Narrative Explaining Logical Conceptualization of a Financial Report

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The purpose of this resource is to provide a common sharable logical conceptualization[1] of the basic underlying model of a financial report.

Key *terms* in this logical conceptualization are highlighted in bold the first time they are used and are referenced to additional information[2]. The logical *relations* between terms are documented in this diagram[3]. The *assertions* in this conceptualization are documented in the form of axioms[4]. This conceptualization is also documented in machine-readable XBRL[5] and in machine-readable OWL[6]. This conceptualization has been tested[7] using four application profiles of XBRL-based financial reports[8] by four different software vendors[9]. Curated metadata[10] can be created using this conceptualization.

A financial report can be explained using four core models[11]: **logical system** model, **business report** model, **multidimensional model**, and the **accounting equation and double-entry accounting** model. The multidimensional model is explained as part of the basic business report model. A basic logical conceptualization is provided for those that desire a high-level understanding of the logical conceptualization of a business report. A more detailed conceptualization of a business report is provided in a separate section for those that desire

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[1] *Enhanced Description of an Ontology-like Thing*, http://xbrl.squarespace.com/journal/2019/7/19/enhanced-description-of-ontology-like-thing.html

[2] *Open Source Framework for Implementing XBRL-based Digital Financial Reporting*, http://xbrlsite.azurewebsites.net/2019/Framework/FrameworkEntitiesSummary.html

[3] Logical Model, http://xbrlsite.azurewebsites.net/2016/conceptual-model/LogicalModel-2019-03-10.jpg

[4] Axioms, http://xbrlsite.azurewebsites.net/2019/Framework/Axioms.html

[5] Prototype SBRM Represented in XBRL, http://xbrl.squarespace.com/journal/2019/7/14/prototype-sbrm-represented-in-xbrl.html

[6] Prototype SBRM Representation in OWL, http://xbrlsite.azurewebsites.net/2019/SBRM/sbrm.owl.xml

[7] *Comparison of Renderings for Concept Arrangement Patterns*, http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/ComparisonOfConceptArrangementPatternRenderings.pdf

[8] Profiles, http://xbrlsite.azurewebsites.net/2018/Library/Profiles-2018-10-22.pdf

[9] Digital Financial Report Conformance Suite, http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/index.xml

[10] US GAAP Financial Report Ontology (Prototype), http://xbrlsite.azurewebsites.net/2019/Prototype/New/Home.html

[11] *Four Core Models Used to Describe a Financial Report*, http://xbrl.squarespace.com/journal/2019/9/25/four-core-models-used-to-describe-a-financial-report.html

those additional details. A basic logical conceptualization of the accounting equation and double entry accounting are provided in a separate section. Finally, in order to explain the higher-level models of a business report, financial report, multidimensional model, and the accounting equation and double-entry accounting; it is necessary to describe the terminology used to describe a logical system. If the reader desires those details of the logical conceptualization of a logic system; those details are provided in a separate section.

Basic Logical Conceptualization of a Business Report

A scalar is a fact which has no characteristics; it stands on its own. For example, the value of pi is a scalar, the value of pi never changes; it always has the same value for everyone. (Pi or π is the ratio of a circle's circumference to its diameter and always has the value of equal to 3.14)

Fact Value
3.14

A business **report**[12] communicates facts. A **fact**[13] defines a single, observable, reportable piece of information contained within a business report, or **fact value**[14], contextualized for unambiguous interpretation or analysis by one or more distinguishing aspects (a.k.a. characteristics). For example, below are two facts with the values of “2,000” and “1,000”. However, the two facts above are not contextualized.

Fact Value
2,000
1,000

An **aspect**[15] describes a fact. An aspect provides information necessary to describe a fact or distinguish one fact from another fact within a report. For example, below you see the concept aspect of the numbers “2,000” and “1,000” which relates to the concepts “Revenues” and “Net income” respectively:

Concept Aspect	Fact Value
Revenues	2,000
Net income	1,000

[12] Report, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Report.html
[13] Fact, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Fact.html
[14] Fact Value, http://xbrlsite.azurewebsites.net/2019/Framework/Details/FactValue.html
[15] Aspect, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Aspect.html

To fully describe a fact you need more than just one aspect. In XBRL-based business reports, a fact must always provide three **core aspects**[16]: reporting entity that reported the fact, calendar period of the reported fact, and the concept that describes the reported fact. Below you see two facts which are characterized by three core aspects which are used to differentiate the two facts from one another.

Reporting Entity Aspect	Calendar Period Aspect	Concept Aspect	Fact Value
ABC Company	Jan 1, 2019 to Dec 31, 2019	Revenues	2,000
ABC Company	Jan 1, 2019 to Dec 31, 2019	Net income	1,000

In XBRL-based business reports, in addition to the core aspects that you always must use, creators of reports can also provide additional **noncore aspects**[17]. A noncore aspect is simply some additional aspect that is created to further distinguish facts beyond the capabilities of the three core aspects. Below you see the noncore aspect "Legal Entity Aspect" has been added to the two facts we have been working with:

Reporting Entity Aspect	Legal Entity Aspect	Calendar Period Aspect	Concept Aspect	Fact Value
ABC Company	Consolidated entity	Jan 1, 2019 to Dec 31, 2019	Revenues	2,000
ABC Company	Consolidated entity	Jan 1, 2019 to Dec 31, 2019	Net income	1,000

Fact values can be **numeric**[18] or **nonnumeric**[19]. Numeric fact values require additional information to describe the units of the numeric fact and the rounding that is used to report the numeric fact. **Units**[20] and **rounding**[21] are properties of the fact value that provide information necessary to describe numeric fact values. Below you see that the units of "US Dollars" and that the rounding of the fact value is "Thousands of dollars":

Reporting Entity Aspect	Legal Entity Aspect	Calendar Period Aspect	Concept Aspect	Fact Value	Units	Rounding
ABC Company	Consolidated entity	Jan 1, 2019 to Dec 31, 2019	Revenues	2,000	US Dollars	Thousands of dollars
ABC Company	Consolidated entity	Jan 1, 2019 to Dec 31, 2019	Net income	1,000	US Dollars	Thousands of dollars

To summarize where we are thus far and to be crystal clear; below you see one fact. That single fact is characterized by a set of four aspects. The numeric fact value is described as

[16] Core Aspect, http://xbrlsite.azurewebsites.net/2019/Framework/Details/CoreAspect.html
[17] Noncore Aspect, http://xbrlsite.azurewebsites.net/2019/Framework/Details/NoncoreAspect.html
[18] Numeric Fact Value, http://xbrlsite.azurewebsites.net/2019/Framework/Details/NumericFactValue.html
[19] Nonnumeric Fact Value, http://xbrlsite.azurewebsites.net/2019/Framework/Details/NonnumericFactValue.html
[20] Units, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Units.html
[21] Rounding, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Rounding.html

having units of “US Dollars” and that the fact value is rounded to the nearest “Thousands of dollars”.

Reporting Entity Aspect	Legal Entity Aspect	Calendar Period Aspect	Concept Aspect	Fact Value	Units	Rounding
ABC Company	Consolidated entity	Jan 1, 2019 to Dec 31, 2019	Revenues	2,000	US Dollars	Thousands of dollars

A **fact set**[22] is a set of facts which go together (tend to be cohesive and share a certain common nature) for some specific purpose within a business report. Synonyms for fact set are block and fact table. Below you see three facts that make up a fact set that are used to describe the breakdown of revenues by geographic area.

Reporting Entity Aspect	Legal Entity Aspect	Geographic Area Aspect	Calendar Period Aspect	Concept Aspect	Fact Value	Units	Rounding
ABC Company	Consolidated entity	All Geographic Areas Combined	Jan 1, 2019 to Dec 31, 2019	Revenues	2,000	US Dollars	Thousands of dollars
ABC Company	Consolidated entity	North America	Jan 1, 2019 to Dec 31, 2019	Revenues	1,000	US Dollars	Thousands of dollars
ABC Company	Consolidated entity	South America	Jan 1, 2019 to Dec 31, 2019	Revenues	1,000	US Dollars	Thousands of dollars

Rules[23] guide, control, suggest, or influence behavior. Rules cause things to happen, prevent things from happening, or suggest that it might be a good idea if something did or did not happen. Rules help shape judgment, help make decisions, help evaluate, help shape behavior.

Don't make the mistake of thinking that rules are completely inflexible and that you cannot break rules. Sure, maybe there are some rules that can never be broken. Maybe there are some rules that you can break. It helps to think of breaking rules as penalties in a football game. The point is that the guidance, control, suggestions, and influence offered by rules are a choice of business professionals. The meaning of a rule is separate from the level of enforcement someone might apply to the rule.

A rule states a fact about the world. A synonym for rule is ***assertion***.

So, considering our fact set below we know that the value “2,000” is for the concept “Revenues”, for the period “Jan 1, 2019 to Dec 31, 2019”, relates to the legal entity “Consolidated entity”, of the reporting entity “ABC Company” and is the total of all “Geographic Areas”. “North America” and “South America” are part of the *whole* “All Geographic Areas Combined”. A rule that expresses that relationship might be expressed as:

[22] Fact Set, http://xbrlsite.azurewebsites.net/2019/Framework/Details/FactSet.html
[23] Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Rule.html

"All Geographic Areas Combined = North America + South America".

Rules both describe and can be used to verify that reported facts are consistent with the provided description. There are many different types of rules including mathematical, structural, mechanical, logical, and accounting related rules.

Reporting Entity Aspect	Legal Entity Aspect	Geographic Area Aspect	Calendar Period Aspect	Concept Aspect	Fact Value	Units	Rounding
ABC Company	Consolidated entity	All Geographic Areas Combined	Jan 1, 2019 to Dec 31, 2019	Revenues	2,000	US Dollars	Thousands of dollars
ABC Company	Consolidated entity	North America	Jan 1, 2019 to Dec 31, 2019	Revenues	1,000	US Dollars	Thousands of dollars
ABC Company	Consolidated entity	South America	Jan 1, 2019 to Dec 31, 2019	Revenues	1,000	US Dollars	Thousands of dollars

Grain[24] is the level of depth of information or granularity. The lowest level of granularity is the actual transaction, event, circumstance, or other phenomenon represented as the actual transaction within an accounting system. The highest level of granularity is the summarized information that is represented as a line item of perhaps a statement, say the income statement.

Considering the fact set you see below the fact outlined in red is one level of granularity as contrast to the other two facts that are outlined in green which provides the same information as is provided by the fact outlined in red, but at a different level of granularity.

Reporting Entity Aspect	Legal Entity Aspect	Geographic Area Aspect	Calendar Period Aspect	Concept Aspect	Fact Value	Units	Rounding
ABC Company	Consolidated entity	All Geographic Areas Combined	Jan 1, 2019 to Dec 31, 2019	Revenues	2,000	US Dollars	Thousands of dollars
ABC Company	Consolidated entity	North America	Jan 1, 2019 to Dec 31, 2019	Revenues	1,000	US Dollars	Thousands of dollars
ABC Company	Consolidated entity	South America	Jan 1, 2019 to Dec 31, 2019	Revenues	1,000	US Dollars	Thousands of dollars

And so hopefully you get an idea of the logical model of a business report. Now we want to shift gears a bit and be a bit more specific as to how business reports are represented using XBRL.

An **information model definition**[25] is a structure which is created to represent each fragment of a report using the XBRL technical format or perhaps some other technical syntax. The following

[24] Grain, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Grain.html
[25] Information Model Definition, http://xbrlsite.azurewebsites.net/2019/Framework/Details/InformationModelDefinition.html

pieces, or **report elements**[26], are commonly used to construct the information model description: **Network**[27], **Table**[28], **Axis**[29], **Member**[30], **Line Items**[31], **Abstract**[32], and **Concept**[33].

Below you see the information model description of the structure of a fragment of a report, in this case one fact set which is used to describe the components of inventory:

#	Label	Report Element Class	Period Type	Balance	Name
1	**Inventory, by Compoment [Table]**	[Table]			gaap:InventoryByCompomentTable
2	**Legal Entity [Axis]**	[Axis]			frm:LegalEntityAxis
3	Consolidated Entity [Member]	[Member]			frm:ConsolidatedEntityMember
4	**Inventory, by Component [Line Items]**	[Line Items]			gaap:InventoryByComponentLineItems
5	Inventory, by Component [Roll Up]	[Abstract]			gaap:InventoryByComponentRollUp
6	Finished Goods	[Concept] Monetary	As Of	Debit	gaap:FinishedGoods
7	Work in Progress	[Concept] Monetary	As Of	Debit	gaap:WorkInProgress
8	Raw Material	[Concept] Monetary	As Of	Debit	gaap:RawMaterial
9	Inventory	[Concept] Monetary	As Of	Debit	gaap:Inventory

Something is important to point out. We mentioned that in XBRL you have core aspects and noncore aspects. In the typical software applications created today, the core aspects reporting entity and calendar period are commonly not represented in the information model description that is typically created by software applications. The graphic above shows that sort of representation.

Below you see a truer information model description which includes the reporting entity and the calendar period. Also, per the US GAAP XBRL Taxonomy, the IFRS XBRL Taxonomy the term "[Axis]" is used as a synonym of "Aspect". Axis and aspect are synonyms and mean exactly the same thing. Also "Period" and "Calendar Period" are exactly the same thing.

#	Label	Report Element Class	Period Type	Balance	Name
1	**Inventory, by Compoment [Table]**	[Table]			gaap:InventoryByCompomentTable
2	**Reporting Entity [Axis]**	[Axis]			xbrl:ReportingEntityAxis
3	http://regulator.gov/id#1234567890	[Member]			http://regulator.gov/id#1234567890
4	**Period [Axis]**	[Axis]			xbrl:PeriodAxis
5	12/31/2010	[Member]			12/31/2010
6	12/31/2009	[Member]			12/31/2009
7	**Legal Entity [Axis]**	[Axis]			frm:LegalEntityAxis
8	Consolidated Entity [Member]	[Member]			frm:ConsolidatedEntityMember
9	**Inventory, by Component [Line Items]**	[Line Items]			gaap:InventoryByComponentLineItems
10	Inventory, by Component [Roll Up]	[Abstract]			gaap:InventoryByComponentRollUp
11	Finished Goods	[Concept] Monetary	As Of	Debit	gaap:FinishedGoods
12	Work in Progress	[Concept] Monetary	As Of	Debit	gaap:WorkInProgress
13	Raw Material	[Concept] Monetary	As Of	Debit	gaap:RawMaterial
14	Inventory	[Concept] Monetary	As Of	Debit	gaap:Inventory

[26] Report Element, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ReportElement.html
[27] Network, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Network.html
[28] Table, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Table.html
[29] Axis, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Axis.html
[30] Member, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Member.html
[31] Line Items, http://xbrlsite.azurewebsites.net/2019/Framework/Details/LineItems.html
[32] Abstract, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Abstract.html
[33] Concept, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Concept.html

Another part of the information model description is the mathematical rules that are used to describe and verify the roll up relations of the concepts that are a part of the information model description. Here is the roll up relations that are part of this information model description.

#	Label	Report Element Class	Weight	Balance	Name
1	Inventory	[Concept] Monetary			gaap:Inventory
2	Finished Goods	[Concept] Monetary	+1	Debit	gaap:FinishedGoods
3	Work in Progress	[Concept] Monetary	+1	Debit	gaap:WorkInProgress
4	Raw Material	[Concept] Monetary	+1	Debit	gaap:RawMaterial

Another part of the information model description is the facts within the fact set themselves. Here is the fact set or the **fact table**[34] for the facts that go with the information model description provided above.

#	Reporting Entity [Aspect]	Period [Aspect]	Concept [Aspect]	Legal Entity [Aspect]	Fact Value	Unit	Rounding
1	http://regulator.gov/id#1234567890	12/31/2010	Finished Goods	Consolidated Entity [Member]	600,000	USD	Thousands
2	http://regulator.gov/id#1234567890	12/31/2009	Finished Goods	Consolidated Entity [Member]	600,000	USD	Thousands
3	http://regulator.gov/id#1234567890	12/31/2010	Work in Progress	Consolidated Entity [Member]	300,000	USD	Thousands
4	http://regulator.gov/id#1234567890	12/31/2009	Work in Progress	Consolidated Entity [Member]	300,000	USD	Thousands
5	http://regulator.gov/id#1234567890	12/31/2010	Raw Material	Consolidated Entity [Member]	100,000	USD	Thousands
6	http://regulator.gov/id#1234567890	12/31/2009	Raw Material	Consolidated Entity [Member]	100,000	USD	Thousands
7	http://regulator.gov/id#1234567890	12/31/2010	Inventory	Consolidated Entity [Member]	1,000,000	USD	Thousands
8	http://regulator.gov/id#1234567890	12/31/2009	Inventory	Consolidated Entity [Member]	1,000,000	USD	Thousands

A software application takes the information model description structure, the information model description rules provided, the facts that are included within the fact set, and known best practices for rendering a business report that are coded into the software application in some manner and then generates a human-readable rendering of the reported information for a fragment or fact set of a report.

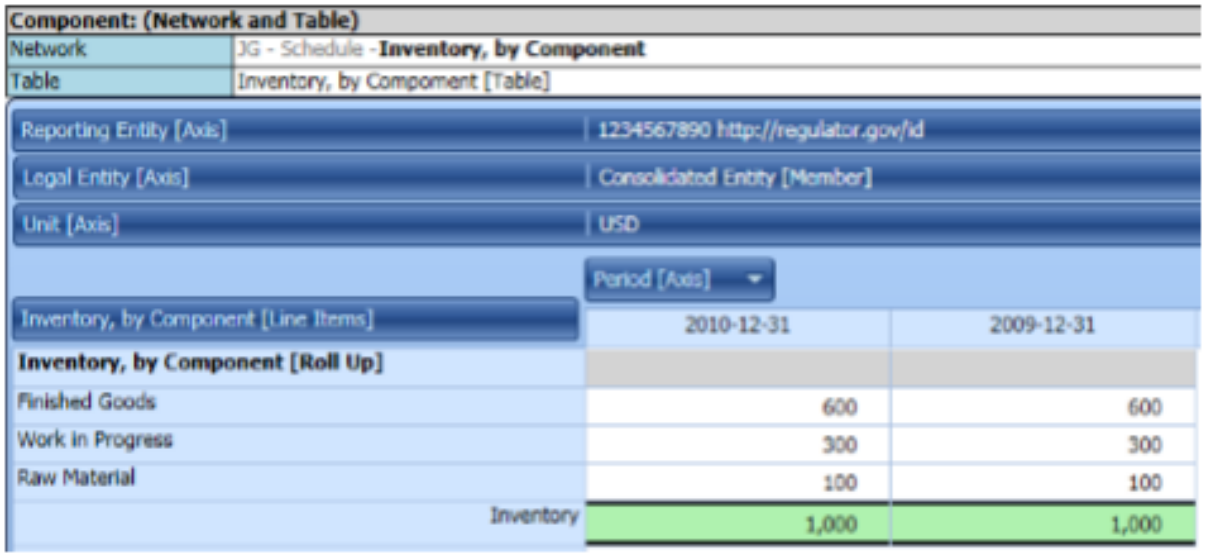
The following is the **rendering**[35] of the inventory components disclosure that we are working with above:

Reporting Entity [Aspect]	http://regulator.gov/id#1234567890
Legal Entity [Aspect]	Consolidated Entity [Member]

	Period [Aspect]	
Concept [Aspect]	12/31/2020	12/31/2019
Inventory, by Component [Roll Up]		
Finished Goods	600,000	600,000
Work in Progress	300,000	300,000
Raw Material	100,000	100,000
Inventory	1,000,000	1,000,000

[34] Fact Table, TO DO…
[35] Rendering, TO DO…

Different software applications will provide slightly different renderings using the same XBRL-based input information[36].



Component: (Network and Table)	
Network	JG - Schedule - **Inventory, by Component**
Table	Inventory, by Component [Table]

Reporting Entity [Axis]	1234567890 http://regulator.gov/id
Legal Entity [Axis]	Consolidated Entity [Member]
Unit [Axis]	USD

Inventory, by Component [Line Items]	Period [Axis] 2010-12-31	2009-12-31
Inventory, by Component [Roll Up]		
Finished Goods	600	600
Work in Progress	300	300
Raw Material	100	100
Inventory	1,000	1,000

Here is what the information model description might look like in that software application:

Label	Report Element Class	Period	Balance	Preferred Label Role	Name
Inventory, by Compoment [Table]	[Table]			Standard Label	gaap:InventoryByCompomentTable
Legal Entity [Axis]	[Axis]			Standard Label	frm:LegalEntityAxis
Consolidated Entity [Member]	[Member]			Standard Label	frm:ConsolidatedEntityMember
Inventory, by Component [Line Items]	[LineItems]			Standard Label	gaap:InventoryByComponentLineItems
Inventory, by Component [Roll Up]	[Abstract]			Standard Label	gaap:InventoryByComponentRollUp
Finished Goods	[Concept] Monetary	As Of	Debit	Standard Label	gaap:FinishedGoods
Work in Progress	[Concept] Monetary	As Of	Debit	Standard Label	gaap:WorkInProgress
Raw Material	[Concept] Monetary	As Of	Debit	Standard Label	gaap:RawMaterial
Inventory	[Concept] Monetary	As Of	Debit	Standard Label	gaap:Inventory

Here is what the roll up rule relations representation might look like in that software application:

Label	Report Element Class	Balance	Weight	Name
Inventory, by Compoment [Table]	[Table]		0	gaap:InventoryByCompomentTable
Inventory	[Concept] Monetary	Debit	0	gaap:Inventory
Finished Goods	[Concept] Monetary	Debit	1	gaap:FinishedGoods
Work in Progress	[Concept] Monetary	Debit	1	gaap:WorkInProgress
Raw Material	[Concept] Monetary	Debit	1	gaap:RawMaterial

Software applications use the rule relations that describe or explain the relations to verify that reported facts are consistent with that explanation. Here is a software application interface for

[36] *Comparison of Renderings for Concept Arrangement Patterns*, http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/ComparisonOfConceptArrangementPatternRenderings.pdf

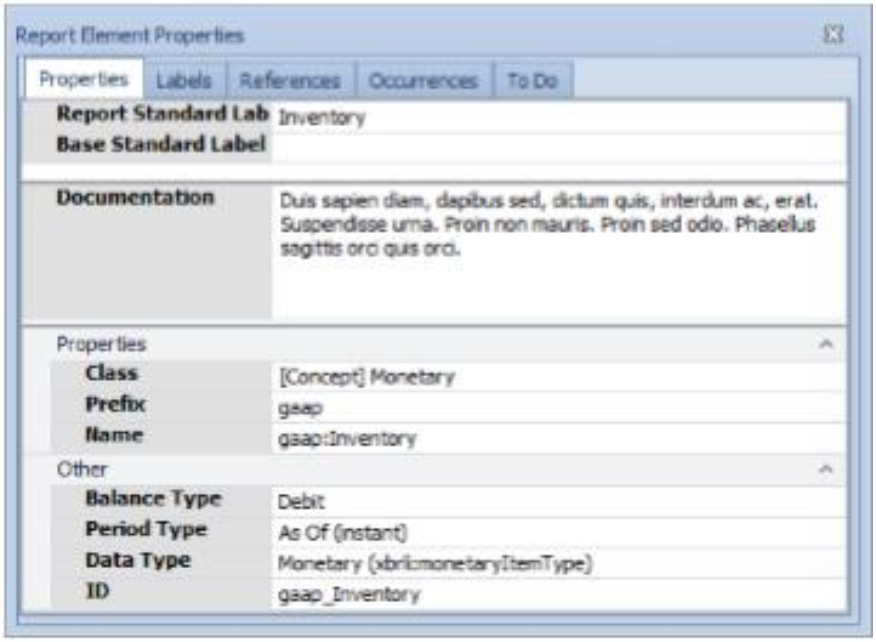
verifying that the reported facts are consistent with the rules that explain the relations between the facts:

Label	Rendered Value	Op	Reported Value	Calculated Value	Balance	Result	Name
Inventory, by Component [Line Items]							gaap:InventoryByComponentLineItems
Inventory, by Component [Roll Up]							gaap:InventoryByComponentRollUp
Finished Goods	600	+	600		Debit		gaap:FinishedGoods
Work in Progress	300	+	300		Debit		gaap:WorkInProgress
Raw Material	100	+	100		Debit		gaap:RawMaterial
Inventory	1,000		1,000	1,000	Debit	Verified	gaap:Inventory

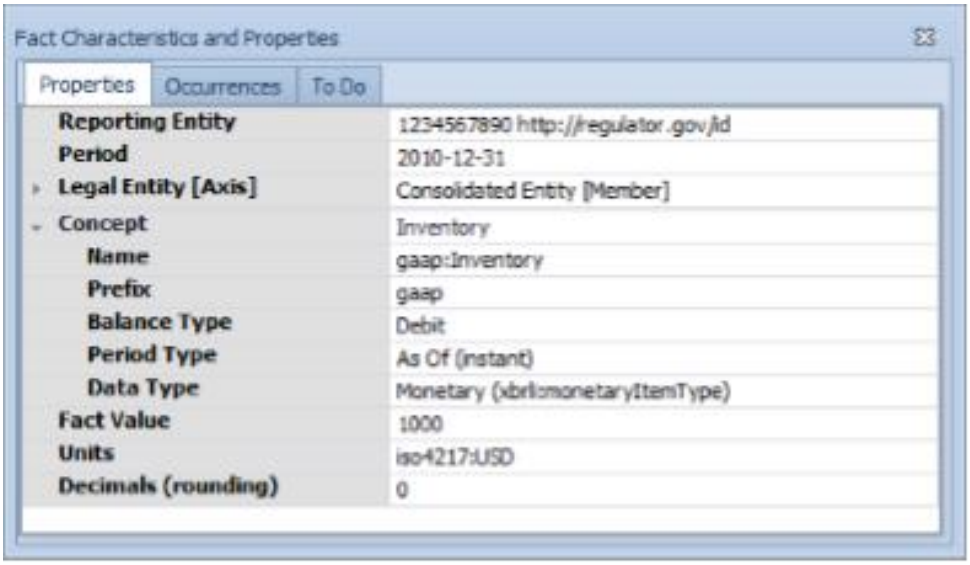
Label	Rendered Value	Op	Reported Value	Calculated Value	Balance	Result	Name
Inventory, by Component [Line Items]							gaap:InventoryByComponentLineItems
Inventory, by Component [Roll Up]							gaap:InventoryByComponentRollUp
Finished Goods	600	+	600		Debit		gaap:FinishedGoods
Work in Progress	300	+	300		Debit		gaap:WorkInProgress
Raw Material	100	+	100		Debit		gaap:RawMaterial
Inventory	1,000		1,000	1,000	Debit	Verified	gaap:Inventory

Alternatively, note that the renderings provided as examples of this fact set contains two green cells which confirm that mathematical relation for the roll up total is consistent with the explanation provided by the rules.

Information about the properties of each report element which makes up the information model description should be accessible to the user of the business report:



Information about the properties of each fact which is represented within the report is accessible to the user of the business report:



This same information is provided for each and every fact set that makes up a business report. Facts could be used in multiple fact sets. The facts used in fact sets must be consistent within a fact set and between the individual fact sets that make up a report.

Remember that a financial report is a special type of business report. Every financial report is a business report; but it is not the case that every business report is a financial report. Every financial report has the characteristic of complying with the accounting equation and double-entry accounting.

Advanced Logical Conceptualization of a Business Report (Details)

A business report can be broken down into fragments. A **fragment**[37] is a set of one to many *fact sets* which go together some specific purpose within a report. For example, a balance sheet is a fragment of a business report that is made up of two fact sets: a roll up of assets and a roll up of liabilities and equity.

Each fact set has a concept arrangement pattern property. A **concept arrangement pattern**[38] specifies the nature of the relationship between the concept aspect of an information model definition.

A **set**[39] is a type of concept arrangement pattern where concepts have no mathematical relations between each other within the fact set. Essentially, a set is a flat list of concepts. A synonym for set is hierarchy.

A **roll up**[40] is a type of concept arrangement pattern which represents a basic roll up type mathematical relationship: Fact A + Fact B + Fact C = Fact D (a set of items and a total of those items).

A **roll forward**[41] is a type of concept arrangement pattern which represents a basic roll forward mathematical relation: Beginning balance (stock) + change1 (flow) + change2 (flow) + change3 (flow) = Ending balance (stock). The beginning and ending balances are two different instances in time (stock) and the changes (flow) are between those two instances.

An **adjustment**[42] is a type of concept arrangement pattern which represents a basic mathematical reconciliation between an originally stated value and a restated value usually due to a correction or error: Originally stated balance + adjustment1 + adjustment2 + adjustment3 = restated balance. The originally stated balance and restated balance are the same concept as of the same instant in time that are differentiated by the date those facts are reported. The adjustments are the changes that reconcile the originally stated to the restated balance.

A **variance**[43] is a type of concept arrangement pattern which represents a mathematical difference between two reporting scenarios: Amount (projected scenario) + Amount(variance) = Amount (actual scenario).

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[37] Fragment, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Fragment.html
[38] Concept Arrangement Pattern, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ConceptArrangementPattern.html
[39] Set, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Set.html
[40] Roll Up, http://xbrlsite.azurewebsites.net/2019/Framework/Details/RollUp.html
[41] Roll Forward, http://xbrlsite.azurewebsites.net/2019/Framework/Details/RollForward.html
[42] Adjustment, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Adjustment.html
[43] Variance, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Variance.html

A **complex computation**[44] is a type of concept arrangement pattern which represents any arbitrary mathematical relationship between a set of numeric facts. A complex computation is comprised of some flat set of numeric concepts and a rule that represents the mathematical relation between that set of concepts.

A **roll forward info**[45] is a type of concept arrangement pattern which represents a non-mathematical relation of information about a roll forward.

A **text block**[46] is a type of concept arrangement pattern which represents a non-mathematical relationship in the form of prose. A text block concept arrangement pattern is comprised of exactly one concept. There are three sub classes or type of text blocks: **Level 1 Note Text Block**[47], **Level 2 Policy Text Block**[48], and **Level 3 Disclosure Text Block**[49].

Each fact set has a member arrangement pattern property. A **member arrangement pattern**[50] expresses the relations between members within an aspect other than the concept aspect (which is explained by the concept arrangement pattern).

The members of an axis might be related mathematically. **Member aggregation**[51] is a type of member arrangement pattern where the members of an axis roll up the same as the roll up concept arrangement pattern. **Member flat**[52] list is a type of member aggregation pattern where the members for a flat list. **Member nonaggregating**[53] is a type of member arrangement pattern where the members of an axis are not related mathematically but simply are used to differentiate reported facts.

Reported facts could need additional arbitrary descriptive information. A **parenthetical explanation**[54] provides additional descriptive information about a fact. A synonym for parenthetical information is comment.

A financial **reporting scheme**[55] is a formal specification for how financial reports are to be created and the underlying accounting rules and is usually created by a standards setter or

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[44] Complex Computation, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ComplexComputation.html
[45] Roll Forward Info, http://xbrlsite.azurewebsites.net/2019/Framework/Details/RollForwardinfo.html
[46] Text Block, http://xbrlsite.azurewebsites.net/2019/Framework/Details/TextBlock.html
[47] Level 1 Note Text Block, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Level1NoteTextBlock.html
[48] Level 2 Policy Text Block, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Level2PolicyTextBlock.html
[49] Level 3 Disclosure Text Block, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Level3DisclosureTextBlock.html
[50] Member Arrangement Pattern, http://xbrlsite.azurewebsites.net/2019/Framework/Details/MemberArrangementPattern.html
[51] Member Aggregation, http://xbrlsite.azurewebsites.net/2019/Framework/Details/MemberAggregation.html
[52] Member Flat List, http://xbrlsite.azurewebsites.net/2019/Framework/Details/MemberFlatList.html
[53] Member Nonaggregating, http://xbrlsite.azurewebsites.net/2019/Framework/Details/MemberNonaggregation.html
[54] Parenthetical Explanation, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ParentheticalExplanation.html
[55] Reporting Scheme, TO DO, http://xbrlsite.azurewebsites.net/2018/Library/ReportingSchemes-2018-12-30.pdf

regulator. For example, US GAAP, IFRS, and IPSAS are all financial reporting schemes. Financial reports are not forms. Financial reporting schemes allow for a certain amount of flexibility and variability when reporting certain specific disclosures or subtotals contained within a disclosure. A **disclosure**[56] is a set of one to many fact sets or a set of one to many fragments which form an accounting disclosure that is either required by statutory or regulatory rules or provided at the discretion of a reporting entity. A **template**[57] is a representation of a possible disclosure that can be used as a prototype in the process of creating a report. An **exemplar**[58] is a representation of a disclosure from an existing report of some economic entity that can be leveraged in the process of creating a report.

Because variability exists in the allowed possible approaches that economic entities represent their financial disclosures, different economic entities have different reporting styles. A **reporting style**[59] is a set of relations, consistency crosscheck rules, mapping rules, and impute rules that are used to check fundamental accounting concept relations for a specific type of report or style of reporting. For example, a classified balance sheet and an order of liquidity balance sheet are two different reporting styles for creating a balance sheet.

A **consistency crosscheck rule**[60] is a type of rule that tests the relations of fundamental accounting concept relations within a report against a specified reporting style to make sure there are no inconsistencies or contradictions between reported facts within a report.

An **impute rule**[61] is a type of rule that explains how to logically derive a fact that have not been explicitly reported based on other facts that have been explicitly reported or which have been logically derived from other reported information. For example, an economic entity might not explicitly report the line item “Noncurrent assets”; but does report “Assets” and “Current assets”. Given the impute rule “Assets = Current assets + Noncurrent assets”; the fact value for Noncurrent assets can be reliably derived logically using the other two reported facts and the impute rule.

A **mapping rule**[62] is a type of rule that explains how a base reporting scheme taxonomy concept reported by an economic entity relates to a fundamental accounting concept. For example, the notion of “Cost of Revenue” could be reported using the concept “Cost of Revenue”, or “Cost of Goods and Services Sold”, or “Cost of Goods Sold”, or “Cost of Services Sold”, etc. Basically, mapping rules enable information to be extracted from a report reliably.

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[56] Disclosure, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Disclosure.html
[57] Template, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Template.html
[58] Exemplar, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Exemplar.html
[59] Reporting Style, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ReportingStyle.html
[60] Consistency Crosscheck Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ConsistencyCrosscheckRule.html
[61] Impute Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ImputeTypeRule.html
[62] Mapping Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/MappingTypeRule.html

A **disclosure mechanics rule**[63] is a type of rule that describes the structural and mechanical representation of a disclosure against a specification or prototype of that disclosure. For example, every disclosure that has the property of concept arrangement pattern of "roll up" must always have a total. A disclosure mechanics rule would specify the concept that would be used to represent that total. A specific disclosure, such as "inventory components roll up" would be required to use a specific concept such as "Inventory, Net" to represent that total. A disclosure mechanics rule would specify that concept. Other concepts might be used as alternatives to some specific total concept to represent a disclosure. A disclosure mechanics rule would specify those alternatives. Every Level 4 Disclosure Detail representation has some complementary Level 3 Disclosure Text Block representation. A disclosure mechanics rule would specify that relation.

A **type or class rule**[64] is a type of rule that expresses an allowed or a disallowed relation between two reporting scheme concepts for some reporting style. For example, the concept "Operating Expense (indirect operating expense)" would never be part of "Cost of Revenue (direct operating expense)", a type or class rule would be used to explicitly disallow this relation. Alternatively, explicitly allowed relations are also expressed using type or class rules.

A **reporting checklist rule**[65] is a type of rule that describes the reportability of a statutory or regulatory disclosure required by a reporting scheme. For example, some disclosures are always required. Other disclosures are required only if a specific line item is reported. Other disclosures could be used as alternatives for some other disclosure.

A **report set**[66] is a set of one to many reports. For example, if you are comparing the reports of an economic entity for the past five years, the five reports that you use to perform that analysis are your report set.

A **reporting entity aspect**[67] is a core aspect that distinguishes the economic entity which creates a report.

A **calendar period aspect**[68] is a core aspect that distinguishes the calendar period of a reported fact. A **stock**[69] is a type of calendar period aspect that is used to represent a fact as of a specific point in time. A synonym for stock is instant. A **flow**[70] is a type of calendar period aspect that is used to represent a fact over a period of time. A synonym for stock is duration.

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[63] Disclosure Mechanics Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/DisclosureMechanicsRule.html
[64] Type or Class Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/TypeClassRule.html
[65] Reporting Checklist Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ReportingChecklistRule.html
[66] Report Set, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ReportSet.html
[67] Reporting Entity Aspect, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ReportingEntityAspect.html
[68] Calendar Period Aspect, http://xbrlsite.azurewebsites.net/2019/Framework/Details/CalendarPeriodAspect.html
[69] Stock, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Stock.html
[70] Flow, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Flow.html

A **concept aspect**[71] is a core aspect that is used to express the concept that relates to a fact. Synonyms for concept aspect include primary item and line item.

A **fragment arrangement pattern**[72] is the relationship between fragments or the order or sequence of fragments within a report.

Prose[73] is a type of fact value that is structure in nature (i.e. a table, an ordered list, an unordered list, paragraphs of text, or any combination of those structures).

Text[74] is a type of fact value that is nonnumeric unstructured text (i.e. not prose).

A **logical rule**[75] is a type of rule expresses logical relations between entities that make up a report.

An **accounting rule**[76] is a type of logical rule that is used to express a logical assertion specifically related to accounting rules.

A **mechanical rule**[77] is a type of logical rule that is used to express the relations between the report elements that make up a disclosure.

Logical Conceptualization of a Financial Report and Double-entry Accounting (Basic)

A financial report is a specialization of the more general business report. A financial report is "bounded" by the rules of double-entry accounting. That is what differentiates a financial report (bounded by the double-entry accounting model) from a business report (NOT bound by the double-entry accounting model).

The basic high-level model of double-entry accounting is described by the accounting equation[78] which is a logical statement:

- Assets = Liabilities + Equity

[71] Concept Aspect, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ConceptAspect.html
[72] Fragment Arrangement Pattern, http://xbrlsite.azurewebsites.net/2019/Framework/Details/FragmentArrangementPattern.html
[73] Prose, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Prose.html
[74] Text, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Text.html
[75] Logical Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/LogicalRule.html
[76] Accounting Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/AccountingRule.html
[77] Mechanical Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/MechanicalRule.html
[78] Wikipedia, *Accounting Equation*, https://en.wikipedia.org/wiki/Accounting_equation

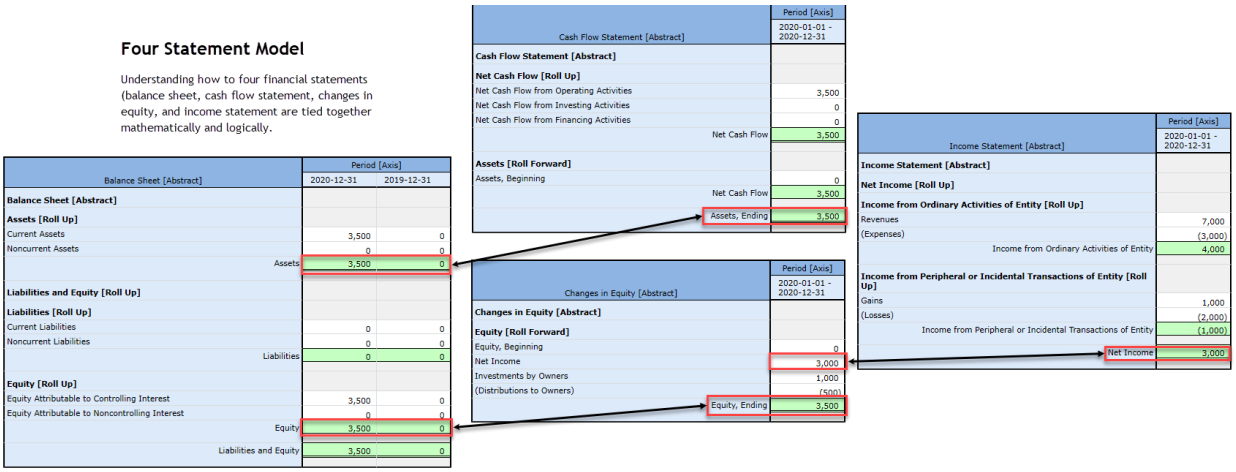
Standards setters create **financial reporting schemes**[79]. Within those financial reporting schemes, the standards setter expands on the accounting equation in slightly different ways per the specific needs of that specific financial reporting scheme. But they never violate the accounting equation. These rules tend to be outlined along with other important information within a conceptual framework for that financial reporting scheme. The financial reporting scheme defines a core set of classes of elements used by that financial reporting scheme which reconciles to the accounting equation.

The elements of financial statements[80] are the building blocks with which financial statements are constructed; the *classes* of *items* that financial statements comprise. The *items* in the financial statements of an economic entity represent in words and numbers certain entity resources, claims to those resources, and the effects of transactions and other events, circumstances, and other phenomenon that result in changes in those resources and claims.

These *classes* of building blocks are intentionally interrelated mathematically within the four core statements that make up a financial report; this is called 'articulation'. Intermediate components, i.e. subtotals, can be used to represent the *items* of an economic entity within the items that comprise a financial report. However, these intermediate components and the *items* must fit into the core framework of the *classes* of elements of a financial report.

The high-level model of a financial report and double-entry accounting can be represented within the XBRL technical syntax[81] and then used to both explain a financial report model and verify that the financial report model is consistent with that explanation[82].

[79] *Comparison of Financial Reporting Schemes High Level Concepts*, http://xbrlsite.azurewebsites.net/2018/Library/ReportingSchemes-2018-12-30.pdf
[80] Charles Hoffman, CPA, *Enhanced US GAAP Financial Report Elements*, http://xbrlsite.azurewebsites.net/2019/Core/core-usgaap/EnhancedFinancialReportElements.pdf
[81] *Methodically Proving the Financial Report Conceptual Model Top Down*, http://xbrl.squarespace.com/journal/2019/9/3/methodically-proving-the-financial-report-conceptual-model-t.html
[82] Human readable example of the four statement model, http://xbrlsite.azurewebsites.net/2019/Core/core-02-furtherEnhanced/evidence-package/contents/index.html#Rendering-BS-Implied.html



The four primary financial statements form the high-level structure of a financial report. The balance sheet provides a roll up of assets, a roll up of liabilities and equity, and the rule "Assets = Liabilities + Equity". The income statement is used to compute that roll up total, "Net Income" and rules for how the subcomponents of Net Income roll up. Net income then flows to the statement of changes in equity which is a roll forward which reconciles beginning and ending equity. The cash flow statement is a roll up of Net Cash Flow, rules that specify how the subcomponents of net cash flow roll up, and a roll forward of the asset Cash and Cash Equivalents which reconciles the beginning and ending balance of Assets on the balance sheet.

While the model shown above which is based on "Assets = Liabilities and Equity"; some economic entities use different sorts of models. For example, some economic entities report using a liquidation basis style balance sheet where "Assets - Liabilities = Net Assets". "Net Assets" and "Equity" are two different labels for what is the same concept.

Using the rules of mathematics, the equation "Assets = Liabilities + Equity" can be converted to "Assets - Liabilities = Equity".

So, while a financial report is not a static form it is not random either. Financial reports follow patterns and these patterns can be explained using specific models to account for and manage the variability inherent in a financial report[83].

[83] *Managing and Controlling Variability in XBRL-based Financial Reports*, http://xbrlsite.azurewebsites.net/2019/Library/ManagingAndControllingVariability.pdf

Logical System Conceptualization (Advanced)

In order to explain the logical conceptualization of a financial report you first have to provide a logical conceptualization of logical systems.

A general-purpose financial report (or business report) is a type of man-made **logical system** (a.k.a. logical theory). There is nothing natural about a general-purpose financial report (or business report), it is an invention of man. A general-purpose financial report is a high-fidelity, high-resolution, high-quality information exchange mechanism[84].

Logic is a set of principles that forms a framework for correct reasoning. Logic is a process of deducing new information correctly so that a chain of reasoning[85] can be created. Logic is a systematic way of thinking. Logic is about the correct methods that can be used to prove a statement is true or false. Logic tells us exactly what is meant. Logic allows systems to be proven. Logic is a tool. Logic is a common language that can be agreed upon, understood by all parties, and which therefore enables precise communication.

A **system** is a cohesive set of interrelated and interdependent parts that form a whole. A system can be either natural or man-made. Changing one part of a system usually affects other parts and the whole system with predictable patterns of behavior.

A logical system[86] is a type of formal system[87]. To be crystal clear I mean a **finite deductive first-order logic system**[88]. The point is to create a logical system that has high expressive capabilities but is also a provably safe and reliable system that is free from catastrophic failures and logical paradoxes (world view): axiomatic (Zermelo–Fraenkel) set theory[89]; directed acyclic graphs[90]; closed world assumption[91]; negation as failure[92]; unique name assumption[93]; Horn logic[94]. (a.k.a. logical theory, strong ontology; see the ontology spectrum[95])

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[84] *Everything you Need to Know to have an Intelligent Conversation about Digital Financial Reporting*, http://xbrl.squarespace.com/journal/2019/5/29/everything-you-need-to-know-to-have-an-intelligent-conversat.html

[85] *Constructing a Chain of Reasoning*, http://xbrl.squarespace.com/journal/2019/9/26/constructing-a-chain-of-reasoning.html

[86] Wikipedia, *Logical Systems*, https://en.wikipedia.org/wiki/Logic#Logical_systems

[87] Wikipedia, *Formal System*, https://en.wikipedia.org/wiki/Formal_system

[88] Wikipedia, *First-order Logic, Deductive System*, https://en.wikipedia.org/wiki/First-order_logic#Deductive_systems

[89] Wikipedia, *Set Theory, Axiomatic Set Theory*, https://en.wikipedia.org/wiki/Set_theory#Axiomatic_set_theory

[90] Wikipedia, *Directed Acyclic Graph*, https://en.wikipedia.org/wiki/Directed_acyclic_graph

[91] Wikipedia, *Closed World Assumption*, https://en.wikipedia.org/wiki/Closed-world_assumption

[92] Wikipedia, *Negation as Failure*, https://en.wikipedia.org/wiki/Negation_as_failure

[93] Wikipedia, *Unique Name Assumption*, https://en.wikipedia.org/wiki/Unique_name_assumption

[94] Wikipedia, *Horn Logic*, https://en.wikipedia.org/wiki/Horn_clause

[95] *Difference between Taxonomy, Conceptual Model, Logical Theory*, http://xbrl.squarespace.com/journal/2018/12/11/difference-between-taxonomy-conceptual-model-logical-theory.html

There are many different ways to describe formal systems in human-understandable and machine-understandable terms. ISO/IEC 11179-3:2013[96] describes this sort of information in global standard but technical terms. It is my observation[97] that each different approach to describing a formal system tends to have its own terminology for explaining what seems to be exactly the same thing, the explanations tend to not always be complete, and the explanations tend to be harder than necessary for a business professional to understand.

Philosophers working with logic, engineers building electronic circuits, computer engineers creating software systems, mathematicians creating proofs, and knowledge engineers creating ontologies are all doing extremely similar things (I would contend that they are actually doing EXACTLY the same thing) but all these folks seem to be working in their little "silos" and are going about this slightly differently.

Each silo as terminology which is inconsistent with other silos, the completeness/precision of the explanations each silo provides as to what they are doing and the approach they are using is unique to each silo, all of the explanations tend to be overly technical, there generally is no "high-level" summary of the explanations, there certainly is no possibility of saying that one silo is a "best practice" or "standard" approach for describing exactly what they are all really doing, and as a consequence of all this a pretty darn simple idea and opportunity is being completely missed.

This is my current best shot at explaining how to express the semantics of a logical system and map those semantics to the XBRL technical syntax in terms understandable to a business professional.

A logical system enables a community of stakeholders to agree on important common models, structures, and statements for capturing meaning or representing a shared understanding of and knowledge in some universe of discourse where specific flexibility/variability is necessary. Because flexibility/variability is allowed in this sort of logical system, that flexibility/variability must be managed so that it can be controlled. Models, structures, and statements allow for this necessary management and control.

- **Theory**: A theory is a set of *models* for a universe of discourse (a.k.a. domain of discourse, domain)
- **Model**: A model is a set of *structures*. A model is an allowable interpretation that satisfies the theory[98].
- **Structure**: A structure is a set of *statements*.

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[96] ISO, *ISO/IEC 11179-3:2013*
Information technology — Metadata registries (MDR) — Part 3: Registry metamodel and basic attributes, https://www.iso.org/standard/50340.html

[97] *Brainstorming How to Describe Semantics of a Flexible Yet Finite Logical System*, http://xbrl.squarespace.com/journal/2019/9/10/brainstorming-how-to-describe-semantics-of-a-flexible-yet-fi.html

[98] Wikipedia, *Model Theory*, https://en.wikipedia.org/wiki/Model_theory

- **Statement**: A statement is a proposition, claim, assertion, belief, idea, or fact about or related to the universe of discourse. (a.k.a. expression)
    - **Term**: A term is a type of statement that specifies the existence of a primitive (a.k.a. simple, atomic) or functional (a.k.a. complex, composite) idea that is used within a universe of discourse. Terms are generally nouns. (Tbox[99])
    - **Relation**: A relation (a.k.a. association[100], predicate) is a type of statement that specifies a permissible structure or specifies a property of a term. A relation is generally a verb.
        - **Is-a**: An is-a relation specifies a general-special or wider-narrower or class-subclass or type-of type relation between terms. (class[101])(generalization[102])
        - **Has-a**: A has-a relation specifies a has-part or part-of type relation between terms. (meronymy[103])(composition[104])
        - **Property-of**: A property-of relation specifies that a term has a specific quality, trait, or attribute. (property[105])
    - **Assertion**: An assertion is a type of statement which specifies a permissible manipulation within a structure within a model for a theory. (Abox[106])
        - **Axiom**: An axiom is a type of assertion which describes a self-evident logical principle related to a universe of discourse that no one would argue with or otherwise dispute.
        - **Theorem**: A theorem is a type of assertion which makes a logical deduction which can be proven by constructing a chain of reasoning by applying axioms or other theorems in the form of IF…THEN statements.
        - **Restriction**: A restriction is a type of assertion that is a special type of axiom or theorem imposed by some authority which restricts, constrains, limits, or imposes some range.
    - **Fact**: A fact (a.k.a. instance, individual) is a type of statement that specifies a piece of information about circumstances that exist or events that have occurred that is reported by an entity "as of" or "for a period" of time and otherwise distinguishable from one another by one or more distinguishing aspects.

The models, structures, and statements of a theory relevant to a particular universe of discourse generally allows for some certain specific system flexibility/variability and as such

[99] Wikipedia, *Tbox*, https://en.wikipedia.org/wiki/Tbox
[100] Wikipedia, *Class Diagram*, https://en.wikipedia.org/wiki/Class_diagram#Association
[101] Wikipedia, *Class (Set Theory)*, https://en.wikipedia.org/wiki/Class_(set_theory)
[102] Wikipedia, *Class Diagram*, https://en.wikipedia.org/wiki/Class_diagram#Generalization/Inheritance
[103] Wikipedia, *Meronymy*, https://en.wikipedia.org/wiki/Meronymy
[104] Wikipedia, *Class Diagram*, https://en.wikipedia.org/wiki/Class_diagram#Composition
[105] Wikipedia, *Property*, https://en.wikipedia.org/wiki/Property_(mathematics)
[106] Wikipedia, *Abox*, https://en.wikipedia.org/wiki/Abox

must be consciously unambiguously and completely as is necessary and practical in order to achieve a specific goal or objective or a range of goals/objectives.

A logical system can have high to low ***precision*** and high to low ***coverage***. *Precision* is a measure of how precisely the information within a logical system has been represented as contrast to reality for the universe of discourse. *Coverage* is a measure of how completely information in a logical system has been represented relative to the reality for a universe of discourse.

The level of precision and coverage expressively encoded within some logical system depends on the application or applications being created that leverage that logical system.

Further, a logical system will have the following characteristics:

- **Consistent**: No statement (assertion) of the logical system contradict another statement (assertion) within that logical system.
- **Valid**: No false inference (logical deduction of a statement) from a true premise is possible.
- **Complete**: If an assertion is true, then that assertion can be proven; i.e. all assertions exists in the system.
- **Sound**: If any assertion is a theorem of the logical system; then the theorem is true.
- **Fully expressed**: If an important term exists in the real world; then the term can be represented within the logical system.

Saying this in another way specifically for a financial report: (note that the term "statement" as is being used as defined by the components of a logical system, this is not the same as statement defined in terms of financial reporting)

- **Completeness**: All relevant models, structures, and statements have been included within the financial report representation.
- **Existence**: No model, structure, or statement exists which should not be included in the financial report has been included.
- **Accuracy**: The models, structures, and statements which are included in the financial report are accurate, correct, and precise.
- **Fidelity**: Considered as a whole; the models, structures, and statements provide a true and fair representation of reported financial information.
- **Integrity**: The model, structure, and statements that describe each part of a financial report provide a true and fair representation of such part and no parts are inconsistent with or contradict any other financial report part.
- **Consistency**: The models, structures, and statements are consistent with prior periods and with the reporting entity's peers as is deemed appropriate.
- **True and fair representation**: The structures, models, and statements of a financial report are a true and fair representation of the information of the reporting economic entity.

All that is above relates to specifying the permissible semantics of a logical system. The terms below tend to be related to the expression of those semantics in the form of some technical syntax:

- **Constant**: A constant is the physical representation of a static term.
- **Variable**: A variable is the physical representation of a dynamic term.
- **Vocabulary**: A vocabulary is a system of physically representing formulas, terms, structures, and models using a specified syntax.
- **Tree**: A tree is a physical representation of a statement to define a structure or specify a property.
- **Sentence**: A sentence is a grammatical unit of a statement.
- **Formula**: A formula (a.k.a. function) is a well-formed physical representation of a statement.
- **Predicate**: A predicate asserts something about a subject. A predicate is a verb.
- **Connectors**: A connector is used to join one or more sentences into a complete and well-formed statement.
    - Implication
    - Disjunction (or)
    - Conjunction (and)
    - Negation (not)
    - Logical equivalence (if and only if)
- **Qualifiers**: A qualifier is used to extend propositional logic[107] into predicate logic[108].
    - There exists (existential qualifier)
    - For all (universal qualifier)

Technical Information

The logic described in this document can be represented using the XBRL technical syntax[109] or any other physical format. Different software applications will highly likely represent artifacts in different ways. However, the logic and meaning conveyed by different software applications should be exactly the same.

[107] Wikipedia, *Propositional Calculus*, https://en.wikipedia.org/wiki/Propositional_calculus
[108] Wikipedia, *First-order Logic*, https://en.wikipedia.org/wiki/First-order_logic
[109] *Examples of Describing a Financial Report Logical System Using XBRL*, http://xbrl.squarespace.com/journal/2019/9/27/examples-of-describing-a-financial-report-logical-system-usi.html