MINI Financial Reporting Scheme

A prototype special purpose financial reporting scheme

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"I skate to where the puck is going to be, not where it has been." *Wayne Gretzky*, legendary Canadian hockey star

Executive summary:

- XBRL can be used for general purpose financial reporting but also for special purpose financial reporting.
- This is a prototype special purpose XBRL-based digital financial reporting scheme.

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The purpose of this document is to experiment with specifying a special purpose financial reporting scheme.

This document defines a prototype financial reporting scheme, MINI financial reporting scheme. This reporting scheme is grounded in FASB's SFAC 6. FASB SFAC 6[1] explicitly defines 10 elements of a financial statement. The elements of financial statements are the building blocks from which financial statements are constructed. The elements are the classes of items that comprise a financial statement.

This document builds on SFAC 6 and specifies not only the elements of a financial statement but also the statements themselves, the mathematical interrelations between the elements, fundamental interrelationships between the statements, and the basic disclosures required to be provided per this MINI financial reporting scheme.

Elements of Financial Statement

As SFAC 6 states, "Elements of financial statements are the building blocks with which financial statements are constructed—the classes of items that financial statements comprise. The items in financial statements represent in words and numbers certain entity resources, claims to those resources, and the effects of transactions and other events and circumstances that result in changes in those resources and claims."

As such and as consistent with the accounting equation and consistent with SFAC 6, the MINI financial reporting scheme defines the following mathematically interrelated elements of a financial statement:

- **Assets** are probable future economic benefits obtained or controlled by a particular entity as a result of past transactions or events.
- **Liabilities** are probable future sacrifices of economic benefits arising from present obligations of a particular entity to transfer assets or provide services to other entities in the future as a result of past transactions or events.
- **Equity** or net assets is the residual interest in the assets of an entity that remains after deducting its liabilities.
- **Investments by owners** are increases in equity of a particular business enterprise resulting from transfers to it from other entities of something valuable to obtain or increase ownership interests (or equity) in it.
- **Distributions to owners** are decreases in equity of a particular business enterprise resulting from transferring assets, rendering services, or incurring liabilities by the enterprise to owners.
  Comprehensive income is the change in equity of a business enterprise during a period from transactions and other events and circumstances from nonowner sources. It includes all

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[1] FASB, *Statement of Financial Reporting Concepts No. 6 (SFAC 6)*, *Elements of Financial Statements*, https://www.fasb.org/jsp/FASB/Document_C/DocumentPage?cid=1218220132802

changes in equity during a period except those resulting from investments by owners and distributions to owners.

- **Revenues** are inflows or other enhancements of assets of an entity or settlements of its liabilities (or a combination of both) from delivering or producing goods, rendering services, or other activities that constitute the entity's ongoing major or central operations.
- **Expenses** are outflows or other using up of assets or incurrences of liabilities (or a combination of both) from delivering or producing goods, rendering services, or carrying out other activities that constitute the entity's ongoing major or central operations.
- **Gains** are increases in equity (net assets) from peripheral or incidental transactions of an entity and from all other transactions and other events and circumstances affecting the entity except those that result from revenues or investments by owners.
- **Losses** are decreases in equity (net assets) from peripheral or incidental transactions of an entity and from all other transactions and other events and circumstances affecting the entity except those that result from expenses or distributions to owners.

The 10 elements of a financial statement summarized above are enhanced and supplemented per the following additional notions:

- **Current** is the notion contrast to "noncurrent" which indicates that an *asset* or *liability* will benefit or sacrifice benefit within one year or within an economic entity's normal operating cycle, whichever is longer.
- **Noncurrent** is defined to be assets and liabilities that are not "current".
- **Net cash flow** is the sum of all changes in *cash and cash equivalents* between the beginning balance sheet date and the ending balance sheet date. Net cash flows are always grouped into three distinct categories which are: operating activities, investing activities, and financing activities.
- **Operating** indicates revenues, expenses, gains, and losses related to ongoing major or central operations of an economic entity.
- **Nonoperating** indicates revenues, expenses, gains, and losses related to peripheral or incidental transactions of an economic entity. By definition, "nonoperating" is everything that is not "operating".
- **Controlling interest** indicates the interests that are in legal control of an economic entity.
- **Noncontrolling interest** indicates the interests that are not in legal control of an economic entity.

As stated, the elements of a financial statement are interrelated mathematically. The following are the mathematical interrelationships between the elements of a financial statement:

- Assets = Liabilities + Equity
- Comprehensive Income = Revenues - Expenses + Gains – Losses
- $0 = (Equity^{T0} + Revenue^{P1} - Expenses^{P1} + Gains^{P1} - Losses^{P1} + Investments\ by\ Owners^{P1} - Distributions\ to\ Owners^{P1}) + Liabilities^{T1} - Assets^{T1}$

- Cash and Cash Equivalents ^{T1} = Cash and Cash Equivalents ^{T0} + Net Cash Flow ^{P1}
- Net Cash Flow = Net Cash Flow from Operating Activities + Net Cash Flow from Investing Activities + Net Cash Flow from Financing Activities

Financial Statement

The following is a summary of the four core financial statements that always must appear within a set of financial statements created using the MINI financial reporting scheme:

- **Statement of financial position** is a snapshot of the financial position of an economic entity as of a point in time. A statement of financial position reports assets, liabilities, and equity.
- **Statement of financial performance** is a moving picture of the financial performance of an economic entity between two balance sheet dates. A statement of financial performance reports *comprehensive income*, *revenues*, *expenses*, *gains*, and *losses*.
- **Statement of cash flows** is a moving picture of the *net cash flows* of an economic entity between two balance sheet dates. A statement of cash flows reports net cash flows categorized into operating activities, investing activities, and financing activities.
- **Statement of changes in equity** is a moving picture of the equity of an economic entity between two balance sheet dates. A statement of changes in equity reports *comprehensive income*, *investments by owners*, and *distributions to owners*.

Again, as stated, the elements of a financial statement are interrelated. In addition, the financial statements are fundamentally interrelated and connected mathematically which is the notion of articulation. The following example financial statements "shells" show the fundamental interrelations and connections that exist between the four core financial statements:

Statement of Financial Position (Balance sheet):

Balance Sheet [Abstract]	Period [Axis]	
	2020-12-31	2019-12-31
Balance Sheet [Abstract]		
Assets [Roll Up]		
Current Assets	3,500	0
Noncurrent Assets	0	0
Assets	3,500	0
Liabilities and Equity [Roll Up]		
Liabilities [Roll Up]		
Current Liabilities	0	0
Noncurrent Liabilities	0	0
Liabilities	0	0
Equity [Roll Up]		
Equity Attributable to Controlling Interest	3,500	0
Equity Attributable to Noncontrolling Interest	0	0
Equity	3,500	0
Liabilities and Equity	3,500	0

Statement of Financial Performance (Comprehensive income):

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

Statement of Cash Flow:

Cash Flow Statement [Abstract]	Period [Axis]
	2020-01-01 - 2020-12-31
Cash Flow Statement [Abstract]	
Net Cash Flow [Roll Up]	
Net Cash Flow from Operating Activities	3,000
Net Cash Flow from Investing Activities	0
Net Cash Flow from Financing Activities	500
Net Cash Flow	3,500
Assets [Roll Forward]	
Assets, Beginning	0
Net Cash Flow	3,500
Assets, Ending	3,500

Note that on a cash flow statement normally the roll forward is for Cash and Cash Equivalents. As we are not yet down to that level of detail, we are using Assets to provide the roll forward.

Statement of Changes in Equity:

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 four statements above show the details of the statement line items; the graphic below shows the interrelationships between the four primary financial statements:

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:

id	satisfied	message
ASSERTION_elements_Equality_AccountingEquation (evaluation 1)	satisfied	$Assets=0 = $Liabilities=0 + $Equity=0
ASSERTION_elements_Equality_AccountingEquation (evaluation 2)	satisfied	$Assets=3500 = $Liabilities=0 + $Equity=3500
ASSERTION_elements_Equality_AccountingEquation_NetAssetsApproach (evaluation 1)	satisfied	$NetAssets=0 = $Assets=0 - $Liabilities=0
ASSERTION_elements_Equality_AccountingEquation_NetAssetsApproach (evaluation 2)	satisfied	$NetAssets=3500 = $Assets=3500 - $Liabilities=0
ASSERTION_elements_ROLLUP_ComprehensiveIncome (evaluation 1)	satisfied	$ComprehensiveIncome=3000 = ($Revenues=7000 + $Gains=1000 - $Expenses=3000 - $Losses=2000)
ASSERTION_elements_ROLLFORWARD_Equity (evaluation 1)	satisfied	$Equity_BalanceStart=0 + $ComprehensiveIncome=3000 + $InvestmentsByOwners=1000 - $DistributionsToOwners=500 = $Equity_BalanceEnd=3500
ASSERTION_elements_ROLLFORWARD_Assets (evaluation 1)	satisfied	$Assets_BalanceStart=0 + $NetCashFlow=3500 = $Assets_BalanceEnd=3500
ASSERTION_elements_CONCEPTUAL_FRAMEWORK_RECONCILATION (evaluation 1)	satisfied	0= (($Equity_BalanceStart=0 + (($Revenues=7000 - $Expenses=3000) + ($Gains=1000 - $Losses=2000)) + ($InvestmentsByOwners=1000 - $DistributionsToOwners=500)) + ($Liabilities_BalanceEnd=0 - $Assets_BalanceEnd=3500))

This verifies that the XBRL-based report and the logical relations articulated via that report are as would be expected. Further, other structures that are not part of the four common statements also proven to be correct and do not conflict with or contradict the four core financial statements.

Variability Caused by Alternative Intermediate Components

While financial reports created using this reporting scheme must fit within the elements of a financial statement defined by a financial reporting scheme; financial reports are not forms. Specific variability is anticipated and allowed.

By far, the most variability that exists within a set of financial statements exists on the statement of financial performance. For example, SFAS 6 discusses the notion of intermediate components[2] of comprehensive income:

> "Examples of intermediate components in business enterprises are gross margin, income from continuing operations before taxes, income from continuing operations, and operating income. Those intermediate components are, in effect, subtotals of comprehensive income and often of one another in the sense that they can be combined with each other or with the basic components to obtain other intermediate measures of comprehensive income."

Basically, variability can be caused by choosing to report different common subtotals or by choosing to report specific line items rather than others.

This MINI financial reporting scheme refers to these different "subtotals and specific line items" as the notion of reporting styles[3]. This variability is not random or arbitrary; it is logical. There are common reporting style patterns.

Of the four concepts "revenues", "expenses", "gains", and "losses" there are themes in the definitions of the terms. One theme is the notion of something related to an "entity's ongoing major or central operations" (i.e. revenues, expenses) and something "from peripheral or incidental transactions" (i.e. gains, losses). This notion is discussed in SFAC 6.

Professional judgement is used to determine the line items that are reported within the framework of a financial statement that has been described above. The framework itself, however, is objective and subject to the rules of mathematics and logic and are not open to interpretation or professional judgement.

Required Disclosures

The following is a summary of the disclosures that are required per this MINI financial reporting scheme:

- Document information is required to be disclosed.
- Entity information is required to be disclosed.

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[2] FASB, SFAC 6, page 47, paragraph 77.
[3] Open Framework for Implementing XBRL-based Financial Reporting, *Reporting Styles*, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ReportingStyle.html

- The statement of financial position, statement of financial performance, statement of cash flows, and statement of changes in equity are required to be disclosed.
- The nature of operations of a reporting economic entity is required to be disclosed.
- The basis of presentation of the financial report created by an economic entity is required to be disclosed.
- The significant accounting policies related to each balance sheet account are required to be disclosed.
- For each balance sheet line item reported, a roll forward of the account from the beginning balance sheet date to the ending balance sheet must be provided.
- For each balance sheet line item reported, a roll up of the significant subclassifications of the line item must be disclosed.
- A trial balance of each balance sheet account must be disclosed and should aggregate to zero.
- Each category of change associated with each balance sheet line item must be disclosed and should aggregate to zero.

Appendix: Double-entry Accounting.

Single-entry accounting is how 'everyone' would do accounting. In fact, that is how accounting was done for about 4,000 years before double-entry accounting was invented. Double-entry accounting was the invention of medieval merchants and was first documented by the Italian mathematician and Franciscan Friar Luca Piccioli[4] in 1494. The section related to double-entry accounting was translated into English in 1914[5].

Double-entry accounting adds an additional important property to the accounting system, that of a clear strategy to identify errors and to remove the errors from the system. Even better, double-entry accounting has a side effect of clearly firewalling errors as either accident or fraud. This then leads to an audit strategy. Double-entry accounting is how professional accountants do accounting.

Which came first, double-entry accounting or the enterprise? It is hard to overstate the impact of double-entry accounting on the evolution of the complex global enterprise[6].

Appendix: Foundational Mathematical Equation for Double-Entry Accounting

The foundational basis of double-entry accounting is straightforward. Quoting David Ellerman from his paper *The Math of Double-Entry Bookkeeping: Part I (scalars)*[7]:

> "Given an equation w + … + x = y + … + z, it is not possible to change just one term in the equation and have it still hold. Two or more terms must be changed."

And so, the left-hand side of the equation "w + … + x" (the DEBIT side) must always equal the right-hand side of the equation "y + … + z" (the CREDIT side) in double-entry accounting. The reason that double-entry accounting is used, as contrast to single-entry accounting, is double-entry accounting's capability to detect errors and to distinguish an error from fraud.

Of course, there are a lot of details associated with setting up and operating an accounting system appropriately, but the fundamental feature is that DEBITS must equal CREDITS and if they don't, then something is up which needs to be investigated and corrected.

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[4] Wikipedia, *Luca Pacioli*, https://en.wikipedia.org/wiki/Luca_Pacioli
[5] J. B. Geijsbeek, *Ancient Double-Entry Bookkeeping*, https://archive.org/details/ancientdoubleent00geij/page/n3
[6] Ian Grigg, *Triple Entry Accounting*, https://iang.org/papers/triple_entry.html
[7] David Ellerman, *The Math of Double-Entry Bookkeeping: Part I (scalars)*, http://www.ellerman.org/the-math-ofdouble-entry-bookkeeping-part-i-scalars/

If you desire to learn more about double-entry accounting, see Colin Dodd's rap song, Debit Credit Theory (Accounting Rap Song)[8].

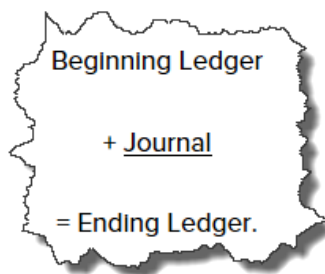# The Accounting Equation: Framework for Financial Accounting

While the model "Debits = Credits" or the notion of basically using two single entry ledgers and synchronizing them to detect errors or fraud is useful; additional power is provided to double-entry accounting via the accounting equation[9] which is:

"Assets = Liabilities + Equity"

The accounting equation within the double-entry accounting is the fundamental basis for financial accounting. By definition, every financial reporting scheme[10] has this high-level model at its core.

Appendix: Ledgers and Journals, Stocks and Flows

Another important piece of double-entry accounting is explained well in David Ellerman's article, *The Math of Double-Entry Bookkeeping: Part II (vectors)*, is ledgers and journals[11]. Many accountants use the terms "ledger" and "journal" incorrectly. This works the same for general and special ledgers and journals. This is the relationship between a ledger and a journal:

Beginning Ledger

\+ Journal

= Ending Ledger.

Ledgers summarized balances. For example, the general ledger summarizes account balances.

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[8] YouTube, *Colin Dodd's rap song, Debit Credit Theory (Accounting Rap Song)*, https://www.youtube.com/watch?v=j71Kmxv7smk

[9] Wikipedia, Accounting Equation, https://en.wikipedia.org/wiki/Accounting_equation

[10] Charles Hoffman, CPA, *Comparison of Financial Reporting Schemes High Level Concepts*, http://xbrlsite.azurewebsites.net/2018/Library/ReportingSchemes-2018-12-30.pdf

[11] David Ellerman, *The Math of Double-Entry Bookkeeping: Part II (vectors)*, http://www.ellerman.org/the-math-of-double-entry-bookkeeping-part-ii-vectors/

Journals record the transactions which make up the changes between ledger balances. Other terms used for the relationship shown above are "roll forward" or "movements" or "stocks and flows" or "account analysis". All three of these terms basically explain the following equation:

"Beginning balance + Additions - Subtractions = Ending balance"

Balance sheet accounts are stocks. Roll forwards of the beginning and ending balances of balance sheet accounts are flows. The income statement is a flow of net income (loss). The cash flow statement is a roll forward of the net change in cash and cash equivalents. The statement of changes in equity is a roll forward of equity accounts.

Many transactions, events, circumstances, and other phenomenon are recorded as transactions in a journal, make their way to a ledger, and then end up in the primary financial statements or within disclosures which detail the line items of the primary financial statements. Much of this information is part of the two trees which make up the roll ups of "Assets" and "Liabilities and Equity". However, other there are other trees that can make up the complete "forest" of a financial report. For more information about the "forest" and the "trees" of a financial report, see the document *Leveraging the Theoretical and Mathematical Underpinnings of a Financial Report*[12]. That document also has some good information related to triple-entry accounting which I am not going to get into here.

As pointed out in the document *General Ledger Trial Balance to External Financial Report*[13], each balance sheet line item has a roll forward. While perhaps not reported externally, these roll forwards can be quite helpful internally to verify that a financial report has been created correctly.

Appendix: Elements of a Financial Report Defined by SFAC 6

The FASB defines the following ten interrelated elements of a financial report:

- Assets
- Liabilities
- Equity
- Investments by Owners

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[12] Charles Hoffman, CPA, *Leveraging the Theoretical and Mathematical Underpinnings of a Financial Report*, http://xbrlsite.azurewebsites.net/2018/Library/TheoreticalAndMathematicalUnderpinningsOfFinancialReport.pdf#page=6

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

- 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 elements[14]. 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".

The FASB explicitly states the components of comprehensive income which include: revenues, expenses, gains, and losses[15].

Note that the balance types, "debit" or "credit", of each of the ten core elements of a financial statement are not articulated by the FASB. However, professional accountants understand the balance type of the ten elements which are the building blocks of a financial report. As such, these balance types can be implied. However, I am explicitly specifying the balance types explicitly in my XBRL representation which makes this crystal clear.

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 interrelated[16]. They result in financial statements that are fundamentally interrelated and connected mathematically.

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"

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.

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[14] FASB, SFAC 6, page 21, paragraph 20
[15] FASB, SFAC 6, page 21, paragraph 20
[16] FASB, SFAC 6, page 21 and 22, paragraph 21

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

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)[17]:

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)[18]:

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:

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

We cannot do a cash flow statement yet because SFAC 6 does not define net cash flow.

Appendix: Four Statement Model with Shell Statements

The four statement model shows the explicitly created articulation or the interrelationships between the four primary financial statements defined by the FASB. However, since net cash flow is not defined by SFAC 6 we can only represent the interrelationships of three of the four statements: balance sheet, income statement, and changes in equity.

Three of the statements of the four statement model can be seen and understood visually as such:

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:

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 = $Equity_BalanceEnd=3500
ASSERTION_CORE_CONCEPTUAL_FRAMEWORK_RECONCILATION (evaluation 1)	satisfied	0= (($Equity_BalanceStart=0 + (($Revenues=7000 - $Expenses=3000) + ($Gains=1000 - $Losses=2000)) + ($InvestmentsByOwners=1000 - $DistributionsToOwners=500)) + ($Liabilities_BalanceEnd=0 - $Assets_BalanceEnd=3500))

XBRL formula processor 2[19]:

#	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 + $Equity
4	0 = (Equity{T0} + (Revenue{P1} - Expenses{P1} + Gains{P1} - Losses{P1}) + (InvestmentsByOwners{P1} - DistributionsToOwners{P1})) + Liabilities{T1} - Assets{T1}) (ASSERTION_CORE_CONCEPTUAL_FRAMEWORK_RECONCILATION)	Pass	0= (($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.

Appendix: Shell of the Financial Report Logical System

The double-entry accounting model, the accounting equation, and FASB SFAC 6, *Elements of Financial Statements* forms a logical core of a digital financial statement. A financial statement is a logical system[20].

A logical system or logical theory is made up of a set of **models**, **structures**, **terms**, **associations**, **assertions**, and **facts**. In very simple terms,

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

[20] Charles Hoffman, CPA, *Understanding and Expressing Logical Systems*, http://xbrl.squarespace.com/journal/2019/9/25/understanding-and-expressing-logical-systems.html

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

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

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

TERMS[21]:

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

#	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]:

ASSOCIATIONS[23,24]:

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

[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

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]:

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 = $Equity_BalanceEnd=3500
ASSERTION_CORE_CONCEPTUAL_FRAMEWORK_RECONCILATION (evaluation 1)	satisfied	0= (($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]:

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[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
[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

#	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]:

Component: (Network and Table)	
Network	**06-Changes in Equity** (http://www.xbrlsite.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.

[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

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.
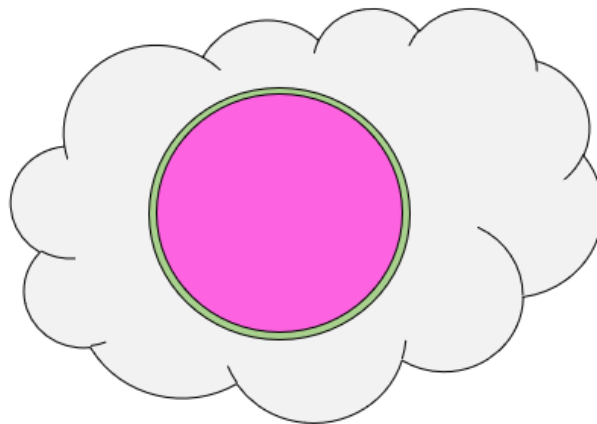
High precision, High coverage (Very good)
All important aspects of reality related to some universe of discourse necessarily to achieve some goal or objective or a set of goals/objectives have been represented.

Appendix: Framework for Adding Further Details

What has been described thus far is only a core or shell of what might actually be represented in an actual financial report. While the core is small, that core is extremely significant. Incremental additions can be made to the core further expanding the logical system but always keeping the logical system in control. But the examples of the accounting equation and core elements of financial statements defined by SFAC 6 are good starting points because they help you see and understand how this method for proving that the logical system is properly functioning. Also, the universe of discourse is defined specifically by the FASB in SFAC 6.

The next significant expansion step to this logical system can be seen in my document *Enhanced US GAAP Financial Statement Elements*[31]. This step is significant because it adds the fourth statement, the cash flow statement, and additional details to a financial report. The report created for that step is likewise a provably properly functioning logical system[32]. But that is still not a full set of financial statements. You can still wrap your head around the terms, associations, assertions, facts, structures, models, and therefore see that this logical system is likewise precise and complete and therefore a properly functioning logical system.

And so, in the next step additional details are added, in the trial balance version of the next step which is described in the document *General Ledger Trial Balance to External Financial Report*[33]. 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[34].

Appendix: MINI Financial Reporting Scheme Builds on SFAC 6

The MINI financial reporting scheme builds on SFAC 6 in order to create a working financial report represented using XBRL which mimics XBRL-based financial reports that are submitted to the SEC by public companies.

However, the MINI financial reporting scheme allows only the best practices of XBRL-based financial reporting and unlike the SEC, enforces financial report creation rules. For example,

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[31] Charles Hoffman, CPA, *Enhanced US GAAP Financial Statement Elements*, http://xbrlsite.azurewebsites.net/2019/Core/core-usgaap/EnhancedFinancialReportElements.pdf

[32] Enhanced US GAAP logical system, http://xbrlsite.azurewebsites.net/2019/Core/core-usgaap/

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

[34] Verification summary, http://xbrlsite.azurewebsites.net/2018/Prototypes/Basic/Basic-XASB-ConsistentRF/evidence-package/contents/index.html#VerificationDashboard.html

the SEC rules state that roll up mathematical relations must be represented using XBRL calculation relations. But the SEC does not enforce this rule and therefore many errors exist in XBRL-based financial reports submitted to the SEC by public companies. Further, roll ups are but one of many different types of mathematical computations. For example, roll forwards also are mathematical computations. But roll forwards are not described in machine readable terms in XBRL-based financial reports submitted to the SEC.

Here is a summary of the key best practices employed by the MINI financial reporting scheme:

- All mathematical computation MUST be described, not just roll ups. XBRL calculation relations or XBRL formulas MUST be used to describe all mathematical associations.
- While the SEC allows for the use of hypercubes, the MINI financial reporting scheme REQUIRES the use of unique hypercubes for each disclosure that is provided.
- All allowed reporting styles are provided for. (Currently, this is not complete within the MINI financial reporting scheme, but examples are provided)
- Consistency crosscheck rules are provided to make sure that there are no inconsistencies or contradictions within reported high-level financial report line items.
- Class associations are explicitly provided and reports created MUST comply with specified class associations.

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
1001 - Document - Document Information | Document Information [Hypercube]	Completed	10	OK	OK	OK	OK	OK	OK
1002 - Document - Entity Information | Entity Information [Hypercube]	Completed	5	OK	OK	OK	OK	OK	OK
1101 - Statement - Balance Sheet | Balance Sheet [Hypercube]	Completed	25	OK	OK	OK	OK	OK	OK
1102 - Statement - Income Statement | Income Statement [Hypercube]	Completed	17	OK	OK	OK	OK	OK	OK
1103 - Statement - Cash Flow Statement | Cash Flow Statement [Hypercube]	Completed	18	OK	OK	OK	OK	OK	OK
1104 - Statement - Statement of Changes in Equity | Statement of Changes in Equity [Hypercube]	Completed	6	OK	OK	OK	OK	OK	OK
2110 - Disclosure - Nature of Business Note (Level 1 Note Text Blocks) | Nature of Business [Hypercube]	Completed	3	OK	OK	OK	OK	OK	OK
2120 - Disclosure - Basis of Reporting Note (Level 1 Note Text Blocks) | Basis of Reporting [Hypercube]	Completed	3	OK	OK	OK	OK	OK	OK
2130 - Disclosure - Significant Accounting Policies Note (Level 1 Note Text Blocks) | Significant Accounting Policies [Hypercube]	Completed	3	OK	OK	OK	OK	OK	OK
2300 - Disclosure - Cash and Cash Equivalents Note (Level 1 Note Text Blocks) | Cash and Cash Equivalents Note [Hypercube]	Completed	3	OK	OK	OK	OK	OK	OK
2400 - Disclosure - Receivables Note (Level 1 Note Text Blocks) | Receivables Note [Hypercube]	Completed	3	OK	OK	OK	OK	OK	OK
2500 - Disclosure - Inventories Note (Level 1 Note Text Blocks) | Inventories Note [Hypercube]	Completed	3	OK	OK	OK	OK	OK	OK
2600 - Disclosure - Property, Plant, and Equipment Note (Level 1 Note Text Blocks) | Property, Plant and Equipment Note [Hypercube]	Completed	3	OK	OK	OK	OK	OK	OK
2700 - Disclosure - Accounts Payable Note (Level 1 Note Text Blocks) | Accounts Payable Note [Hypercube]	Completed	3	OK	OK	OK	OK	OK	OK
2800 - Disclosure - Long-term Debt Note (Level 1 Note Text Blocks) | Long-term Debt Note [Hypercube]	Completed	3	OK	OK	OK	OK	OK	OK
2900 - Disclosure - Retained Earnings Note (Level 1 Note Text Blocks) | Retained Earnings Note [Hypercube]	Completed	3	OK	OK	OK	OK	OK	OK
4000 - Disclosure - Significant Accounting Policies (Level 2 Policy Text Blocks) | Significant Accounting Policies [Hypercube]	Completed	9	OK	OK	OK	OK	OK	OK
5000 - Disclosure - Disclosures (Level 3 Disclosure Text Blocks) | Disclosures [Hypercube]	Completed	17	OK	OK	OK	OK	OK	OK
6110 - Disclosure - Cash and Cash Equivalents Roll Forward (Level 4 Detail) | Cash and Cash Equivalents Roll Forward [Hypercube]	Completed	10	OK	OK	OK	OK	OK	OK
6120 - Disclosure - Receivables Roll Forward (Level 4 Detail) | Receivables Roll Forward [Hypercube]	Completed	9	OK	OK	OK	OK	OK	OK
6130 - Disclosure - Inventories Roll Forward (Level 4 Detail) | Inventories Roll Forward [Hypercube]	Completed	8	OK	OK	OK	OK	OK	OK
6140 - Disclosure - Property, Plant, and Equipment Roll Forward (Level 4 Detail) | Property, Plant and Equipment Roll Forward [Hypercube]	Completed	8	OK	OK	OK	OK	OK	OK
7110 - Disclosure - Accounts Payable Roll Forward (Level 4 Detail) | Accounts Payable Roll Forward [Hypercube]	Completed	7	OK	OK	OK	OK	OK	OK
7120 - Disclosure - Long-term Debt Roll Forward (Level 4 Detail) | Long-term Debt Roll Forward [Hypercube]	Completed	7	OK	OK	OK	OK	OK	OK
7130 - Disclosure - Retained Earnings Roll Forward (Level 4 Detail) | Retained Earnings Roll Forward [Hypercube]	Completed	6	OK	OK	OK	OK	OK	OK
8110 - Disclosure - Cash and Cash Equivalents Subclassifications (Level 4 Detail) | Cash and Cash Equivalents Subclassifications [Hypercube]	Completed	6	OK	OK	OK	OK	OK	OK

8120 - Disclosure - Receivables Subclassifications (Level 4 Detail) | Receivables Subclassifications [Hypercube]	Completed	6	OK	OK	OK	OK	OK	OK
8130 - Disclosure - Inventories Subclassifications (Level 4 Detail) | Inventories Subclassifications [Hypercube]	Completed	7	OK	OK	OK	OK	OK	OK
8140 - Disclosure - Inventories - Finished Goods Subclassifications (Level 4 Detail) | Finished Goods Subclassifications [Hypercube]	Completed	6	OK	OK	OK	OK	OK	OK
8150 - Disclosure - Property, Plant, and Equipment Subclassifications (Level 4 Detail) | Property, Plant and Equipment Subclassifications [Hypercube]	Completed	10	OK	OK	OK	OK	OK	OK
8160 - Disclosure - Accounts Payable Subclassifications (Level 4 Detail) | Accounts Payable Subclassifications [Hypercube]	Completed	6	OK	OK	OK	OK	OK	OK
8170 - Disclosure - Long-term Debt Subclassifications (Level 4 Detail) | Long-term Debt Subclassifications [Hypercube]	Completed	6	OK	OK	OK	OK	OK	OK
8180 - Disclosure - Long-term Debt Maturities (Level 4 Detail) | Long-term Debt Maturities [Hypercube]	Completed	10	OK	OK	OK	OK	OK	OK
9101 - Support - Trial Balance (Level 4 Detail) | Trial Balance [Hypercube]	Completed	11	OK	OK	OK	OK	OK	OK
9102 - Support - Transactions Groupings (Level 4 Detail) | Transactions Groupings [Hypercube]	Completed	24	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 processes[35]:

Primary Information

#	Disclosure	Category	Level	Pattern	Disclosure ...	Disclosure ...	Applicable	Representation Concept [TEXT BLOCK]	Representation Concept DETAIL
1	Accounts Payable Roll Forward	Unknown	Level3TextBlock/Level4...	RollForward	True	CONSISTENT	True	Accounts Payable Roll Forward [Text Block]	Accounts Payable
2	Accounts Payable Subclassifications	Unknown	Level3TextBlock/Level4...	RollUp	True	CONSISTENT	True	Accounts Payable Subclassifications [Text Block]	Accounts Payable
3	Assets Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Assets
4	Balance Sheet, Classified	Statement	UNKNOWN	Component	True	CONSISTENT	True	-	-
5	Basis of Presentation	Unknown	Level1TextBlock	TextBlock	True	CONSISTENT	True	Basis of Reporting [Text Block]	NOT-EXPECTED
6	Cash and Cash Equivalents Roll Forward	Unknown	Level3TextBlock/Level4...	RollForward	True	CONSISTENT	True	Cash and Cash Equivalents Roll Forward [Text Block]	Cash and Cash Equivalents
7	Cash and Cash Equivalents Subclassifications	Unknown	Level3TextBlock/Level4...	RollUp	True	CONSISTENT	True	Cash and Cash Equivalents Subclassifications [Text ...	Cash and Cash Equivalents
8	Cash and Cash Equivalents Summary Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Cash and Cash Equivalents
9	Cash Flow Statement, Direct Method	Statement	UNKNOWN	Component	True	CONSISTENT	True	-	-
10	Document Information	Unknown	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Balance Sheet Date
11	Entity Information	Unknown	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Economic Entity Name
12	Finished Goods Subclassifications	Unknown	Level3TextBlock/Level4...	RollUp	True	CONSISTENT	True	Finished Goods Subclassifications [Text Block]	Finished Goods
13	Income Statement	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Net Income (Loss)
14	Inventories Roll Forward	Unknown	Level3TextBlock/Level4...	RollForward	True	N/A	False	Inventories Roll Forward [Text Block]	Inventories
15	Inventories Subclassifications	Unknown	Level3TextBlock/Level4...	RollUp	True	N/A	False	Inventories Subclassifications [Text Block]	Inventories
16	Liabilities and Equity Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Liabilities and Equity
17	Long-Term Debt Maturities	Unknown	Level3TextBlock/Level4...	RollUp	True	CONSISTENT	True	Long-term Debt Maturities [Text Block]	Long-term Debt
18	Long-Term Debt Roll Forward	Unknown	Level3TextBlock/Level4...	RollForward	True	CONSISTENT	True	Long-term Debt Roll Forward [Text Block]	Long-term Debt
19	Long-Term Debt Subclassifications	Unknown	Level3TextBlock/Level4...	RollUp	True	CONSISTENT	True	Long-term Debt Subclassifications [Text Block]	Long-term Debt
20	Nature of Entity	Unknown	Level1TextBlock	TextBlock	True	CONSISTENT	True	Nature of Business [Text Block]	NOT-EXPECTED
21	Net Cash Flow Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Net Cash Flow
22	Property, Plant, and Equipment, Net Roll Forward	Unknown	Level3TextBlock/Level4...	RollForward	True	CONSISTENT	True	Property, Plant, and Equipment Roll Forward [Text ...	Property, Plant and Equipment
23	Property, Plant, and Equipment, Net Subclassifications	Unknown	Level3TextBlock/Level4...	RollUp	True	CONSISTENT	True	Property, Plant, and Equipment Subclassifications [...	Property, Plant and Equipment
24	Receivables Roll Forward	Unknown	Level3TextBlock/Level4...	RollForward	True	CONSISTENT	True	Receivables Roll Forward [Text Block]	Receivables
25	Receivables Subclassifications	Unknown	Level3TextBlock/Level4...	RollUp	True	CONSISTENT	True	Receivables Subclassifications [Text Block]	Receivables
26	Retained Earnings Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Retained Earnings
27	Significant Accounting Policies	Unknown	Level1TextBlock	TextBlock	False	CONSISTENT	True	NOT-FOUND	NOT-EXPECTED
28	Statement of Changes in Equity	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Equity
29	Transactions Groupings	Unknown	Level4Detail	RollUp	True	N/A	False	NOT-EXPECTED	Check Sum Changes
30	Trial Balance	Unknown	Level4Detail	RollUp	True	N/A	False	NOT-EXPECTED	Check Sum

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[36]* details and describes nine specific types of errors that I tend to see in

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[35] Human-readable disclosure mechanics and reporting checklist results, http://xbrlsite.azurewebsites.net/2018/Prototypes/Basic/Basic-XASB-ConsistentRF/ReportingChecklistResults/Disclosure%20Mechanics%20and%20Reporting%20Checklist.html

[36] Charles Hoffman, CPA, *Proving Accounting, Structural, Mathematical, and Other Logic of XBRL-based Financial Reports*, http://xbrlsite.azurewebsites.net/2019/Library/ProvingAccountingStructuralMathematicsLogic.pdf

XBRL-based digital financial reports that must be controlled and prevented in order to maintain high report quality.

Finally, with a reference implementation of an XBRL-based report using what I call the XASB reporting scheme I try to demonstrate that it is quite possible and how exactly to show that a full report can be proven to be a properly functioning logical system. Anyone can load the XBRL instance[37], view the human-readable version of the report[38], view a screen shot of the reporting checklist validation result[39] a copy of which is shown below, or even download a software application[40] to reproduce the same result that I was able to produce:

What the screen shot above is intended to communicate is that the same basic techniques used to prove that the SFAC 6 logical system is properly functioning can be used to verify that any XBRL-based financial report can be proven to be properly functioning or specify specifically where it is not properly functioning.

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[37] XASB instance, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/xasb/taxonomy/company-instance.xml
[38] 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
[39] XASB reporting checklist validation result, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/xasb/taxonomy/Validation_DisclosureMechanics.jpg
[40] Pesseract download, http://pesseract.azurewebsites.net/#menu3

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.

By way of contrast, the Microsoft 2017 10-K was tested using this method[41]. That Microsoft report can be broken down into fragments. That 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 generated[42] and the mechanical tests of the structures was created as well[43].

#	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.

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[41] Microsoft 2017 10-K filed with the SEC, https://www.sec.gov/Archives/edgar/data/789019/000156459017014900/0001564590-17-014900-index.htm
[42] Microsoft 2017 10-K evidence package generated by XBRL Cloud, http://xbrlsite.azurewebsites.net/2017/Prototypes/Microsoft2017/evidence-package/
[43] 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 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*[44].

Appendix: Variability Caused by Alternative Intermediate Components of Comprehensive Income

While financial reports must fit within the elements of a financial report defined by a financial reporting scheme; financial reports are not forms. Specific variability is anticipated and allowed by financial reporting schemes such as US GAAP, IFRS, IPSAS, GAS, FAS, etc.[45] By far, the most variability that exists within a set of financial statements exists on the income statement. SFAS 6 discusses the notion of intermediate components[46] of comprehensive income:

> "Examples of intermediate components in business enterprises are gross margin, income from continuing operations before taxes, income from continuing operations, and operating income. Those intermediate components are, in effect, subtotals of comprehensive income and often of one another in the sense that they can be combined with each other or with the basic components to obtain other intermediate measures of comprehensive income."

Basically, variability can be caused by choosing to report different common subtotals or by choosing to report specific line items rather than others. I refer to these different subtotals and specific line items as the notion of reporting styles[47]. This variability is not random or completely arbitrary. There are common reporting style patterns.

Of the four concepts "revenues", "expenses", "gains", and "losses" there are themes in the definitions of the terms. One theme is the notion of something related to an "entity's ongoing major or central operations" (i.e. revenues, expenses) and something "from peripheral or incidental transactions" (i.e. gains, losses). This notion is discussed in SFAC 6.

Of the approximately 6,000 public companies that report to the SEC, 87% of those companies using one of only nine different sets of intermediate components, i.e. subtotals, to report their income statements. About 89.1% of public companies are completely consistent with the patterns of alternative

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[44] Charles Hoffman, CPA, *Auditing XBRL-based Financial Reports*,
http://xbrlsite.azurewebsites.net/2019/Library/AudtingXBRLBasedFinancialReports.pdf
[45] Charles Hoffman, CPA, *Comparison of Elements of Financial Statements*,
http://xbrlsite.azurewebsites.net/2019/Core/ElementsOfFinancialStatements.pdf
[46] FASB, SFAC 6, page 47, paragraph 77.
[47] Open Framework for Implementing XBRL-based Financial Reporting, *Reporting Styles*,
http://xbrlsite.azurewebsites.net/2019/Framework/Details/ReportingStyle.html

intermediate component organization schemes (i.e. reporting styles) and approximately 99.24% of total relations are consistent with expectation[48]. This is all measurable.

Measurements can be used to establish the assertions and associations necessary and therefore the structures and models necessary in order to both explain and verify reported facts within XBRL-based financial reports.

This approach works for every financial reporting scheme[49]. This is a fundamental feature of financial reporting. All of this is provable using mathematics, the double-entry accounting model, the accounting equation, the elements of financial statements defined by standards setters, and the actual financial reports created by economic entities.

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[48] Quarterly XBRL-based Public Company Financial Report Quality Measurement (March 2019), http://xbrl.squarespace.com/journal/2019/3/29/quarterly-xbrl-based-public-company-financial-report-quality.html
[49] Charles Hoffman, CPA, Comparison of Elements of Financial Statement, http://xbrlsite.azurewebsites.net/2019/Core/ElementsOfFinancialStatements.pdf