Understanding the Mechanics of an SEC-type XBRL-based Digital Financial Report

by

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ABSTRACT:

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

The audience for this document is accounting professionals creating such digital financial reports, analysts and investors wishing to make use of information contained within such reports, and other business professionals.

This information is also likely helpful to information technology professionals building software for those creating or using information from SEC-style digital financial reports.

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1. Introduction

Section 6 of the SEC EDGAR Filer Manual¹ (EFM), the "Tagging Instructions" makes the following statement:

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

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

This document builds upon the following documents:

- Understanding the Basic Mechanics of a Digital Financial Report²
- Important Issues, Considerations, and Opportunities for Accounting Professionals in Creating the Digital Financial Report³
- Financial Report Semantics and Dynamics Theory⁴
- Summary Information about Conformance with Fundamental Accounting Concept Relations⁵
- Digital Financial Reporting Principles⁶

We strongly encourage anyone reading this document who is interested in understanding this information in detail to take the time to read those foundational documents. We will summarize information from those foundational documents in this document, but we will not re-explain rational behind conclusions used in this document. Please refer to those prior documents for such background.

Further, footnotes are used extensively to refer to additional background material and other supporting material. Again, use of this supporting material is strongly encouraged for those who choose to understand the rational for information in this document.

¹ EDGAR Filer Manual (Version 29), <u>http://www.sec.gov/info/edgar/edgarfm-vol2-v29.pdf</u>

² Understanding the Basic Mechanics of a Digital Financial Report,

http://www.xbrlsite.com/2015/Library/UnderstandingTheMechanicsOfDigitalFinancialReport.pdf ³ Important Issues, Considerations, and Opportunities for Accounting Professionals in Creating the Digital Financial Report, http://www.xbrlsite.com/2015/Library/IssuesAndConsiderationsInCreatingDigitalFinancialReporting.pdf

⁴ Financial Report Semantics and Dynamics Theory, <u>http://xbrl.squarespace.com/fin-report-sem-dyn-theory/</u> ⁵ Summary Information about Conformance with Fundamental Accounting Concept Relations,

http://www.xbrlsite.com/2014/Library/SummaryInformationAboutConformanceWithFundamentalAccountingConc eptRelations.pdf

⁶ Digital Financial Reporting Principles, <u>http://www.xbrlsite.com/2015/Library/DigitalFinancialReportingPrinciples-</u> 2015-01-05.pdf

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The purpose of this document is to move toward a safe global standard format for a digital financial report that works reliably and predictably. In that spirit, consider the following definitions of arbitrary and standard:

- **Arbitrary**: based on random choice or personal whim, rather than any reason or system; depending on individual discretion (as of a judge) and not fixed by law
- **Standard**: used or accepted as normal; something established by authority, custom, or general consent as a model or example

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

Digital financial reports contain thousands and sometimes many thousands of individual pieces or structures. These structures, formatted in machine-readable form using XBRL, are used to represent the information contained in the digital financial report. There are two distinct aspects of these pieces or structures that are important to recognize:

- **objective aspects** which are mechanical and do not require judgment and therefore can be managed using automated machine-based processes.
- **subjective aspects** which require the professional judgment of a skilled accountant, therefore they must be managed by humans.

These objective mechanical aspects are distinct from the subjective aspects which require professional judgment. The mechanical aspects relate to the things and relations between the things which make up a digital financial report. These mechanical aspects are governed by rules of logic, common sense, and mathematics. These mechanical aspects are what make up the structure of a financial report. These objective aspects are the scope of this document.

Subjective aspects generally relate to what should go into the financial report. These subjective aspects are not in scope of what is addressed by this document.

Information technology professionals creating software for business professionals need to be aware of the mechanical things and relations between things which make up a financial report in order to create software useful to business professionals. With useful software the mechanical aspects can be handled by

software freeing accounting professionals to use their skills in area which are impossible to automate, areas which require the professional judgment of a skilled human.

Is the purpose for each individual to dig their heels into the ground and insist that their arbitrary reality is the only reality? Or is the purpose to consciously create a coordinated, shared, commonly accepted, standard, useful view of reality to achieve a specific purpose: so that reality does appear to be objective and stable enough yet nuanced enough to be useful so that information can be used safely, reliably, predictably, repeatedly by both human and automated machine-based processes. The desired system state is one of balance or equilibrium; of consistency.

Prudence dictates that using financial information from a digital financial report not be a guessing game. It is only through conscious effort that the specific control mechanisms can be put in place to realize this intent. This document helps to identify and create those control mechanisms.

It is only through conscious collaboration, cooperation and coordination by the participants of the financial reporting supply chain that that XBRL-based digital financial reporting will work safely, reliably, predictably, repeatedly, effectively, and efficiently. That is the goal.

Conscious and skillful execution by knowledgeable professionals from the accounting profession, information technology profession, and knowledge engineering profession, using this approach can create digital financial reporting which is simple and elegant; and yet a sophisticated and powerful tool. This document is intended to contribute to that endeavor.

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2. Summary of the Basic Mechanics of a Digital Financial Report

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

a. Foundational terms

We will use foundational terminology which is consistent with the state-of-the-art W3C vocabularies for describing the information of a problem domain or area of concern, the Semantic Web⁷ terms:

- **Thing**: A thing is something that exists in the real world, in the problem domain, in the area of concern. A thing is just a class that all classes and individuals of the problem domain must belong to. All classes are subclasses of thing. Every individual must be of some class. Every class is a thing. Therefore since all classes are subclasses of thing; then all individuals are likewise ultimately a thing. "Nothing" is the opposite of thing.
- **Individual**: An individual is some specific item that exists in reality. For example, a specific person such as *Bill Gates III*, a specific report such as *Fiscal year 2014 financial statement*, a specific economic entity such as *Microsoft Corp*. An individual exists only once.
- **Class**: A class is a set or category of individuals that have one or more distinguishing features in common which differentiates the class from other classes. For example *person* is the class consisting of all persons of which *Bill Gates III* is a member. Each problem domain can be captured in terms of a family of classes, together with a set of relations. The most important relation is the subclass relation (also called *is-a*) which organizes the classes in a taxonomic tree. Other key types of relations are *whole-part* and *has-part*.
- **Property**: A property is a trait, quality, feature, attribute of an individual, for example the property of *being male* of a person, of *being filed* of a report, and so on.

⁷ Semantic Web, <u>http://www.w3.org/standards/semanticweb/</u>

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- **Relations between individuals:** one individual can be related to another individual, as when *Bill* is *brother-of Dave*, *Bill* is *owner-of the building at 1835 73rd Ave NE, Medina*, and so on.
- **Relations between classes**: when every member of a certain class stands in a certain relation to some member of another class, then the relation is universal and we can formulate this as a relation between classes. So for example because every brother *is identical to* some male person, we can assert this as a *relation* between the classes *brother* and *male person* to the effect that *brother is-a male person* – in other words the class *brother* is included as a subclass in the class *male person*. If every *financial report* has some *statement* as part, then we can assert *financial report has-part statement*. Relations between classes are universal and apply to every member of that class.

A digital financial report is a finite set of structural, mechanical things. As such, the finite system a useful tool because it is safe, predictable, reliable, results are repeatable, and no unexpected complexity-caused blowups will ever occur. That is the underlying purpose for using this approach: to eliminate risk and unexpected results. This system makes the closed world assumption. This system is decidable and therefore a conclusion can be reached with regard to the consistency of an instance of a digital financial report with this description.

Another term used to describe relations is business rule. The Business Rules Manifesto⁸ does a good job of describing what a business rule is. Article 9; *Of, By, and For Business People, Not IT People*; points out the need for these business rules to be managed by business professionals:

- 9.1. Rules should arise from knowledgeable business people.
- 9.2. Business people should have tools available to help them formulate, validate, and manage rules.
- 9.3. Business people should have tools available to help them verify business rules against each other for consistency.

Business professionals are the ones who understand the problem domain. As such, business professionals are the ones who understand the business rules or relations between the things in their problem domain.

⁸ Business Rules Manifesto, <u>http://www.businessrulesgroup.org/brmanifesto.htm</u>

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b. Classes

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

- **Economic entity**: Economic or accounting entity which creates a report.
- **Report**: A report is created by an economic entity. By report we mean digital financial report.
- **Component**: A report is made up of pieces. The pieces of a report are called a component. A component contains or groups a sets of facts. (Another term for component is Report Fragment⁹.)
- **Characteristic**: Characteristics describe and distinguish facts contained within a component from other facts. (Another term for characteristic is Aspect¹⁰.)
- **Fact**: A fact is reported and can be organized into components and described by characteristics. Another term for fact is Data Point.
- **Parenthetical explanation**: A parenthetical explanation provides additional descriptive information about a fact.
- **Block**: A block is a part¹¹ of a component; a component is made up of one to many blocks.
- Whole-part¹² relation: A whole-part relations is something composed exactly of their parts and nothing else or more where the parts add up to the whole.
- **Is-a relation**: An is-a relation describes some list but the list does not add up mathematically.

⁹ The US GAAP Taxonomy Architecture uses the term report fragment, <u>http://xbrl.us/Documents/SECOFM-USGAAPT-Architecture-20080428.pdf</u>

¹⁰ The XBRL Abstract Model 2.0 uses the term Aspect, <u>http://www.xbrl.org/Specification/abstractmodel-</u> primary/PWD-2012-06-06/abstractmodel-primary-pwd-2012-06-06.html

¹¹ A block is a sub-set of a component. For example, the disclosure Funding Status of Defined Benefit Plans is made up of two roll forwards, a roll up, and a hierarchy each of which is a block of the component, see <u>http://www.xbrlsite.com/2013/ReportingTemplates/2013-05-15/Library/730000-003-</u> <u>FundingStatusOfDefinedBenefitPlans/Template.jpg</u>

¹² Toward Understanding Whole-Part Relations, <u>http://xbrl.squarespace.com/journal/2015/1/20/toward-understanding-whole-part-relations.html</u>

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• **Properties**: Each economic entity, report, component, characteristic, fact, block, and relation has a finite set of properties.

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

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

c. Slots

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

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

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

You cannot add a second total to a roll up as a roll up only has one total. It would not make logical sense to add a second total to a roll up. Other terms used to describe this are illogical or irrational. What makes sense is to add another line item to the total of the roll up, somewhere in the list of existing line items. One slot is adding a line item between *Land* and *Machinery and equipment, gross*. Another slot is adding a line item before the first item *Land*.

Further, *what* you add to the list is also constrained. For example, what you add needs to be a number as a roll up involves showing how some list of numbers rolls up. You would not add text. And it cannot be just any number, it needs to be an "as of" type number (as contrast to a "for period" number from, say, the income statement). Why? Because all of the other numbers in the list are "as of" some balance sheet date, not "for period" of some income statement or cash flow statement period.

There is another slot which makes sense in the information above. You can see that there are two periods. Adding information for a third or even more periods makes sense. It could also make sense to add an entirely new characteristic such as Geographic Area [Axis] and break down the information by that dimension.

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

d. Creating/adding subclasses or individuals into slots

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

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

The following is a summary of subclasses and individuals which may be added to a digital financial report:

- Adding new economic/accounting entities: (Individual) An economic/accounting or reporting entity is created by creating a new instance of identifier. For example the CIK number of a public company which reports to the SEC.
- **Adding new report**: (Individual) A new report is created by creating a new report instance. For example, Microsoft submits a new financial report for fiscal year ended 2014.
- Adding a new characteristic: (Subclass and/or Individual) A new characteristic can be added but the characteristic MUST be distinguished as being either a "whole-part" or "is-a" type of relation or some existing subclass of existing relations (which must be one of those two). For example, Microsoft uses the existing characteristic "Legal Entity [Axis]" (which is a whole-part type relation) or Microsoft creates the characteristic "Tax Entity

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[Axis]" and distinguishes that characteristic as being a "whole-part" type of relation.

- Adding new concept characteristic: (Subclass and/or Individual) A new concept can be added but the concept MUST be distinguished as being a subclass of some existing concept or distinguished as being a new type of class (if that is allowed). For example, Microsoft might add a new concept to its balance sheet such as "Ultra-tangible asset"; however it MUST NOT break the rules of a "roll up" because a balance sheet is a roll up. Further, the added concept MUST be identified as a subclass of something that exists on a balance sheet which can contain ONLY assets, liabilities, or equity.
- Adding new disclosure (component or block): (Subclass and/or Individual) A disclosure is in essence a set of facts which must be disclosed. A set of facts is represented as a component and that component might have one or many blocks. To add a new disclosure, a reporting entity simply creates a new component and/or block individual. That individual of the class component MUST be (i.e. follow) the relations patterns of the existing component which the individual is a member of. For example, if Microsoft creates a "balance sheet" individual, it must associate that individual with the existing class "balance sheet" and therefore must follow the relation rules of a roll up because the existing component "balance sheet" is a roll up. Why? Because a balance sheet is a roll up, it is not ever a roll forward. Now, a reporting entity could also, if they desired, create a new subclass of "balance sheet" called "my balance sheet" and associate it with the class "balance sheet". Or, a company could create an entirely new disclosure such as "cash and cash equivalents by county", associate that disclosure not with some existing disclosure but rather with the root class "component" and then provide a completely new disclosure. However, what the reporting entity may NOT do is create some new relations pattern, it must use existing relations patterns (i.e. no new relation patterns can be added). Basically, any individual MUST follow the rules as must any new class.
- Adding facts: (Individual) A fact is always an individual. Facts are put into blocks which go into components. Facts are never "free floating in space". Every fact has distinguishing aspects to make them identifiable from other reported facts. Facts are described by characteristics, exist within a report, and are reported by an economic/accounting entity. For example, the accounting entity Microsoft might report the fact 1,000,000 which relates to

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the consolidated entity, to the current balance sheet date of December 31, 2014, be reported in US Dollars, and report the balance sheet line item Cash and cash equivalents. That fact might be in the component balance sheet and has a relation between the concept Current assets in that it rolls up to that total.

- Adding new parenthetical explanation to fact: (Individual) One or many parenthetical explanations can be added to a fact to further describe the face.
- **Adding new properties**: New properties MUST NEVER be added, XBRLbased financial filings to the SEC does not allow the addition of new properties, there is no "slot" available where new properties may be added.

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

e. Patterns

A pattern is something that recurs. The world is full of patterns and information technology engineers leverage these patterns when trying to get a computer to do something effectively and efficiently for humans. Understanding the patterns which exist can help make both building and using software easier.

Patterns perform two fundamental tasks. First, they enable implementation of functionality at a higher-level. So rather than working with low-level pieces, business professionals can interact with higher-level ideas. This is like working with "Lego blocks" to build something. Second, patterns provide boundaries. Boundaries are necessary in order to make a system work safely and predictably.

The following types patterns exist in digital financial reports:

• **Concept arrangement pattern**: Concept arrangement patterns are relations between the Concepts and Abstracts which make up a set of [Line Items]

- Whole-part
 - Roll up
 - Roll forward
 - Adjustment
- o Is-a
 - Hierarchy (or Set)
 - Text Block
- **Member arrangement pattern**: Member arrangement patterns are relations between the set of [Member]s of an [Axis].
 - Whole-part
 - o Is-a
- Network arrangement pattern: A network arrangement pattern is the sequence or order of the set of networks of a digital financial report

 Is-a

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

f. Block

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

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

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

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

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

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

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

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

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

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

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

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

Consider the component taken from an XBRL-based public company financial filing submitted to the SEC below. The component contains six different blocks of information: one hierarchy and five roll ups. But it is harder to understand the information because the pieces are not separated.

Software can create the separations for business users making use of the information within a component. Different disclosures can be identified by their structural signatures. A roll up always has (or always should have) XBRL calculation relations expressed. A roll forward always has an XBRL preferred label role for the start date and another for the end date of the roll forward. These structural signatures can be used by software to help business users making use of reported information. The more creators of information help the software, the better the experience software can provide to business users.

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Commitments (Details) (USD \$)	12 Months Ended		ed
In Millions, unless otherwise specified	Oct. 31, 2012	Oct. 31, 2011	Oct. 31, 2010
Commitments			
Rent expense	\$ 1,012	\$ 1,042	\$ 1,062
Sublease rental income	37	38	46
Property under capital lease	882	577	
Accumulated depreciation on property under capital lease	453	454	
Minimum lease payments, sublease rental income			
Minimum lease payments, 2013	780		
Minimum lease payments, 2014	665		
Minimum lease payments, 2015	517		
Minimum lease payments, 2016	351		
Minimum lease payments, 2017	218		
Minimum lease payments, thereafter	805		
Minimum lease payments, total	3,336		
Less: Sublease rental income, 2013	(28)		
Less: Sublease rental income, 2014	(23)		
Less: Sublease rental income 2015	(18)		
Less: Sublease rental income, 2016	(9)		
Less: Sublease rental income 2017	(4)		
Less: Sublease rental income, thereafter	(12)		
Sublease rental income total	(94)		
Minimum lease payments net of sublease	752		
Minimum lease payments net of sublease rental income 2014	642		
Minimum lease payments net of sublease rental income. 2015	499		
Minimum lease payments net of sublease rental income, 2016	342		
Minimum lease payments net of sublease rental income, 2017	214		
Minimum lease payments net of sublease rental income, thereafter	793		
Minimum lease payments net of sublease rental income, total	3,242		
Capital lease commitments			
Capital lease commitments, 2013	59		
Capital lease commitments, 2014	240		
Capital lease commitments, 2015	11		
Capital lease commitments, 2016	7		
Capital lease commitments, 2017	4		
Capital lease commitments, thereafter	33		
Capital lease commitments, total	354		
Less: Interest payments, 2013	(8)		
Less: Interest payments, 2014	(6)		
Less: Interest payments, 2015	(3)		
Less: Interest payments, 2016	(2)		
Less: Interest payments, 2017	(2)		
Less Interest payments, thereafter	(12)		
Interest payments, total	(33)		

Here is one final example. Below you see four blocks: the first two are [Roll Forward]s, the third a [Roll Up], and the fourth a [Hierarchy]. The two [Roll Forward]s are connected to the [Roll Up], the ending balances of the [Roll Forward]s are the items which are being rolled up in the [Roll Up]. Because the information is represented correctly and because the rendering engine which produced the renderings from the machine-readable representation, the information is easy to understand.

In addition to the concept arrangement patterns which show the organization of the [Line Items] (which are in the rows on the left of the rendering), the information is further distinguished using the *Defined Benefit Plan Category* [Axis].

A block is a combination of a *concept arrangement pattern* and *member arrangement patterns* which work together to distinguish reported facts.

	Period [Axis]						
		2011-01-01 - 2011-12-31		2010-01-01 - 2010-12-31 Defined Benefit Plan Category [Axis]			
	Defined	Benefit Plan Categor	ry [Axis]				
Defined Benefit Plan Disclosure [Line Items]	U.S. Pension Benefits [Member]	Non-U.S. Pension Benefits [Member]	Other Postretirement Benefits [Member]	U.S. Pension Benefits [Member]	Non-U.S. Pension Benefits [Member]	Other Postretirement Benefits [Member]	
Change in benefit obligation [Roll Forward]							
Benefit obligation at beginning of year	444,000,000	593,000,000	166,000,000	375,000,000	327,000,000	157,000,000	
Service cost	38,000,000	9,000,000	8,000,000	32,000,000	8,000,000	10,000,000	
Interest cost	21,000,000	33,000,000	8,000,000	22,000,000	26,000,000	9,000,000	
Actuarial loss	43,000,000	25,000,000	28,000,000	31,000,000	4,000,000	10,000,000	
Benefits paid	(19,000,000)	(16,000,000)	(14,000,000)	(47,000,000)	(12,000,000)	(15,000,000)	
Curtailment	0	(4,000,000)	0	0	(1,000,000)	0	
Acquisitions of businesses	0	2,000,000	0	34,000,000	253,000,000	27,000,000	
Plan amendments	0	0	0	0	0	(32,000,000)	
Other changes	(3,000,000)	1,000,000	0	(3,000,000)	2,000,000	0	
Exchange rate adjustments	0	0	0	0	(14,000,000)	0	
Benefit obligation at end of year	524,000,000	643,000,000	196,000,000	444,000,000	593,000,000	166,000,000	
Change in plan assets [Roll Forward]							
Fair value of plan assets at beginning of year	416,000,000	474,000,000	0	346,000,000	248,000,000	0	
Actual return on plan assets	(5,000,000)	38,000,000	0	48,000,000	36,000,000	0	
Employer contributions	43,000,000	28,000,000	14,000,000	72,000,000	52,000,000	15,000,000	
Acquisitions of businesses	0	0	0	0	160,000,000	0	
Administration expenses	(2,000,000)	1,000,000	0	(3,000,000)	1,000,000	0	
Exchange rate adjustments	0	1,000,000	0	0	(11,000,000)	0	
Fair value of plan assets at end of year	433,000,000	526,000,000	0	416,000,000	474,000,000	0	
Funding Status [Roll Up]							
Fair value of plan assets	433,000,000	526,000,000	0	416,000,000	474,000,000	0	
Benefit obligation	524,000,000	643,000,000	196,000,000	444,000,000	593,000,000	166,000,000	
Funded status - underfunded at end of year	(91,000,000)	(117,000,000)	(196,000,000)	(28,000,000)	(119,000,000)	(166,000,000)	
Accumulated Benefit Obligation [Hierarchy]							
Accumulated benefit obligation	491,000,000	616,000,000	196,000,000	421,000,000	553,000,000	166,000,000	

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3. Digital Financial Report Details

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

a. Economic entity

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

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

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

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

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

b. Report document

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

Document type (dei:DocumentType)

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

c. Report creation date

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

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

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

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

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

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

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

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

• The value of the startDate context which is used on the reported fact with the concept dei:DocumentPeriodEndDate.

• The actual calendar period characteristic value which is used for the income statement concepts.

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

g. Report components

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

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

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

Report

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

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

The statements of a financial report are consistently the following:

- Statement of financial position or balance sheet
 - Classified

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

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

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

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

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

h. Intersections

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

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Reporting Entity [Axis]	0000000001 (http://www.sec.gov/CIK)				
Legal Entity [Axis]	Consolidated Entity [Domain]				
	Period [Axis]				
Balance Sheet [Line Items]	2012-12-31	2011-12-31			
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	1		
Deferred costs	9,000,000	9,000,000			
Total noncurrent assets	91,000,000	91,000,000	1		
Total assets	147,000,000	147,000,000			
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	Ŧ		

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

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

The fact is the same. In both cases the fact is "property, plant, and equipment, net" which has the value 82,000,000. However the characteristics which describe the fact are different. On the balance sheet, there is no property, plant and equipment type [Axis], but in the disclosure there is. This is because the

component which represents the disclosure needs to be able to differentiate the concepts.

It is challenging to show¹³ the notion of an intersection and how useful it is in software applications without using software. This is best experienced to be fully appreciated.

HINT: A good way to view intersections is using the free Firefox XBRL plug-in¹⁴ or the XBRL Cloud Viewer.

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

i. Reported facts

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

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

Reporting entity	Legal entity	Period	Concept	Fact Value
ABC Company	Consolidated entity	January 1, 2011 to December 31, 2011	Revenues	2000
ABC Company	Consolidated entity	January 1, 2010 to December 31, 2010	Revenues	2500
ABC Company	Consolidated entity	January 1, 2009 to December 31, 2009	Revenues	2300
ABC Company	Consolidated entity	January 1, 2011 to December 31, 2011	Cost of revenues	1800
ABC Company	Consolidated entity	January 1, 2010 to December 31, 2010	Cost of revenues	1700
ABC Company	Consolidated entity	January 1, 2009 to December 31, 2009	Cost of revenues	1600
ABC Company	Consolidated entity	January 1, 2011 to December 31, 2011	Gross profit	200
ABC Company	Consolidated entity	Januar <u>y 1, 2010 to Decem</u> ber <u>31, 2</u> 010	Gross profit	
	Carlow today			

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

¹³ This video walks you through the notion of an intersection, <u>https://www.youtube.com/watch?v=INPjwKy2Obs</u> ¹⁴ To get the Firefox plug-in See <u>http://xbrl.squarespace.com/journal/2010/10/29/game-changer-xbrl-viewer-add-on-for-firefox.html</u>

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4. Structural Pieces of a Digital Financial Report

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

a. Networks

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

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

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

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

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

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

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

b. Report elements

The US GAAP Taxonomy Architecture¹⁵ section 4.5 *Implementation of Tables* describes the relations between [Table], [Axis], [Member], [Line Items], Concept, and [Abstract] report elements.

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

¹⁵ US GAAP Taxonomy Architecture,

http://www.fasb.org/cs/ContentServer?c=Document_C&pagename=FASB%2FDocument_C%2FDocumentPage&cid =1176163689810

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

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

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

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

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

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

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

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

You need to reconcile the mechanical representation with an implementation of the mechanical representation in software¹⁶. While it is beyond the scope to do a detailed reconciliation between the semantics use in this document, the terms use by software and the US GAAP XBRL Taxonomy and SEC, and the XBRL technical syntax specification; it is necessary to provide an overview because we need to shift terminology slightly. This is that overview which reconciles terminology:

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

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

¹⁶ Reconciliation of Financial Report Semantics and Dynamics Theory, to US GAAP XBRL Taxonomy Architecture and SEC implementation, to XBRL technical syntax, see

http://www.xbrlsite.com/2012/Library/SemanticObjectIReconciliation.pdf

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



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

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

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

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

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

c. Properties

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

• Report

- Collection of components
- Component
 - Collection of report elements
- Network
 - o Name
 - Label (SortCode + Type + Title)
- Table
 - o Name
 - o Label
- Axis
 - o Name
 - o Label
- Member
 - o Name
 - o Label
- Line Items
 - o Name
 - o Label
- Abstract
 - o Name
 - o Label
- Concept
 - o Name
 - o Label
 - o Data Type
 - Period Type
 - Balance Type
- Fact
 - Collection of characteristics
 - Fact value
 - Collection of parenthetical explanations
 - Units (numeric facts only)
 - Decimals (numeric facts only)

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

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

d. Components and blocks

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

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

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

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

5. Relations between Structural Pieces of a Financial Report

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

a. Economic entity and parts of economic entity

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

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

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Subsid	liary 1	Subsidiary 2	Subsidiary 3	Subsidiary 4	Subsidiary 5	Subsidiary 6	Subsidiary 7
Divis Busin	ion a wss i	Business iv	Business v 2 Product Lines	2 Similar Businesses Business vi	2 Similar B Business viii	Business ix	2 Nonsimilar Business Business x
Asset Group (a) Asset		Asset Group (d) with Primary Asset	Asset Group (e) and Disposal Group (f)	Asset Group (g)	Asset Group (i)	Asset Group (j)	Asset Group (k) Reporting Unit (6)
Reportin	g Unit (1)	Reporting Unit (2)	Reporting Unit (3)	Reporting Unit (4)	Reporti	ng Unit (5)	Business xi
Business ii	Business iii	1.1		Business vii		11 1 1 1 1 1	
Asset Group (b)	Asset Group (c)			Asset Group (h)			Asset Group (1) Reporting Unit (7)
Operating Segment A Operating Segment B			Operating Segment C	Operatin	g Segment D	Operating Segment E	
Reportable Segment I			Reportable Segment II	Reportable Segment III		Reportable Segment IV	

b. Current balance sheet date and other balance sheet dates

Financial reports contain information for the current balance sheet date but also for prior balance sheet dates and perhaps balance sheets of some sub-part of the economic entity reporting. Software analyzing a financial report must be able to discover the current balance sheet date.

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

c. Current year-to-date income statement period and other periods

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

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

d. Primary financial statement line items and line item breakdowns

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

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

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

e. Fundamental accounting concepts and relations between concepts

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

- Assets = Liabilities and Equity (the accounting equation)
- Assets = Current Assets + Noncurrent Assets (classified balance sheet only)
- Equity = Equity Attributable to Parent + Equity Attributable to Noncontrolling Interest
- Liabilities = Current Liabilities + Noncurrent Liabilities (classified balance sheet only)
- Liabilities and Equity = Liabilities + Temporary Equity + Equity
- Current Assets = Assets Noncurrent Assets (classified balance sheet only)
- Current Liabilities = Liabilities Noncurrent Liabilities (classified balance sheet only)
- Noncurrent Assets = Assets Current Assets (classified balance sheet only)
- Noncurrent Liabilities = Liabilities Current Liabilities (classified balance sheet only)
- Gross Profit = Revenues Cost Of Revenue (Multi-step approach only)
- Operating Income (Loss) = Gross Profit Operating Expenses + Other Operating Income (Multi-step approach only)
- Income (Loss) from Continuing Operations after Tax = Income (Loss) from Continuing Operations Before Tax - Income Tax Expense (Benefit)
- Net Income (Loss) = Income (Loss) from Continuing Operations After Tax + Income (Loss) from Discontinued Operations, Net of Tax + Extraordinary Items, Gain (Loss)
- Net Income (Loss) = Net Income (Loss) Attributable to Parent + Net Income (Loss) Attributable to Noncontrolling Interest
- Net Income (Loss) Available to Common Stockholders, Basic = Net Income (Loss) Attributable to Parent - Preferred Stock Dividends and Other Adjustments
- Comprehensive Income (Loss) = Comprehensive Income (Loss) Attributable to Parent + Comprehensive Income (Loss) Attributable to Noncontrolling Interest

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- Comprehensive Income (Loss) = Net Income (Loss) + Other Comprehensive Income (Loss)
- Operating Income (Loss) = Revenues Costs And Expenses + Other Operating Income (Single-step approach)
- Costs And Expenses = Cost Of Revenue + Operating Expenses (Single-step approach)
- Net Cash Flow = Net Cash Flows, Operating + Net Cash Flows, Investing + Net Cash Flows, Financing + Exchange Gains (Losses)
- Net Cash Flows, Continuing = Net Cash Flows, Operating, Continuing + Net Cash Flows, Investing, Continuing + Net Cash Flows, Financing, Continuing
- Net Cash Flows, Discontinued = Net Cash Flows, Operating, Discontinued + Net Cash Flows, Investing, Discontinued + Net Cash Flows, Financing, Discontinued
- Net Cash Flows, Operating = Net Cash Flows, Operating, Continuing + Net Cash Flows, Operating, Discontinued
- Net Cash Flows, Investing = Net Cash Flows, Investing, Continuing + Net Cash Flows, Investing, Discontinued
- Net Cash Flows, Financing = Net Cash Flows, Financing, Continuing + Net Cash Flows, Financing, Discontinued

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

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

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f. Reporting pallets or report frames

Economic entities report using different reporting pallets or report frames. For example, consider the variability in where public companies report the line item *Income (Loss) from Equity Method Investments*¹⁷:

- 624 entities (60%) reported the line item before tax directly as part of income (loss) from continuing operations before tax
- 110 entities (10%) reported the line item after tax
- 128 entities (12%) reported the line item as part of nonoperating income (expense)
- 20 entities (2%) reported the line item as part of revenues
- 22 entities (2%) reported the line item between income (loss) from continuing operations before and after tax
- 10 entities (less than 1%) reported the line item as part of costs and expenses
- 8 entities (less than 1%) reported the line item as part of operating expenses
- 60 entities (6%) created an extension concept and the line item rolls up to that extension concept
- 66 entities (5%) did something else which was not directly analyzed so exact placement is unknown

Comprehensive testing of all SEC XBRL financial filings at this very high level revealed a very limited amount of variability most of which occurs on the income statement. This variability is not random. Most variability relates to the reporting practices of different industries which account for different activities. The following is a summary of and a complete inventory of this variability¹⁸ at this high-level of a financial report:

- Entities report using some accounting industry or activity
 - Commercial and industrial (standard approach)
 - Interest based revenues
 - Insurance based revenues
 - Securities based revenues
 - REIT (real estate investment trust)

¹⁷ See a detailed analysis of this topic here, <u>http://xbrl.squarespace.com/journal/2014/10/14/options-for-dealing-</u> with-line-items-that-bounce-around-incom.html

¹⁸ This Excel spreadsheet is helpful in understanding reporting variability, <u>http://xbrl.squarespace.com/journal/2014/9/15/wonderful-things-xbrl-based-structured-information-enables.html</u>

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- o Utility
- Balance sheets can be
 - Classified and report current and noncurrent assets and liabilities
 - Unclassified
 - Report using liquidity based reporting
- Income statements can be
 - Multi-step and report gross profit
 - Single-step and do not report gross profit
- Income statements can
 - Report operating income (loss)
 - Do not report operating income (loss)
- Income (loss) from equity method investments can be reported on the income statement
 - As part of revenues
 - As part of nonoperating income (loss)
 - Before taxes as a separate line item
 - After taxes as a separate line item
 - Between income (loss) from continuing operations before and after taxes
- Cash flow statements can report net cash flow as
 - Including exchange gains (losses)
 - Not including exchange gains (losses)

This is a comprehensive and complete inventory of the high level variability in public company financial filings. This information is not a statistical analysis or speculation. This is observable empirical evidence provided by the XBRL-based public company financial filings submitted to the SEC.

A coding scheme was developed to articulate this information in both human readable and machine readable form. Below is a brief description of that coding scheme. Each code has six parts: "COMID-BSC-CF1-ISS-IEMIB-OILY". This explains each part and the codes used for each part and shows the number of entities which have that characteristic (note that the totals add up to 6,943 and not 6,947; this relates to an issue with CIK numbers):

- Part 1: Industry codes: (Total 6,943)
 - COMID=Commercial and Industrial (5,985)
 - INTBX=Interest based revenues (632)
 - INSBX=Insurance based revenues (50)

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- SECBX=Securities based revenues (93)
- REITX=Real estate investment trust (158)
- UTILX=Utility (25)
- Part 2: Balance sheet form codes: (Total 6,943)
 - BSC=Classified balance sheet (5,527)
 - BSU=Unclassified balance sheet (1,412)
 - BSL=Liquidity based balance sheet (4)
- Part 3: Cash flow statement exchange gains codes: (Total 6,943)
 - CF1=Exchange gains (losses) part of net cash flow or does not report line item (6,845)
 - CF2=Exchange gains (losses) part of cash roll forward (98)
- Part 4: Income statement form codes: (Total 6,943)
 - ISS=Single step income statement (4,255)
 - ISM=Multi step income statement (2,688)
- Part 5: Income (loss) from equity method investments location codes: (Total 6,943)
 - IEMIX=Income (loss) from equity method investments not reported (5,290)
 - IEMIB=Income (loss) from equity method investments reported BEFORE tax (1,402)
 - IEBIA=Income (loss) from equity method investments reported AFTER tax (113)
 - IEMIN=Income (loss) from equity method investments reported within nonoperating income (loss) (122)
 - IEMIR=Income (loss) from equity method investments reported within revenues (16)
 - IEMIT=Income (loss) from equity method investments reported between income (loss) from continuing operations before and after taxes (0, not working yet)
- Part 6: Operating income (loss) codes: (Total 6,943)
 - OILY=Operating income (loss) reported (5,120)
 - OILN=Operating income (loss) not reported (1,823)

While the complete set of codes and report frames cannot be known until the process of breaking public company filings into these sets and testing each filing and set as to their conformance to the fundamental accounting concepts and relations within the set and the success of this process is verified by 100% conformance by each reporting entity to 100% of the fundamental accounting concepts and relations between those concepts within each set; this is achievable.

In fact, testing shows that this objective has already been achieved for 98.7% of relations and 60.0% of all public company financial reports submitted to the SEC using the XBRL format. Further, which reporting entities do not conform to these concepts and relations and why they do not conform is easy to observe.

Another possibility which exists in order to manage this process is simply to remove sets of reporting entities from scope. For example, I have already removed entities which are funds and trusts from scope because I personally have no interest in such entities. Also, there are five entities which I classify as "hybrids" because they report using significantly more complex reporting schemes. Basically, certain report frames can be simply removed from scope.

j. Primary financial statement roll ups

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

k. Reporting units

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

I. Relations between text block, text blocks and detail

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

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

- Level 1 Text Blocks represent all notes: Each note provided by a reporting entity is represented by one Level 1 Text Block.
- **Significant accounting policies**: One of the Level 1 Text Blocks contains the significant accounting policies of an economic entity. Those significant

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accounting policies are detailed in one set of Level 2 Text Blocks which represent the individual policies.

- Level 3 Text Blocks provide details of specific Level 1 Text Blocks: There is a relation between a Level 3 Text Block and a Level 1 Text Block. Said another way, some set of Level 3 Text Blocks go with some Level 1 Text Block.
- Level 4 Detail relates to Level 3 Text Block: Each Level 3 Text Block has one or more Level 4 Detail disclosures which provides equivalent information.

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

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

6. Workflow and Process Related to Financial Reports

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

a. Amended reports

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

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

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

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7. Consequences of Implementation Choices

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

a. Consequences of using non-unique and non-explicit tables

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

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

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

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

Contrast that to what this might look like if unique and explicit [Table]s were used:

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

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

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

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

This is not to say that querying information is impossible. The current approach only makes things harder. It is still quite possible to query information using prototype theory¹⁹.

b. Consequences of not employing explicit concept class relations

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

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

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

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

¹⁹ Understanding Prototype Theory and How it Can be Useful in Analyzing and Creating SEC XBRL Filings, <u>http://www.xbrlsite.com/2013/Library/UnderstandingPrototypeTheory.pdf</u>

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concept *us-gaap:Revenue* but the definition is tweaked slightly to indicate that ..." This mechanism already exists in XBRL²⁰.

c. Consequences of not requiring explicit business rules for roll forwards and member aggregations

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

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

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

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

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

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

²⁰ Basically an XBRL definition linkbase relation is created between the extension concept and the existing US GAAP XBRL Taxonomy concept using the "essence-alias" (http://www.xbrl.org/2003/arcrole/essence-alias) relation.

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8. APPENDIX: Understanding why adding new patterns is both rare and not a significant constraint

Adding new patterns is both rare and not a significant constraint. While this notion might seem absurd or unintuitive, it is important to look at empirical evidence to understand why this is the case.

If one were to observe XBRL-based financial filings, one would realize that 98% or more of public company financial reports contain [Line Items] which contain concepts and abstracts which follow these concept arrangement patterns:

- Text block
 - Level 1 Note Level Text Block
 - Level 2 Policy Level Text Block
 - Level 3 Disclosure Level Text Block
- **Roll Up**: Concept A + Concept B + Concept N = Total
- **Roll Forward**: Beginning balance + Additions Subtractions Ending balance
- Hierarchy: No mathematical relationships
- **Adjustment**: Originally stated balance + Adjustments = Restated balance
- **Roll Forward Info**: Beginning balance info + Additions info Subtractions info Ending balance info (there are no mathematical relations, but information for the beginning and ending balances must be distinguished)

Similarly, each [Axis] falls into one of two categories and describes the [Member]s of that [Axis] as being one of the following two member arrangement patterns:

- **Whole-part**: Characteristic describes something composed exactly of their parts and nothing else or more where the parts add up to the whole
- **Is-a**: Characteristic describes some list but the list does not add up mathematically

Consider the following theory: A combination of those *concept arrangement patterns* and *member arrangement patterns* describes every component of every report of every reporting entity which submits XBRL-based financial information to the SEC.

That theory is speculated to be true for 98% of the components of public company financial reports. Being conservative, we leave room for 2% of report components which might deviate from these rules because they are not structural patterns described in this document. Basically, the following spectrum delineates all possible alternatives:

- 1. A reporting entity report component follows (**is consistent with**) existing concept arrangement patterns and existing member arrangement patterns.
- A reporting entity component DOES NOT FOLLOW, however SHOULD FOLLOW (is inconsistent with) existing concept arrangement patterns and existing member arrangement patterns. HOWEVER, after the inconsistency is corrected within the report, the reporting entity report component follows (is consistent with) existing patterns.
- 3. A reporting entity component DOES NOT FOLLOW, but either a concept arrangement pattern or member arrangement pattern IS MISSING from the list of allowed patterns. The pattern is logical, rational and sensible and would NOT RENDER the system NOT DECIDABLE. THEREFORE, the pattern should be added (**is consistent with**).
- 4. A reporting entity component DOES NOT FOLLOW, but either a concept arrangement pattern or member arrangement pattern IS MISSING from the list of allowed patterns. The pattern is logical, rational and sensible HOWEVER; the pattern (a) can be reduced down to a less complex pattern and (b) if added it WOULD RENDER THE SYSTEM NOT DECIDABLE. THEREFORE, the pattern should NOT BE ADDED. Rather, the reporting entity should change how they report information to keep the overall system safe (is consistent with).
- 5. A reporting entity component follows (**is consistent with**) the existing [Hierarchy] concept arrangement patterns and an existing member arrangement pattern; HOWEVER the pattern is in reality not a [Hierarchy] but rather some other unsupported mathematical relation or some other unsupported member arrangement pattern. While not optimal because specific information which could be verified to be consistent is not being verified, this is still on par with current practices. Currently, a [Roll Forward] is a known and a commonly used pattern. The pattern is identifiable, but has no computation articulated.

And so either a filer is already consistent with the existing system (#1), or should be consistent with the existing system (#2). It is possible that a reporting entity is using a logical and sensible concept arrangement pattern or member arrangement pattern that is missing (#3); and if so, that pattern should be added to the system. It is possible that a reporting entity is using a logical and sensible concept arrangement pattern or member arrangement pattern; however, (a) that pattern can be broken down into a simpler, less complex pattern an (b) if the pattern were added to the system it would make the system not decidable and therefore should not be added to the system.

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And, as discussed in the next section, there is always a fallback position (#5). Everything can be represented as a [Hierarchy] concept arrangement pattern. Other concept arrangement patterns simply add additional rules, generally mathematical computations. This allows new patterns to evolve. This is explained in more detail in the next section.

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9. APPENDIX: Understanding that pattern maintenance is an evolutionary process

Every concept arrangement pattern is some [Hierarchy]²¹ of concepts. Other non-[Hierarchy] concept arrangement patterns add some sort of mathematical computation. For example,

- A [Roll Up] is simply a [Hierarchy] with the addition of XBRL calculation relations which articulate the information about how the concepts roll up.
- A [Roll Forward] is simply a [Hierarchy] with the addition of a preferred label role to differentiate the beginning and ending instant concept.
- An [Adjustment] is simply a [Hierarchy] with the addition of a preferred label role to differentiate the originally stated and restated balances plus a member arrangement pattern to distinguish the Report Date [Axis].
- A [Text Block] is a [Hierarchy] which has only one concept which is of a specific data type.

Basically, any information can be represented as a [Hierarchy]. The down side of representing information in this manner if it really is some other pattern is that you do not provide metadata which software can use to assure that what is represented is consistent with reality. The information might be consistent with the knowledgebase of information, but that is only because the rules are not included in the knowledgebase. What that means is that the information needs to be verified using manual processes because consistency cannot be determined using automated processes because there are no machine-readable business rules.

This situation is not optimal, but it is also not the end of the world either. As was stated above, this situation is on par with current XBRL-based public company financial filings in that [Roll Forward] concept arrangement patterns in existing SEC filings do not provide business rules for the [Roll Forward].

What this means is that there is already a process to allow patterns to evolve.

²¹ I really don't like the name [Hierarchy] because everything is a hierarchy. A better term might be [Set] or some other term.

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10. APPENDIX: Understanding that patterns are finite (i.e. not infinite)

To understand that it is not an overwhelming task to inventory all patterns and add new patterns to the system, consider the notion of report frame patterns²². If you look closely at the report frame patterns, this is what you observe:

- Every public company can be grouped into one of 95 report frames.
- Of the approximately 8,000 reporting entities in scope (funds and trusts are excluded as they follow other patterns which are not of interest); 90% of all public companies fall into one of 13 report frames. The remaining 10% of reporting entities use the other 82 report frames.
- Some of the report frames which are used are likely illegal. For example, why would a commercial and industrial company report using an unclassified balance sheet? Meaning, some existing report frames need to be removed.
- It is highly-likely that some report frames will have only 1 reporting entity, for example JPMorgan seems to fall into that category. Nothing wrong with that.
- It is highly-likely that there are between perhaps 100 to maybe even 250 additional report frames. It is of no consequence to have 100 or even 250 additional report frames.

Every other class works precisely the same way. Some finite list of subclasses can exist. And so, the system is finite, the system has boundaries, but the system is flexible but only where specific flexibility is exposed.

²² For more information on report frame patterns, see <u>http://www.xbrlsite.com/2015/fro/us-gaap/html/ReportFrames/</u>

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11. APPENDIX: Understanding technical syntax rules and workflow/process rules

There has not really been much emphasis on technical syntax rules and workflow/process rules, the primary focus is on business domain semantic rules.

The reason for less effort in explaining technical syntax rules is because of the following:

- XBRL technical syntax rules were created and interoperability between software is excellent due to a publically available conformance suite provided by XBRL International.
- Because of the first point; XBRL-based digital financial reports provided to the SEC by public companies are 99.9% consistent with the XBRL technical syntax rules.
- Business professionals should never be exposed to technical syntax; software should hide all aspects of technical syntax from business professionals.

Basic workflow/process rules are worth covering a little because that would yield important useful information. However, there has not been a lot of focus on workflow/process rules so we really don't know the full extent of what workflow/process rules are necessary.

However, we do understand the basic, fundamental rules which are necessary for any system to work with a digital financial report.

Consider a simple query of two concepts: *Assets* and *Liabilities and Equity*. In order to extract that information from any XBRL-based financial filing using a machine-based process the following process needs to be followed:

- 1. Software MUST locate each report you want to query.
- 2. The report MUST be valid XBRL technical syntax. If the technical syntax is invalid, you may or may not get the correct results.
- 3. Software MUST locate the appropriate reporting units (currency). In the case of public company financial reports, 99% of entities report using US Dollars. However, 1% use other currencies as the reporting units.
- 4. Software MUST appropriately identify the root reporting entity in the report. Generally, this is the consolidated entity but it could be a parent holding company or some other accounting entity.
- 5. Software MUST appropriately locate the current balance sheet date. Generally you want information about the current balance sheet data and not the prior balance sheet.

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- 6. Software MUST find the appropriate US GAAP concept used to express *Assets* which is us-gaap:Assets.
- Software MUST find appropriate US GAAP concept for Liabilities and Equity. This is a little harder because there are multiple possible concepts: usgaap:LiabilitiesAndStockholdersEquity or usgaap:LiabilitiesAndPartnersCapital.
- 8. Software MUST check the returned information to assure that it is consistent with what is expected, the business domain rule that "Assets = Liabilities and Equity".

That is an overview of the workflow/process to obtain a basic set of information from the knowledgebase of XBRL-based public company financial filings. And here are the results of that query for every financial report in that data set:

		Fiscal	Fiscal				
xbrl:Entity	Legal Entity	Period	Year	Assets	Liabilities and Equity	Units	Difference in Value
All CIK numbers	Root economic entity	FY	2001	280	280	iso4217:USD	0
All CIK numbers	Root economic entity	FY	2009	31,586,555,000	31,586,555,000	iso4217:USD	0
All CIK numbers	Root economic entity	FY	2010	23,061,516,000	23,061,516,000	iso4217:CAD	0
All CIK numbers	Root economic entity	FY	2010	8,833,200,000	8,833,200,000	iso4217:GBP	0
All CIK numbers	Root economic entity	FY	2010	33,205,444,569,755	33,235,543,477,631	iso4217:USD	30,098,907,876
All CIK numbers	Root economic entity	FY	2011	45,216,467	45,216,467	iso4217:AUD	0
All CIK numbers	Root economic entity	FY	2011	110,885,000	110,885,000	iso4217:BRL	0
All CIK numbers	Root economic entity	FY	2011	28,708,716,218	28,708,716,218	iso4217:CAD	0
All CIK numbers	Root economic entity	FY	2011	1,226,733,000	1,226,733,000	iso4217:EUR	0
All CIK numbers	Root economic entity	FY	2011	7,938,800,000	7,938,800,000	iso4217:GBP	0
All CIK numbers	Root economic entity	FY	2011	1,565,000	1,565,000	iso4217:ILS	0
All CIK numbers	Root economic entity	FY	2011	46,395,324,314,234	46,165,763,878,111	iso4217:USD	(229,560,436,123)
All CIK numbers	Root economic entity	FY	2012	49,066,850	49,066,850	iso4217:AUD	0
All CIK numbers	Root economic entity	FY	2012	32,470,161,238	32,470,161,238	iso4217:CAD	0
All CIK numbers	Root economic entity	FY	2012	1,303,349,000	1,303,349,000	iso4217:EUR	0
All CIK numbers	Root economic entity	FY	2012	10,504,300,000	10,504,300,000	iso4217:GBP	0
All CIK numbers	Root economic entity	FY	2012	47,493,211,088,244	47,307,285,874,940	iso4217:USD	(185,925,213,304)
All CIK numbers	Root economic entity	FY	2013	54,642,443	54,642,443	iso4217:AUD	0
All CIK numbers	Root economic entity	FY	2013	39,919,462,935	39,919,385,738	iso4217:CAD	(77,197)
All CIK numbers	Root economic entity	FY	2013	13,120,000	13,120,000	iso4217:EUR	0
All CIK numbers	Root economic entity	FY	2013	48,909,115,040,682	48,735,740,980,605	iso4217:USD	(173,374,060,077)
All CIK numbers	Root economic entity	FY	2014	342,493,649,881	342,493,649,881	iso4217:USD	0
				176,531,415,952,227	175,972,655,073,402		(558,760,878,825)
							-0.3%

The results²³ show that most of the balance sheets balance, Assets = Liabilities and Equity. Some are inconsistent with what you would expect. The total inconsistency is .3% which is not too bad. However, the information needs to be 100% consistent in order to not get humans involved to figure out what is causing the inconsistencies.

²³ Query and results provided by SECXBRL.info which is a commercial software application, see http://app.secxbrl.info/

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12. APPENDIX: Proving mechanics using XBRL-based public company financial filings

The following is a summary of the consistency of other mechanics of XBRL-based public company 10-K financial filings from the same set of 6,674 filings for FY 2013, an earlier set of similar 10-K financial reports for FY 2012, and for another similar set of 10-Q and 10-K financial filings for FY 2014²⁴.

#	Goal or Desired State	Process tests	FY 2014	FY 2013	FY 2012
1	Consistent XBRL technical syntax	Automated XBRL technical	99.9%	99.9%	99.9%
		syntax error checks			
2	Consistent EDGAR Filer Manual (EFM)	Automated EFM syntax and	98.0%	97.9%	80.5%
	syntax/semantics	semantics error checks			
3	Consistent report level structure	Automated model structure	97.6%	95.8%	97.9%
		error checks			
4	Detectable economic entity or accounting entity	Successful and unambiguous	99.3%	99.2%	98.8%
	or "root reporting entity" or "entity of focus"	identification of the "entity of			
		focus"			
5	Detectable and unambiguous current period	Successful and unambiguous	98.4%	99.3%	99.8%
	balance sheet and income statement period	identification of the current			
	dates	balance sheet date and			
		income statement period			
6	Detectable and unambiguous set of fundamental	Automated verification	97.9%	97.8%	97.9%
	reported facts and intact relations between those	checks to be sure			
	fundamental facts which prove trustworthy	fundamental accounting			
	nature of information	concepts are			
		distinguishable/decipherable			
		and the relations between			
		those fundamental concepts			
		are intact/sound			
7	Detectable basic primary financial statement roll	Automated verification	90.7%	90.1%	84.9%
	up computations are intact which prove	checks for existence of			
	trustworthy nature of information	business rules which			
		articulate these basic primary			
		financial statement relations			
		and successful passing of			
		these business rules			

The primary point here is that if you look at the columns on the right for FY 2014, FY 2013, and FY 2012 you notice that testing against what we would expect yielded

²⁴ Not all FY 2014 financial filings have been submitted to the SEC as of the date of this document, so the latest 10-Q was used if the 10-K was not available.

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a very high number of XBRL-based public company financial reports that are consistent with those expectations.

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13. APPENDIX: Summary of evidence in support of report level classes

To tie all of the pieces together, we provide this summary of the representation model and an overview of the mechanical aspects of a financial report. The graphic below shows each of the implementation pieces which can be different depending upon how a software application exposes the pieces of a digital financial report to its business users. This is a summary of the pieces of a financial report.



The table below summarizes the pieces that exist in the 10-K financial information of 6,674 public companies who report to the SEC using the XBRL format. The class of report piece, a count of the individuals in those reports, an average for many of the pieces and a brief comment is provided:

		Average	
Class	Count	Report	Comment
Report	6,674	1	Report
Network	477,041	71	Part of Component
Table	232,230	35	Part of Component
Axis	386,912	58	Part of Characteristic
Member	1,216,391	181	Part of Characteristic
Line Items	232,690	35	Subclass of Characteristic, Type of [Axis]
Abstract	732,409	111	No meaning, only used for organization
Concept	3,165,249	474	Part of Characteristic
Properties	Not	NA	Each class has different but finite properties
	counted		

Fact	8,532,275	1,278	Described by Characteristic, Required to exist within
			Network, Required to exist within explicit or implied Table
Text Block	398,492	59	Counted facts with data type of nonnum:textBlockItemType
Roll Forward	48,960		Counted preferred label roles which had start date and end
			date (approximate)
Roll Forward	18,794		Counted preferred label roles which had start date and end
Info			date but data type was not monetary (approximate)
Roll Up	114,584		Counted XBRL calculation relation roots
Hierarchy			Counted Networks with no matching XBRL calculation and
			no start date/end date preferred label role (work in
			progress)
Whole-part			Count specific [Axis] types (work in progress)
Is-a			Count specific [Axis] types (work in progress)

Taking this one step further, this provides lists of the next level of the digital financial report, the classes of text blocks, disclosures, characteristics, etc.:

Class	Comment
Axis (need to break this out by whole-	http://www.xbrlsite.com/2015/fro/us-gaap/html/Classes/Axes Tree.html
part and is-a type relations)	
Level 1 Note Level	http://www.xbrlsite.com/2015/fro/us-
Text Blocks	gaap/html/Classes/Level1TextBlock Tree.html
Level 2 Policy Level	http://www.xbrlsite.com/2015/fro/us-
Text Blocks	gaap/html/Classes/Level2TextBlock Tree.html
Level 3 Disclosure	http://www.xbrlsite.com/2015/fro/us-
Level Text Blocks	gaap/html/Classes/Level3TextBlock_Tree.html
Hierarchy	http://www.xbrlsite.com/LinkedData/Exemplars/Disclosures.aspx?Information
	Model=[Hierarchy]
Roll Up	http://www.xbrlsite.com/LinkedData/Exemplars/Disclosures.aspx?Information
	Model=[Roll Up]
Roll Forward	http://www.xbrlsite.com/LinkedData/Exemplars/Disclosures.aspx?Information
	Model=[Roll Forward]
Report	http://www.sec.gov/Archives/edgar/monthly/xbrlrss-2014-12.xml

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14. APPENDIX: Expanding base mechanics, advanced mechanics articulated by the Financial Report Ontology

In order to explore the idea of consistent mechanics of a digital financial report, we used a base subset of the things and relations between things that one would find in a financial report. The purpose of using this base is to both reduce complexity of trying to explain these mechanics and to avoid debates by focusing on easy to distinguish things and relations and where high percentages of XBRL-based public company financial reports submitted to the SEC are consistent with those mechanics. If someone looks at the facts, these mechanical aspects are self-evident.

But these basic mechanical aspects of a financial report form only the base or foundation of a digital financial report.

The *Financial Report Ontology*²⁵ builds on that base.

The *Financial Report Ontology* is nothing more than a set of things and relations between things. It is basically a set of business rules which describe how a digital financial report works. The ontology is expressed in machine-readable terms.

Article 9 of *The Business Rules Manifesto*²⁶ states that business rules are: "Of, By, and For Business People, Not IT People". Article 9 further details what it means with the following three sub points:

- 9.1. Rules should arise from knowledgeable business people.
- 9.2. Business people should have tools available to help them formulate, validate, and manage rules.
- 9.3. Business people should have tools available to help them verify business rules against each other for consistency.

Business professionals understand their domains. Accounting professionals understand the domain of financial reporting. Business rules both *describe* the business domain rules, the semantics are IT professionals call them, of a business domain such as financial reporting and serve as the *quality control* mechanism that assures financial reports created are consistent with that description.

There is a direct relation between the description and quality control. In fact, description and quality control are two different sides of exactly the same coin. What we stated earlier in this document is worth repeating:

 ²⁵ Financial Report Ontology, <u>http://xbrl.squarespace.com/financial-report-ontology/</u>
 ²⁶ Business Rules Manifesto, <u>http://www.businessrulesgroup.org/brmanifesto.htm</u>

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The only way a meaningful exchange of information can occur is the prior existence of agreed upon technical syntax rules, domain semantics rules, and workflow/process rules.

The *Financial Report Ontology* is simply additional helpful rules. The more business rules there are, the more software can do to help business and accounting professionals.

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