Narrative Explaining Logical Conceptualization of a Business 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 business report that is understandable to business professionals and technical professionals.

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 *associations* 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 commercial software vendors[9].

A business report can be explained using three core models[10]: **logical system** model, **business report** model, and **multidimensional 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 those additional details. Finally, in

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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] *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

order to explain the higher-level models of a business report and multidimensional model; it is necessary to describe the terminology used to describe a logical system.

Overview of Logical System in Simple Terms

A **system**[11] is a cohesive conglomeration of interrelated and interdependent parts that is either natural or man-made. A business report is a type of man-made **logical system**. A logical system (a.k.a.) logical theory is made up of a set of *models*, *structures*, *terms*, *associations*, *assertions*, and *facts*. In very simple terms,

- **Logical theory**: A *logical theory* is a set of models that are consistent with and permissible per that logical theory.
- **Model**: A *model* is a set of structures. A model is a permissible interpretation of a theory.
- **Structure**: A *structure* is a set of statements which describe the structure. A structure provides context.
- **Statement**: A statement is a proposition, claim, assertion, belief, idea, or fact about or related to the universe of discourse to which the logical theory relates. There are four broad categories of statements:
    - **Terms**: (simple, functional) Terms are statements that define ideas used by the logical theory such as the simple terms "assets", "liabilities", and "equity" or the functional term "balance sheet".
    - **Associations**: (is-a, has-a, property-of) Associations are statements that describe permissible interrelationships between the terms such as "assets is 'part-of' the balance sheet" or "operating expenses 'is-a' type of expense" or "assets = liabilities + equity" or "an asset is a 'debit' and is 'as of' a specific point in time and is always a monetary numeric value".
    - **Assertions**: (axioms, theorems, restrictions) Assertions are statements that describe what tend to be IF…THEN…ELSE types of relationships such as "IF the economic entity is a not-for-profit THEN net assets = assets - liabilities; ELSE assets = liabilities + equity".
    - **Facts**: Facts are statements about the numbers and words that are provided by an economic entity within a business report. For example, the financial report, a type of business report, might state "assets for the consolidated legal entity Microsoft as of June 20, 2017 was $241,086,000,000 expressed in US dollars and rounded to the nearest millions of dollars.

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[11] Systems Theory: Method to my Madness, http://xbrl.squarespace.com/journal/2019/12/29/systems-theory-method-to-my-madness.html

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.

If the models, structures, terms, associations, assertions, and facts have high precision and high coverage and all the statements within the system are **consistent**, the logical system can be proven to be **properly functioning**.

It is this set of consistent models, structures, terms, associations, assertions, and facts that would be represented within some technical syntax to represent some business report logical system with high precision and high coverage.

Basic Logical Conceptualization of a Business Report

A business report is a logical system. This narrative explains the structures, terms, associations, assertions, and facts that comprise that system.

A **scalar** is a fact which has no characteristics; it stands on its own. For example, the value of the fact pi is a scalar, the fact 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 information in the form of numbers and words. A **fact**[13] defines a single, observable, reportable piece of information contained within a business report and has a **fact value**[14] contextualized for unambiguous interpretation or analysis by one or more distinguishing aspects. For example, below are two facts with the values of "2,000" and "1,000". However, the two facts above are not contextualized, the facts have no aspects.

Fact Value
2,000
1,000

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[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

An **aspect**[15] (a.k.a. characteristic) describes a fact. An aspect is a property of a fact which provides information necessary to describe the 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

To fully describe a fact, you need more than just one aspect. 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 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":

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[15] Aspect, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Aspect.html
[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

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 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. Those three facts make up a fact set.

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.

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

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:

"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. For example, 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 financial statement, say the income statement. Other levels of granularity can exist between the highest and lowest levels.

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

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[24] Grain, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Grain.html

The facts in a fact set forms a **fragment**[25] of the report. A report can have one or many fragments. A fragment is a type of *structure*. For example, a "balance sheet" is a structure or the "long term debt maturities" disclosure is a structure.

An **information structure definition**[26] is a structure which is created to describe each fragment of a report. The following pieces, or **report elements**[27], are commonly used to construct the information structure description: **Network**[28], **Table** (a.k.a. Hypercube)[29], **Axis** (a.k.a. Dimension)[30], **Member**[31], **Line Items** (a.k.a. Primary Items)[32], **Abstract**[33], and **Concept**[34].

Below you see the information structure definition 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 structure definition that is typically created by software applications. The graphic above shows that sort of representation.

Below you see a truer information structure definition 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.

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

#	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

Another part of the information structure definition is the **mathematical rules**[35] that are used to describe and verify the roll up relations of the concepts that are a part of the information structure definition. Here is the roll up relations (a.k.a. associations) that are part of this information structure definition.

#	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 structure definition is the facts within the fact set themselves. Here is the fact set or the **fact table**[36] for the facts that go with the information structure definition 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 structure definition structure, the information structure definition 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, other commonly understood information, 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**[37] of the inventory components disclosure that we are working with above:

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[35] Mathematical Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/MathematicalRule.html
[36] Fact Table, TO DO…
[37] Rendering, TO DO…

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

Different software applications will provide slightly different renderings using the same input information[38]. Here is the same rendering provide by a second software application:

Component: (Network and Table)		
Network	JG - Schedule -**Inventory, by Component**	
Table	Inventory, by Compoment [Table]	
Reporting Entity [Axis]	1234567890 http://regulator.gov/id	
Legal Entity [Axis]	Consolidated Entity [Member]	
Unit [Axis]	USD	
	Period [Axis]	
Inventory, by Component [Line Items]	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 structure definition* 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 *mathematical 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

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

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 *verifying* that the reported facts are consistent with the *mathematical 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 structure definition should be accessible to the user of the business report:

Report Element Properties

| Properties | Labels | References | Occurrences | To Do |

Report Standard Lab Inventory
Base Standard Label

Documentation   Duis sapien diam, dapibus sed, dictum quis, interdum ac, erat. Suspendisse urna. Proin non mauris. Proin sed odio. Phasellus sagittis orci quis orci.

Properties
  Class   [Concept] Monetary
  Prefix   gaap
  Name   gaap:Inventory
Other
  Balance Type   Debit
  Period Type   As Of (instant)
  Data Type   Monetary (xbrli:monetaryItemType)
  ID   gaap_Inventory

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.

Financial Reports

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.

It is worth pointing out that financial reporting schemes have five things in common that can be leveraged in the communication of financial statement information and are unique to financial reporting schemes and therefore to all financial reports:

- *First*, at the foundation of every financial reporting scheme is the double-entry accounting model[39]. Simply stated, that model is: **DEBITS = CREDITS**. It is a mathematical model. (If you don't understand this model, this video is helpful[40]!)
- *Second*, building on the double-entry accounting model is the accounting equation[41]: **Assets = Liabilities + Equity**.
- *Third*, every financial reporting scheme defines a core set of interrelated elements of a financial statement that are fundamentally grounded in some form of the accounting equation. For example, the Financial Accounting Standards Board (FASB) defines these

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[39] David P. Ellerman, *The Mathematics of Double Entry Bookkeeping*, Mathematics Magazine, http://www.ellerman.org/wp-content/uploads/2012/12/DEB-Math-Mag.CV_.pdf
[40] YouTube, *2016 Debit Credit Theory Accounting Rap Song from O'Neill High School*, https://www.youtube.com/watch?v=PHanSCcMb_I
[41] Wikipedia, *Accounting Equation*, https://en.wikipedia.org/wiki/Accounting_equation

ten elements of a financial statement in SFAC 6[42]; Assets, Liabilities, Equity, Comprehensive Income, Investments by Owners, Distributions to Owners, Revenues, Expenses, Gains, Losses. Then, additional elements are defined based on that core set.

- *Fourth*, every financial reporting scheme has what is called "articulation". Articulation is the notion that the elements of a financial statement are interrelated and therefore depend on one another and so the four core statements; the balance sheet, the income statement, the changes in equity and the cash flow statement are all mathematically interrelated. Articulation is explained very methodically by the FASB in SFAC 6[43].

- *Fifth*, every financial report has inherent variability that is the result of explicitly allowing intermediate components of a financial report (i.e. subtotals) to be combined in appropriate but perhaps different ways depending on the needs of the reporting economic entity. Again, this is explained in detail within SFAC 6[44].

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[42] ibid, page 23.
[43] ibid, page 21 – 22, "Interrelation of Elements-Articulation"
[44] Ibid, page 47, paragraph 77.

Advanced Details for Logical Conceptualization of a Business Report

A business report can be broken down into fragments. A **fragment**[45] 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**[46] specifies the nature of the relationship between the concept aspect within a set of [Line Items] (a.k.a. Primary Items) of an information structure definition.

A **set**[47] 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**[48] 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**[49] 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**[50] 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**[51] 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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[45] Fragment, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Fragment.html
[46] Concept Arrangement Pattern, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ConceptArrangementPattern.html
[47] Set, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Set.html
[48] Roll Up, http://xbrlsite.azurewebsites.net/2019/Framework/Details/RollUp.html
[49] Roll Forward, http://xbrlsite.azurewebsites.net/2019/Framework/Details/RollForward.html
[50] Adjustment, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Adjustment.html
[51] Variance, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Variance.html

A **complex computation**[52] (a.k.a. arithmetic) 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**[53] is a type of concept arrangement pattern which represents a non-mathematical relation of information about a roll forward.

A **text block**[54] 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**[55], **Level 2 Policy Text Block**[56], and **Level 3 Disclosure Text Block**[57].

And so, the concept arrangement patterns specify the patterns of the arrangement of the concepts within a set of [Line Items]. It is also the case that additional noncore dimensions can be added to a structure defined via a hypercube and each of these structures can be explained dimensionally[58]. Each of those dimensions have members; and the members likewise have arrangement patterns.

Each fact set has a member arrangement pattern property. A **member arrangement pattern**[59] 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**[60] 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**[61] list is a type of member aggregation pattern where the members for a flat list. **Member nonaggregating**[62] 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.

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[52] Complex Computation, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ComplexComputation.html

[53] Roll Forward Info, http://xbrlsite.azurewebsites.net/2019/Framework/Details/RollForwardinfo.html

[54] Text Block, http://xbrlsite.azurewebsites.net/2019/Framework/Details/TextBlock.html

[55] Level 1 Note Text Block, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Level1NoteTextBlock.html

[56] Level 2 Policy Text Block, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Level2PolicyTextBlock.html

[57] Level 3 Disclosure Text Block,
http://xbrlsite.azurewebsites.net/2019/Framework/Details/Level3DisclosureTextBlock.html

[58] Hypercubes,
http://xbrlsite.azurewebsites.net/2017/IntelligentDigitalFinancialReporting/Part01_Chapter02.8_Hypercubes.pdf

[59] Member Arrangement Pattern,
http://xbrlsite.azurewebsites.net/2019/Framework/Details/MemberArrangementPattern.html

[60] Member Aggregation, http://xbrlsite.azurewebsites.net/2019/Framework/Details/MemberAggregation.html

[61] Member Flat List, http://xbrlsite.azurewebsites.net/2019/Framework/Details/MemberFlatList.html

[62] Member Nonaggregating,
http://xbrlsite.azurewebsites.net/2019/Framework/Details/MemberNonaggregation.html

Reported facts could need additional arbitrary descriptive information. A **parenthetical explanation**[63] provides additional descriptive information about a fact. A synonym for parenthetical information is comment.

A financial **reporting scheme**[64] 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 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**[65] 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**[66] is a representation of a possible disclosure that can be used as a prototype in the process of creating a report. An **exemplar**[67] 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**[68] 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**[69] 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**[70] 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

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[63] Parenthetical Explanation, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ParentheticalExplanation.html

[64] Reporting Scheme, TO DO, http://xbrlsite.azurewebsites.net/2018/Library/ReportingSchemes-2018-12-30.pdf

[65] Disclosure, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Disclosure.html

[66] Template, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Template.html

[67] Exemplar, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Exemplar.html

[68] Reporting Style, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ReportingStyle.html

[69] Consistency Crosscheck Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ConsistencyCrosscheckRule.html

[70] Impute Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ImputeTypeRule.html

Noncurrent assets can be reliably derived logically using the other two reported facts and the impute rule.

A **mapping rule**[71] 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.

A **disclosure mechanics rule**[72] 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**[73] 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**[74] 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**[75] 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.

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[71] Mapping Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/MappingTypeRule.html
[72] Disclosure Mechanics Rule,
http://xbrlsite.azurewebsites.net/2019/Framework/Details/DisclosureMechanicsRule.html
[73] Type or Class Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/TypeClassRule.html
[74] Reporting Checklist Rule,
http://xbrlsite.azurewebsites.net/2019/Framework/Details/ReportingChecklistRule.html
[75] Report Set, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ReportSet.html

A **reporting entity aspect**[76] is a core aspect that distinguishes the economic entity which creates a report.

A **calendar period aspect**[77] is a core aspect that distinguishes the calendar period of a reported fact. A **stock**[78] 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**[79] 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.

A **concept aspect**[80] 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**[81] is the relationship between fragments or the order or sequence of fragments within a report.

Prose[82] 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[83] is a type of fact value that is nonnumeric unstructured text (i.e. not prose).

A **logical rule**[84] is a type of rule expresses logical relations between entities that make up a report.

An **accounting rule**[85] is a type of logical rule that is used to express a logical assertion specifically related to accounting rules.

A **mechanical rule**[86] is a type of logical rule that is used to express the relations between the report elements that make up a disclosure.

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[76] Reporting Entity Aspect, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ReportingEntityAspect.html
[77] Calendar Period Aspect, http://xbrlsite.azurewebsites.net/2019/Framework/Details/CalendarPeriodAspect.html
[78] Stock, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Stock.html
[79] Flow, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Flow.html
[80] Concept Aspect, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ConceptAspect.html
[81] Fragment Arrangement Pattern,
http://xbrlsite.azurewebsites.net/2019/Framework/Details/FragmentArrangementPattern.html
[82] Prose, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Prose.html
[83] Text, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Text.html
[84] Logical Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/LogicalRule.html
[85] Accounting Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/AccountingRule.html
[86] Mechanical Rule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/MechanicalRule.html

Technical Information

The logic described in this document can be represented using the XBRL technical syntax[87] or any other physical format including RDF, OWL, and SHACL. 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.

Graphically, the relations between all the terms that make up a business report can be visualized as such[88]:
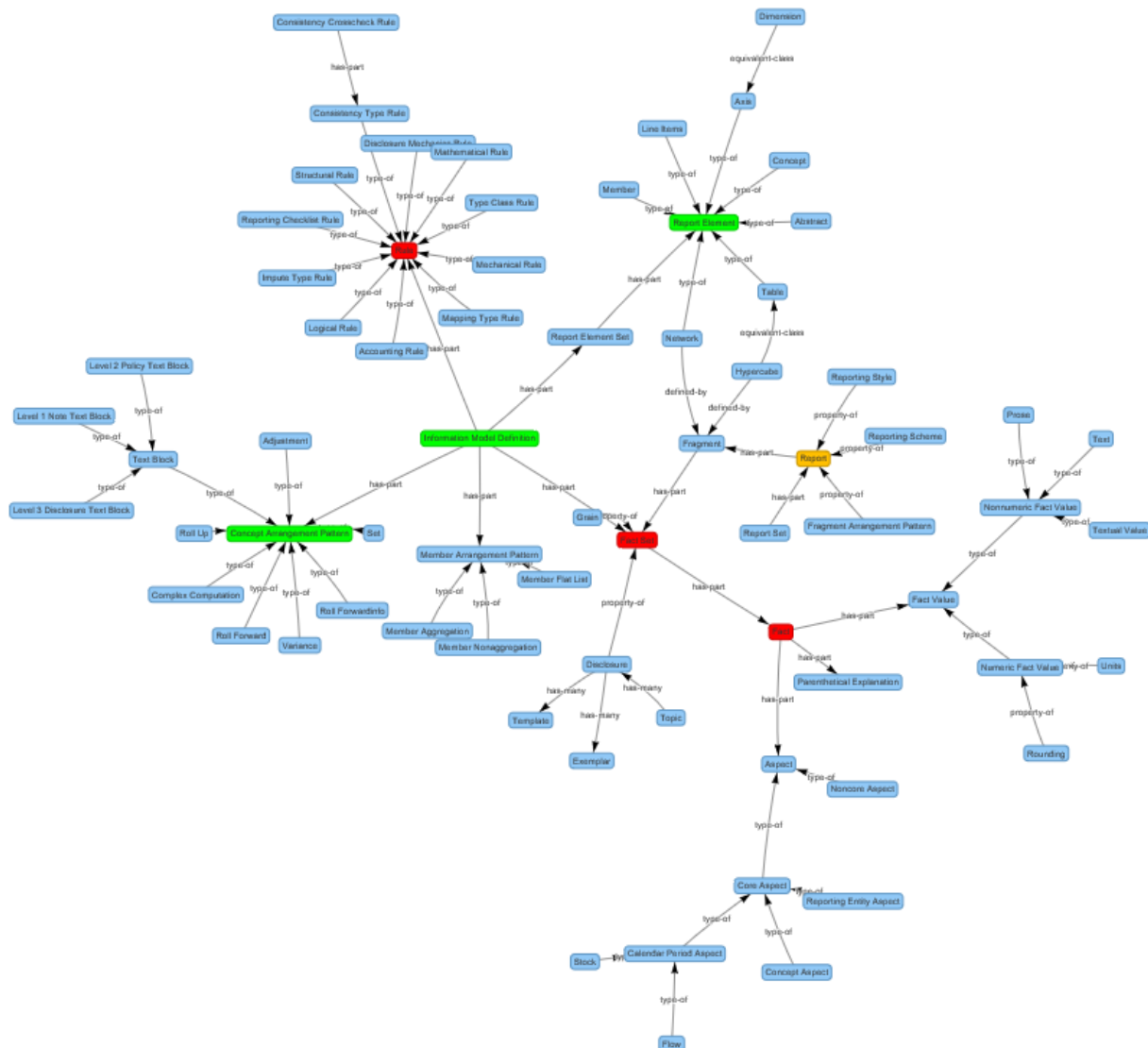
[87] *Examples of Describing a Financial Report Logical System Using XBRL*,
http://xbrl.squarespace.com/journal/2019/9/27/examples-of-describing-a-financial-report-logical-system-usi.html
[88] Associations, http://xbrlsite.azurewebsites.net/2019/Prototype/sbrm/Associations.html