://www.abc.com/role/SignificantAccountingPolicies)
Table	Significant Accounting Policies [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Significant Accounting Policies [Line Items]	Period [Axis] 2016-01-01 - 2016-12-31
Cash and cash equivalents policy [Text Block]	Proin elit sem, ornare non, ullamcorper vel, sollicitudin a, lacus. Mauris tincidunt cursus est. Nulla sit amet nibh. Sed elementum feugiat augue. Nam non tortor non leo porta bibendum. Morbi eu pede.
Receivables policy [Text Block]	Proin elit sem, ornare non, ullamcorper vel, sollicitudin a, lacus. Mauris tincidunt cursus est. Nulla sit amet nibh. Sed elementum feugiat augue. Nam non tortor non leo porta bibendum. Morbi eu pede. Proin elit sem, ornare non, ullamcorper vel, sollicitudin a, lacus. Mauris tincidunt cursus est. Nulla sit amet nibh. Sed elementum feugiat augue. Nam non tortor non leo porta bibendum. Morbi eu pede.
Inventories policy [Text Block]	Mauris tincidunt cursus est. Nulla sit amet nibh. Sed elementum feugiat augue. Nam non tortor non leo porta bibendum. Morbi eu pede.Proin elit sem, ornare non, ullamcorper vel, sollicitudin a, lacus.
Debt policy [Text Block]	Pellentesque condimentum commodo wisi. Fusce gravida, ligula a placerat placerat, leo erat euismod lectus, et lacinia justo libero non pede. Vivamus ac velit vel magna nonummy pretium.
Revenue recognition policy [Text Block]	Nulla facilisi. Aliquam viverra risus vitae ante. Sed rhoncus mi in wisi.

Key Points:

- Component is a hierarchy.
- The list of policies, in this case, is simply a flat list. The policies could have sub-hierarchies or groupings within sections of the financial report presentation.
- While there is a relation between the balance sheet item "Cash and cash equivalents" and the "Cash and cash equivalents policy", there is no physical relation expressed in the US GAAP taxonomy or in financial reports. The same is true for other policies.
- By contrast, there is a physical relation between the next component, "Property, plant and equipment policy" and the items which make up the classes of property, plant, and equipment. This relation is indicated via the "Property, Plant, and Equipment Type [Axis]". This is one of the primary benefits of modeling information as [Member]s of an [Axis] as compared to as concepts within a set of [Line Items].

Business Rules:

- If the item cash and cash equivalents exist on the balance sheet, then it is likely that the policy for that component likely should also exist. The same is true for other policies.
- Revenue recognition policy is required to be provided.

1.19. Property, plant and equipment policies

By contrast, this property, plant and equipment policy is comprised of multiple facts which work together to make up that disclosure. These disclosures are tied together via the "Property, Plant and Equipment Type [Axis]" which distinguishes which valuation basis, depreciation method, estimated useful life, and disclosure policy relates to which class of property, plant, and equipment.

Component: (Network and Table)	
Network	4030 - Disclosure - **Property, Plant and Equipment Policies** (http://www.abc.com/role/PropertyPlantAndEquipmentPolicies)
Table	Property, Plant and Equipment Components [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

	Period [Axis]		
	2016-01-01 - 2016-12-31		
	Property, Plant and Equipment, Type [Axis]		
Property, Plant and Equipment [Line Items]	Land [Member]	Machinery and equipment [Member]	Furniture and fixtures [Member]
Property, Plant and Equipment Policies [Hierarchy]			
Basis of valuation	Mauris tincidunt cursus	Mauris tincidunt cursus	Mauris tincidunt cursus
Depreciation methods		Sed elementum feugiat	Mauris tincidunt
Estimated useful lives		15 years	5 years
Dispositions policy	Nam non tortor	Nam non tortor	Nam non tortor

Key Points:

- Component is a hierarchy.
- The five concepts within the set of [Line Items] which are included within the hierarchy are tied together via the Property, Plant and Equipment Type [Axis] and its related [Member]s.
- Likewise, these same five concepts in this component can be physically combined with the [Line Item]s can be combined with the single concept in the set of [Line Items] within the "Property, Plant and Equipment Components" component. Again, it is the Property, Plant and Equipment Type [Axis] and its related [Member]s which provides this physical connection.
- Software may not take advantage of this feature currently, but as software matures, software will leverage this feature.

Business Rules:

- Valuation basis is required for all [Member]s.
- Depreciation method, and estimated useful life is required for all [Member]s other than Land.

1.20. Cash, cash equivalents, and marketable securities details

Cash, cash equivalents, and marketable securities components are three separate models which work together to disclose this report fragment. The first component is a roll up of total cash, cash equivalents, and marketable securities which is best seen by viewing the balance sheet.

Balance Sheet [Line Items]	2016-12-31	2015-12-31
Assets [Roll Up]		
Current assets [Roll Up]		
Cash, cash equivalents, and marketable securities [Roll Up]		
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		

This is the same information represented within the disclosures.

Component: (Network and Table)	
Network	5010 - Disclosure - **Cash, Cash Equivalents, and Marketable Securities** (http://www.abc.com/role/CashCashEquivalentsAndMarketableSecurities)
Table	Cash, Cash Equivalents, and Marketable Securities [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

	Period [Axis]			
Cash, Cash Equivlents, and Marketable Securities [Line Items]	2016-12-31	2015-12-31	2014-12-31	2013-12-31
Cash, Cash Equivalents, and Marketable Securities [Roll Up]				
Cash and cash equivalents	11,000,000	10,000,000	9,000,000	8,000,000
Marketable securities	9,000,000	10,000,000		
Cash, cash equivalents, and marketable securities	20,000,000	20,000,000		

The second and third are two member aggregations, the first for total cash and cash equivalents and the second for total marketable securities. Each of the member aggregations ties to and intersects with the corresponding balance sheet fact as shown above. The balance sheet roll up is repeated in the disclosure to tie the two member aggregations to the grand total, "Total cash, cash equivalents, and marketable securities.

Cash and cash equivalents components

Component: (Network and Table)	
Network	5020 - Disclosure - **Cash and Cash Equivalents Components** (http://www.abc.com/role/CashAndCashEquivalentsComponents)
Table	Cash and Cash Equivalents Components [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

	Period [Axis]														
	2016-12-31							2015-12-31						2014-12-31	2013-12-31
	Cash and Cash Equivalents Type [Axis]							Cash and Cash Equivalents Type [Axis]						Cash and Cash Equivalents Type [Axis]	Cash and Cash Equivalents Type [Axis]
Cash and Cash Equivalents [Line Items]	Cash [Member]	Bank time deposits [Member]	Money market funds [Member]	U.S. government agencies securities [Member]	Foreign government debt [Member]	Corporate debt securities [Member]	Cash and Cash Equivalents, All Types [Domain]	Cash [Member]	Bank time deposits [Member]	Money market funds [Member]	U.S. government agencies securities [Member]	Foreign government debt [Member]	Corporate debt securities [Member]	Cash and Cash Equivalents, All Types [Domain]	Cash and Cash Equivalents, All Types [Domain]	Cash and Cash Equivalents, All Types [Domain]
Cash and Cash Equivalents [Hierarchy]															
Cash and cash equivalents	4,000,000	2,000,000	3,000,000	500,000	300,000	1,200,000	11,000,000	4,000,000	1,000,000	2,000,000	500,000	0	2,500,000	10,000,000	9,000,000	8,000,000

Marketable securities components

Component: (Network and Table)	
Network	5030 - Disclosure - **Marketable Securities Components** (http://www.abc.com/role/MarketableSecuritiesComponents)
Table	Marketable Securities [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

	Period [Axis]											
	2016-12-31						2015-12-31					
	Instrument Type [Axis]						Instrument Type [Axis]					
Marketable Securities [Line Items]	Bank time deposits [Member]	U.S. government agencies securities [Member]	Foreign government debt [Member]	Municipal securities [Member]	Marketable equity securities [Member]	Instruments, All Types [Domain]	Bank time deposits [Member]	U.S. government agencies securities [Member]	Foreign government debt [Member]	Municipal securities [Member]	Marketable equity securities [Member]	Instruments, All Types [Domain]
Marketable Securities [Hierarchy]												
Marketable securities	300,000	3,000,000	1,200,000	2,500,000	2,000,000	9,000,000	400,000	4,000,000	1,600,000	1,000,000	3,000,000	10,000,000

Key Points:

- The components of both "Total cash and cash equivalents" and "Total marketable securities" are detailed using member aggregations.
- Each of the two member aggregations of components ties to the corresponding concept in the roll up, which also provides a grand total.
- Note that alternatively, each of the member aggregations could have been modeled using concepts within a set of [Line Items].
- Because of the presentation layout there might be a temptation to model "Cash" as an item. However, this would not be appropriate as the model would not work correctly. Cash is simply a type of cash and cash equivalents.
- Note the item of cash and cash equivalents "Foreign government debt" and that the fact value is zero for 2015. As the item is provided for 2016, it is appropriate to have a fact value for 2015. The fact value is not "nil", it is zero.

Business Rules:

- Total cash and cash equivalents must exist within this component.
- Total marketable securities must exist within this component.
- Total cash and cash equivalents must foot.
- Total marketable securities must foot.
- Total cash, cash equivalents, and marketable securities must foot.

HINT: Dimension defaults are misnamed.

"Dimension defaults" are commonly misunderstood to be a "default" value for a dimension or [Axis]. This is not the case. Dimension defaults are used to indicate the dimension or [Axis] value which serves as the intersection between two components which use the same one fact to express information which is presented in multiple physical locations within the set of components which make up a financial report. For example, "Cash and cash equivalents" is expressed both on the balance sheet and in the component breakdown of "Cash and cash equivalents". The balance sheet does not have a "Cash and cash equivalents type [Axis]", but the component breakdown of cash and cash equivalents does. This requires the fact to "morph" into two different forms in this case, potentially into even more forms. This happens by not physically instantiating the dimension default, or the intersection between the two components, within the context of the fact which must show up in two or perhaps more different presentation locations on the financial report. Rather, an XBRL processor virtually instantiates the dimension or [Axis] depending on the component "lens" through which you are looking at the fact.

This sounds a little like quantum physics, but if you think about it or better yet if you look at the fact tables of each of the components what is going on becomes quite clear.

***TECHNICAL**: Technically (if you are interested) what is going on behind the scenes is that XBRL processors create Cartesian products of all facts to deal with two situations. The first situation is these intersections between component fact tables. The second reason is the fact that XBRL 2.1 has no knowledge of XBRL Dimensions and this is the way XBRL International got XBRL 2.1 and XBRL Dimensions to work together correctly. This becomes another problem when you bring XBRL Formula into the equation. XBRL Formula has two aspect models: non-dimensional and dimensional. XBRL Formula cannot handle mixed models. It is very dangerous to mix XBRL instances with both dimensional and non-dimensional facts. It is best, and safest, to use one model or the other.*

1.21. Inventories details

Inventory components is a roll up of the detailed [Line Items] which make up the components of inventory. This component intersects with the balance sheet fact "Inventories" which it details. This roll up foots.

Component: (Network and Table)	
Network	5040 - Disclosure - **Inventory Components** (http://www.abc.com/role/InventoryComponents)
Table	Inventory Components [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Inventory Components [Line Items]	Period [Axis]	
	2016-12-31	2015-12-31
Inventory, Net [Roll Up]		
Finished Goods	1,000,000	1,000,000
Work in progress	1,000,000	1,000,000
Raw materials	1,000,000	1,000,000
Other	1,000,000	1,000,000
Total inventories, net	4,000,000	4,000,000

Key Points:

- Component is a roll up.
- Alternatively, this could have been modeled as one concept and each individual component of inventory being articulated as a [Member] of an [Axis].

Business Rules:

- Total inventories is required.
- Total inventories must foot.

1.22. Property, plant and equipment details

Property, plant, and equipment details is two models. The first is a member aggregation which details property, plant and equipment, gross. The second is a roll up which details the components of property, plant, and equipment, net which are property, plant and equipment, gross and accumulated depreciation. Both the member aggregation and the roll up must foot. Property, plant, and equipment, net, intersects with and ties to the balance sheet.

Component: (Network and Table)	
Network	S050 - Disclosure - **Property, Plant and Equipment Components** (http://www.abc.com/role/PropertyPlantAndEquipmentComponents)
Table	Property, Plant and Equipment Components [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Property, Plant and Equipment [Line Items]	Period [Axis]							
	2016-12-31				2015-12-31			
	Property, Plant and Equipment, Type [Axis]				Property, Plant and Equipment, Type [Axis]			
	Land [Member]	Machinery and equipment [Member]	Furniture and fixtures [Member]	Property, Plant and Equipment, All Types [Domain]	Land [Member]	Machinery and equipment [Member]	Furniture and fixtures [Member]	Property, Plant and Equipment, All Types [Domain]
Property, Plant and Equipment, Net, by Type [Roll Up]								
Property, plant and equipment, gross	40,000,000	50,000,000	7,000,000	97,000,000	40,000,000	50,000,000	7,000,000	97,000,000
Accumulated depreciation				(15,000,000)				(15,000,000)
Property, plant, and equipment, net				82,000,000				82,000,000

Key Points:

- The component which details property, plant, and equipment gross is modeled as a member aggregation.
- Alternatively, this could have been modeled as a roll up.
- The component which computes property, plant and equipment, net is a roll up (net = gross - accumulated depreciation).
- Note that this component intersects with the property, plant, and equipment policies via the connection created by the Property, Plant and Equipment Type [Axis].

Business Rules:

- Property, plant, and equipment, gross must exist.
- Accumulated deprecation must exist.
- Accumulated depreciation must be a positive value.
- Property, plant, and equipment, net must exist.
- Member aggregation of property, plant, and equipment, gross must foot.
- Roll up of property, plant and equipment, net must foot.

HINT: Modelling as [Line Items] or [Member]s of an [Axis]; which to use when?

If you look at the inventory components breakdown and the property, plant, and equipment breakdown; you will notice that they are modelled differently. Inventory components are modelled using multiple concepts within a set of [Line Items]. Whereas, property, plant and equipment, gross components are modelled using a single concept "Property, plant, and equipment, gross" and then distinguishing which the class of PPE using different [Member]s of the "Property, plant and equipment type [Axis]".

An obvious question is why the difference and when do you use the first approach and when do you use the second? Also, because the US GAAP Taxonomy uses both approaches, does not explain or reveal any pattern as to which approach is use and in fact many times provides both approaches for the same financial report component; selecting the right option can be challenging.

Here is the way to look at this. First off, most of the time how things are modelled in other areas determines how you have to model something. For example, the balance sheet is a set of concepts. You are not going to create an extension concept which is a [Member] of an [Axis] and get that on the balance sheet and get your balance sheet roll ups to foot correctly by using that approach. In this particular case, you need to create a concept which fits onto the balance sheet correctly given its existing model and given that all your business rules must work correctly.

The second consideration is the need to articulate other information. For example, if you consider the balance sheet parenthetical components of preferred and common stock, multiple pieces of information are provided for each class of stock. You cannot provide that information by creating one single concept, you have to create multiple concepts and wire those concepts together using a [Member] of an [Axis]. Further, if you consider the property, plant and equipment component breakdown and the property, plant, and equipment policies; the components and the policies are tied together via that "Property, plant and equipment type [Axis]" and the [Member]s of each component. It would be trivial for a user of the information to use those two components together, if of course the application using that information worked correctly and leveraged that connection.

And so, while there is no clear answer for all cases, these rules can be helpful in determining when to model a component as a set of [Line Items] or as [Member]s of an [Axis]:

Consider the component into which the piece that you are going to model must fit into, you need to make sure you don't break any existing component model and be sure you pass all business rules.

Consider how the component you want to create will intersect with other components.

Consider what other facts what you are modelling might be used with and now those components are modelled.

Consider whether your component communicates one piece of information per fact or will need to communicate multiple or a more complex set of facts.

Each approach does have a distinct set of pros and cons; understanding these pros and cons can help you make the correct choice given your specific situation.

HINT: Seeing how an [Axis] ties [Line Items] together

Take a look at two components and you can understand why modelling information correctly is important: Property, plant, and equipment policies and property, plant and equipment components:

Policies:

Component: (Network and Table)	
Network	4030 - Disclosure - **Property, Plant and Equipment Policies** (http://www.abc.com/role/PropertyPlantAndEquipmentPolicies)
Table	Property, Plant and Equipment Components [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

	Period [Axis]		
	2016-01-01 - 2016-12-31		
	Property, Plant and Equipment, Type [Axis]		
Property, Plant and Equipment [Line Items]	Land [Member]	Machinery and equipment [Member]	Furniture and fixtures [Member]
Property, Plant and Equipment Policies [Hierarchy]			
Basis of valuation	Mauris tincidunt cursus	Mauris tincidunt cursus	Mauris tincidunt cursus
Depreciation methods		Sed elementum feugiat	Mauris tincidunt
Estimated useful lives		15 years	5 years
Dispositions policy	Nam non tortor	Nam non tortor	Nam non tortor

Components:

Component: (Network and Table)	
Network	5050 - Disclosure - **Property, Plant and Equipment Components** (http://www.abc.com/role/PropertyPlantAndEquipmentComponents)
Table	Property, Plant and Equipment Components [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

	Period [Axis]							
	2016-12-31				2015-12-31			
	Property, Plant and Equipment, Type [Axis]				Property, Plant and Equipment, Type [Axis]			
Property, Plant and Equipment [Line Items]	Land [Member]	Machinery and equipment [Member]	Furniture and fixtures [Member]	Property, Plant and Equipment, All Types [Domain]	Land [Member]	Machinery and equipment [Member]	Furniture and fixtures [Member]	Property, Plant and Equipment, All Types [Domain]
Property, Plant and Equipment, Net, by Type [Roll Up]								
Property, plant and equipment, gross	40,000,000	50,000,000	7,000,000	97,000,000	40,000,000	50,000,000	7,000,000	97,000,000
Accumulated depreciation				(15,000,000)				(15,000,000)
Property, plant, and equipment, net				82,000,000				82,000,000

If you look at the model structures for these two components you see that they share the same axis, "Property, Plant and Equipment Type [Axis]" and the same [Member]s:

Policies model structure:

Component: (Network and Table)	
Network	4030 - Disclosure - Property, Plant and Equipment Policies (http://www.abc.com/role/PropertyPlantAndEquipmentPolicies)
Table	Property, Plant and Equipment Components [Table]

#	Label	Report Element Class	Period Type	Balance	Name
1	**Property, Plant and Equipment Components [Table]**	[Table]			us-gaap:ScheduleOfPropertyPlantAndEquipmentTable
2	**Legal Entity [Axis]**	[Axis]			dei:LegalEntityAxis
3	Consolidated Entity [Domain]	[Domain]			dei:EntityDomain
4	**Property, Plant and Equipment, Type [Axis]**	[Axis]			us-gaap:PropertyPlantAndEquipmentByTypeAxis
5	Property, Plant and Equipment, All Types [Domain]	[Domain]			us-gaap:PropertyPlantAndEquipmentTypeDomain
6	Land [Member]	[Member]			us-gaap:LandMember
7	Machinery and equipment [Member]	[Member]			us-gaap:MachineryAndEquipmentMember
8	Furniture and fixtures [Member]	[Member]			us-gaap:FurnitureAndFixturesMember
9	**Property, Plant and Equipment [Line Items]**	[Line Items]			us-gaap:PropertyPlantAndEquipmentLineItems
10	*Property, Plant and Equipment Policies [Hierarchy]*	[Abstract]			abc:PropertyPlantEquipmentPoliciesHierarchy
11	Basis of valuation	[Concept] String	For Period		us-gaap:PropertyPlantAndEquipmentBasisOfValuation
12	Depreciation methods	[Concept] String	For Period		us-gaap:PropertyPlantAndEquipmentDepreciationMethods
13	Estimated useful lives	[Concept] String	For Period		us-gaap:PropertyPlantAndEquipmentEstimatedUsefulLives
14	Dispositions policy	[Concept] String	For Period		us-gaap:PropertyPlantAndEquipmentDispositions

Components model structure:

Component: (Network and Table)	
Network	5050 - Disclosure - Property, Plant and Equipment Components (http://www.abc.com/role/PropertyPlantAndEquipmentComponents)
Table	Property, Plant and Equipment Components [Table]

#	Label	Report Element Class	Period Type	Balance	Name
1	**Property, Plant and Equipment Components [Table]**	[Table]			us-gaap:ScheduleOfPropertyPlantAndEquipmentTable
2	**Legal Entity [Axis]**	[Axis]			dei:LegalEntityAxis
3	Consolidated Entity [Domain]	[Domain]			dei:EntityDomain
4	**Property, Plant and Equipment, Type [Axis]**	[Axis]			us-gaap:PropertyPlantAndEquipmentByTypeAxis
5	Property, Plant and Equipment, All Types [Domain]	[Domain]			us-gaap:PropertyPlantAndEquipmentTypeDomain
6	Land [Member]	[Member]			us-gaap:LandMember
7	Machinery and equipment [Member]	[Member]			us-gaap:MachineryAndEquipmentMember
8	Furniture and fixtures [Member]	[Member]			us-gaap:FurnitureAndFixturesMember
9	**Property, Plant and Equipment [Line Items]**	[Line Items]			us-gaap:PropertyPlantAndEquipmentLineItems
10	*Property, Plant and Equipment [Hierarchy]*	[Abstract]			abc:PropertyPlantEquipmentHierarchy
11	Property, plant and equipment, gross	[Concept] Monetary	As Of	Debit	us-gaap:PropertyPlantAndEquipmentGross
12	*Property, Plant and Equipment, Net, by Type [Roll Up]*	[Abstract]			us-gaap:PropertyPlantAndEquipmentNetByTypeAbstract
13	Property, plant and equipment, gross	[Concept] Monetary	As Of	Debit	us-gaap:PropertyPlantAndEquipmentGross
14	Accumulated depreciation	[Concept] Monetary	As Of	Credit	us-gaap:AccumulatedDepreciationDepletionAndAmortizationPropertyPlantAndEquipment
15	Property, plant, and equipment, net	[Concept] Monetary	As Of	Debit	us-gaap:PropertyPlantAndEquipmentNet

Software applications, if they are built correctly, can leverage these sorts of intersections of metadata to provide functionality to users such as displaying the information about the components and the policies of components together. Software can also use these intersections to navigate to different sections of the same financial report which are linked together by this correctly modelled intersecting metadata.

It is this type of functionality which should drive the best way to model your financial information.

HINT: Roll ups, roll forwards, adjustments, variances are defined by which [Axis] changes.

If you look at a roll up, roll forward, adjustment, or variance visually they might look the similar. However, the dynamics of each is different and is defined by which [Axis] is changing. The following table summarizes which [Axis] changes for each of the different types of numeric relations patterns:

Metapattern	Concept	Period	Report date	Reporting scenario
Roll up	Yes	No	No	No
Roll forward	No	Yes	No	No
Adjustment	No	No	Yes	No
Variance	No	No	No	Yes

Note that for each of the numeric patterns articulated above, one and only one of the [Axis] changes. For example, a "roll up" it is an aggregation across some set of concepts, the only characteristic of a set of reported facts which changes in a roll up. For example, the assets roll up of a balance sheet is an aggregation of the items, or concepts, which make up the assets section of a balance sheet.

A member aggregation is similar to a roll up (such as the Inventories Components) except that rather than the concept changing (it does not change, it stays the same) it is the [Axis] which differentiates the [Member]s of that [Axis] which change (such as the Property, Plant and Equipment Components).

1.23. Deferred Costs details

Deferred costs details is a roll up which foots. The component intersects with the balance sheet.

Component: (Network and Table)	
Network	5060 - Disclosure - **Deferred Costs** (http://www.abc.com/role/DeferredCosts)
Table	Deferred Costs Components [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Deferred Costs Components [Line Items]	Period [Axis]	
	2016-12-31	2015-12-31
Deferred Costs [Roll Up]		
Deferred advertising costs	2,000,000	2,000,000
Deferred set-up costs	2,000,000	2,000,000
Deferred sales commissions	5,000,000	5,000,000
Total deferred costs	9,000,000	9,000,000

Key Points:

- Component is a roll up.
- Alternatively, this could have been modeled as one concept and each individual component of deferred costs being articulated as a [Member] of an [Axis].

Business Rules:

- Total deferred costs must exist.
- Total deferred costs must foot.

QUESTION: Suppose a reporting entity had only one item of deferred costs, say "Deferred setup costs". There are two approaches which could be taken to disclose/present this item. The first would be to have the concept "Total deferred costs" on the balance sheet, then to have this same detail of the components of deferred costs as above, but showing only the single line item. The advantage of this is that analysts could always find deferred costs on the balance sheet and the always go find the component which details that total in the disclosures. Alternatively, a reporting entity could simply put the concept "Deferred setup costs" on the balance sheet. As there could be any number of different items of deferred costs on the balance sheet, the analysis algorithm would be vastly more complicated. Multiply this by each balance sheet line item, and writing analysis software becomes significantly more challenging and what the analysis software can safely do to sort out the items on the balance sheet is significantly reduced. The purpose of pointing this out is not to say that one approach is better than the other, it is simply to point out the reality of what analysis software needs to deal with and help the financial reporting supply chain understand the options which they have available to them.

1.24. Product warranty accrual

The product warranty accrual is two components which work together to tie information together. The first component is a roll forward of the product warranty accrual. The second component is a roll up or breakdown of the total product warranty into its current and noncurrent portions which are provided on the balance sheet. The roll forward must reconcile and the roll up must foot.

Roll forward:

Component: (Network and Table)	
Network	5070 - Disclosure - **Product Warranty Accrual** (http://www.abc.com/role/ProductWarrantyAccrual)
Table	Product Liability Contingency [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Product Liability Contingency [Line Items]	Period [Axis]	
	2016-01-01 - 2016-12-31	2015-01-01 - 2015-12-31
Product warranty accrual [Roll Forward]		
Product warranty accrual, beginning balance	58,000,000	58,000,000
Provision for product warranties issued	7,000,000	7,000,000
Payments to satisfy claims	(6,000,000)	(6,000,000)
Currency translation	(1,000,000)	(1,000,000)
Product warranty accrual, ending balance	58,000,000	58,000,000
Product Warranty Accrual, Balance Sheet Classification [Roll Up]		
Product warranty accrual, current portion	26,000,000	26,000,000
Product warranty accrual, noncurrent portion	32,000,000	32,000,000
Product warranty accrual, total	58,000,000	58,000,000

Key Points:

- Component is a roll forward.
- Note that this roll forward is for the total product warranty accrual, current and noncurrent portion.

Business Rules:

- Product warranty accrual concept is required.
- Product warranty accrual roll forward must reconcile.

Roll up:

Key Points:

- Component is a roll up.

Business Rules:

- Product warranty accrual is required.
- Product warranty accrual total must foot (roll up must foot).

QUESTION: If a reporting entity only has a current product warranty or only has a noncurrent product warranty; then which concept should be used for the roll forward? There are to choices: (a) the same concept they would use if they had both a current and noncurrent portion, or (b) either the current or noncurrent portion depending on which it is and then they would not need to roll up. In my view, while approach "b" seems appealing, approach "a" is superior as it makes financial reports consistent and analysis software does not have to deal with this exception. The primary point here is not specifically product warranty accruals, but rather the need to deal with each exception such as this within analysis software. This is an issue which is similar to having a domain which only has one member, such as pointed out in the preferred stock component of the balance sheet parenthetical section.

1.25. Long-term debt instruments

Long-term debt instruments is two components. The first component is a hierarchy which details facts reported for each debt instrument and it is also a member aggregation which details each long-term debt instrument amount and provides a total of all amounts of long-term debt instruments. The second component is a roll up which details the current and noncurrent portions of total long-term debt. Total long-term debt intersects with the long-term debt maturities component. The current and noncurrent portions intersect with the balance sheet. Detail of long-term debt instruments foots to total long-term debt. Current and noncurrent portions also foot to total long-term debt.

Component: (Network and Table)	
Network	5080 - Disclosure - **Long-term Debt Instruments** (http://www.abc.com/role/LongTermDebtInstruments)
Table	Long-term Debt Instruments [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

	Period [Axis]			
	2016-01-01 - 2016-12-31			2015-12-31
	Long-term Debt, Type [Axis]			Long-term Debt, Type [Axis]
	Loans payable [Member]		Long-term Debt, All Types [Domain]	Long-term Debt, All Types [Domain]
	Debt Instrument [Axis]		Debt Instrument [Axis]	Debt Instrument [Axis]
Debt Instrument [Line Items]	Debt instrument AA [Member]	Debt instrument BB [Member]	Debt Instrument, All Instruments [Domain]	Debt Instrument, All Instruments [Domain]
Debt Instrument Hierarchy [Hierarchy]				
Description	Mauris tincidunt cursus est	Mincidunt est		
Collateral	cursus elt sem	cursus elit sem		
Interest rate	.10	.125		
Maturity date	April 2018	October 2016		
Amount	30,000,000	11,000,000	41,000,000	
Long-term Debt [Roll Up]				
Current portion of long-term debt			22,000,000	22,000,000
Long-term debt excluding current maturities			19,000,000	19,000,000
Total long-term debt	30,000,000	11,000,000	41,000,000	

Key Points:

- Long-term debt instruments itself is a hierarchy which contains 5 concepts.
- The amount concept is part of a member aggregation.
- Note that in this hierarchy, the amount is shown twice, once for the current period and once for the prior period. Yet, the description, collateral, interest rate, and maturity date are shown once.
- Alternatively, this component could have been modeled as two concepts: one which contains the entire description (combining what is now separated into description, collateral, interest rate, maturity date). There are pros and cons related to either combining the facts or separating the facts. Neither approach is inherently right or wrong; rather the needs of the overall system determine what is most appropriate.
- The breakdown of the current and noncurrent portion of long-term debt is a roll up. Although the roll up is presented upside down as compared to other roll ups, it is still a roll up.
- Another approach to expressing this roll up would be: "noncurrent portion of long-term debt = total long-term debt - current portion of long-term debt". However, by convention roll ups are generally shown: "Total = Part A + Part B". The reason for this has to do with limitations of XBRL Calculations and a rule created which shows the

relations between debits and credits. The rule was created because people were modeling this type of situation inconsistently. In hind sight, the calculation rules for debits and credits is a mistake, in my view. The rules was created to protect people from themselves.

- The current portion intersects with both the balance sheet and should intersect with the maturities of long-term debt component. (See the question related to this in that component.)
- The long-term debt excluding current portion intersects with the balance sheet.

Business Rules:

- Long-term debt amount for each instrument foots to the total.
- Long-term debt amount is required.
- Total long-term debt = Current portion of long term debt + Long-term debt excluding current portion.

1.26. Long-term debt maturities

Long-term debt maturities is a roll up. The roll up foots to total long-term debt. Total long-term debt intersects with the long-term debt instruments component.

Component: (Network and Table)	
Network	5090 - Disclosure - **Maturities of Long-term Debt** (http://www.abc.com/role/MaturitiesOfLongTermDebt)
Table	Maturities of Long-Term Debt [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Maturities of Long-Term Debt [Line Items]	Period [Axis]	
	2016-12-31	2015-12-31
Maturities of Long-Term Debt RollUp [Roll Up]		
Current	22,000,000	
2014	1,000,000	
2015	1,000,000	
2016	1,000,000	
2017	1,000,000	
Thereafter	15,000,000	
Total long-term debt	41,000,000	41,000,000

Key Points:

- Component is a roll up.
- Component intersects with the long-term debt instruments component.

Business Rules:

- The concept total long-term debt must exist in this component.
- Total maturities must foot.

QUESTION: The concept used to express current maturities here and the concept used to express current maturities on the balance sheet are two different concepts. Would it ever be the case that these two numbers would be different? If not (which I believe is the case) then one of the concepts should be removed from the US GAAP Taxonomy.

1.27. Other noncurrent liabilities details

Other noncurrent liabilities details is a roll up which foots to total other noncurrent liabilities. This component intersects with the balance sheet.

Component: (Network and Table)	
Network	5110 - Disclosure - **Other Noncurrent Liabilities** (http://www.abc.com/role/OtherNoncurrentLiabilities)
Table	Other Noncurrent Liabilities [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Other Noncurrent Liabilities [Line Items]	Period [Axis]	
	2016-12-31	2015-12-31
Other Liabilities, Noncurrent [Roll Up]		
Other sundry noncurrent liabilities	250,000	250,000
Noncurrent deferred taxes and other liabilities	750,000	750,000
Total other noncurrent liabilities	1,000,000	1,000,000

Key Points:

- Component is a roll up, and is modeled using concepts which are part of a set of [Line Items].
- Alternatively, this could have been modeled as one concept and each individual component of other noncurrent liabilities being articulated as a [Member] of an [Axis].

Business Rules:

- Total other noncurrent liabilities must exist.
- Total other noncurrent liabilities must foot.

1.28. Business segment breakdown

The business segment breakdown is a hierarchy of facts which the reporting entity discloses for each business segment. In this case, each fact within the hierarchy is also part of a member aggregation which totals to a sum for all business segments. A number of the facts intersect with the income statement, capital additions intersects with the cash flow statement, and total assets intersects with the balance sheet. Note that this member aggregation is a complete flat set.

Component: (Network and Table)	
Network	5120 - Disclosure - **Business Segments** (http://www.abc.com/role/BusinessSegments)
Table	Business Segment Information, by Segment [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Segment Reporting Information [Line Items]	Period [Axis]										
	2016-01-01 - 2016-12-31					2015-01-01 - 2015-12-31					2014-01-01 - 2014-12-31
	Business Segments [Axis]					Business Segments [Axis]					Business Segments [Axis]
	Business Segment Alpha [Member]	Business Segment Bravo [Member]	Business Segment Charlie [Member]	Business Segment Delta [Member]	All Business Segments [Domain]	Business Segment Alpha [Member]	Business Segment Bravo [Member]	Business Segment Charlie [Member]	Business Segment Delta [Member]	All Business Segments [Domain]	All Business Segments [Domain]
Business Segment Information [Hierarchy]											
Revenues	4,000,000	2,000,000	2,000,000	2,000,000	10,000,000	4,000,000	2,000,000	2,000,000	2,000,000	10,000,000	10,000,000
Operating expenses	500,000	500,000	500,000	350,000	1,850,000	500,000	500,000	500,000	350,000	1,850,000	1,850,000
Selling, general and administrative expenses	250,000	250,000	250,000	250,000	1,000,000	250,000	250,000	250,000	250,000	1,000,000	1,000,000
Depreciation	100,000	100,000	100,000	200,000	500,000	100,000	100,000	100,000	200,000	500,000	500,000
Operating income (loss)	1,000,000	1,000,000	1,000,000	1,150,000	4,150,000	1,000,000	1,000,000	1,000,000	1,150,000	4,150,000	4,150,000
Capital additions	4,000,000	2,000,000	2,000,000	2,000,000	10,000,000	4,000,000	2,000,000	2,000,000	2,000,000	10,000,000	10,000,000
Assets	25,000,000	25,000,000	47,000,000	50,000,000	147,000,000	25,000,000	25,000,000	47,000,000	50,000,000	147,000,000	

Key Points:

- This component is a hierarchy. In addition, each concept in the hierarchy is part of a member aggregation.
- This component intersects with the income statement, statement of cash flows, and the balance sheet.
- Note that the member aggregation is "flat". Contrast that to the geographic area component which is a two level hierarchy.

Business Rules:

- Each of the member aggregations must foot.
- Reporting entities can disclose different facts in many cases, other facts are specifically required.

NOTE: There is an issue with the creation application which needs to be worked around, the total Capital Additions should be a positive number but is shown as a negative number here. That will be corrected.

QUESTION: Should a business segment breakdown like this have a "Legal Entity [Axis]"?

1.29. Geographic areas breakdown

The geographic area breakdown is two hierarchies. The first hierarchy contains only the fact with the concept revenues. The second hierarchy has the fact with the concept long-lived assets (which is total noncurrent assets). Each component is also a member aggregation of each of those two concepts over the set of geographic areas. This member aggregation is a complete hierarchical set in that the set of countries has an additional layer of hierarchy in that countries are grouped into regions. Revenues intersects with the income statement. Long-lived assets intersects with the balance sheet.

Component: (Network and Table)	
Network	5130 - Disclosure - **Geographic Areas** (http://www.abc.com/role/GeographicAreas)
Table	Revenues from External Customers and Long-lived Assets by Geographic Area [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

	Period [Axis]														
	2016-01-01 - 2016-12-31							2015-01-01 - 2015-12-31							2014-01-01 - 2014-12-31
	Geographic Area [Axis]							Geographic Area [Axis]							Geographic Area [Axis]
Revenues from External Customers and Long-Lived Assets [Line Items]	UNITED STATES	CANADA	North America [Member]	UNITED KINGDOM	GERMANY	Europe [Member]	All geographic areas [Domain]	UNITED STATES	CANADA	North America [Member]	UNITED KINGDOM	GERMANY	Europe [Member]	All geographic areas [Domain]	All geographic areas [Domain]
Revenues from External Customers [Hierarchy]															
Revenues	4,000,000	2,000,000	6,000,000	2,000,000	2,000,000	4,000,000	10,000,000	4,000,000	2,000,000	6,000,000	2,000,000	2,000,000	4,000,000	10,000,000	10,000,000
Long Lived Assets [Hierarchy]															
Long lived assets	40,000,000	12,000,000	52,000,000	30,000,000	9,000,000	39,000,000	91,000,000	40,000,000	12,000,000	52,000,000	30,000,000	9,000,000	39,000,000	91,000,000	

Key Points:

- This component could be modeled as one hierarchy or it could be modeled as to distinct hierarchies. Modeling it as two hierarchies as opposed to the one provides a better rendering of the information.
- This component intersects with the balance sheet and with the income statement.
- While most domains of an [Axis] tends to be flat, this set of members is a hierarchy because the individual countries are grouped into the regions "North America" and "Europe". Many people tend to imply meaning in such hierarchy, however there is nothing in XBRL which allows you to communicate such meaning, other than the expression of an XBRL Formula to explicitly state your meaning.
- This model could have been created using two separate [Axis], one for region and a different [Axis] for the country. Neither approach is inherently right or wrong, but XBRL US suggests that using one [Axis] in this situation is the better alternative.

Business Rules:

- Revenues foots by region.
- Revenues by region foots to total revenues.
- Long-lived assets foots by region.
- Long-lived assets foots to total long-lived assets.
- Revenues exists.
- Long-lived assets exists.

QUESTION: What is the general rule for when one should use one [Axis] and when one would use two separate [Axis]?

QUESTION: Should a geographic area breakdown like this have a "Legal Entity [Axis]" in addition to the Geographic Area [Axis]?

HINT: How to model nested hierarchies of members

[To Do]

1.30. Nonmonetary transactions details

Nonmonetary transactions is a hierarchy of facts. Of the facts, two facts are also member aggregations across the set of all monetary transactions. This component does not intersect with any other components; it stands on its own.

Component: (Network and Table)	
Network	5140 - Disclosure - **Nonmonetary Transactions** (http://www.abc.com/role/NonmonetaryTransactions)
Table	Nonmonetary Transaction, by Type [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Nonmonetary Transaction [Line Items]	Period [Axis]: 2016-01-01 - 2016-12-31			
	Nonmonetary Transaction Type [Axis]			
	Receipt of Assets in Satisfaction of Debt [Member]	Advertising Barter Transactions [Member]	Inventory Exchanges [Member]	Nonmonetary Transaction, All Types [Domain]
Nonmonetary Transaction [Hierarchy]				
Basis of accounting for assets transferred	Nunc in elit non metus viverra sollicitudin.	Mulla sit amet nibh	Nam non tortor non leo	
Name of counterparty	Duis metus	Nulla sit amet	Proinsitamet sem	
Gain (loss) recognized on transfer	100,000	100,000	100,000	300,000
Amount of barter transaction	200,000	200,000	200,000	600,000

Key Points:

- The component is a hierarchy of facts and also a member aggregation.
- Note that not all concepts are part of an aggregation.
- The component does not intersect with any other component, it stands alone.

Business Rules:

- Transaction type is required and is expressed using an [Axis].
- Basis of accounting for assets transferred, name of counterparty, gain on transfer, and amount of barter transaction are required in this component.

1.31. Selected financial information

The selected financial information component is a hierarchy in that it contains three facts which are not related to the other facts in any way except that all three concepts participate within the same component. However, the component is also a variance which, in this case, is the difference between an actual and forecast amounts of the facts. Each of the three facts intersects with the income statement.

Component: (Network and Table)	
Network	5150 - Disclosure - **Select Financial Information** (http://www.abc.com/role/SelectFinancialInformation)
Table	Select Financial Information [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Select Financial Information [Line Items]	Period [Axis]				
	2016-01-01 - 2016-12-31			2015-01-01 - 2015-12-31	2014-01-01 - 2014-12-31
	Reporting scenario [Axis]			Reporting scenario [Axis]	Reporting scenario [Axis]
	Variance [Member]	Forecast [Member]	Actual [Domain]	Actual [Domain]	Actual [Domain]
Select Financial Information [Hierarchy]					
Revenues	(1,000,000)	11,000,000	10,000,000	10,000,000	10,000,000
Operating income (loss)	(850,000)	5,000,000	4,150,000	4,150,000	4,150,000
Net income (loss)	3,350,000	2,000,000	5,350,000	7,450,000	1,350,000

Key Points:

- Component is a hierarchy and a variance.
- A variance is a change of the Reporting Scenario [Axis] between two different reporting scenarios.
- It is the actual reporting scenario which generally intersects with other components. For example, here all three actual facts intersect with the income statement. As such, it is the actual [Member] which should be the dimension-default because that enables the facts to be usable within both components.

Business Rules:

- The variance between each scenario must compute. Here, variance = forecast - actual. This may vary depending on preference and depending on which reporting scenarios are used by the variance.

HINT: Actual should be the domain, not the variance

A common mistake is to represent the variance as the domain. This causes the need to create duplicate facts. However, if this is represented correctly with the actual as the domain, no duplicate facts are necessary.

1.32. Subsequent events

The subsequent events component is a hierarchy of two concepts which make up a subsequent event. Each concept is reported three times, once for each of the three subsequent events. In this case the amount is not aggregated (i.e. it is not a member aggregation) as it would make no sense to aggregate the amount of all three subsequent events. This component does not intersect with any other component within the financial report.

Component: (Network and Table)	
Network	5160 - Disclosure - **Subsequent Events** (http://www.abc.com/role/SubsequentEvents)
Table	Subsequent Event [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Subsequent Event [Line Items]	Period [Axis]	
	2016-01-01 - 2016-12-31	
	Subsequent Event Type [Axis]	
	Dividend Declared [Member]	Threatened Litigation [Member]
Subsequent Event [Hierarchy]		
Event description	Nunc in elit non metus viverra sollicitudin. Duis metus. Donec pulvinar nonummy erat. In vel justo at urna rutrum ultrices. Cras consectetuer orci non lorem. Vestibulum bibendum aliquet augue.	Suspendisse vestibulum augue eu justo. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Fusce suscipit pede ut erat. Sed rutrum.
Event date	2017-03-01	2017-01-22

Key Points:

- Component is a hierarchy.
- Although there is a numeric concept as part of this component, that amount is not aggregated.
- The US GAAP Taxonomy provides a specific set of concepts which should be reported for a subsequent event;

Business Rules:

- The type of subsequent event is required which is expressed via an [Axis] of the component.
- Either an amount is required, a range of amounts is required, or a reason an amount is inestimable is required.

QUESTION: A physical [Domain] (as this has been used in the past) is not necessary here. Why should it be provided and is it required to be provided. If so, why?

QUESTION: See the HINT "Differing forms of quantitative and qualitative measures. It seems that the taxonomy is very clear in indicating what concepts should be reported.

However, if you look at the subsequent event disclosures of filers, very few use any of the [Line Items] provided by the US GAAP Taxonomy. Which is correct? How does the user of the US GAAP Taxonomy know the difference?

1.33. Raw materials breakdown

The raw material breakdown is a roll up. This component was provided to make four specific points.

First, there is an intersection between this component and the total inventory component. The line item "Total raw materials" is part of the inventory component roll up.

Second, this information is not considered part of the disclosures; rather it is considered supplementary information. The SEC does not provide for supplementary information.

Third, the three concepts that make up the parts of "Total raw materials" are all extension concepts created by the economic entity reporting this information. In the reference implementation, XBRL definition relations were created and a relationship explicitly states that the concepts *abc:Steel*, *abc:Copper*, and *abc:Lead* are all specializations[4] of the general concept of the US GAAP XBRL Taxonomy *us-gaap:InventoryRawMaterials*.

Fourth, these concepts are represented as concepts similar to how the inventory components report fragment is represented. These facts could also have been represented using an [Axis] and [Member]s similar to how the property, plant and equipment report fragment is represented. There would be no difference in meaning had the other approach been used. There are important differences in the power of the [Line Items] based approach which was used and the [Axis]/[Member]s based approach which could have been used. These differences are important to understand.

Component: (Network and Table)	
Network	9101 - Disclosure - **Raw Materials Details (Supplemental Information)** (http://www.abc.com/role/RawMaterialDetails)
Table	Inventory Components [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)
Legal Entity [Axis]	Consolidated Entity [Domain]

Inventory Components [Line Items]	Period [Axis]	
	2016-12-31	2015-12-31
Raw Materials [Roll Up]		
Steel	800,000	600,000
Copper	100,000	200,000
Lead	100,000	200,000
Total raw materials	1,000,000	1,000,000

[4] See the XBRL Technical Specification which explains the "general-special" XBRL definition relation arcrole, http://www.xbrl.org/specification/xbrl-2.1/rec-2003-12-31/xbrl-2.1-rec-2003-12-31+corrected-errata-2013-02-20.html#_5.2.6.2.1

Key Points:

- Component is a roll up.
- The breakdown used by this filer is unique to the filer, and therefore extension concepts are appropriate. The XBRL definition relations make it explicit that these concepts a specialization of an existing concept in the US GAAP XBRL Taxonomy.
- This report fragment intersects with the inventory components report fragment, but not with the total of that report fragment.

Business Rules:

- Roll up of the total raw materials inventory concept.

QUESTION: This report fragment provides XBRL calculation relations. It could be assumed that the XBRL calculation relations and the fact that the three extension concepts added which are "items" in the XBRL calculation relation to the "summation"[5]. This could be enough semantics to make adding the XBRL definition relations, in this case, unnecessary. Is this the case? If so, why? If not, then why?

[5] See the XBRL Technical specification "summation-item" arcrole, http://www.xbrl.org/specification/xbrl-2.1/rec-2003-12-31/xbrl-2.1-rec-2003-12-31+corrected-errata-2013-02-20.html#_5.2.5.2

1.34. Other information

The following is other information which is helpful in understanding XBRL-based digital financial reports:

HINT: Commonly Used Axes

Some axes are specific to specific components modelled within a financial report taxonomy model. Other axes are very common and tend to be shared between components. The following is a summary of the more common axes used within a financial report:

- **Reporting entity**: Articulates the reporting entity, identified by the SEC CIK number to which a fact relates. Providing a reporting entity is required.
- **Period**: Articulates the calendar period to which a fact relates. (Note that XBRL has no means currently of articulating which fiscal period to which a fact relates, only the calendar period.) Providing a period is required.
- **[Line Items]**: Articulates the concept to which the reported fact relates such as "Cash and cash equivalents" or "Net income (loss). Providing a concept is required.
- **Legal Entity [Axis]**: Articulates the legal entity which is to which the fact relates such as the consolidated entity, parent holding company, variable interest entity, or some legal subunit. Generally facts are considered to relate to the consolidated entity if the Legal Entity [Axis] is not provided.
- **Report Date [Axis]**: Articulates the date of the report to which the reported fact relates. This could be the date filed or the audit report date. Generally facts are all considered to be of the same report date if the Report Date [Axis] is not provided.
- **Reporting Scenario [Axis]**: Articulates the reporting scenario of the reported fact such as actual, forecast, budgeted, etc. Generally facts are considered to be actual if the Reporting Scenario is not provided.
- **Business Segment [Axis]**: Articulates the business segment to which the reported fact relates. Generally facts are considered to relate to the combined business segment if the Business Segment [Axis] is not provided.
- **Geographic Area [Axis]**: Articulates the geographic area to which a reported fact relates. Generally facts are considered to relate to the combined set of all geographic areas if the Geographic Area [Axis] is not provided.

Note that syntactically, or considering the technical syntax, the reporting entity, period, and concept are implemented technically in a manner different than other axes. However, semantically or considering the business meaning, all are axes just like any other axes and articulate some specific characteristic related to a reported fact.

HINT: Using fact tables to understand component intersections.

The notion of intersections were discussed, this is another discussion of intersections leveraging the raw information which makes up a component of a financial report. This raw information is sometimes called a **fact table**.

Fact tables are exactly as the name implies, a table of facts. Recall that a fact is a set of characteristics, a value, and may contain some additional information if the fact is numeric which we will ignore for now.

The following is a fact table for the balance sheet component. A partial list of the 66 facts which make up the balance sheet are shown below. Each fact has the characteristics: Reporting entity, Period, Legal Entity, and Concept. Each fact also has a value. Each row which is numbered represents one fact.

Component: (Network and Table)	
Network	2001 - Statement - Balance Sheet (http://www.abc.com/role/BalanceSheet)
Table	Balance Sheet [Table]

#	Reporting Entity	Period	Legal Entity [Axis]	Concept	Value
1	0000000001 (http://www.sec.gov/CIK)	2011-12-31	Consolidated Entity [Domain]	Liabilities and Equity	147000000
2	0000000001 (http://www.sec.gov/CIK)	2012-12-31	Consolidated Entity [Domain]	Liabilities and Equity	147000000
3	0000000001 (http://www.sec.gov/CIK)	2012-12-31	Consolidated Entity [Domain]	Product warranty accrual, current portion	26000000
[illegible]					
62	0000000001 (http://www.sec.gov/CIK)	2011-12-31	Consolidated Entity [Domain]	Assets	147000000
63	0000000001 (http://www.sec.gov/CIK)	2012-12-31	Consolidated Entity [Domain]	Long-term debt	19000000
64	0000000001 (http://www.sec.gov/CIK)	2011-12-31	Consolidated Entity [Domain]	Long-term debt	19000000
65	0000000001 (http://www.sec.gov/CIK)	2011-12-31	Consolidated Entity [Domain]	Property, plant and equipment, net	82000000
66	0000000001 (http://www.sec.gov/CIK)	2012-12-31	Consolidated Entity [Domain]	Property, plant and equipment, net	82000000

The fact table below is for the Property, Plant and Equipment Components component. Note that it likewise has characteristics. In fact, all the characteristic are the same except for one, the "Property, Plant and Equipment, Type [Axis]".

Note that line # 65 and #66 from the fact table above relating to the balance sheet and #11 and #12 below relating to the property, plant and equipment components component are the same fact (i.e. they exist only once within an XBRL instance).

Recall the hint "HINT: Dimension defaults are misnamed". Be sure you have read that hint.

Component: (Network and Table)	
Network	5050 - Disclosure - Property, Plant and Equipment Components (http://www.abc.com/role/PropertyPlantAndEquipmentComponents)
Table	Property, Plant and Equipment Components [Table]

#	Reporting Entity	Period	Legal Entity [Axis]	Property, Plant and Equipment, Type [Axis]	Concept	Value
1	0000000001 (http://www.sec.gov/CIK)	2011-12-31	Consolidated Entity [Domain]	Property, Plant and Equipment, All Types [Domain]	Accumulated Depreciation, Depletion and Amortization, Property, Plant, and Equipment	15000000
2	0000000001 (http://www.sec.gov/CIK)	2012-12-31	Consolidated Entity [Domain]	Property, Plant and Equipment, All Types [Domain]	Accumulated Depreciation, Depletion and Amortization, Property, Plant, and Equipment	15000000
3	0000000001 (http://www.sec.gov/CIK)	2011-12-31	Consolidated Entity [Domain]	Machinery and equipment [Member]	Property, plant and equipment, gross	50000000
4	0000000001 (http://www.sec.gov/CIK)	2011-12-31	Consolidated Entity [Domain]	Property, Plant and Equipment, All Types [Domain]	Property, plant and equipment, gross	97000000
5	0000000001 (http://www.sec.gov/CIK)	2012-12-31	Consolidated Entity [Domain]	Land [Member]	Property, plant and equipment, gross	40000000
6	0000000001 (http://www.sec.gov/CIK)	2011-12-31	Consolidated Entity [Domain]	Furniture and fixtures [Member]	Property, plant and equipment, gross	7000000
7	0000000001 (http://www.sec.gov/CIK)	2012-12-31	Consolidated Entity [Domain]	Property, Plant and Equipment, All Types [Domain]	Property, plant and equipment, gross	97000000
8	0000000001 (http://www.sec.gov/CIK)	2011-12-31	Consolidated Entity [Domain]	Land [Member]	Property, plant and equipment, gross	40000000
9	0000000001 (http://www.sec.gov/CIK)	2012-12-31	Consolidated Entity [Domain]	Furniture and fixtures [Member]	Property, plant and equipment, gross	7000000
10	0000000001 (http://www.sec.gov/CIK)	2012-12-31	Consolidated Entity [Domain]	Machinery and equipment [Member]	Property, plant and equipment, gross	50000000
11	0000000001 (http://www.sec.gov/CIK)	2011-12-31	Consolidated Entity [Domain]	Property, Plant and Equipment, All Types [Domain]	Property, plant and equipment, net	82000000
12	0000000001 (http://www.sec.gov/CIK)	2012-12-31	Consolidated Entity [Domain]	Property, Plant and Equipment, All Types [Domain]	Property, plant and equipment, net	82000000

The fact morphs, using the dimension-default, to be the balance sheet line item or to become the total of the property, plant and equipment components component (the net amount) depending upon which fact table or rendering you are using to look at the fact.

This is why the fact property, plant, and equipment, net can be viewed as an intersection between two components.

1.35. Model structure validation

Every piece of model structure which is used represent the information contained within a digital financial report can be grouped into these categories: Network, Table, Axis, Member, LineItems, Abstract, Concept. Each of those categories are related to other categories in very specific ways. The following is a summary of those relations in the reference implementation:

Model Structure Validation Result

Child	Parent						
	Network	Table	Axis	Member	LineItems	Abstract	Concept
Network	0	0	0	0	0	0	0
Table	0	0	0	0	0	0	0
Axis	0	48	0	0	0	0	0
Member	0	0	48	44	0	0	0
LineItems	0	32	0	0	0	0	0
Abstract	0	0	0	0	39	20	0
Concept	0	0	0	0	6	191	0

RED means XBRL valuation will detect the issue. ORANGE means error in the structure. YELLOW means that sort of relation is not advisable but it will not break anything. GREEN means that the relations is of the type that is expected.

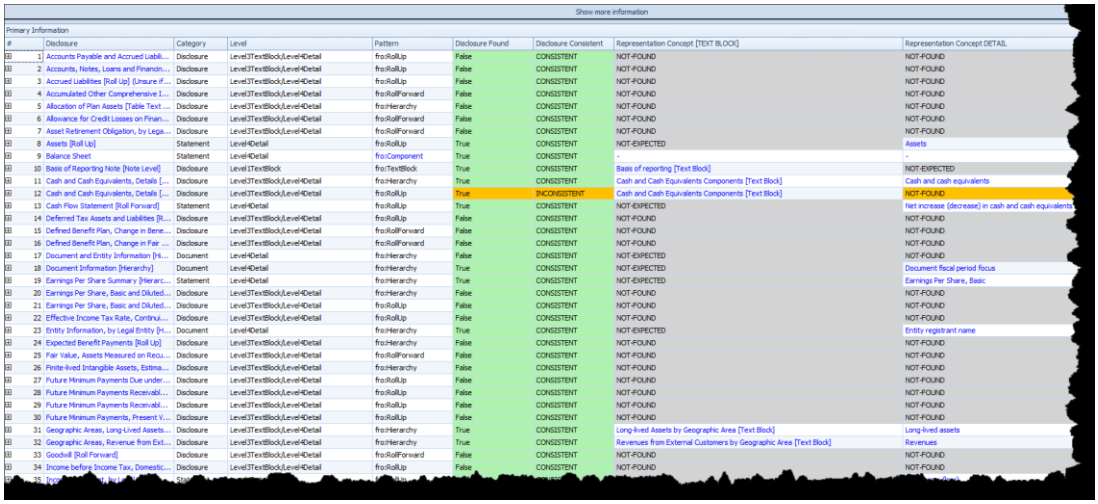
1.36. Fundamental accounting concept relations validation

The following is a summary of fundamental accounting concept relations validation results:

Entity	Period	ID	Test	Result	Amount Of I...	Evaluation
0000000001	2016-FY	FAC_CONSISTENCY_1	fac:Equity = (fac:EquityAttributableToParent + fac:EquityAttributableToNoncontrollingInterest)	True	0	fac:Equity[us-gaap:StockholdersEquityIncludingPortionAttributableToNoncontrollingInterest[40,000,000]] = (fac:EquityAttributableToParent[us-gaap:StockholdersEquity[36,000,000]] + fac:EquityAttributableToNoncontrollingInterest[us-gaap:MinorityInterest[4,000,000]])
0000000001	2016-FY	FAC_CONSISTENCY_10	fac:NetCashFlowFromInvestingActivities = (fac:NetCashFlowFromInvestingActivitiesContinuing + fac:NetCashFlowFromInvestingActivitiesDiscontinued)	True	0	fac:NetCashFlowFromInvestingActivities[15,000,000] = (fac:NetCashFlowFromInvestingActivitiesContinuing[us-gaap:NetCashProvidedByUsedInInvestingActivitiesContinuingOperations[15,000,000]] + fac:NetCashFlowFromInvestingActivitiesDiscontinued[0])
0000000001	2016-FY	FAC_CONSISTENCY_11	fac:NetCashFlowFromFinancingActivities = (fac:NetCashFlowFromFinancingActivitiesContinuing + fac:NetCashFlowFromFinancingActivitiesDiscontinued)	True	0	fac:NetCashFlowFromFinancingActivities[(20,000,000)] = (fac:NetCashFlowFromFinancingActivitiesContinuing[us-gaap:NetCashProvidedByUsedInFinancingActivitiesContinuingOperations[(20,000,000)]] + fac:NetCashFlowFromFinancingActivitiesDiscontinued[0])
0000000001	2016-FY	FAC_CONSISTENCY_12	fac:GrossProfit = (fac:Revenues - fac:CostOfRevenue)	True	0	fac:GrossProfit[us-gaap:GrossProfit[6,000,000]] = (fac:Revenues[us-gaap:Revenues[10,000,000]] - fac:CostOfRevenue[us-gaap:CostOfRevenue[4,000,000]])
0000000001	2016-FY	FAC_CONSISTENCY_13	fac:OperatingIncomeLoss = (fac:GrossProfit - fac:OperatingExpenses)	True	0	fac:OperatingIncomeLoss[us-gaap:OperatingIncomeLoss[4,150,000]] = (fac:GrossProfit[us-gaap:GrossProfit[6,000,000]] - fac:OperatingExpenses[us-gaap:OperatingExpenses[1,850,000]])
0000000001	2016-FY	FAC_CONSISTENCY_15	fac:IncomeLossFromContinuingOperationsBeforeTax = (fac:OperatingIncomeLoss + fac:NonoperatingIncomePlusInterestAndDebtExpensePlusIncomeFromEquityMethodInvestments)	True	0	fac:IncomeLossFromContinuingOperationsBeforeTax[us-gaap:IncomeLossFromContinuingOperationsBeforeIncomeTaxesMinorityInterestAndIncomeLossFromEquityMethodInvestments[7,350,000]] = (fac:OperatingIncomeLoss[us-gaap:OperatingIncomeLoss[4,150,000]] + fac:NonoperatingIncomePlusInterestAndDebtExpensePlusIncomeFromEquityMethodInvestments[3,200,000])
0000000001	2016-FY	FAC_CONSISTENCY_16	fac:IncomeLossFromContinuingOperationsAfterTax = (fac:IncomeLossFromContinuingOperationsBeforeTax - fac:IncomeTaxExpenseBenefit)	True	0	fac:IncomeLossFromContinuingOperationsAfterTax[5,350,000] = (fac:IncomeLossFromContinuingOperationsBeforeTax[us-gaap:IncomeLossFromContinuingOperationsBeforeIncomeTaxesMinorityInterestAndIncomeLossFromEquityMethodInvestments[7,350,000]] - fac:IncomeTaxExpenseBenefit[us-gaap:IncomeTaxExpenseBenefit[2,000,000]])
0000000001	2016-FY	FAC_CONSISTENCY_17	fac:NetIncomeLoss = (fac:IncomeLossFromContinuingOperationsAfterTax + fac:IncomeLossFromDiscontinuedOperationsNetOfTax + fac:ExtraordinaryItemsOfIncomeExpenseNetOfTax)	True	0	fac:NetIncomeLoss[us-gaap:ProfitLoss[5,350,000]] = (fac:IncomeLossFromContinuingOperationsAfterTax[5,350,000] + fac:IncomeLossFromDiscontinuedOperationsNetOfTax[0] + fac:ExtraordinaryItemsOfIncomeExpenseNetOfTax[0])
0000000001	2016-FY	FAC_CONSISTENCY_18	fac:NetIncomeLoss = (fac:NetIncomeLossAttributableToParent + fac:NetIncomeLossAttributableToNoncontrollingInterest)	True	0	fac:NetIncomeLoss[us-gaap:ProfitLoss[5,350,000]] = (fac:NetIncomeLossAttributableToParent[us-gaap:NetIncomeLoss[4,815,000]] + fac:NetIncomeLossAttributableToNoncontrollingInterest[us-gaap:NetIncomeLossAttributableToNoncontrollingInterest[535,000]])
0000000001	2016-FY	FAC_CONSISTENCY_19	fac:NetIncomeLossAvailableToCommonStockholdersBasic = (fac:NetIncomeLossAttributableToParent - fac:PreferredStockDividendsAndOtherAdjustments)	True	0	fac:NetIncomeLossAvailableToCommonStockholdersBasic[4,815,000] = (fac:NetIncomeLossAttributableToParent[us-gaap:NetIncomeLoss[4,815,000]] - fac:PreferredStockDividendsAndOtherAdjustments[0])
0000000001	2016-FY	FAC_CONSISTENCY_2	fac:Assets = fac:LiabilitiesAndEquity	True	0	fac:Assets[us-gaap:Assets[147,000,000]] = fac:LiabilitiesAndEquity[us-gaap:LiabilitiesAndStockholdersEquity[147,000,000]]
0000000001	2016-FY	FAC_CONSISTENCY_20	fac:ComprehensiveIncomeLoss = (fac:ComprehensiveIncomeLossAttributableToParent + fac:ComprehensiveIncomeLossAttributableToNoncontrollingInterest)	True	0	fac:ComprehensiveIncomeLoss[us-gaap:ComprehensiveIncomeNetOfTaxIncludingPortionAttributableToNoncontrollingInterest[9,000,000]] = (fac:ComprehensiveIncomeLossAttributableToParent[us-gaap:ComprehensiveIncomeNetOfTax[1,000,000]] + fac:ComprehensiveIncomeLossAttributableToNoncontrollingInterest[us-gaap:ComprehensiveIncomeNetOfTaxAttributableToNoncontrollingInterest[2,000,000]])
0000000001	2016-FY	FAC_CONSISTENCY_21	fac:ComprehensiveIncomeLoss = (fac:NetIncomeLoss + fac:OtherComprehensiveIncomeLoss)	True	0	fac:ComprehensiveIncomeLoss[us-gaap:ComprehensiveIncomeNetOfTaxIncludingPortionAttributableToNoncontrollingInterest[9,000,000]] = (fac:NetIncomeLoss[us-gaap:ProfitLoss[5,350,000]] + fac:OtherComprehensiveIncomeLoss[us-gaap:OtherComprehensiveIncomeLossNetOfTax[3,650,000]])
0000000001	2016-FY	FAC_CONSISTENCY_3	fac:Assets = (fac:CurrentAssets + fac:NoncurrentAssets)	True	0	fac:Assets[us-gaap:Assets[147,000,000]] = (fac:CurrentAssets[us-gaap:AssetsCurrent[56,000,000]] + fac:NoncurrentAssets[us-gaap:AssetsNoncurrent[91,000,000]])
0000000001	2016-FY	FAC_CONSISTENCY_4	fac:Liabilities = (fac:CurrentLiabilities + fac:NoncurrentLiabilities)	True	0	fac:Liabilities[107,000,000] = (fac:CurrentLiabilities[us-gaap:LiabilitiesCurrent[55,000,000]] + fac:NoncurrentLiabilities[us-gaap:LiabilitiesNoncurrent[52,000,000]])
0000000001	2016-FY	FAC_CONSISTENCY_5	fac:LiabilitiesAndEquity = (fac:Liabilities + fac:CommitmentsAndContingencies + fac:TemporaryEquity + fac:Equity)	True	0	fac:LiabilitiesAndEquity[us-gaap:LiabilitiesAndStockholdersEquity[147,000,000]] = (fac:Liabilities[107,000,000] + fac:CommitmentsAndContingencies[us-gaap:CommitmentsAndContingencies[0]] + fac:TemporaryEquity[0] + fac:Equity[us-gaap:StockholdersEquityIncludingPortionAttributableToNoncontrollingInterest[40,000,000]])
0000000001	2016-FY	FAC_CONSISTENCY_50	fac:NetCashFlow = (fac:NetCashFlowContinuing + fac:NetCashFlowDiscontinued + fac:ExchangeGainsLosses)	True	0	fac:NetCashFlow[us-gaap:CashAndCashEquivalentsPeriodIncreaseDecrease[1,000,000]] = (fac:NetCashFlowContinuing[920,000] + fac:NetCashFlowDiscontinued[0] + fac:ExchangeGainsLosses[us-gaap:EffectOfExchangeRateOnCashAndCashEquivalents[80,000]])
0000000001	2016-FY	FAC_CONSISTENCY_6	fac:NetCashFlow = (fac:NetCashFlowFromOperatingActivities + fac:NetCashFlowFromInvestingActivities + fac:NetCashFlowFromFinancingActivities + fac:ExchangeGainsLosses)	True	0	fac:NetCashFlow[us-gaap:CashAndCashEquivalentsPeriodIncreaseDecrease[1,000,000]] = (fac:NetCashFlow[us-gaap:CashProvidedByUsedInOperatingActivities[5,920,000]] + fac:NetCashFlowFromInvestingActivities[15,000,000] + fac:NetCashFlowFromFinancingActivities[(20,000,000)] + fac:ExchangeGainsLosses[us-gaap:EffectOfExchangeRateOnCashAndCashEquivalents[80,000]])
0000000001	2016-FY	FAC_CONSISTENCY_7	fac:NetCashFlowContinuing = (fac:NetCashFlowFromOperatingActivitiesContinuing + fac:NetCashFlowFromInvestingActivitiesContinuing + fac:NetCashFlowFromFinancingActivitiesContinuing)	True	0	fac:NetCashFlowContinuing[920,000] = (fac:NetCashFlowFromOperatingActivitiesContinuing[us-gaap:NetCashProvidedByUsedInOperatingActivitiesContinuingOperations[5,920,000]] + fac:NetCashFlowFromInvestingActivitiesContinuing[us-gaap:NetCashProvidedByUsedInInvestingActivitiesContinuingOperations[15,000,000]] + fac:NetCashFlowFromFinancingActivitiesContinuing[us-gaap:NetCashProvidedByUsedInFinancingActivitiesContinuingOperations[(20,000,000)]])
0000000001	2016-FY	FAC_CONSISTENCY_8	fac:NetCashFlowDiscontinued = (fac:NetCashFlowFromOperatingActivitiesDiscontinued + fac:NetCashFlowFromInvestingActivitiesDiscontinued + fac:NetCashFlowFromFinancingActivitiesDiscontinued)	True	0	fac:NetCashFlowDiscontinued[0] = (fac:NetCashFlowFromOperatingActivitiesDiscontinued[0] + fac:NetCashFlowFromInvestingActivitiesDiscontinued[0] + fac:NetCashFlowFromFinancingActivitiesDiscontinued[0])
0000000001	2016-FY	FAC_CONSISTENCY_9	fac:NetCashFlowFromOperatingActivities = (fac:NetCashFlowFromOperatingActivitiesContinuing + fac:NetCashFlowFromOperatingActivitiesDiscontinued)	True	0	fac:NetCashFlowFromOperatingActivities[5,920,000] = (fac:NetCashFlowFromOperatingActivitiesContinuing[us-gaap:NetCashProvidedByUsedInOperatingActivitiesContinuingOperations[5,920,000]] + fac:NetCashFlowFromOperatingActivitiesDiscontinued[0])

1.37. Disclosure mechanics validation

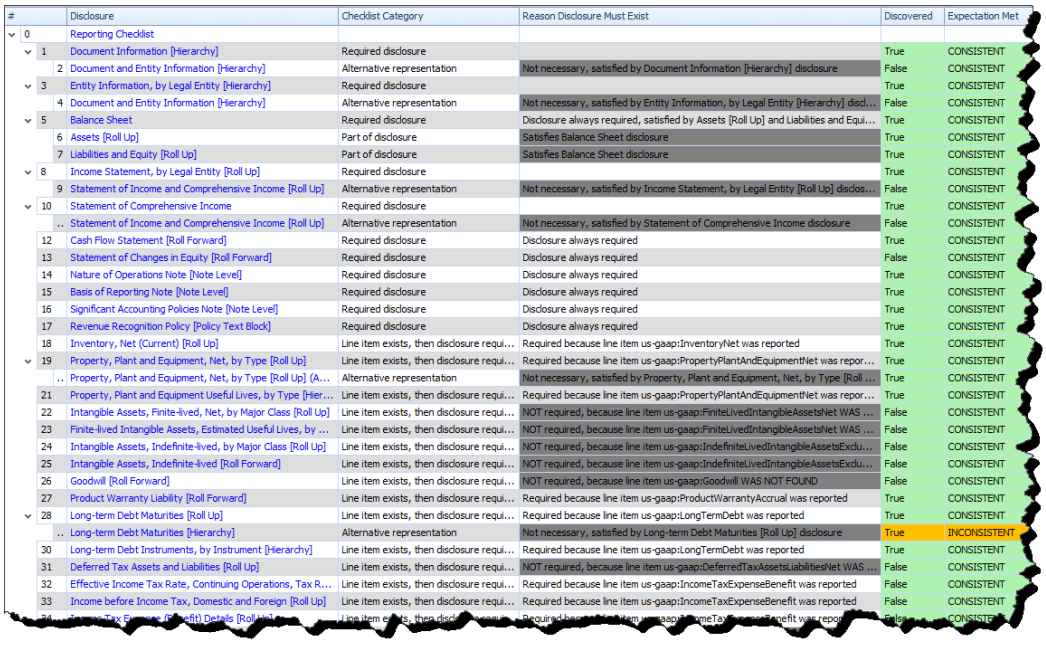
The following is a screen shot of the disclosure mechanics validation results. (This is a work in progress).



#	Disclosure	Category	Level	Pattern	Disclosure Found	Disclosure Consistent	Representation Concept [TEXT BLOCK]	Representation Concept DETAIL
1	Accounts Payable and Accrued Liabi...	Disclosure	Level3TextBlock/Level4Detail	fro:RollUp	False	CONSISTENT	NOT-FOUND	NOT-FOUND
2	Accounts, Notes, Loans and Financin...	Disclosure	Level3TextBlock/Level4Detail	fro:RollUp	False	CONSISTENT	NOT-FOUND	NOT-FOUND
3	Accrued Liabilities [Roll Up] (Unsure if ...	Disclosure	Level3TextBlock/Level4Detail	fro:RollUp	False	CONSISTENT	NOT-FOUND	NOT-FOUND
4	Accumulated Other Comprehensive I...	Disclosure	Level3TextBlock/Level4Detail	fro:RollForward	False	CONSISTENT	NOT-FOUND	NOT-FOUND
5	Allocation of Plan Assets [Table Text ...	Disclosure	Level3TextBlock/Level4Detail	fro:Hierarchy	False	CONSISTENT	NOT-FOUND	NOT-FOUND
6	Allowance for Credit Losses on Finan...	Disclosure	Level3TextBlock/Level4Detail	fro:RollForward	False	CONSISTENT	NOT-FOUND	NOT-FOUND
7	Asset Retirement Obligation, by Lega...	Disclosure	Level3TextBlock/Level4Detail	fro:RollForward	False	CONSISTENT	NOT-FOUND	NOT-FOUND
8	Assets [Roll Up]	Statement	Level4Detail	fro:RollUp	True	CONSISTENT	NOT-EXPECTED	Assets
9	Balance Sheet	Statement	Level4Detail	fro:Component	True	CONSISTENT	-	-
10	Basis of Reporting Note [Note Level]	Disclosure	Level1TextBlock	fro:TextBlock	True	CONSISTENT	Basis of reporting [Text Block]	NOT-EXPECTED
11	Cash and Cash Equivalents, Details [...	Disclosure	Level3TextBlock/Level4Detail	fro:Hierarchy	True	CONSISTENT	Cash and Cash Equivalents Components [Text Block]	Cash and cash equivalents
12	Cash and Cash Equivalents, Details [...	Disclosure	Level3TextBlock/Level4Detail	fro:RollUp	True	INCONSISTENT	Cash and Cash Equivalents Components [Text Block]	NOT-FOUND
13	Cash Flow Statement [Roll Forward]	Statement	Level4Detail	fro:RollUp	True	CONSISTENT	NOT-EXPECTED	Net increase (decrease) in cash and cash equivalents
14	Deferred Tax Assets and Liabilities [R...	Disclosure	Level3TextBlock/Level4Detail	fro:RollUp	False	CONSISTENT	NOT-FOUND	NOT-FOUND
15	Defined Benefit Plan, Change in Bene...	Disclosure	Level3TextBlock/Level4Detail	fro:RollForward	False	CONSISTENT	NOT-FOUND	NOT-FOUND
16	Defined Benefit Plan, Change in Fair ...	Disclosure	Level3TextBlock/Level4Detail	fro:RollForward	False	CONSISTENT	NOT-FOUND	NOT-FOUND
17	Document and Entity Information [Hi...	Document	Level4Detail	fro:Hierarchy	False	CONSISTENT	NOT-EXPECTED	NOT-FOUND
18	Document Information [Hierarchy]	Document	Level4Detail	fro:Hierarchy	True	CONSISTENT	NOT-EXPECTED	Document fiscal period focus
19	Earnings Per Share Summary [Hierarc...	Statement	Level4Detail	fro:Hierarchy	True	CONSISTENT	NOT-EXPECTED	Earnings Per Share, Basic
20	Earnings Per Share, Basic and Diluted...	Disclosure	Level3TextBlock/Level4Detail	fro:Hierarchy	False	CONSISTENT	NOT-FOUND	NOT-FOUND
21	Earnings Per Share, Basic and Diluted...	Disclosure	Level3TextBlock/Level4Detail	fro:RollUp	False	CONSISTENT	NOT-FOUND	NOT-FOUND
22	Effective Income Tax Rate, Continui...	Disclosure	Level3TextBlock/Level4Detail	fro:RollUp	False	CONSISTENT	NOT-FOUND	NOT-FOUND
23	Entity Information, by Legal Entity [H...	Document	Level4Detail	fro:Hierarchy	True	CONSISTENT	NOT-EXPECTED	Entity registrant name
24	Expected Benefit Payments [Roll Up]	Disclosure	Level3TextBlock/Level4Detail	fro:Hierarchy	False	CONSISTENT	NOT-FOUND	NOT-FOUND
25	Fair Value, Assets Measured on Recu...	Disclosure	Level3TextBlock/Level4Detail	fro:RollForward	False	CONSISTENT	NOT-FOUND	NOT-FOUND
26	Finite-lived Intangible Assets, Estima...	Disclosure	Level3TextBlock/Level4Detail	fro:Hierarchy	False	CONSISTENT	NOT-FOUND	NOT-FOUND
27	Future Minimum Payments Due under...	Disclosure	Level3TextBlock/Level4Detail	fro:RollUp	False	CONSISTENT	NOT-FOUND	NOT-FOUND
28	Future Minimum Payments Receivabl...	Disclosure	Level3TextBlock/Level4Detail	fro:RollUp	False	CONSISTENT	NOT-FOUND	NOT-FOUND
29	Future Minimum Payments Receivabl...	Disclosure	Level3TextBlock/Level4Detail	fro:RollUp	False	CONSISTENT	NOT-FOUND	NOT-FOUND
30	Future Minimum Payments, Present V...	Disclosure	Level3TextBlock/Level4Detail	fro:RollUp	False	CONSISTENT	NOT-FOUND	NOT-FOUND
31	Geographic Areas, Long-Lived Assets...	Disclosure	Level3TextBlock/Level4Detail	fro:Hierarchy	True	CONSISTENT	Long-lived Assets by Geographic Area [Text Block]	Long-lived assets
32	Geographic Areas, Revenue from Ext...	Disclosure	Level3TextBlock/Level4Detail	fro:Hierarchy	True	CONSISTENT	Revenues from External Customers by Geographic Area [Text Block]	Revenues
33	Goodwill [Roll Forward]	Disclosure	Level3TextBlock/Level4Detail	fro:RollForward	False	CONSISTENT	NOT-FOUND	NOT-FOUND
34	Income before Income Tax, Domestic...	Disclosure	Level3TextBlock/Level4Detail	fro:RollUp	False	CONSISTENT	NOT-FOUND	NOT-FOUND

1.38. Reporting checklist validation

The following is a summary of the reporting checklist validation results. (This is a work in progress).



#	Disclosure	Checklist Category	Reason Disclosure Must Exist	Discovered	Expectation Met
0	Reporting Checklist				
1	Document Information [Hierarchy]	Required disclosure		True	CONSISTENT
2	Document and Entity Information [Hierarchy]	Alternative representation	Not necessary, satisfied by Document Information [Hierarchy] disclosure	False	CONSISTENT
3	Entity Information, by Legal Entity [Hierarchy]	Required disclosure		True	CONSISTENT
4	Document and Entity Information [Hierarchy]	Alternative representation	Not necessary, satisfied by Entity Information, by Legal Entity [Hierarchy] disc...	False	CONSISTENT
5	Balance Sheet	Required disclosure	Disclosure always required, satisfied by Assets [Roll Up] and Liabilities and Equi...	True	CONSISTENT
6	Assets [Roll Up]	Part of disclosure	Satisfies Balance Sheet disclosure	True	CONSISTENT
7	Liabilities and Equity [Roll Up]	Part of disclosure	Satisfies Balance Sheet disclosure	True	CONSISTENT
8	Income Statement, by Legal Entity [Roll Up]	Required disclosure		True	CONSISTENT
9	Statement of Income and Comprehensive Income [Roll Up]	Alternative representation	Not necessary, satisfied by Income Statement, by Legal Entity [Roll Up] disclos...	False	CONSISTENT
10	Statement of Comprehensive Income	Required disclosure		True	CONSISTENT
..	Statement of Income and Comprehensive Income [Roll Up]	Alternative representation	Not necessary, satisfied by Statement of Comprehensive Income disclosure	False	CONSISTENT
12	Cash Flow Statement [Roll Forward]	Required disclosure	Disclosure always required	True	CONSISTENT
13	Statement of Changes in Equity [Roll Forward]	Required disclosure	Disclosure always required	False	CONSISTENT
14	Nature of Operations Note [Note Level]	Required disclosure	Disclosure always required	True	CONSISTENT
15	Basis of Reporting Note [Note Level]	Required disclosure	Disclosure always required	True	CONSISTENT
16	Significant Accounting Policies Note [Note Level]	Required disclosure	Disclosure always required	True	CONSISTENT
17	Revenue Recognition Policy [Policy Text Block]	Required disclosure	Disclosure always required	True	CONSISTENT
18	Inventory, Net (Current) [Roll Up]	Line item exists, then disclosure requi...	Required because line item us-gaap:InventoryNet was reported	True	CONSISTENT
19	Property, Plant and Equipment, Net, by Type [Roll Up]	Line item exists, then disclosure requi...	Required because line item us-gaap:PropertyPlantAndEquipmentNet was repor...	True	CONSISTENT
..	Property, Plant and Equipment, Net, by Type [Roll Up] (A...	Alternative representation	Not necessary, satisfied by Property, Plant and Equipment, Net, by Type [Roll ...	True	CONSISTENT
21	Property, Plant and Equipment Useful Lives, by Type [Hier...	Line item exists, then disclosure requi...	Required because line item us-gaap:PropertyPlantAndEquipmentNet was repor...	True	CONSISTENT
22	Intangible Assets, Finite-lived, Net, by Major Class [Roll Up]	Line item exists, then disclosure requi...	NOT required, because line item us-gaap:FiniteLivedIntangibleAssetsNet WAS ...	False	CONSISTENT
23	Finite-lived Intangible Assets, Estimated Useful Lives, by ...	Line item exists, then disclosure requi...	NOT required, because line item us-gaap:FiniteLivedIntangibleAssetsNet WAS ...	False	CONSISTENT
24	Intangible Assets, Indefinite-lived, by Major Class [Roll Up]	Line item exists, then disclosure requi...	NOT required, because line item us-gaap:IndefiniteLivedIntangibleAssetsExclu...	False	CONSISTENT
25	Intangible Assets, Indefinite-lived [Roll Forward]	Line item exists, then disclosure requi...	NOT required, because line item us-gaap:IndefiniteLivedIntangibleAssetsExclu...	False	CONSISTENT
26	Goodwill [Roll Forward]	Line item exists, then disclosure requi...	NOT required, because line item us-gaap:Goodwill WAS NOT FOUND	False	CONSISTENT
27	Product Warranty Liability [Roll Forward]	Line item exists, then disclosure requi...	Required because line item us-gaap:ProductWarrantyAccrual was reported	True	CONSISTENT
28	Long-term Debt Maturities [Roll Up]	Line item exists, then disclosure requi...	Required because line item us-gaap:LongTermDebt was reported	True	CONSISTENT
..	Long-term Debt Maturities [Hierarchy]	Alternative representation	Not necessary, satisfied by Long-term Debt Maturities [Roll Up] disclosure	True	INCONSISTENT
30	Long-term Debt Instruments, by Instrument [Hierarchy]	Line item exists, then disclosure requi...	Required because line item us-gaap:LongTermDebt was reported	True	CONSISTENT
31	Deferred Tax Assets and Liabilities [Roll Up]	Line item exists, then disclosure requi...	NOT required, because line item us-gaap:DeferredTaxAssetsLiabilitiesNet WAS ...	False	CONSISTENT
32	Effective Income Tax Rate, Continuing Operations, Tax R...	Line item exists, then disclosure requi...	Required because line item us-gaap:IncomeTaxExpenseBenefit was reported	True	CONSISTENT
33	Income before Income Tax, Domestic and Foreign [Roll Up]	Line item exists, then disclosure requi...	Required because line item us-gaap:IncomeTaxExpenseBenefit was reported	False	CONSISTENT

For more information please see *Blueprint for Creating Zero-Defect XBRL-based Digital Financial Reports*[6].

[6] *Blueprint for Creating Zero-Defect XBRL-based Digital Financial Reports*, http://xbrlsite.azurewebsites.net/2017/Library/BlueprintForZeroDefectDigitalFinancialReports.pdf