

SBRM Proof of Concepts

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Very Basic Proof of Concept¹ (XBRL syntax)

The following provides a very basic proof of concept of using SBRM to represent a business report. An example from financial reporting is used to provide this very basic example. Most business professionals are familiar with the accounting equation² which is “Assets = Liabilities and Equity” and represents the high-level financial elements that would appear within a balance sheet.

The following are statements made in this proof of concept to represent the terms, associations, structures, assertions, and facts represented by this very basic proof of concept of the accounting equation:

- **Terms:**
 - Assets is-a simple term.
 - Liabilities is-a simple term.
 - Equity is-a simple term.
 - Balance sheet is-a functional term.
- **Associations:**
 - Assets has-property balance of debit.
 - Liabilities has-property balance of credit.
 - Equity has-property balance of credit.
 - Assets has-property period of instant.
 - Liabilities has-property period of instant.
 - Equity has-property period of instant.
- **Structure**
 - Balance sheet has-part Assets.
 - Balance sheet has-part Liabilities.
 - Balance sheet has-part Equity.
- **Assertions:**
 - Assets = Liabilities + Equity
- **Facts:**
 - ABC Company is an economic entity.
 - Assets for December 31, 2019 for ABC Company is \$5,000 US Dollars.
 - Liabilities for December 31, 2019 for ABC Company is \$1,000 US Dollars.
 - Equity for December 31, 2019 for ABC Company is \$4,000 US Dollars.

¹ All human-readable and machine-readable technical artifacts can be obtained here, <http://xbrlsite.azurewebsites.net/2019/core/core-ae/>

² Wikipedia, *Accounting Equation*, https://en.wikipedia.org/wiki/Accounting_equation

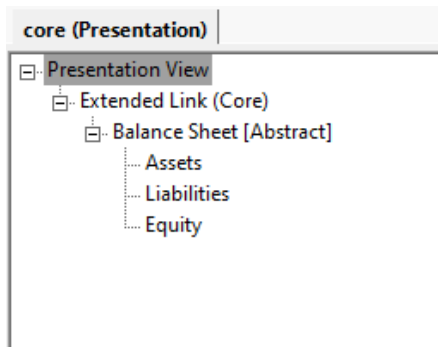
Here are the same statements provided above represented in XBRL including the facts³, terms⁴, associations⁵, and assertions⁶.

Software #1: (provided by UBmatrix Taxonomy Designer, a commercially available software product)

Terms and property associations:

Prefix	Label/	Name	Data Type	Abstr...	Substitutio...	Balance	Period Type
core	Assets	Assets	Monetary	False	xbri:item	Debit	Instant
core	Balance Sheet [Abstract]	BalanceSheetAbstract	String	True	xbri:item		Instant
core	Equity	Equity	Monetary	False	xbri:item	Credit	Instant
core	Liabilities	Liabilities	Monetary	False	xbri:item	Credit	Instant

Structure: (provided by UBmatrix Taxonomy Designer, a commercially available product)



XBRL technical syntax validation report: (provided by UBmatrix Taxonomy Designer, a commercially available product)

Line	Type	Message ID	Message
1	Info	Info	Validating Taxonomy (core)...
2	Info	Info	XML schema-level validation of taxonomy ref-2004-08-10.xsd succeeded
3	Info	Info	XML schema-level validation of taxonomy core.xsd succeeded
4	Info	Info	Validating linkbase core-label.xml
5	Info	Info	XML-level validation of linkbase core-label.xml succeeded
6	Info	Info	Validating linkbase core-presentation.xml
7	Info	Info	XML-level validation of linkbase core-presentation.xml succeeded
8	Info	Info	Validating linkbase core-reference.xml
9	Info	Info	XML-level validation of linkbase core-reference.xml succeeded
10	Info	Info	Validating Taxonomy (core) on XBRL-level...
11	Info	Info	XBRL-level : Checking Cycles...
12	Info	Info	Taxonomy (core) XML, XBRL validation completed : 0 errors, 0 warnings
13	Info	txValRptSet	Validation settings for this report: XML, XBRL
14	Info	txValRptLvl	Error levels for this report: Errors

³ XBRL instance, <http://xbrlsite.azurewebsites.net/2019/Core/core-audit/instance.xml>

⁴ XBRL taxonomy schema, <http://xbrlsite.azurewebsites.net/2019/Core/core-audit/core.xsd>

⁵ XBRL presentation relations, <http://xbrlsite.azurewebsites.net/2019/Core/core-audit/core-presentation.xml>

⁶ XBRL formula, <http://xbrlsite.azurewebsites.net/2019/Core/core-audit/core-formula.xml>

XBRL syntax validation report⁷: (provided by XBRL Cloud's XRun commercial software product)

XBRL Validation Report

Severity	Count
Error	0
Warning	0
Inconsistency	0
Best Practice	0
Information	0
Total	0

Assertions validation: (provided by UBmatrix XPE 4.0, a commercially available product)

Summary

Formulas Compiled	Formula Fired	Assertions Compiled	Assertions Fired	Assertions Satisfied	Assertions Not Satisfied
0	0	1	1	1	0

Assertion Report

Value Assertions

id	satisfied	message
ASSERTION_CORE_Equality_AccountingEquation (evaluation 1)	satisfied	\$Assets=5000 = \$Liabilities=1000 + \$Equity=4000

⁷ XBRL validation report provided by the commercial product XBRL Cloud, http://xbrl.azurewebsites.net/2019/core/core-audit/audit_validation_XRun.html

Software #2: (provided by XBRL Cloud Evidence Package which is a commercially available product)

Human readable representation⁸:

Balance Sheet [Abstract]	Period [Axis]
	2020-12-31
Balance Sheet [Abstract]	
Assets	5,000
Liabilities	1,000
Equity	4,000

Terms and associations⁹:

#	Label	Report Element Class	Period Type	Balance	Name
1	Core [Table]				(Implied)
2	Balance Sheet [Abstract]	[Abstract]			core:BalanceSheetAbstract
3	Assets	[Concept] Monetary	As Of	Debit	core:Assets
4	Liabilities	[Concept] Monetary	As Of	Credit	core:Liabilities
5	Equity	[Concept] Monetary	As Of	Credit	core:Equity

Facts¹⁰:

#	Reporting Entity [Axis]	Period [Axis]	Concept	Fact Value	Unit	Rounding	Parentetical Explanations
1	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-12-31	Assets	5000	USD	INF	
2	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-12-31	Liabilities	1000	USD	INF	
3	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-12-31	Equity	4000	USD	INF	

XBRL technical syntax validation¹¹:

Verification Summary		
	A	M
XBRL Technical Syntax Rules	OK	OK
Model Structure Rules	OK	OK
Business Rules	OK	OK
Roll Up Rules	NS	NS
Other Manual Review Tasks	NS	NS
Other Rules and Best Practice Tasks	OK	OK

⁸ Human readable rendering, <http://xbrlsite.azurewebsites.net/2019/Core/core-audit/evidence-package/contents/index.html#Rendering-Core-Implied.html>

⁹ Human readable model structure, <http://xbrlsite.azurewebsites.net/2019/Core/core-audit/evidence-package/contents/index.html#NetworkStructure-Core-Implied.html>

¹⁰ Human readable facts, <http://xbrlsite.azurewebsites.net/2019/Core/core-audit/evidence-package/contents/index.html#NetworkFacts-Core-Implied.html>

¹¹ Human readable report properties including validation, <http://xbrlsite.azurewebsites.net/2019/Core/core-audit/evidence-package/contents/index.html#ReportProperties.html>

Assertions validation¹²:

#	Label	Result	
1	Accounting Equation (Assets = Liabilities and Equity) (ASSERTION_CORE_Equality_AccountingEquation)	Pass	\$Assets = \$Liabilities + \$Equity

While a complete description of the logical model of a business report is provided in a complete narrative, we will explain the key highlights of the logical model using this very basic report to provided a high-level overview of the logical conceptualization of a business report.

An **information model description** is created for the **report**:

#	Label	Report Element Class	Period Type	Balance	Name
1	Core [Table]				(Implied)
2	Balance Sheet [Abstract]	[Abstract]			core:BalanceSheetAbstract
3	Assets	[Concept] Monetary	As Of	Debit	core:Assets
4	Liabilities	[Concept] Monetary	As Of	Credit	core:Liabilities
5	Equity	[Concept] Monetary	As Of	Credit	core:Equity

This very basic report has one **fact set**:

#	Reporting Entity [Axis]	Period [Axis]	Concept	Fact Value	Unit	Rounding	Parentetical Explanations
1	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-12-31	Assets	5000	USD	INF	
2	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-12-31	Liabilities	1000	USD	INF	
3	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-12-31	Equity	4000	USD	INF	

The fact set contains three **facts**. The facts are distinguished from one another using three **aspects**: reporting entity, period, and concept. The **fact value** is numeric and described by the **unit** and **rounding property**. The rendering is created

Balance Sheet [Abstract]	Period [Axis]
	2020-12-31
Balance Sheet [Abstract]	
Assets	5,000
Liabilities	1,000
Equity	4,000




PROLOG

Note that this very basic example was also implemented using the Prolog syntax¹³ and executed using the SWISH online application¹⁴. In the Prolog example, the fact values for Microsoft from their 2017 10-K submission to the SEC were used.




¹² Business rules summary, <http://xbrlsite.azurewebsites.net/2019/Core/core-audit/evidence-package/contents/index.html#BusinessRulesSummary.html>

¹³ Accounting equation in Prolog syntax, http://xbrlsite.azurewebsites.net/2019/sbrm/prolog/Prolog_AccountingEquation.txt

¹⁴ SWI-Prolog online application, <https://swish.swi-prolog.org/>

 `fact(Term, Entity, Period, Value).`  

Term	Entity	Period	Value	
<code>term(asset)</code>	<code>entity(microsoft)</code>	<code>period(2017)</code>	241086000000	1
<code>term(liabilities)</code>	<code>entity(microsoft)</code>	<code>period(2017)</code>	168692000000	2
<code>term(equity)</code>	<code>entity(microsoft)</code>	<code>period(2017)</code>	72394000000	3

 `does_balance_sheet_balance(microsoft, 2017).`  

true 1

?- `does_balance_sheet_balance(microsoft, 2017).`

Core Financial Statement Model Proof of Concept¹⁵ (XBRL syntax)

The FASB defines the following ten interrelated elements of a financial report in Statement of Financial Reporting Concepts 6:

- Assets
- Liabilities
- Equity
- Investments by Owners
- Distributions to Owners
- Comprehensive Income
- Revenues
- Expenses
- Gains
- Losses

The FASB uses the analogy of a “photograph” and a “motion picture” to differentiate the two types of elements¹⁶. Three elements that are like a photograph are “assets”, “liabilities” and “equity” and are for a point in time. In XBRL terms, they are instants or “as of” a specific point in time. The others are like “motion pictures”, over a period of time, in XBRL terms they are durations or “for period”.

Note the term “interrelated”. If you read the definitions you can implicitly understand the specific interrelations. The FASB uses the term “articulation” to describe the notion that financial statements are fundamentally interrelated¹⁷. They result in financial statements that are fundamentally interrelated and connected mathematically. These ten elements of a financial report and the interrelations are represented in this

The following two equations articulate the fundamental relationships between all these elements of a financial report defined by the FASB in SFAC 6. First, as the FASB stated;

“Comprehensive Income = Revenues - Expenses + Gains - Losses”

¹⁵ All human readable and technical artifacts for this proof of concept can be found here, <http://xbrlsite.azurewebsites.net/2019/core/core-sfac6/>

¹⁶ FASB, SFAC 6, page 21, paragraph 20

¹⁷ FASB, SFAC 6, page 21 and 22, paragraph 21

The equation above defines the relationship between comprehensive income and its components. The equation below defines the relations between the other concepts and uses the term “Comprehensive Income” as defined above.

$$0 = (\text{Equity}^{\text{T0}} + \text{Revenue}^{\text{P1}} - \text{Expenses}^{\text{P1}} + \text{Gains}^{\text{P1}} - \text{Losses}^{\text{P1}} + \text{InvestmentsByOwners}^{\text{P1}} - \text{DistributionsToOwners}^{\text{P1}}) + \text{Liabilities}^{\text{T1}} - \text{Assets}^{\text{T1}}$$

And so, using both equations, the relations between each of the concepts is crystal clear as long as you understand the balance type (debit, credit) of each of the core elements.

As such, in more visual terms you have the following:

Shell of a statement of financial position (balance sheet)¹⁸:

Balance Sheet [Abstract]	Period [Axis]	
	2020-12-31	2019-12-31
Balance Sheet [Abstract]		
Assets	3,500	0
Liabilities	0	0
Equity	3,500	0

Shell of a statement of financial performance (comprehensive income statement)¹⁹:

Comprehensive Income Statement [Abstract]	Period [Axis]
	2020-01-01 - 2020-12-31
Comprehensive Income Statement [Abstract]	
Comprehensive Income [Roll Up]	
Revenues	7,000
(Expenses)	(3,000)
Gains	1,000
(Losses)	(2,000)
Comprehensive Income	3,000

Shell of statement of changes in equity:

¹⁸ Human readable rendering of balance sheet, <http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/evidence-package/contents/index.html#Rendering-BS-Implied.html>

¹⁹ Human readable rendering of comprehensive income statement, <http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/evidence-package/contents/index.html#Rendering-IS-Implied.html>

Changes in Equity [Abstract]	Period [Axis]
	2020-01-01 - 2020-12-31
Changes in Equity [Abstract]	
Equity [Roll Forward]	
Equity, Beginning	0
Comprehensive Income	3,000
Investments by Owners	1,000
(Distributions to Owners)	(500)
Equity, Ending	3,500

The interrelationships between the three statements above can be shown visually in the graphic below:

Balance Sheet [Abstract]	Period [Axis]	
	2020-12-31	2019-12-31
Balance Sheet [Abstract]		
Assets	3,500	0
Liabilities	0	0
Equity	3,500	0

Comprehensive Income Statement [Abstract]	Period [Axis]
	2020-01-01 - 2020-12-31
Comprehensive Income Statement [Abstract]	
Comprehensive Income [Roll Up]	
Revenues	7,000
(Expenses)	(3,000)
Gains	1,000
(Losses)	(2,000)
Comprehensive Income	3,000

Changes in Equity [Abstract]	Period [Axis]
	2020-01-01 - 2020-12-31
Changes in Equity [Abstract]	
Equity [Roll Forward]	
Equity, Beginning	0
Comprehensive Income	3,000
Investments by Owners	1,000
(Distributions to Owners)	(500)
Equity, Ending	3,500

The details and the relationships can be tested by running the supporting XBRL taxonomy and XBRL instance that define the elements, the associations between the elements, and the assertions which show mathematical relations between the elements processed by an XBRL formula processor. Every XBRL formula processor is expected to get exactly the same results although those results can be presented in different ways. Here are those results provided by two different XBRL formula processors:

XBRL formula processor 1: (UBmatrix XPE 4.0, a commercially available software product)

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id	satisfied	message
ASSERTION_CORE_Equality_AccountingEquation (evaluation 1)	satisfied	\$Assets=0 = \$Liabilities=0 + \$Equity=0
ASSERTION_CORE_Equality_AccountingEquation (evaluation 2)	satisfied	\$Assets=3500 = \$Liabilities=0 + \$Equity=3500
ASSERTION_Core_ROLLUP_ComprehensiveIncome (evaluation 1)	satisfied	\$ComprehensiveIncome=3000 = (\$Revenues=7000 + \$Gains=1000 - \$Expenses=3000 - \$Losses=2000)
ASSERTION_CORE_ROLLFORWARD_Equity (evaluation 1)	satisfied	\$Equity_BalanceStart=0 + \$ComprehensiveIncome=3000 + \$InvestmentsByOwners=1000 - \$DistributionsToOwners=500 = \$Equity_BalanceEnd=3500
ASSERTION_CORE_CONCEPTUAL_FRAMEWORK_RECONCILIATION (evaluation 1)	satisfied	0= ((\$Equity_BalanceStart=0 + ((\$Revenues=7000 - \$Expenses=3000) + (\$Gains=1000 - \$Losses=2000)) + (\$InvestmentsByOwners=1000 - \$DistributionsToOwners=500)) + (\$Liabilities_BalanceEnd=0 - \$Assets_BalanceEnd=3500))

XBRL formula processor 2²⁰:

#	Label	Result	Rule
1	Net income foots (ASSERTION_Core_ROLLUP_ComprehensiveIncome)	Pass	\$ComprehensiveIncome = (\$Revenues + \$Gains - \$Expenses - \$Losses)
2	Accounting Equation (Assets = Liabilities and Equity) (ASSERTION_CORE_Equality_AccountingEquation)	Pass	\$Assets = \$Liabilities + \$Equity
3	Accounting Equation (Assets = Liabilities and Equity) (ASSERTION_CORE_Equality_AccountingEquation)	Pass	\$Assets = \$Liabilities + \$Equity
4	0 = (Equity{T0} + (Revenue{P1} - Expenses{P1} + Gains{P1} - Losses{P1}) + (InvestmentsByOwners{P1} - DistributionsToOwners{P1})) + Liabilities{T1} - Assets{T1} (ASSERTION_CORE_CONCEPTUAL_FRAMEWORK_RECONCILIATION)	Pass	0= ((\$Equity_BalanceStart + ((\$Revenues - \$Expenses) + (\$Gains - \$Losses)) + (\$InvestmentsByOwners - \$DistributionsToOwners)) + (\$Liabilities_BalanceEnd - \$Assets_BalanceEnd))
5	Equity roll forward (Equity{P0} + ComprehensiveIncome + InvestmentsByOwners - DistributionsToOwners = Equity{P1}) (ASSERTION_CORE_ROLLFORWARD_Equity)	Pass	\$Equity_BalanceStart + \$ComprehensiveIncome + \$InvestmentsByOwners - \$DistributionsToOwners = \$Equity_BalanceEnd

This verifies that the XBRL-based report and the logical relations articulated via that report are as would be expected.

Here is the human-readable and machine-readable logical system that describes the elements of a financial report defined by SFAC 6:

TERMS²¹:

#	Label	Report Element Class	Period Type	Balance	Name
1	01-Elements of Financial Statement Defined by SFAC 6 [Table]				(Implied)
2	Elements of Financial Statements Defined by FASB [Set]	[Abstract]			core:ElementsFinancialStatementsDefinedByFASBSet
3	Assets	[Concept] Monetary	As Of	Debit	core:Assets
4	Liabilities	[Concept] Monetary	As Of	Credit	core:Liabilities
5	Equity	[Concept] Monetary	As Of	Credit	core:Equity
6	Investments by Owners	[Concept] Monetary	For Period	Credit	core:InvestmentsByOwners
7	Distributions to Owners	[Concept] Monetary	For Period	Debit	core:DistributionsToOwners
8	Comprehensive Income	[Concept] Monetary	For Period	Credit	core:ComprehensiveIncome
9	Revenues	[Concept] Monetary	For Period	Credit	core:Revenues
10	Expenses	[Concept] Monetary	For Period	Debit	core:Expenses
11	Gains	[Concept] Monetary	For Period	Credit	core:Gains
12	Losses	[Concept] Monetary	For Period	Debit	core:Losses

Statements that provide additional information about a term such as labels, references to authoritative literature, properties of the term, etc.²²:

²⁰ Human readable results for assertions, <http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/evidence-package/contents/index.html#BusinessRulesSummary.html>

²¹ Machine-readable terms, <http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/core.xsd>

²² Human-readable term, <http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/term.jpg>

The screenshot shows a 'Report Element Properties' window for the 'Assets' element. It contains the following information:

- Report Standard Label:** Assets
- Documentation:** Assets are probable future economic benefits obtained or controlled by a particular entity as a result of past transactions or events.
- Report Element Class:** Concept
- Prefix (From Taxonomy):** core
- Balance Type:** Debit
- Period Type:** As Of (instant)
- Data Type:** Monetary (xbrli:monetaryItemType)
- Name:** core:Assets
- ID:** core_Assets

Below this, there are two tables:

Labels of Report Element

From	Role	Label	Lang
core	Standard label	Assets	en
core	Period end label	Assets, Ending	en
core	Period start label	Assets, Beginning	en

References of Report Element

Publisher	Reference Name	Reference Information
FASB	SFAC	Paragraph: 25 URIDate: 2019-10-22 URI: https://www.fasb.org/jsp/FASB/Document_C/DocumentPage?cid=1218220132802&acceptedDisclaimer=true Number: 6

ASSOCIATIONS^{23,24}:

Comprehensive Income Statement [Abstract]	Period [Axis]
	2020-01-01 - 2020-12-31
Comprehensive Income Statement [Abstract]	
Comprehensive Income [Roll Up]	
Revenues	7,000
(Expenses)	(3,000)
Gains	1,000
(Losses)	(2,000)
Comprehensive Income	3,000

The graphic above shows that the classes of elements revenues, expenses, gains, and losses are all part-of comprehensive income.

ASSERTIONS^{25,26}:

²³ Machine-readable associations, <http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/core-presentation.xml>

²⁴ Human-readable associations, <http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/evidence-package/contents/index.html#Rendering-IS-Implied.html>

²⁵ Machine-readable assertions, <http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/core-formula.xml>

²⁶ Human-readable assertions, <http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/evidence-package/contents/index.html#BusinessRulesSummary.html>

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ASSERTION_CORE_Equality_AccountingEquation (evaluation 1)	satisfied	$\$Assets=0 = \$Liabilities=0 + \$Equity=0$
ASSERTION_CORE_Equality_AccountingEquation (evaluation 2)	satisfied	$\$Assets=3500 = \$Liabilities=0 + \$Equity=3500$
ASSERTION_Core_ROLLUP_ComprehensiveIncome (evaluation 1)	satisfied	$\$ComprehensiveIncome=3000 = (\$Revenues=7000 + \$Gains=1000 - \$Expenses=3000 - \$Losses=2000)$
ASSERTION_CORE_ROLLFORWARD_Equity (evaluation 1)	satisfied	$\$Equity_BalanceStart=0 + \$ComprehensiveIncome=3000 + \$InvestmentsByOwners=1000 - \$DistributionsToOwners=500 = \$Equity_BalanceEnd=3500$
ASSERTION_CORE_CONCEPTUAL_FRAMEWORK_RECONCILIATION (evaluation 1)	satisfied	$0 = ((\$Equity_BalanceStart=0 + ((\$Revenues=7000 - \$Expenses=3000) + (\$Gains=1000 - \$Losses=2000))) + (\$InvestmentsByOwners=1000 - \$DistributionsToOwners=500)) + (\$Liabilities_BalanceEnd=0 - \$Assets_BalanceEnd=3500))$

The statements above are assertions that are applicable if an economic entity is a for-profit entity.

FACTS^{27,28}:

#	Reporting Entity [Axis]	Period [Axis]	Concept	Fact Value	Unit	Rounding	Parenthetical Explanations
1	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-01-01 - 2020-12-31	Losses	2000	USD	INF	
2	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-01-01 - 2020-12-31	Investments by Owners	1000	USD	INF	
3	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-01-01 - 2020-12-31	Gains	1000	USD	INF	
4	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2019-12-31	Assets	0	USD	INF	
5	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-12-31	Assets	3500	USD	INF	
6	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-01-01 - 2020-12-31	Revenues	7000	USD	INF	
7	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-12-31	Equity	3500	USD	INF	
8	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2019-12-31	Equity	0	USD	INF	
9	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-01-01 - 2020-12-31	Comprehensive Income	3000	USD	INF	
10	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-12-31	Liabilities	0	USD	INF	
11	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2019-12-31	Liabilities	0	USD	INF	
12	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-01-01 - 2020-12-31	Distributions to Owners	500	USD	INF	
13	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)	2020-01-01 - 2020-12-31	Expenses	3000	USD	INF	

Facts are statements or the words and numbers reported within a financial report differentiated from one another by their distinguishable aspects.

STRUCTURES^{29,30}:

²⁷ Machine-readable facts, <http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/instance.xml>

²⁸ Human-readable facts, <http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/evidence-package/contents/index.html#FactTableSummary.html>

²⁹ Machine-readable structures, <http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/core-presentation.xml>

³⁰ Human-readable structures, <http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/evidence-package/contents/index.html#RenderingSummary.html>

Component: (Network and Table)	
Network	06-Changes in Equity (http://www.xbrsite.com/core/role/CE)
Table	(Implied)

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

Reporting Entity [Axis]	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)
-------------------------	--

Changes in Equity [Abstract]	Period [Axis]
	2020-01-01 - 2020-12-31
Changes in Equity [Abstract]	
Equity [Roll Forward]	
Equity, Beginning	0
Comprehensive Income	3,000
Investments by Owners	1,000
(Distributions to Owners)	(500)
Equity, Ending	3,500

The changes in equity structure is distinguishable from, say, the balance sheet structure or the income statement structure.

MODELS:

In this particular logical system, there is only one set of structures and that set of structures is universally applicable to all economic entities. The relation between “assets” and “liabilities” and “equity” is interpreted to be “assets = liabilities + equity”, there is our only interpretation provided for in this logical system.

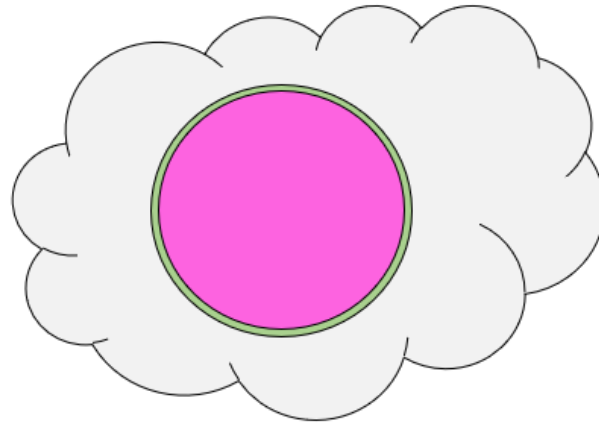
However, SFAS 6 allows for another permissible interpretation: “net assets = assets - liabilities”. But we do not use that second interpretation of the logical theory in this specific logical system of the financial report we are specifying and describing. We use the first permissible interpretation. We could add another structure to represent this permissible interpretation.

PRECISION AND COVERAGE:

The **precision** of the statements made by the models, structures, terms, associations, assertions, and facts in this logical theory or system we are describing is HIGH because the logical system is provably consistent with reality defined by SFAC 6. Further, the **coverage** of the logical system is HIGH because we cannot think of or demonstrate that anything is missing from the system. No important *terms* seem to be missing, no *associations*, no *assertions*, no *models* seem to be causing logical problems such as errors, inconsistencies, contradictions, etc. Therefore, this logical system can be deemed to be **properly functioning**.

Showing this graphically below, the universe of discourse we are concerned with at the moment is only SFAC 6. That is represented by the GREEN circle. Because the logical

representation has high precision, the representation in PINK is essentially the same size as GREEN showing that the coverage is appropriate. The description is precise because no one really can demonstrate or prove that anything in the system is imprecise. Further, the facts reported, the terms used, the assertions, the associations, the structures that make up the model are all consistent with expectations of all stakeholders that are concerned with this system.



High precision, High coverage (Very good)

All important aspects of reality related to some universe of discourse necessarily to achieve some goal or objective or a set of goals/objectives have been represented.

PROLOG IMPLEMENTATION

In addition to testing this example using XBRL, and additional implementation was created using Prolog. The terms, associations, structures, assertions, and facts were represented using the Prolog syntax³¹, and that syntax was executed using a web based application that executes Prolog called SWISH³², and the logic of SFAC 6 was proven to be correct as can be seen via the results of the execution seen in the screenshot below:

³¹ SFAC 6 representation using Prolog syntax, http://xbrlsite.azurewebsites.net/2019/sbrm/prolog/Prolog_FASB_SFAC6.txt

³² SWISH Prolog, <https://swish.swi-prolog.org/>

Term	Entity	Period	Value	
term(asset)	entity(microsoft)	period(2017)	241086000000	1
term(liabilities)	entity(microsoft)	period(2017)	168692000000	2
term(equity)	entity(microsoft)	period(2017)	72394000000	3
term(equity)	entity(microsoft)	period(2016)	71997000000	4
term(investmentsByOwners)	entity(microsoft)	period(2017)	0	5
term(distributionsToOwners)	entity(microsoft)	period(2017)	19701000000	6
term(revenues)	entity(microsoft)	period(2017)	89950000000	7
term(expenses)	entity(microsoft)	period(2017)	69569000000	8
term(gains)	entity(microsoft)	period(2017)	823000000	9
term(losses)	entity(microsoft)	period(2017)	1106000000	10
term(comprehensiveIncome)	entity(microsoft)	period(2017)	20098000000	11

does_balance_sheet_balance(microsoft, 2017).
true

does_income_statement_foot(microsoft, 2017).
true

does_equity_roll_forward(microsoft, period_range(2016, 2017)).
true

?- does_equity_roll_forward(microsoft, period_range(2016, 2017)).

These results can be repeated using the provided Prolog syntax and the online SWISH application.

Incremental Addition of Roll Forwards and Roll Ups³³ (XBRL syntax)

The purpose of this incremental addition of roll forwards and roll ups is provided to make a specific and important point. Details of this proof of concept are provide in the document *General Ledger Trial Balance to External Financial Report*³⁴. This expansion step adds detailed line items to the report, additional disclosures, roll forwards for every balance sheet line item, and subclassifications that detail a classification. This logical system becomes harder to get your head around mentally so we start to use automated processes to keep track of things. However, there is still a need to prove that the report is a properly functioning logical system. Thus, software is employed to provide a justification mechanism that help the user of the report to reach the correct conclusion³⁵.

³³ All human-readable and machine-readable technical artifacts can be obtained here, <http://xbrlsite.azurewebsites.net/2019/core/core-trialbalance/>

³⁴ Charles Hoffman, CPA, *General Ledger Trial Balance to External Financial Report*, <http://xbrlsite.azurewebsites.net/2018/RoboticFinance/TrialBalanceToReport.pdf>

³⁵ Verification summary, <http://xbrlsite.azurewebsites.net/2018/Prototypes/Basic/Basic-XASB-ConsistentRF/evidence-package/contents/index.html#VerificationDashboard.html>

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Component (Network/Table)	Status	Count of Relations	XBRL Technical Syntax Rules	Model Structure Rules	Business Rules ^(a)	Roll Up Rules ^(b)	Other Manual Review Tasks	Other Rules and Best Practice Tasks
1110 - Statement - Balance Sheet	Completed	24	OK	OK	OK	OK	OK	OK
1120 - Statement - Income Statement	Completed	7	OK	OK	OK	OK	OK	OK
1130 - Statement - Cash Flow Statement	Completed	16	OK	OK	OK	OK	OK	OK
1210 - Disclosure - Cash and Cash Equivalents Roll Forward	Completed	8	OK	OK	OK	OK	OK	OK
1220 - Disclosure - Receivables Roll Forward	Completed	7	OK	OK	OK	OK	OK	OK
1230 - Disclosure - Inventories	Completed	6	OK	OK	OK	OK	OK	OK
1240 - Disclosure - Property, Plant, and Equipment	Completed	6	OK	OK	OK	OK	OK	OK
1250 - Disclosure - Accounts Payable	Completed	5	OK	OK	OK	OK	OK	OK
1260 - Disclosure - Long-term Debt	Completed	5	OK	OK	OK	OK	OK	OK
1270 - Disclosure - Retained Earnings	Completed	4	OK	OK	OK	OK	OK	OK
(Component not specified)	Completed	0	OK	OK	OK	OK	OK	OK

Because the volume of terms is increasing and the structures are becoming more sophisticated and there is a higher volume of structures, we automate the mechanical and structural aspects of testing the statements made within the logical system using additional automated processes³⁶:

#	Disclosure	Category	Level	Pattern	Applicable	Found	Disclosure Consistent	Representation Concept [TEXT BLOCK]	Representation Concept [DETAIL]	Checklist Category	Reason
1	Balance Sheet		Level4Detail	COMPONENT	True	True	CONSISTENT	NOT-EXPECTED	NOT-EXPECTED	Required disclosure	Disclosure always required, satisfied by Assets [Roll Up] and Liabilities and Equity [Roll Up]
2	Assets [Roll Up]		Level4Detail	ROLL UP	True	True	CONSISTENT	NOT-EXPECTED	Assets	Part of disclosure	Disclosure always required
3	Liabilities and Equity [Roll Up]		Level4Detail	ROLL UP	True	True	CONSISTENT	NOT-EXPECTED	Liabilities and Equity	Part of disclosure	Disclosure always required
4	Income Statement		Level4Detail	ROLL UP	True	True	CONSISTENT	NOT-EXPECTED	Net Income (Loss)	Required disclosure	Disclosure always required
5	Cash Flow Statement, Direct Method		Level4Detail	ROLL UP	True	True	CONSISTENT	NOT-EXPECTED	Net Cash Flow	Required disclosure	Disclosure always required
6	Receivables [Roll Forward]		Level4Detail	ROLL FORWARD	True	True	CONSISTENT	NOT-EXPECTED	Receivables	Required disclosure	Disclosure always required
7	Cash and Cash Equivalents [Roll Forward]		Level4Detail	ROLL FORWARD	True	True	CONSISTENT	NOT-EXPECTED	Cash and Cash Equivalents	Line item exists, then disclosure required	Required because line item basic:CashAndCashEquivalents was reported
8	Inventories [Roll Forward]		Level4Detail	ROLL FORWARD	True	True	CONSISTENT	NOT-EXPECTED	Inventories	Line item exists, then disclosure required	Required because line item basic:Inventories was reported
9	Accounts Payable [Roll Forward]		Level4Detail	ROLL FORWARD	True	True	CONSISTENT	NOT-EXPECTED	Accounts Payable	Line item exists, then disclosure required	Required because line item basic:AccountsPayable was reported
10	Property, Plant, and Equipment [Roll Forward]		Level4Detail	ROLL FORWARD	True	True	CONSISTENT	NOT-EXPECTED	Property, Plant and Equipment	Line item exists, then disclosure required	Required because line item basic:PropertyPlantAndEquipment was reported
11	Long-Term Debt [Roll Forward]		Level4Detail	ROLL FORWARD	True	True	CONSISTENT	NOT-EXPECTED	Long-term Debt	Line item exists, then disclosure required	Required because line item basic:LongtermDebt was reported
12	Retained Earnings [Roll Forward]		Level4Detail	ROLL FORWARD	True	True	CONSISTENT	NOT-EXPECTED	Retained Earnings	Line item exists, then disclosure required	Required because line item basic:RetainedEarnings was reported

At this step you can begin to see specific types of errors that can, and do, creep into the logical system. The document *Proving Accounting, Structural, Mathematical, and Other Logic of XBRL-based Financial Reports*³⁷ details and describes nine specific types of errors that I tend to see in XBRL-based digital financial reports that must be controlled and prevented in order to maintain high report quality.

³⁶ Human-readable disclosure mechanics and reporting checklist results,

<http://xbrl.azurewebsites.net/2018/Prototypes/Basic/Basic-XASB-ConsistentRF/ReportingChecklistResults/Disclosure%20Mechanics%20and%20Reporting%20Checklist.html>

³⁷ Charles Hoffman, CPA, *Proving Accounting, Structural, Mathematical, and Other Logic of XBRL-based Financial Reports*, <http://xbrl.azurewebsites.net/2019/Library/ProvingAccountingStructuralMathematicsLogic.pdf>

“Proof” Proof of Concept³⁸ (XBRL syntax)

This proof of concept is another incremental increase to the previous proof of concepts. With this example, each of the concept arrangement patterns are represented within the same XBRL instance and XBRL taxonomy for the purpose of testing (a) the proper functioning of each concept arrangement pattern relative to all other concept arrangement patterns and (b) showing that software can process 100% of the specified concept arrangement patterns.

This proof of concept starts with a proven properly functioning logical system, the SFAC 6 proof of concept, and then incrementally adds additional report fragments such that each of the concept arraignment patterns is ultimately represented within the XBRL taxonomy and XBRL instance.

Keeping the Logical System Properly Functioning

So, we have proven that the accounting equation logical system is properly functioning and that the SFAC 6 logical system is properly functioning; however, there is much more to a financial report than exist within those two small, tiny really, logical systems.

In the next section we are going to add important and necessary pieces to the provably properly functioning logical system and keep that system consistent, complete, and precise and provably properly functioning.

Prior to adding additional pieces, the mathematical relations were all reported to be consistent. After adding all the additional pieces, the XBRL Formula results should likewise be consistent.

Below you can see the XBRL Formula validation results provided by four different XBRL Formula processors, each of which reports 11 assertions having been defined, 14 assertions have then executed, and of the 14 executed all 14 are reported to be satisfied per each of the four XBRL Formula processors.

Those results are summarized below:

UBmatrix XPE 4.0:

³⁸ Proof, all human-readable and machine-readable technical artifacts can be obtained here, <http://xbrlsite.azurewebsites.net/2020/master/proof/index.html>

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Thu Feb 27 15:49:50 PST 2020

XBRL Processor Version:4.0.0.2125

Report name: Detailed Output

Summary

Formulas Compiled	Formula Fired	Assertions Compiled	Assertions Fired	Assertions Satisfied	Assertions Not Satisfied
0	0	11	14	14	0

Assertion Report

Value Assertions

id	satisfied	message
CONSISTENCY_AccountingEquation (evaluation 1)	satisfied	\$Assets=0 = (\$Liabilities=0 + \$Equity=0)
CONSISTENCY_AccountingEquation (evaluation 2)	satisfied	\$Assets=3500 = (\$Liabilities=0 + \$Equity=3500)
CONSISTENCY_ComprehensiveIncome (evaluation 1)	satisfied	\$ComprehensiveIncome=3000 = (\$Revenues=7000 - \$Expenses=3000 + \$Gains=1000 - \$Losses=2000)
CONSISTENCY_ComprehensiveIncome (evaluation 2)	satisfied	\$ComprehensiveIncome=3750 = (\$Revenues=6000 - \$Expenses=2000 + \$Gains=750 - \$Losses=1000)
CONSISTENCY_ComprehensiveIncome (evaluation 3)	satisfied	\$ComprehensiveIncome=-750 = (\$Revenues=1000 - \$Expenses=1000 + \$Gains=250 - \$Losses=1000)
RollForward_Equity (evaluation 1)	satisfied	\$Equity_BalanceStart=0 + \$ComprehensiveIncome=3000 + \$InvestmentsByOwners=1000 - \$DistributionsToOwners=500 = \$Equity_BalanceEnd=3500
CONSISTENCY_SFAC6_Conceptual_Framework_Reconciliation (evaluation 1)	satisfied	0 = ((\$Equity_BalanceStart=0 + ((\$Revenues=7000 - \$Expenses=3000) + (\$Gains=1000 - \$Losses=2000)) + (\$InvestmentsByOwners=1000 - \$DistributionsToOwners=500)) + (\$Liabilities_BalanceEnd=0 - \$Assets_BalanceEnd=3500))
VARIANCE_Revenues (evaluation 1)	satisfied	\$Actual=7000 = (\$Budget=6000 + \$Variance=1000)
VARIANCE_Expenses (evaluation 1)	satisfied	\$Actual=3000 = (\$Budget=2000 + \$Variance=1000)
VARIANCE_Gains (evaluation 1)	satisfied	\$Actual=1000 = (\$Budget=750 + \$Variance=250)
VARIANCE_Losses (evaluation 1)	satisfied	\$Actual=2000 = (\$Budget=1000 + \$Variance=1000)
VARIANCE_ComprehensiveIncome (evaluation 1)	satisfied	\$Actual=3000 = (\$Budget=3750 + \$Variance=-750)
MemberAggregation_SegmentRevenues (evaluation 1)	satisfied	SATISFIED: (OK) The reported total 7000 for the concept proof: Revenues agrees to the aggregate of each reported member.
Adjustment_Reconciles_EquityPriorPeriodAdjustments (evaluation 1)	satisfied	\$Restated=0 = (\$OriginallyStated=2000 + \$CorrectionOfError=-1500 + \$MandatoryAccountingChange=-500)

XBRL Cloud Evidence Package:

Assertions Summary

	Defined	Executed	Pass	Fail
Existence assertions	0	0	0	0
Value assertions	11	14	14	0
Consistency assertions	0	0	0	0
Total all assertions	11	14	14	0

#	Label	Result	Rule
1	$\$ComprehensiveIncome = (\$Revenues - \$Expenses + \$Gains - \$Losses)$ (CONSISTENCY_ComprehensiveIncome)	Pass	$\$ComprehensiveIncome = (\$Revenues - \$Expenses + \$Gains - \$Losses)$
2	$\$ComprehensiveIncome = (\$Revenues - \$Expenses + \$Gains - \$Losses)$ (CONSISTENCY_ComprehensiveIncome)	Pass	$\$ComprehensiveIncome = (\$Revenues - \$Expenses + \$Gains - \$Losses)$
3	$\$ComprehensiveIncome = (\$Revenues - \$Expenses + \$Gains - \$Losses)$ (CONSISTENCY_ComprehensiveIncome)	Pass	$\$ComprehensiveIncome = (\$Revenues - \$Expenses + \$Gains - \$Losses)$
4	$\$Actual = (\$Budget + \$Variance)$ (VARIANCE_Expenses)	Pass	$\$Actual = (\$Budget + \$Variance)$
5	$\$Actual = (\$Budget + \$Variance)$ (VARIANCE_ComprehensiveIncome)	Pass	$\$Actual = (\$Budget + \$Variance)$
6	$\$Actual = (\$Budget + \$Variance)$ (VARIANCE_Revenues)	Pass	$\$Actual = (\$Budget + \$Variance)$
7	Adjustment reconciles: originally stated balance + adjustments restated balance across the Report Date [Axis] (Adjustment_Reconciles_EquityPriorPeriodAdjustments)	Pass	$\$Restated = (\$OriginallyStated + \$CorrectionOfError + \$MandatoryAccountingChange)$
8	$\$Equity_BalanceStart + \$ComprehensiveIncome + \$InvestmentsByOwners - \$DistributionsToOwners = \$Equity_BalanceEnd$ (RollForward_Equity)	Pass	$\$Equity_BalanceStart + \$ComprehensiveIncome + \$InvestmentsByOwners - \$DistributionsToOwners = \$Equity_BalanceEnd$
9	$\$Assets = (\$Liabilities + \$Equity)$ (CONSISTENCY_AccountingEquation)	Pass	$\$Assets = (\$Liabilities + \$Equity)$
10	$\$Assets = (\$Liabilities + \$Equity)$ (CONSISTENCY_AccountingEquation)	Pass	$\$Assets = (\$Liabilities + \$Equity)$
11	SATISFIED: (OK) The reported total 7000 for the concept proof:Revenues agrees to the aggregate of each reported member. (MemberAggregation_SegmentRevenues)	Pass	$\$Total\ eq\ sum(\$Each)$
12	$0 = (\$Equity(T0) - (\$Revenue(P1) - \$Expenses(P1) + \$Gains(P1) - \$Losses(P1)) + (\$InvestmentsByOwners(P1) - \$DistributionsToOwners(P1))) + \$Liabilities(T1) - \$Assets(T1)$ (CONSISTENCY_SFAC6_Conceptual_Framework_Reconciliation)	Pass	$0 = ((\$Equity_BalanceStart + ((\$Revenues - \$Expenses) + (\$Gains - \$Losses)) + (\$InvestmentsByOwners - \$DistributionsToOwners)) + (\$Liabilities_BalanceEnd - \$Assets_BalanceEnd))$
13	$\$Actual = (\$Budget + \$Variance)$ (VARIANCE_Gains)	Pass	$\$Actual = (\$Budget + \$Variance)$
14	$\$Actual = (\$Budget + \$Variance)$ (VARIANCE_Losses)	Pass	$\$Actual = (\$Budget + \$Variance)$

Fujitsu XWand:

No. ID	Type	Expression	Element	Context	Unit	Value
1	CONSISTENCY_AccountingEquation	$\$Assets = (\$Liabilities + \$Equity)$	-	-	-	True
2	CONSISTENCY_AccountingEquation	$\$Assets = (\$Liabilities + \$Equity)$	-	-	-	True
3	CONSISTENCY_ComprehensiveIncome	$\$ComprehensiveIncome = (\$Revenues - \$Expenses + \$Gains - \$Losses)$	-	-	-	True
4	CONSISTENCY_ComprehensiveIncome	$\$ComprehensiveIncome = (\$Revenues - \$Expenses + \$Gains - \$Losses)$	-	-	-	True
5	CONSISTENCY_ComprehensiveIncome	$\$ComprehensiveIncome = (\$Revenues - \$Expenses + \$Gains - \$Losses)$	-	-	-	True
6	RollForward_Equity	$\$Equity_BalanceStart + \$ComprehensiveIncome + \$InvestmentsByOwners - \$DistributionsToOwners = \$Equity_BalanceEnd$	-	-	-	True
7	CONSISTENCY_SFAC6_Conceptual_Framework_Reconciliation	$0 = ((\$Equity_BalanceStart + ((\$Revenues - \$Expenses) + (\$Gains - \$Losses)) + (\$InvestmentsByOwners - \$DistributionsToOwners)) + (\$Liabilities_BalanceEnd - \$Assets_BalanceEnd))$	-	-	-	True
8	VARIANCE_Revenues	$\$Actual = (\$Budget + \$Variance)$	-	-	-	True
9	VARIANCE_Expenses	$\$Actual = (\$Budget + \$Variance)$	-	-	-	True
10	VARIANCE_Gains	$\$Actual = (\$Budget + \$Variance)$	-	-	-	True
11	VARIANCE_Losses	$\$Actual = (\$Budget + \$Variance)$	-	-	-	True
12	VARIANCE_ComprehensiveIncome	$\$Actual = (\$Budget + \$Variance)$	-	-	-	True
13	MemberAggregation_SegmentRevenues	$\$Total\ eq\ sum(\$Each)$	-	-	-	True
14	Adjustment_Reconciles_EquityPriorPeriodAdjustments	$\$Restated = (\$OriginallyStated + \$CorrectionOfError + \$MandatoryAccountingChange)$	-	-	-	True

Arelle:

```

messages Concepts
(formula:assertionSatisfied) $Actual = ($Budget + $Variance), $Actual: proof:ComprehensiveIncome context D-E2B5-4642-81CA-A478, $Budget: proof:ComprehensiveIncome context D-E2B5-4642-81CA-A478-Budget, $Variance: proof:ComprehensiveIncome context D-E2B5-4642-81CA-A478-Variance
(formula:assertionSatisfied) $Actual = ($Budget + $Variance), $Actual: proof:Expenses context D-E2B5-4642-81CA-A478, $Budget: proof:Expenses context D-E2B5-4642-81CA-A478-Budget, $Variance: proof:Expenses context D-E2B5-4642-81CA-A478-Variance - Rule-Variance-VA01-formula
(formula:assertionSatisfied) $ComprehensiveIncome = ($Revenues - $Expenses + $Gains - $Losses), $ComprehensiveIncome: proof:ComprehensiveIncome context D-E2B5-4642-81CA-A478, $Expenses: proof:Expenses context D-E2B5-4642-81CA-A478, $Gains: proof:Gains context D-E2B5-4642-81CA-A478, $Losses: proof:Losses context D-E2B5-4642-81CA-A478
(formula:assertionSatisfied) $ComprehensiveIncome = ($Revenues - $Expenses + $Gains - $Losses), $ComprehensiveIncome: proof:ComprehensiveIncome context D-E2B5-4642-81CA-A478, $Expenses: proof:Expenses context D-E2B5-4642-81CA-A478, $Gains: proof:Gains context D-E2B5-4642-81CA-A478, $Losses: proof:Losses context D-E2B5-4642-81CA-A478
(formula:assertionSatisfied) $Assets = ($Liabilities + $Equity), $Assets: proof:Assets context I-99F9-4C9C-8C6C-BE7C, $Equity: proof:Equity context I-5251-4725-9160-E873, $Liabilities: proof:Liabilities context I-99F9-4C9C-8C6C-BE7C - Rule-Consistency-B501-formula.xml 77, instance.xml 142
(formula:assertionSatisfied) $Assets = ($Liabilities + $Equity), $Assets: proof:Assets context I-5251-4725-9160-E873, $Equity: proof:Equity context I-5251-4725-9160-E873, $Liabilities: proof:Liabilities context I-5251-4725-9160-E873 - Rule-Consistency-B501-formula.xml 77, instance.xml 142
(formula:assertionSatisfied) $Equity_BalanceStart + $ComprehensiveIncome + $InvestmentsByOwners - $DistributionsToOwners = $Equity_BalanceEnd, $Equity_BalanceStart: proof:Equity context D-E2B5-4642-81CA-A478, $ComprehensiveIncome: proof:ComprehensiveIncome context D-E2B5-4642-81CA-A478, $InvestmentsByOwners: proof:InvestmentsByOwners context D-E2B5-4642-81CA-A478, $DistributionsToOwners: proof:DistributionsToOwners context D-E2B5-4642-81CA-A478
(formula:assertionSatisfied) $Actual = ($Budget + $Variance), $Actual: proof:Gains context D-E2B5-4642-81CA-A478, $Budget: proof:Gains context D-E2B5-4642-81CA-A478-Budget, $Variance: proof:Gains context D-E2B5-4642-81CA-A478-Variance - Rule-Variance-VA01-formula.xml 281, instance.xml 174
(formula:assertionSatisfied) Adjustment reconciles: originally stated balance + adjustments restated balance across the Report Date [Axis], $CorrectionOfError: proof:CorrectionOfError context I-5251-4725-9160-E873, $MandatoryAccountingChange: proof:CorrectionOfError context I-5251-4725-9160-E873
validated in 0.10 secs

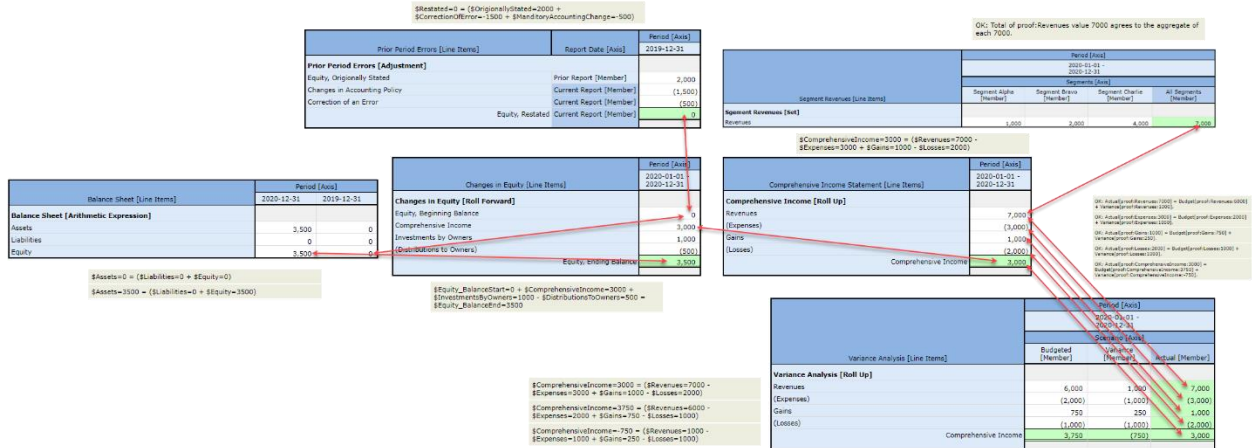
```

Here you see the interconnections between the facts that have all been verified to be consistent with expectation and mapped to the XBRL Formula validation results that are shown above³⁹:

³⁹ Proof mathematical computations, <http://xbrl.azurewebsites.net/2020/core/master-proof/ProofMathematicalComputations.jpg>

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And so, this shows that the proof logical system is consistent, complete, and precise and therefore properly functioning.

First, I want to explain the three existing concept arrangement patterns that existed in the accounting equation and SFAC 6 logical systems for completeness. Then, I will explain the additional concept arrangement patterns that have been added in order to have a full set of all concept arrangement patterns represented within one report.

Existing: Roll Up

One common mathematical association between numeric facts within a financial statement is the roll up. A Roll Up concept arrangement pattern is exemplified by the Comprehensive Income statement structure which looks as follows⁴⁰:

	Period [Axis]
Comprehensive Income Statement [Line Items]	
2020-01-01 - 2020-12-31	
Comprehensive Income [Roll Up]	
Revenues	7,000
(Expenses)	(3,000)
Gains	1,000
(Losses)	(2,000)
Comprehensive Income	3,000

A Roll Up is some set of items that aggregates to a total. Above, the items are Revenues, Expenses, Gains, and Losses and the total is Comprehensive Income. Items can be added to the total or subtracted from the total. All Roll Ups follow this pattern. Roll Ups can be nested within other Roll Ups to form subtotals that ultimately aggregate into a grand total. Every Roll Up is explained by machine-readable rules represented in the form of either XBRL calculation

⁴⁰ Comprehensive Income, http://xbrlsite.azurewebsites.net/2020/core/master-proof/evidence-package/contents/index.html#Rendering-ComprehensiveIncome-proof_ComprehensiveIncomeStatementHypercube.html

relations⁴¹ or XBRL Formulas⁴² that articulate the mathematical relation in machine-readable form.

Existing: Roll Forward

A second very common mathematical oriented pattern of relations between numeric concepts is the Roll Forward which reconciles changes between the values of a line item for two points in time. Accounting students learn this fundamental relation by the acronym BASE which means **B**eginning balance + **A**dditions - **S**ubtractions = **E**nding balance. A Roll Forward is exemplified by the Changes in Equity structure⁴³:

Changes in Equity [Line Items]	Period [Axis]	
	2020-01-01 - 2020-12-31	
Changes in Equity [Roll Forward]		
Equity, Beginning Balance	0	
Comprehensive Income	3,000	
Investments by Owners	1,000	
(Distributions to Owners)	(500)	
Equity, Ending Balance	3,500	

Every Roll Forward can be represented in machine-readable form using XBRL Formulas⁴⁴.

Existing: Arithmetic Expression

All other mathematical relations can be represented by the Arithmetic Expression concept arrangement pattern. This mathematical pattern can simply think of as containing two parts. The first part is a set of facts. The second set of the pattern is the mathematical relations between the set of facts represented as some XBRL Formula. The Arithmetic Expression concept arrangement pattern can be exemplified by the Balance Sheet structure⁴⁵:

Balance Sheet [Line Items]	Period [Axis]	
	2020-12-31	2019-12-31
Balance Sheet [Arithmetic Expression]		
Assets	3,500	0
Liabilities	0	0
Equity	3,500	0

⁴¹ Comprehensive Income XBRL calculation rules for Roll Up, <http://xbrlsite.azurewebsites.net/2020/core/master-proof/proof-cal.xml>

⁴² Comprehensive Income XBRL Formula rules for Roll Up, <http://xbrlsite.azurewebsites.net/2020/core/master-proof/Rule-Arithmetic-ISO1-formula.xml>

⁴³ Changes in Equity, http://xbrlsite.azurewebsites.net/2020/core/master-proof/evidence-package/contents/index.html#Rendering-ChangesInEquity-proof_ChangesInEquityHypercube.html

⁴⁴ Changes in Equity XBRL Formula rules for Roll Forward, <http://xbrlsite.azurewebsites.net/2020/core/master-proof/Rule-RollForward-formula.xml>

⁴⁵ Balance Sheet structure, http://xbrlsite.azurewebsites.net/2020/core/master-proof/evidence-package/contents/index.html#Rendering-BalanceSheet-proof_BalanceSheetHypercube.html

As with the Roll Forward and Roll Up, the Arithmetic Expression machine-readable rules can be represented using XBRL Formula⁴⁶.

Add: Adjustment for Correcting Prior Period Accounting Change or Error

Financial statements can be adjusted for accounting changes and/or prior period errors that are discovered and must be corrected in future reports. Generally, all such changes are run through equity in order to adjust a current financial report for a prior period change in accounting policy and/or a correction of an error.

The concept arrangement pattern created for this purpose is called an “Adjustment” and the pattern is described as a reconciliation of an originally stated balance to a restated balance by adding or subtracting specific adjustments to the originally stated balance to the restated balance. You see that example here in the Prior Period Error structure⁴⁷:

Prior Period Errors [Line Items]	Report Date [Axis]	Period [Axis]
		2019-12-31
Prior Period Errors [Adjustment]		
Equity, Originally Stated	Prior Report [Member]	2,000
Changes in Accounting Policy	Current Report [Member]	(1,500)
Correction of an Error	Current Report [Member]	(500)
	Equity, Restated	0

What can be tricky to understand about this representation is that the above restated balance is the exact same fact as the beginning balance of equity in the changes in equity fact set⁴⁸:

Changes in Equity [Line Items]	Period [Axis]	
	2020-01-01 - 2020-12-31	
Changes in Equity [Roll Forward]		
Equity, Beginning Balance	0	
Comprehensive Income	3,000	
Investments by Owners	1,000	
(Distributions to Owners)	(500)	
	Equity, Ending Balance	3,500

Note that in the *Prior Period Errors* structure has the dimension “Report Date [Axis]” and that the *Changes in Equity* structure does not have that dimension. And so, you might ask the question, “How can a fact exist only once but have a dimension in one structure and not have that dimension in a different structure?”

⁴⁶ Balance Sheet XBRL Formula rules, <http://xbrlsite.azurewebsites.net/2020/core/master-proof/Rule-Consistency-BS01-formula.xml>

⁴⁷ Prior Period Errors, <http://xbrlsite.azurewebsites.net/2020/core/master-proof/evidence-package/contents/index.html#Rendering-PriorPeriodErrors-proof> [PriorPeriodErrorsHypercube.html](#)

⁴⁸ Changes in Equity, <http://xbrlsite.azurewebsites.net/2020/core/master-proof/evidence-package/contents/index.html#Rendering-ChangesInEquity-proof> [ChangesInEquityHypercube.html](#)

The answer to that question is the XBRL notion of a “dimension-default”. The “Current Report [Member]” is established as the dimension-default within the Prior Period Error structure⁴⁹:

#	Label	Report Element Class	Period Type	Balance	Name
1	Prior Period Errors [Hypercube]	[Table]			proof:PriorPeriodErrorsHypercube
2	Report Date [Axis]	[Axis]			proof:ReportDateAxis
3	Current Report [Member]	[Member]			proof:CurrentReportMember
4	Prior Report [Member]	[Member]			proof:PriorReportMember
5	Prior Period Errors [Line Items]	[Line Items]			proof:PriorPeriodErrorsLineItems
6	Prior Period Errors [Adjustment]	[Abstract]			proof:PriorPeriodErrorsAdjustment
7	Equity, Originally Stated	[Concept] Monetary	As Of	Credit	proof:Equity
8	Changes in Accounting Policy	[Concept] Monetary	As Of	Credit	proof:ChangesInAccountingPolicy
9	Correction of an Error	[Concept] Monetary	As Of	Credit	proof:CorrectionOfAnError
10	Equity, Restated	[Concept] Monetary	As Of	Credit	proof:Equity

A detailed discussion about the “dimension-default” is beyond the scope of this document. If you are familiar with the notion of a dimension-default, you can see this represented in the XBRL definition relations of the Proof XBRL taxonomy schema and its related XBRL linkbases⁵⁰.

	Order	Arctrole
Definition View		
01-Balance Sheet		
02-Comprehensive Income		
03-Changes in Equity		
04-Prior Period Errors		
Prior Period Errors [Line Items]	0	
Equity	67	http://xbrl.org/int/dim/arctrole/domain-member
Changes in Accounting Policy	68	http://xbrl.org/int/dim/arctrole/domain-member
Correction of an Error	69	http://xbrl.org/int/dim/arctrole/domain-member
Prior Period Errors [Hypercube]	70	http://xbrl.org/int/dim/arctrole/all
Report Date [Axis]	71	http://xbrl.org/int/dim/arctrole/hypercube-dimension
Current Report [Member]	72	http://xbrl.org/int/dim/arctrole/dimension-domain
Prior Report [Member]	74	http://xbrl.org/int/dim/arctrole/domain-member
Current Report [Member]	73	http://xbrl.org/int/dim/arctrole/dimension-default

Finally, an XBRL formula is added to verify that the Adjustment concept arrangement pattern is operating correctly per the logic expected from the XBRL Formula processor⁵¹.

Adjustment_Reconciles_EquityPriorPeriodAdjustments (evaluation 1)	satisfied	\$Restated=0 = (\$OriginallyStated=2000 + \$CorrectionOfError=-1500 + \$MandatoryAccountingChange=-500)
---	-----------	---

As such, the logical system remains consistent, complete, and precise.

Add: Actual to Budget Comparison

⁴⁹ Prior Period Error, Model Structure, http://xbrlsite.azurewebsites.net/2020/core/master-proof/evidence-package/contents/index.html#NetworkStructure-PriorPeriodErrors-proof_PriorPeriodErrorsHypercube.html

⁵⁰ Proof XBRL taxonomy schema, <http://xbrlsite.azurewebsites.net/2020/core/master-proof/proof.xsd>

⁵¹ XBRL Formula for Adjustment, <http://xbrlsite.azurewebsites.net/2020/core/master-proof/Rule-Adjustment-formula.xml>

Financial statements can include an “Actual” to “Budget” comparison with the difference between actual and budget represented by a “Variance”. This can be achieved within an XBRL-based report using the Variance concept arrangement pattern.

A Variance concept arrangement pattern is described as a representation of one or more line items which are differentiated by using a “Scenario [Axis]” dimension. Actual and budget reporting scenarios can be achieved using an Actual [Member], a Budgeted [Member], and a Variance [Member] and is exemplified below⁵²:

Variance Analysis [Line Items]	Period [Axis]		
	2020-01-01 - 2020-12-31		
	Scenario [Axis]		
	Budgeted [Member]	Variance [Member]	Actual [Member]
Variance Analysis [Roll Up]			
Revenues	6,000	1,000	7,000
(Expenses)	(2,000)	(1,000)	(3,000)
Gains	750	250	1,000
(Losses)	(1,000)	(1,000)	(2,000)
Comprehensive Income	3,750	(750)	3,000

Again, note that similar to the Prior Period Error representation; the “Actual [Member]” values in the Variance Analysis structure directly tie to the Comprehensive Income structure⁵³:

Comprehensive Income Statement [Line Items]	Period [Axis]
	2020-01-01 - 2020-12-31
Comprehensive Income [Roll Up]	
Revenues	7,000
(Expenses)	(3,000)
Gains	1,000
(Losses)	(2,000)
Comprehensive Income	3,000

Once again, the connection between the Variance Analysis structure and the Comprehensive Income structure is achieved by representing the Actual [Member] as the dimension-default⁵⁴.

⁵² Variance Analysis, http://xbrlsite.azurewebsites.net/2020/core/master-proof/evidence-package/contents/index.html#Rendering-VarianceAnalysis-proof_VarianceAnalysisHypercube.html

⁵³ Comprehensive Income structure, http://xbrlsite.azurewebsites.net/2020/core/master-proof/evidence-package/contents/index.html#Rendering-ComprehensiveIncome-proof_ComprehensiveIncomeStatementHypercube.html

⁵⁴ Variance Analysis Model Structure, http://xbrlsite.azurewebsites.net/2020/core/master-proof/evidence-package/contents/index.html#NetworkStructure-VarianceAnalysis-proof_VarianceAnalysisHypercube.html

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#	Label	Report Element Class	Period Type	Balance	Name
1	Variance Analysis [Hypercube]	[Table]			proof:VarianceAnalysisHypercube
2	Scenario [Axis]	[Axis]			proof:ScenarioAxis
3	Actual [Member]	[Member]			proof:ActualMember
4	Budgeted [Member]	[Member]			proof:BudgetedMember
5	Variance [Member]	[Member]			proof:VarianceMember
6	Variance Analysis [Line Items]	[Line Items]			proof:VarianceAnalysisLineItems
7	Variance Analysis [Roll Up]	[Abstract]			proof:VarianceAnalysisRollUp
8	Revenues	[Concept] Monetary	For Period	Credit	proof:Revenues
9	(Expenses)	[Concept] Monetary	For Period	Debit	proof:Expenses
10	Gains	[Concept] Monetary	For Period	Credit	proof:Gains
11	(Losses)	[Concept] Monetary	For Period	Debit	proof:Losses
12	Comprehensive Income	[Concept] Monetary	For Period	Credit	proof:ComprehensiveIncome

Again, this can be seen in the XBRL definition relations.

Finally, the mathematical computation to verify the relationship between actual, budgeted, and variance values are represented using XBRL Formula and are consistent⁵⁵:

VARIANCE_Revenues (evaluation 1)	satisfied	$\$Actual=7000 = (\$Budget=6000 + \$Variance=1000)$
VARIANCE_Expenses (evaluation 1)	satisfied	$\$Actual=3000 = (\$Budget=2000 + \$Variance=1000)$
VARIANCE_Gains (evaluation 1)	satisfied	$\$Actual=1000 = (\$Budget=750 + \$Variance=250)$
VARIANCE_Losses (evaluation 1)	satisfied	$\$Actual=2000 = (\$Budget=1000 + \$Variance=1000)$
VARIANCE_ComprehensiveIncome (evaluation 1)	satisfied	$\$Actual=3000 = (\$Budget=3750 + \$Variance=-750)$

As such, the logical system can still be considered consistent, complete, and precise.

Add: Roll Forward Info

Financial statements can include what at first glance appears to be a Roll Forward but is actually a different concept arrangement pattern referred to as a Roll Forward Info. A Roll Forward Info has a “beginning” and “ending” balance similar to a Roll Forward, but unlike a Roll Forward, there is no mathematical computation. The Roll Forward Info is exemplified by the Stock Activity Plan structure⁵⁶:

Weighted Average Grant Date Fair Value [Line Items]	Period [Axis]
	2020-01-01 - 2020-12-31
Weighted Average Grant Date Fair Value [Roll Forward Info]	
Nonvested Fair Value, Beginning Balance	32.72
Granted	41.51
Vested	30.92
Forfeited	35.93
Nonvested Fair Value, Ending Balance	36.92

⁵⁵ Variance Analysis XBRL Formulas, <http://xbrlsite.azurewebsites.net/2020/core/master-proof/Rule-Variance-VA01-formula.xml>

⁵⁶ Stock Activity Plan structure, http://xbrlsite.azurewebsites.net/2020/core/master-proof/evidence-package/contents/index.html#Rendering-StockPlanActivity-proof_WeightedAverageGrantDateFairValueHypercube.html

While a Roll Forward Info is commonly represented in human-readable presentations with the single underline and double underline similar to a Roll Forward; the Roll Forward Info does not actually foot. Rather, a Roll Forward Info tends to always be provided with a Roll Forward which it explains in additional detail. Finally, the Roll Forward Info while necessary does not logically connect or mathematically connect to any other reported facts within the financial report.

As such, the logical system can still be considered consistent, complete, and precise.

Add: Set

A Set concept arrangement pattern is simply some set of numeric or nonnumeric or a combination of numeric and nonnumeric concepts that have no mathematical relations between the concepts. A Set is exemplified by the Financial Highlights structure⁵⁷:

Financial Highlights [Line Items]	Period [Axis]
	2020-01-01 - 2020-12-31
Financial Highlights [Set]	
Revenues	7,000
Comprehensive Income	3,000
Distributions to Owners	500

Again, while the structure shown above provides three numeric facts described by numeric concepts; there are no mathematical relations between these facts within the context of this structure. As such, there are no mathematical rules needed to explain this structure. Further, this structure does not tie mathematically to any other structure in the report. Rather, each fact ties individually to some structure.

As such, the logical system can still be considered consistent, complete, and precise.

Add: Text Blocks

A financial report can contain words that do not connect mathematically to other facts represented within a financial report. At times the words are more than simply text, rather than contain structures within the words. For example, the words could include a table, an ordered list, an unordered list, or other sorts of prose. This information is represented within a financial report using the Text Block concept arrangement pattern.

⁵⁷ Financial Highlights, http://xbrlsite.azurewebsites.net/2020/core/master-proof/evidence-package/contents/index.html#Rendering-FinancialHighlights-proof_FinancialHighlightsHypercube.html

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While only one is necessary, three Text Blocks have been created and are exemplified using the Policies structure⁵⁸:

Policies [Line Items]	Period [Axis]																			
	2020-01-01 - 2020-12-31																			
Basis of Reporting [Text Block]	Duis fermentum. Nullam dui orci, scelerisque porttitor, volutpat a, porttitor a, enim. Sed lobortis. Maecenas scelerisque ullamcorper libero. Aliquam porta leo imperdiet pede. In semper, elit vel elementum auctor, lectus purus rhoncus arcu, lacinia sollicitudin justo odio et nunc. Phasellus sagittis fringilla risus. Curabitur iaculis sagittis orci. Ut malesuada libero nec nulla molestie vestibulum. Suspendisse lectus massa, ullamcorper at, tincidunt eget, bibendum vel, risus. Curabitur imperdiet. Suspendisse accumsan, arcu vel ornare interdum, magna tellus porta mauris, in porta mi lacus sodales felis. Pellentesque dapibus, leo non sollicitudin consequat, lectus orci fringilla felis, non interdum leo libero sed augue. Sed magna. Maecenas ante ipsum, congue ut, sodales a, pulvinar ut, dui. Suspendisse mauris massa, sollicitudin et, hendrerit eget, placerat id, orci. Donec molestie magna.																			
Nature of Operations [Text Block]	<p>Sed justo: Nibh, placerat</p> <table border="1"> <thead> <tr> <th></th> <th>20XX</th> <th>20XX</th> </tr> </thead> <tbody> <tr> <td>Sed dapibus dui quis lectus; Donec id sem. Integer sit amet 2% diam ac nibh consequat vestibulum; Sed eget augue malesuada quam adipiscing mattis</td> <td>XX,XXX</td> <td>XX,XXX</td> </tr> <tr> <td>Sed lobortis, Maecenas scelerisque ullamcorper libero, Aliquam porta \$880 leo imperdiet pede</td> <td>XX,XXX</td> <td>-</td> </tr> <tr> <td>Nunc congue. Fusce venenatis. Maecenas tincidunt, ipsum in fringilla hendrerit, dolor metus eleifend neque, vel tincidunt mi nunc a purus</td> <td>-</td> <td>XX,XXX</td> </tr> <tr> <td>Fusce venenatis. Maecenas tincidunt, ipsum in fringilla \$1,200 hendrerit, dolor metus eleifend neque, vel tincidunt mi nunc a purus</td> <td>XX,XXX</td> <td>XX,XXX</td> </tr> <tr> <td>Pellentesque</td> <td>XXX,XXX</td> <td>XXX,XXX</td> </tr> </tbody> </table>			20XX	20XX	Sed dapibus dui quis lectus; Donec id sem. Integer sit amet 2% diam ac nibh consequat vestibulum; Sed eget augue malesuada quam adipiscing mattis	XX,XXX	XX,XXX	Sed lobortis, Maecenas scelerisque ullamcorper libero, Aliquam porta \$880 leo imperdiet pede	XX,XXX	-	Nunc congue. Fusce venenatis. Maecenas tincidunt, ipsum in fringilla hendrerit, dolor metus eleifend neque, vel tincidunt mi nunc a purus	-	XX,XXX	Fusce venenatis. Maecenas tincidunt, ipsum in fringilla \$1,200 hendrerit, dolor metus eleifend neque, vel tincidunt mi nunc a purus	XX,XXX	XX,XXX	Pellentesque	XXX,XXX	XXX,XXX
	20XX	20XX																		
Sed dapibus dui quis lectus; Donec id sem. Integer sit amet 2% diam ac nibh consequat vestibulum; Sed eget augue malesuada quam adipiscing mattis	XX,XXX	XX,XXX																		
Sed lobortis, Maecenas scelerisque ullamcorper libero, Aliquam porta \$880 leo imperdiet pede	XX,XXX	-																		
Nunc congue. Fusce venenatis. Maecenas tincidunt, ipsum in fringilla hendrerit, dolor metus eleifend neque, vel tincidunt mi nunc a purus	-	XX,XXX																		
Fusce venenatis. Maecenas tincidunt, ipsum in fringilla \$1,200 hendrerit, dolor metus eleifend neque, vel tincidunt mi nunc a purus	XX,XXX	XX,XXX																		
Pellentesque	XXX,XXX	XXX,XXX																		
Revenue Recognition Policy [Text Block]	<p>Nature of business</p> <p>Sed mauris. Nulla facilisi. Fusce tristique posuere ipsum. Nulla facilisi. Aliquam viverra risus vitae ante. Sed rhoncus mi in wisi. Nullam nibh dui, molestie vitae, imperdiet non, ornare at, elit.</p> <ul style="list-style-type: none"> Suspendisse accumsan, arcu vel ornare interdum, magna tellus porta mauris, in porta mi lacus sodales felis. Phasellus eleifend, diam vitae dapibus pulvinar, erat ligula auctor dui, eget congue justo lorem hendrerit tellus. Fusce gravida, ligula a placerat placerat, leo erat euismod lectus, et lacinia justo libero non pede. <p>Fusce gravida, ligula a placerat placerat, leo erat euismod lectus, et lacinia justo libero non pede. Vivamus ac velit vel magna nonummy pretium.</p> <ol style="list-style-type: none"> Etiam ut augue Aliquam erat volutpat 																			

As such, the logical system can still be considered consistent, complete, and precise.

Add: Member Aggregation

Finally, not really a concept arrangement pattern itself; (a) the [Member]s of a dimension can be related to one another mathematically and (b) any other concept arrangement pattern might be supplemented with a Member Arrangement Pattern. This is exemplified by the Segment Revenues structure shown below⁵⁹:

Segment Revenues [Line Items]	Period [Axis]			
	2020-01-01 - 2020-12-31			
	Segments [Axis]			
	Segment Alpha [Member]	Segment Bravo [Member]	Segment Charlie [Member]	All Segments [Member]
Segment Revenues [Set]				
Revenues	1,000	2,000	4,000	7,000

What you see above is a Member Aggregation of the segment revenues. This Member Aggregation is 100% consistent with the logic of a Roll Up concept arrangement pattern. The

⁵⁸ Policies, http://xbrlsite.azurewebsites.net/2020/core/master-proof/evidence-package/contents/index.html#Rendering-Policies-proof_PoliciesHypercube.html

⁵⁹ Segment Revenues Structure, http://xbrlsite.azurewebsites.net/2020/core/master-proof/evidence-package/contents/index.html#Rendering-SegmentRevenues-proof_SegmentRevenuesHypercube.html

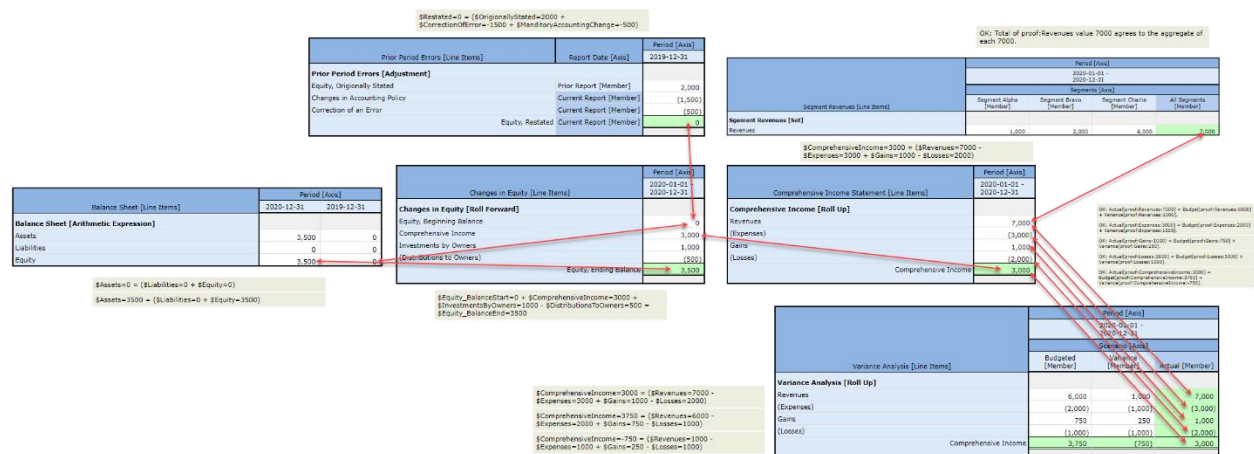
Segment Revenues [Set] contains exactly one concept “Revenues” for which four Facts are provided; one each for segments Alpha, Bravo, and Charlie and in addition the total of all segments. The mathematical relation is represented using an XBRL Formula⁶⁰.

Note that the Revenues of “All Segments” ties to the structure Comprehensive Income and to the structure Variance Analysis as well.

As such, the logical system can still be considered consistent, complete, and precise.

Proof Continues to be a Properly Functioning Logical System

At each increment and at the conclusion of adding all increments the Proof logical system continues to be consistent, complete, and precise and therefore a properly functioning logical system. Further, the logic of the financial report makes sense and this logical information is effectively represented within the XBRL technical syntax. Four different XBRL processors provide the same result.



As such, the representation approach is provably correct. Could there be other possible representation approaches? Yes, for example, a structure that we have represented as a set of [Line Items] could perhaps be represented as a set of [Member]s of a dimension. But while the technical representation syntax preference or choice might impact the technical representation the logic of the information would remain unchanged.

⁶⁰ Segment Revenues XBRL Formula for Member Aggregation, <http://xbrl.azurewebsites.net/2020/core/master-proof/Rule-MemberAggregation-formula.xml>

Reference Implementation of a Complete Financial Report Proof of Concept (XBRL syntax)

This proof of concept is another incremental increase to the previous proof of concepts. With this example, it is impossible to use purely human-based processes to verify that the financial report is properly functioning. Automated machine-based processes that rely on machine-readable rules must be employed.

This XBRL instance⁶¹ and XBRL taxonomy⁶² can be loaded into any off-the-shelf software product that provides support for the XBRL technical syntax. However, not all XBRL processors or XBRL formula processors provide support for processing the associated rules.

One commercially available software application can process all associated rules, XBRL Cloud. Another working proof of concept software application can process all rules. Again, this machine readable XBRL instance⁶³ can be loaded. You can view a human-readable version of the report⁶⁴ that was generated by XBRL Cloud. This screen shot of the reporting checklist validation result⁶⁵ a copy of which is shown below, or even download a working proof of concept software application⁶⁶ to reproduce the same result that I was able to produce and is shown below:

⁶¹ XBRL instance, <http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/xasb/taxonomy/company-instance.xml>

⁶² XBRL taxonomy, <http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/xasb/taxonomy/company.xsd>

⁶³ XASB instance, <http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/xasb/taxonomy/company-instance.xml>

⁶⁴ XASB human-readable evidence package, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/xasb/taxonomy/evidence-package/contents/index.html#Rendering-FinancialHighlightsSchedule-gaap_FinancialHighlightsTable.html

⁶⁵ XASB reporting checklist validation result, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/xasb/taxonomy/Validation_DisclosureMechanics.jpg

⁶⁶ Pesseract download, <http://pesseract.azurewebsites.net/#menu3>

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Disclosure Mechanics Validation Result							
Show more information							
Primary Information							
#	Disclosure	Category	Level	Pattern	Disclosure Found	Disclosure Consistent	Representation Concept [TEXT BLOCK]
1	Assets [Roll Up]	Unknown	Level4Detail	fr:RollUp	True	CONSISTENT	NOT-EXPECTED
2	Balance Sheet	Statement	Level4Detail	fr:Component	True	CONSISTENT	-
3	Basics of Reporting	Unknown	Level1TextBlock	fr:TextBlock	True	CONSISTENT	Overall Financial Report Presentation and Display [HTML]
4	Buildings [Roll Forward]	Unknown	Level1TextBlock,Level4Detail	fr:RollForward	True	CONSISTENT	Property, Plant, and Equipment Roll Forward [Schedule]
5	Business Segments	Unknown	Level1TextBlock	fr:Component	False	CONSISTENT	NOT-EXPECTED
6	Business Segments, Assets [Roll Up]	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Business Segments, Assets [Schedule]
7	Business Segments, Depreciation and Amortization	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Business Segments, Depreciation and Amortization [Schedule]
8	Business Segments, Liabilities [Roll Up]	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Business Segments, Liabilities [Schedule]
9	Business Segments, Other Information	Unknown	Level1TextBlock,Level4Detail	fr:Hierarchy	True	CONSISTENT	Business Segments, Other Information [Schedule]
10	Business Segments, Results [Roll Up]	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Business Segments, Results [Schedule]
11	Business Segments, Revenue [Roll Up]	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Business Segments, Revenue [Schedule]
12	Cash and Cash Equivalents Components	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Cash and Cash Equivalents Components [Schedule]
13	Cash Flow Statement, Direct Method	Unknown	Level4Detail	fr:RollUp	True	CONSISTENT	Cash Flow, Net
14	Common Stock, By Class	Unknown	Level1TextBlock,Level4Detail	fr:Hierarchy	True	CONSISTENT	Common Stock by Class [Schedule]
15	Director Compensation	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Director Compensation [Schedule]
16	Director Compensation, Options Granted	Unknown	Level1TextBlock,Level4Detail	fr:Hierarchy	True	CONSISTENT	Director Compensation Options Granted [Schedule]
17	Document Information	Unknown	Level4Detail	fr:Hierarchy	True	CONSISTENT	NOT-EXPECTED
18	Earnings Per Share Summary	Unknown	Level4Detail	fr:Hierarchy	True	CONSISTENT	NOT-EXPECTED
19	Entity Address	Unknown	Level4Detail	fr:Hierarchy	True	CONSISTENT	NOT-EXPECTED
20	Entity Information	Unknown	Level4Detail	fr:Hierarchy	True	CONSISTENT	NOT-EXPECTED
21	Financial Highlights	Unknown	Level1TextBlock,Level4Detail	fr:Hierarchy	True	CONSISTENT	Financial Highlights [HTML]
22	Furniture and Fixtures [Roll Forward]	Unknown	Level1TextBlock,Level4Detail	fr:RollForward	True	CONSISTENT	Property, Plant, and Equipment Roll Forward [Schedule]
23	Income Statement	Unknown	Level4Detail	fr:RollUp	True	CONSISTENT	NOT-EXPECTED
24	Income Tax Expense (Benefit) Components	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Income Tax Expense (Benefit) Components [Schedule]
25	Inventory Components	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Inventory Components [Schedule]
26	Investment	Unknown	Level1TextBlock,Level4Detail	fr:Hierarchy	True	CONSISTENT	Investments [Schedule]
27	Land [Roll Forward]	Unknown	Level1TextBlock,Level4Detail	fr:RollForward	True	CONSISTENT	Property, Plant, and Equipment Roll Forward [Schedule]
28	Leasehold Land and Buildings	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Leasehold Land and Buildings [Schedule]
29	Liabilities and Equity [Roll Up]	Unknown	Level4Detail	fr:RollUp	True	CONSISTENT	NOT-EXPECTED
30	Long-Term Debt Components	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Long-Term Debt Components [Schedule]
31	Long-Term Debt Current and Noncurrent	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Long-Term Debt Current and Noncurrent Breakdown [Schedule]
32	Long-Term Debt Instruments	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Long-Term Debt Instruments [Schedule]
33	Long-Term Debt Maturities	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Long-Term Debt Maturities [Schedule]
34	Nature of Operations	Unknown	Level1TextBlock	fr:TextBlock	True	CONSISTENT	Nature of Business [HTML]
35	Other Assets Current and Noncurrent	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Other Assets, Current and Noncurrent Portion [Schedule]
36	Other Liabilities Current and Noncurrent	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Other Liabilities Current and Noncurrent Breakdown [Schedule]
37	Other Property, Plant, and Equipment	Unknown	Level1TextBlock,Level4Detail	fr:RollForward	True	CONSISTENT	Property, Plant, and Equipment Roll Forward [Schedule]
38	Payables and Accruals Components	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Payables and Accruals Components [Schedule]
39	Preferred Stock Characteristics	Unknown	Level4Detail	fr:RollForward	True	CONSISTENT	NOT-EXPECTED
40	Prepaid Expenses	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Prepaid Stock by Class [Schedule]
41	Prepaid Expenses	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Prepaid Expenses Components [Schedule]
42	Property, Plant, and Equipment Components	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Property, Plant, and Equipment Components [Schedule]
43	Property, Plant, and Equipment Current	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Property, Plant, and Equipment (Estimated Useful Life) [Schedule]
44	Property, Plant, and Equipment Roll Forward	Unknown	Level1TextBlock,Level4Detail	fr:RollForward	True	CONSISTENT	Property, Plant, and Equipment Roll Forward [Schedule]
45	Receivables Details, By Component	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Receivables, by Component [Schedule]
46	Receivables Details, Current and Noncurrent	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Receivables, Current and Noncurrent [Schedule]
47	Receivables Details, Gross, Net	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Receivables, Net and Gross [Schedule]
48	Reconciliation of Cash Summary	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Reconciliation of Cash Flow Statement, Summary [Schedule]
49	Reconciling Items of Cash and Cash Equivalents	Unknown	Level1TextBlock,Level4Detail	fr:Hierarchy	True	CONSISTENT	Reconciliation of Cash Flow Statement, Detail [Schedule]
50	Related Party	Unknown	Level1TextBlock,Level4Detail	fr:Hierarchy	True	CONSISTENT	Related Parties [Schedule]
51	Related Party Transaction	Unknown	Level1TextBlock,Level4Detail	fr:Hierarchy	True	CONSISTENT	Related Party Transaction, Amount [Schedule]
52	Sales Analysis, By Customer	Unknown	Level1TextBlock,Level4Detail	fr:Hierarchy	True	CONSISTENT	Sales Analysis by Customer [Schedule]
53	Share Ownership Plan Stock Options	Unknown	Level1TextBlock,Level4Detail	fr:RollForward	True	CONSISTENT	Share Options Outstanding Roll Forward [Schedule]
54	Significant Accounting Policies	Unknown	Level1TextBlock	fr:TextBlock	True	CONSISTENT	Significant Accounting Policies [Table]
55	Statement of Changes in Equity	Unknown	Level4Detail	fr:RollForward	True	CONSISTENT	NOT-EXPECTED
56	Statement of Changes in Equity, Common Stock	Unknown	Level1TextBlock,Level4Detail	fr:RollForward	True	CONSISTENT	Common Stock Shares Outstanding Roll Forward [Schedule]
57	Statement of Changes in Equity, Preferred Stock	Unknown	Level1TextBlock,Level4Detail	fr:RollForward	True	CONSISTENT	Preferred Stock, Shares Outstanding [Schedule]
58	Statement of Changes in Equity, Retained Earnings	Unknown	Level4Detail	fr:Equation	True	CONSISTENT	NOT-EXPECTED
59	Subsequent Events	Unknown	Level1TextBlock,Level4Detail	fr:Hierarchy	True	CONSISTENT	Subsequent Events [Schedule]
60	Variance Analysis Gross Profit	Unknown	Level1TextBlock,Level4Detail	fr:RollUp	True	CONSISTENT	Variance Analysis [Schedule]

The important point of this example is to show that 100% of the fact sets (fragments) of this report are verified to be properly functioning and there are no inconsistencies or contradictions between fact sets.

The key is simple: the facts, assertions, associations, terms, structures, and models that make statements about the logical system MUST be in a state of equilibrium where no, say, assertion is missing that would have proven that a fact is misrepresented, inconsistent with, or contradicts some other fact and a quality problem can therefore slip into the logical system undetected.

SEC Filing Example, Microsoft 10-K Proof of Concept (XBRL syntax)

By way of contrast, the Microsoft 2017 10-K was tested using this method⁶⁷. This Microsoft XBRL instance⁶⁸ can be loaded into any off-the-shelf commercially available software application. The Microsoft 2017 10-K can be viewed using a commercial software product,

⁶⁷ Microsoft 2017 10-K filed with the SEC, <https://www.sec.gov/Archives/edgar/data/789019/000156459017014900/0001564590-17-014900-index.htm>

⁶⁸ Microsoft 2017 10-K XBRL instance, <https://www.sec.gov/Archives/edgar/data/789019/000156459017014900/msft-20170630.xml>

XBRL Cloud Evidence Package⁶⁹. The report can also be viewed using the SEC provided open source XBRL viewer tool⁷⁰.

That Microsoft report can be broken down into fragments. That Microsoft report has 194 distinct testable fragments referred to as fact sets within its XBRL-based financial report. This report was verified using this same method and a human-readable version of this report was generated⁷¹ and the mechanical tests of the structures was created as well⁷².

#	Disclosure	Category	Level	Pattern	Applicable	Found	Disclosure Consistent	Representation Concept (TEXT BLOCK)	Representation Concept [DETAIL]	Checklist Category	Reason
1	Document Information (Hierarchy)	DOCUMENT	Level4Detail	HIERARCHY	True	True	CONSISTENT	NOT-EXPECTED	Document Fiscal Period Focus	Required disclosure	Disclosure always required
2	Document and Entity Information (Hierarchy)	DOCUMENT	Level4Detail	HIERARCHY	False	True	CONSISTENT	NOT-EXPECTED	Entity Registrant Name	Alternative representation	Not necessary, satisfied by Document Information (Hierarchy) disclosure
3	Entity Information, by Legal Entity (Hierarchy)	DOCUMENT	Level4Detail	HIERARCHY	True	True	CONSISTENT	NOT-EXPECTED	Entity Registrant Name	Required disclosure	Disclosure always required
4	Document and Entity Information (Hierarchy)	DOCUMENT	Level4Detail	HIERARCHY	False	True	CONSISTENT	NOT-EXPECTED	Entity Registrant Name	Alternative representation	Not necessary, satisfied by Entity Information, by Legal Entity (Hierarchy) disclosure
5	Balance Sheet	STATEMENT	Level4Detail	COMPONENT	True	True	CONSISTENT	NOT-EXPECTED	NOT-EXPECTED	Required disclosure	Disclosure always required, satisfied by Assets (Roll Up) and Liabilities and Equity (Roll Up)
6	Assets (Roll Up)	STATEMENT	Level4Detail	ROLL UP	True	True	CONSISTENT	NOT-EXPECTED	Assets	Part of disclosure	Disclosure always required
7	Liabilities and Equity (Roll Up)	STATEMENT	Level4Detail	ROLL UP	True	True	CONSISTENT	NOT-EXPECTED	Liabilities and Equity	Part of disclosure	Disclosure always required
8	Income Statement, by Legal Entity (Roll Up)	STATEMENT	Level4Detail	ROLL UP	True	True	CONSISTENT	NOT-EXPECTED	Net Income (Loss) Attributable to Parent	Required disclosure	Disclosure always required

But the logical system of this report is not provably a properly functioning logical system. Why?

While the Microsoft report tends to be very *precise* in that there are only a very small amount of inconsistencies discovered including no nature of operations disclosure and only a portion of the restructuring charges disclosure which should be investigated; the mechanical and structural rules used to test the report only exercised about 37 of the 194 total structures. This is because the set of machine-readable rules used to exercise the report is *not complete*. Because of the missing rules the logical system of the report is not provably properly functioning because (a) facts could have been reported incorrectly and (b) there are no rules to discover the error. Basically, Microsoft can only hope that reported information is correct because the reported information is not proved.

⁶⁹ XBRL Cloud Evidence Package, <https://www.sec.gov/Archives/edgar/data/789019/000156459017014900/msft-20170630.xml>

⁷⁰ Microsoft 2017 10-K viewed using the SEC open source XBRL viewer, https://www.sec.gov/cgi-bin/viewer?action=view&cik=789019&accession_number=0001564590-17-014900&xbml_type=v

⁷¹ Microsoft 2017 10-K evidence package generated by XBRL Cloud, <http://xbrlsite.azurewebsites.net/2017/Prototypes/Microsoft2017/evidence-package/>

⁷² Microsoft 2017 10-K disclosure mechanics and reporting checklist generated by XBRL Cloud, <http://xbrlsite.azurewebsites.net/2017/Prototypes/Microsoft2017/Disclosure%20Mechanics%20and%20Reporting%20Checklist.html>

The financial report logical system for the Microsoft report can be made more complete by adding the additional rules that are currently missing and then the report can then be proven to be a properly functioning logical system.

This method is the audit strategy for XBRL-based reports described in the document *Auditing XBRL-based Financial Reports*⁷³.

SEC Inline XBRL Filing Example Proof of Concept (XBRL syntax)

In addition to the raw XBRL instance⁷⁴ format, Inline XBRL syntax⁷⁵ which is essentially an XBRL instance imbedded within XHTML is another report format option for SBRM. This specific proof of concept was created by the professional services team of DataTracks (a commercial product). The XBRL instance was independently verified using XBRL Cloud's evidence package⁷⁶ commercial product.

DataTracks created the Inline XBRL version of the report. XBRL Cloud took the Inline XBRL version of the report, ran it through an automated process, and converted the Inline XBRL into raw XBRL. The raw XBRL was then loaded into a third software application, Pesseract, which is a working proof of concept XBRL creation tool. The point is that all three software applications give the same results and are therefore interoperable at the syntax and the semantics level.

Entity	Period	ID	Test	Result
0000000001	2018-Q1	FAC_CONSISTENCY_1	fac:Equity = (fac:EquityAttributableToParent + fac:EquityAttributableToNoncontrollingInterest)	True
0000000001	2018-Q1	FAC_CONSISTENCY_10	fac:NetCashFlowFromInvestingActivities = (fac:NetCashFlowFromInvestingActivitiesContinuing + fac:NetCashFlowFromInvestingActivitiesDiscontinued)	True
0000000001	2018-Q1	FAC_CONSISTENCY_11	fac:NetCashFlowFromFinancingActivities = (fac:NetCashFlowFromFinancingActivitiesContinuing + fac:NetCashFlowFromFinancingActivitiesDiscontinued)	True
0000000001	2018-Q1	FAC_CONSISTENCY_12	fac:GrossProfit = (fac:Revenues - fac:CostOfRevenue)	True
0000000001	2018-Q1	FAC_CONSISTENCY_13	fac:OperatingIncomeLoss = (fac:GrossProfit - fac:OperatingExpenses)	True
0000000001	2018-Q1	FAC_CONSISTENCY_15	fac:IncomeLossFromContinuingOperationsBeforeTax = (fac:OperatingIncomeLoss + fac:NonoperatingIncomePlusInterestAndDebtExpensePlusIncomeFromEquityMethodInvestments)	True
0000000001	2018-Q1	FAC_CONSISTENCY_16	fac:IncomeLossFromContinuingOperationsAfterTax = (fac:IncomeLossFromContinuingOperationsBeforeTax - fac:IncomeTaxExpenseBenefit)	True
0000000001	2018-Q1	FAC_CONSISTENCY_17	fac:NetIncomeLoss = (fac:IncomeLossFromContinuingOperationsAfterTax + fac:IncomeLossFromDiscontinuedOperationsNetOfTax + fac:ExtraordinaryItemsOfIncomeExpenseNetOfTax)	True
0000000001	2018-Q1	FAC_CONSISTENCY_18	fac:NetIncomeLoss = (fac:NetIncomeLossAttributableToParent + fac:NetIncomeLossAttributableToNoncontrollingInterest)	True
0000000001	2018-Q1	FAC_CONSISTENCY_19	fac:NetIncomeLossAvailableToCommonStockholdersBasic = (fac:NetIncomeLossAttributableToParent - fac:PreferredStockDividendsAndOtherAdjustments)	True
0000000001	2018-Q1	FAC_CONSISTENCY_2	fac:Assets = fac:LiabilitiesAndEquity	True
0000000001	2018-Q1	FAC_CONSISTENCY_20	fac:ComprehensiveIncomeLoss = (fac:ComprehensiveIncomeLossAttributableToParent + fac:ComprehensiveIncomeLossAttributableToNoncontrollingInterest)	True
0000000001	2018-Q1	FAC_CONSISTENCY_21	fac:ComprehensiveIncomeLoss = (fac:NetIncomeLoss + fac:OtherComprehensiveIncomeLoss)	True
0000000001	2018-Q1	FAC_CONSISTENCY_3	fac:Assets = (fac:CurrentAssets + fac:NoncurrentAssets)	True
0000000001	2018-Q1	FAC_CONSISTENCY_4	fac:Liabilities = (fac:CurrentLiabilities + fac:NoncurrentLiabilities)	True
0000000001	2018-Q1	FAC_CONSISTENCY_5	fac:LiabilitiesAndEquity = (fac:Liabilities + fac:CommitmentsAndContingencies + fac:TemporaryEquity + fac:Equity)	True
0000000001	2018-Q1	FAC_CONSISTENCY_50	fac:NetCashFlow = (fac:NetCashFlowContinuing + fac:NetCashFlowDiscontinued + fac:ExchangeGainsLosses)	True
0000000001	2018-Q1	FAC_CONSISTENCY_6	fac:NetCashFlow = (fac:NetCashFlowFromOperatingActivities + fac:NetCashFlowFromInvestingActivities + fac:NetCashFlowFromFinancingActivities + fac:ExchangeGainsLosses)	True
0000000001	2018-Q1	FAC_CONSISTENCY_7	fac:NetCashFlowContinuing = (fac:NetCashFlowFromOperatingActivitiesContinuing + fac:NetCashFlowFromInvestingActivitiesContinuing + fac:NetCashFlowFromFinancingActivitiesContinuing)	True
0000000001	2018-Q1	FAC_CONSISTENCY_8	fac:NetCashFlowDiscontinued = (fac:NetCashFlowFromOperatingActivitiesDiscontinued + fac:NetCashFlowFromInvestingActivitiesDiscontinued + fac:NetCashFlowFromFinancingActivitiesDiscontinued)	True
0000000001	2018-Q1	FAC_CONSISTENCY_9	fac:NetCashFlowFromOperatingActivities = (fac:NetCashFlowFromOperatingActivitiesContinuing + fac:NetCashFlowFromOperatingActivitiesDiscontinued)	True

⁷³ Charles Hoffman, CPA, *Auditing XBRL-based Financial Reports*,

<http://xbrlsite.azurewebsites.net/2019/Library/AuditingXBRLBasedFinancialReports.pdf>

⁷⁴ Raw XBRL instance financial report, <http://xbrlsite.azurewebsites.net/2019/sbrm/ald/ald-20180331.xml>

⁷⁵ Inline XBRL financial report, <http://xbrlsite.azurewebsites.net/2019/sbrm/ald/ald-20180331.htm>

⁷⁶ XBRL Cloud evidence package, <http://xbrlsite.azurewebsites.net/2019/sbrm/ald/evidence-package/contents/index.html#ReportProperties.html>

The Inline XBRL produces business reports that have pixel perfect representations to the extent that global standard HTML can provide such representations. But, this does not change the underlying logic of information conveyed via the XBRL taxonomy which models the structures, terms, associations, and assertions of reports or the facts which are reported. Converting from the Inline XBRL format to the raw XBRL format; or from the raw XBRL format to the Inline XBRL format is lossless.

the financial statements.

Emerging Growth Company

The Company is an emerging growth company as defined under the Jumpstart Our Business Startups Act of 2012 (JOBS Act). An emerging growth company may delay the adoption of certain accounting standards until those standards would otherwise apply to private companies. The Company will remain an emerging growth company until December 31, 2017, although it will lose that status sooner if its revenues exceed \$1,000,000,000 billion, if it issues more than \$1,000,000,000 billion in non-convertible debt in a three year period, or if the market value of its common stock that is held by non-affiliates exceeds \$700 million as of any March 31. At March 31, 2017, the market value of the Company's common stock that is held by non-affiliates totaled \$60 million.

Note 3 – Fixed Assets

Fixed assets are summarized as follows:

	March 31, 2018	December 31, 2017
Machinery and equipment	635,000	633,000
Office furniture and equipment	98,000	95,000
Leasehold improvements	62,000	62,000
Accumulated depreciation	(425,000)	(366,000)
	370,000	424,000
Construction in progress	16,000	3,000
	386,000	427,000

Note 4 – Stockholders' Equity

Common Stock and Preferred Stock

The Company is authorized to issue 62,500,000 shares of common stock and 2,000,000 shares of preferred stock. Preferences, limitations, voting powers and relative rights of any preferred stock to be issued may be determined by the Company's Board of Directors. The Company has not issued any shares of preferred stock.

In March 2018, the Company completed a registered direct offering of common stock whereby 812,500 shares were issued at \$8 per share. Gross proceeds from the offering totaled \$7 million and net cash proceeds approximated \$6 million. Expenses of the offering approximated \$1 million. Cash expenses included placement agent fees of \$488,000, placement agent legal and other fees of \$75,000, issuer legal fees of \$113,000, and other costs of \$44,000. Non-cash expenses consisted of a placement agent warrant to purchase 20,313 shares of the Company's common stock at \$10 per share exercisable until March 2019 valued at

SBRM Conformance Suite Proof of Concept (XBRL syntax)

An XBRL-based Financial Reporting Conformance Suite⁷⁷ provides numerous positive and negative examples that can be used by software developers to understand SBRM and test their implementations to be sure that they are consistent with the intent of the SBRM conceptualization of a business report.

To date, there are three software vendors that support 100% of the logical model of a business report in what will become the SBRM specification⁷⁸ using the XBRL technical syntax.

XBRL-based Digital Financial Reporting Conformance Suite Tests

As of date: 2019-03-05

Published by <http://www.xbrlsite.com>

Min	# of Variations	Name	Owner	Description
	1	1000-ConceptArrangementPatterns/01-Hierarchy/01-TestCase-Hierarchy.xml	charles.hoffman@me.com	Concept arrangement patterns, Hierarchy
	1	1000-ConceptArrangementPatterns/02-RollUp/02-TestCase-RollUp.xml	charles.hoffman@me.com	Concept arrangement patterns, RollUp
	1	1000-ConceptArrangementPatterns/03-RollForward/03-TestCase-RollForward.xml	charles.hoffman@me.com	Concept arrangement patterns, RollForward
	1	1000-ConceptArrangementPatterns/04-CompoundFact/04-TestCase-CompoundFact.xml	charles.hoffman@me.com	Concept arrangement patterns, CompoundFact
	1	1000-ConceptArrangementPatterns/05-Adjustment/05-TestCase-Adjustment.xml	charles.hoffman@me.com	Concept arrangement patterns, Adjustment
	1	1000-ConceptArrangementPatterns/06-Variance/06-TestCase-Variance.xml	charles.hoffman@me.com	Concept arrangement patterns, Variance
	1	1000-ConceptArrangementPatterns/07-ComplexComputation/07-TestCase-ComplexComputation.xml	charles.hoffman@me.com	Concept arrangement patterns, ComplexComputation
	1	1000-ConceptArrangementPatterns/08-TextBlock/08-TestCase-TextBlock.xml	charles.hoffman@me.com	Concept arrangement patterns, TextBlock
	1	1000-ConceptArrangementPatterns/09-Grid/09-TestCase-Grid.xml	charles.hoffman@me.com	Concept arrangement patterns, Grid
	1	1000-ConceptArrangementPatterns/10-RollForwardInfo/10-TestCase-RollForwardInfo.xml	charles.hoffman@me.com	Concept arrangement patterns, RollForwardInfo
	1	1000-ConceptArrangementPatterns/11-Set/11-TestCase-Set.xml	charles.hoffman@me.com	Concept arrangement patterns, Set
	1	2000-Valid/01-ManyReportingEntities/01-TestCase-ManyReportingEntities.xml	charles.hoffman@me.com	Example, Many different reporting entities in one XBRL instance
	1	2000-Valid/02-PathologicalModelStructure/02-TestCase-PathologicalModelStructure.xml	charles.hoffman@me.com	Example, Pathological presentation relations
	1	2000-Valid/03-MultipleCalculationsMultipleTables/03-TestCase-MultipleCalculationsMultipleTables.xml	charles.hoffman@me.com	Example, Multiple Calculations Multiple Tables
	1	2000-Valid/04-TickAndTieCrossCastAndFoot/04-TestCase-TickAndTieCrossCastAndFoot.xml	charles.hoffman@me.com	Example, Tick and tie, cross cast and foot
	1	2000-Valid/05-TwoRollUpBlocksProper/05-TestCase-TwoRollUpBlocksProper.xml	charles.hoffman@me.com	Example, Two Roll Up blocks constructed properly
	1	2000-Valid/06-BasicIoremIpsumWithFiveLabels/06-TestCase-BasicIoremIpsumWithFiveLabels.xml	charles.hoffman@me.com	Example, Basic example, lorem ipsum names, five mock labels.
	1	2000-Valid/07-BasicExample/07-TestCase-BasicExample.xml	charles.hoffman@me.com	Example, Basic example, regular labels.
	1	2000-Valid/08-IPSAS/08-TestCase-IPSAS.xml	charles.hoffman@me.com	Example, IPSAS core example, all concept arrangement patterns in one document.
	1	2000-Valid/10-USGAAP/10-TestCase-USGAAP.xml	charles.hoffman@me.com	Example, US GAAP Reference Implementation.
	1	3000-Basic/01-MemberAbstractAttribute/01-TestCase-MemberAbstractAttribute.xml	charles.hoffman@me.com	Error, Every member MUST have an abstract attribute which has the value of true.
	1	3000-Basic/02-HypercubesClosed/02-TestCase-HypercubesClosed.xml	charles.hoffman@me.com	Error, Every hypercube MUST be closed.
	1	3000-Basic/03-PresentationRelationMissingConcept/03-TestCase-PresentationRelationMissingConcept.xml	charles.hoffman@me.com	Error, Stray facts are not allowed, presentation concept missing.
	1	3000-Basic/04-DefinitionRelationMissingConcept/04-TestCase-DefinitionRelationMissingConcept.xml	charles.hoffman@me.com	Error, Stray facts are not allowed, definition relation missing.
	1	3000-Basic/05-CalculationRelationMissingConcept/05-TestCase-CalculationRelationMissingConcept.xml	charles.hoffman@me.com	Error, Stray facts are not allowed, calculation relations missing concept.
	1	3000-Basic/06-NetworkIdentifiersInconsistent/06-TestCase-NetworkIdentifiersInconsistent.xml	charles.hoffman@me.com	Error, Network relations for presentation, calculation, and definition relations must be consistent.
	1	3000-Basic/07-TwoRollUpBlocksRunTogether/07-TestCase-TwoRollUpBlocksRunTogether.xml	charles.hoffman@me.com	Error, Two blocks run together.
	1	3000-Basic/08-AdjustmentReportDateNoDefault/08-AdjustmentReportDateNoDefault.xml	charles.hoffman@me.com	Error, Adjustment Report Date (Axis) Missing Dimension Default.

⁷⁷ XBRL-based Digital Financial Reporting Conformance Suite, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/index.xml>

⁷⁸ Comparison of Renderings for Concept Arrangement Patterns, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/ComparisonOfConceptArrangementPatternRenderings.pdf>