Impediments to Creating Properly Functioning XBRL-based Reports (AE)

Understanding the logical system consequences of specific actions

By Charles Hoffman, CPA (Charles.Hoffman@me.com)

Last Revised – February 19, 2020 (DRAFT)

"The things that we should do are: the things that need to be done, the things you see that need to be done, and the things no one else thinks need to be done." *Richard Buckminster Fuller*[1]

Executive summary:

- This document summarizes information about versions of a very simple logical system, the accounting equation, for the purpose of demonstrating what can go wrong and the rules that can be used to prevent those things from going wrong.
- Rules provide a specification of the permissible manipulations of the model of a logical system. Rules prevent anarchy.
- For every action there is an equal and opposite reaction.
- Being conscious of the consequences of actions related to an XBRL-based digital financial report helps you understand how to create high-quality reports.
- Being unconscious can lead to quality problems.
- While the accounting equation example is simple, it is not simplistic at all but rather can be used to help one understand sophisticated information represented cases.
- This document points out 10 states of the simple accounting equation example, what causes a state to function improperly, and what it takes to make that state properly functioning.
- The XBRL-based mechanisms used to do this are provided for each example.

[1] WikiQuotes, Richard Buckminster Fuller, https://simple.wikiquote.org/wiki/Richard_Buckminster_Fuller

Copyright (full and complete release of copyright)

If you are reading this you are likely an adult. But computers are not like adults, they are more like babies. Not children, babies. Computer have to be led by the hand and taken where you want them to go.

Rules provide a specification of the permissible manipulations of the model of a logical system. Rules prevent anarchy. Rules lead the computer by the hand, telling the computer where you need to go.

This document builds on a prior version[2] of the very basic "accounting equation" representation in XBRL. The point is to show the specific consequences of decisions that are made with respect to a logical system and the rules that are necessary as a result of those decisions.

You can download a zip file[3] that contains all of the XBRL examples or the human-readable representation of the example[4]. The home page for this information can be found here[5].

The Accounting Equation

The accounting equation[6] is the fundamental basis for financial accounting. By definition, every financial reporting scheme[7] has this high-level accounting equation model at its core. The accounting equation is:

"Assets = Liabilities + Equity"

The accounting equation defines three core **terms** of a financial report:

- Assets
- Liabilities
- Equity

The accounting equation defines those three terms and provides the mathematical relations (**rule** or **assertion**) between the three terms:

Assets = Liabilities + Equity

Depending upon how you read the definition of the accounting equation, it either explicitly says or at least implies the existence of a **structure**, the **Balance Sheet**, within which the three

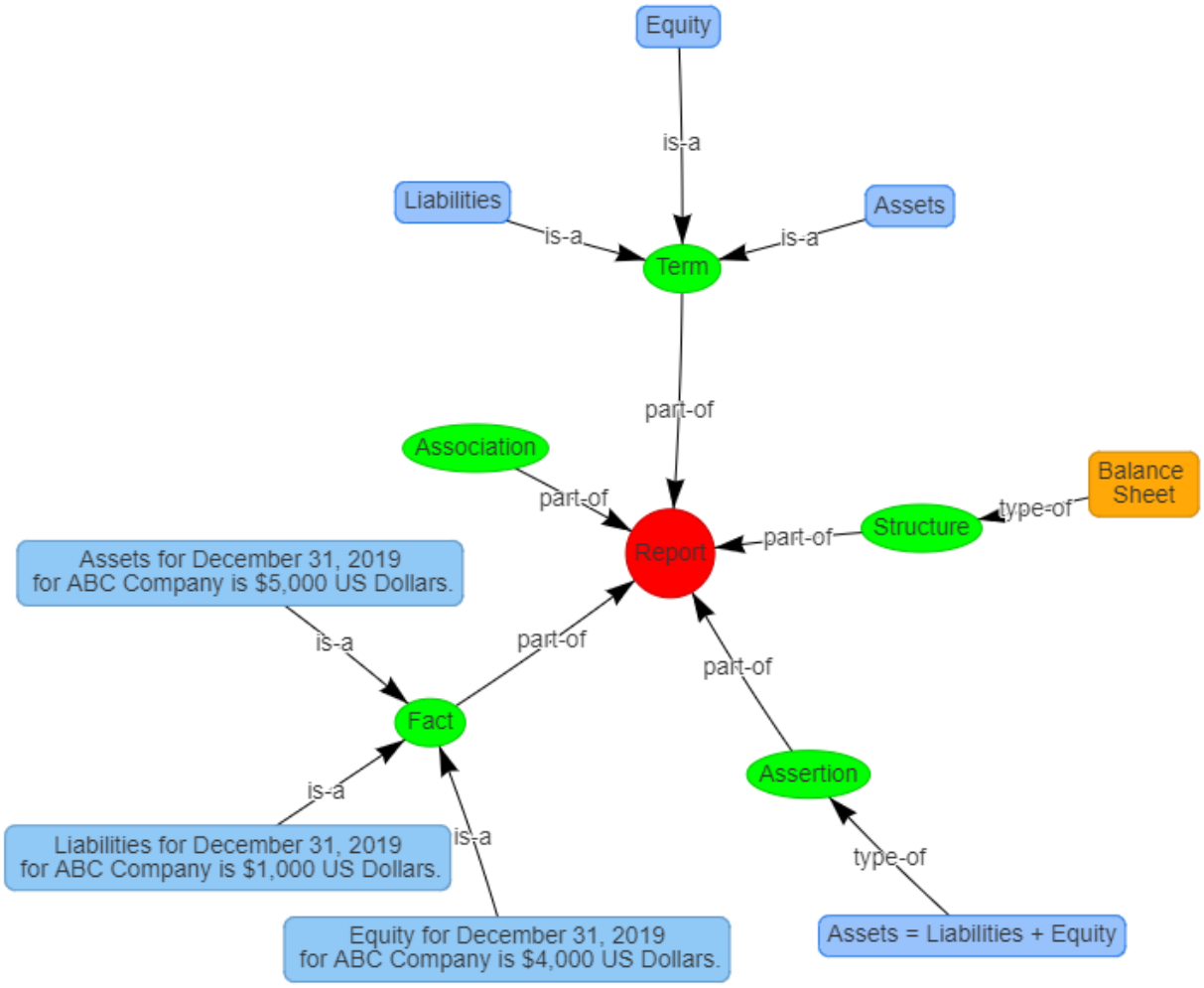
[2] Accounting equation, prior verion, http://xbrlsite.azurewebsites.net/2019/core/master-ae/
[3] ZIP file download, http://xbrlsite.azurewebsites.net/2020/core/master-ae/ae.zip
[4] Human readable representation, http://xbrlsite.azurewebsites.net/2020/core/master-ae/evidence-package.zip
[5] Index page, http://xbrlsite.azurewebsites.net/2020/core/master-ae/index.html
[6] Wikipedia, Accounting Equation, https://en.wikipedia.org/wiki/Accounting_equation
[7] Charles Hoffman, CPA, *Comparison of Financial Reporting Schemes High Level Concepts*, http://xbrlsite.azurewebsites.net/2018/Library/ReportingSchemes-2018-12-30.pdf

concepts exist. As such, the three terms, Assets, Liabilities, and Equity are **associated** with the Balance Sheet structure because they are part-of that structure.

With that information, an economic entity can create a financial statement that communicate **facts** about that economic entity. For example, the economic entity "ABC Company" might represent their assets, liabilities, and equity as of December 31, 2019:

- Assets = $5,000
- Liabilities = $1,000
- Equity = $4,000

And so, the information that has been explained above can be represented as the following set of vertices and edges using graph theory[8]:



[8] Wikipedia, *Graph Theory*, https://en.wikipedia.org/wiki/Graph_theory

The accounting equation is a simple man-made logical system.

A **logical system**[9] (logical theory) enables a community of stakeholders trying to achieve a specific goal or objective or a range of goals/objectives to agree on important common models, structures, and statements for capturing meaning or representing a shared understanding of and knowledge in some universe of discourse.

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

- **Logical theory**: A logical theory is a set of *models* that are consistent with that logical theory.
- **Model**: A model is a set of *structures*. A model is a permissible interpretation of a theory.
- **Structure**: A structure is a set of *statements* which describe the structure.
- **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 the ideas “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 “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**: (a.k.a. rules) 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.

The statements within a logical system can be **consistent** or inconsistent or can contradict one another. 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

[9] Charles Hoffman, CPA, *Explanation of a Financial Report Logical System in Simple Terms*, http://xbrl.squarespace.com/journal/2019/11/1/explanation-of-a-financial-report-logical-system-in-simple-t.html

discourse. If a logical system is consistent, has high precision, and has high coverage it is said to be a properly functioning logical system.

Finally, nothing about this logical system is a "black box". The innerworkings are logical, they are clear, and humans can understand what is being expressed because they understand the rules of logic and they understand the terminology being used to explain the logical system. Information is knowable.

And so, if any of this is explained in machine-readable terms it must be done using auditable algorithms that are explainable to humans. Algorithms, including artificial intelligence, used by the enterprise or for accounting, reporting, auditing, and analysis needs to be explainable artificial intelligence. Explainable AI[10] (XAI) provides insight into how the software algorithms reached its conclusions, an understandable "line of reasoning" so to speak.

Accounting Equation Logical System Represented Using XBRL

The following is a summary of the model of the accounting equation logical system expressed in both machine-readable and human-readable terms.

One specific thing to note is that additional details are being added to the simple explanation provided above. For example, above we defined "Assets". But now, we define "Assets" as being a data type of "monetary", being "as of" a specific point in time (i.e. instant), and being a "Debit". Computers need this precise representation to help humans achieve what they desire to achieve from this logical system. You probably were aware that Assets is a debit and as of a point in time and is a number.

TERMS[11,12]:

Three simple terms are defined for the accounting equation logical system: Assets, Liabilities, Equity.

[10] ACCA, Narayanan Vaidyanathan, *Explainable AI: Putting the user at the core*, https://www.accaglobal.com/uk/en/professional-insights/technology/Explainable_AI.html
[11] Machine-readable terms, http://xbrlsite.azurewebsites.net/2020/core/master-ae/ae.xsd
[12] Human-readable terms, http://xbrlsite.azurewebsites.net/2020/core/master-ae/evidence-package/contents/ReportElements-Concepts.html

#	Label	Data Type	Period Type	Balance Type	Prefix	Standard label, Documentation, References, Concept name	Count
1	Assets	Monetary	As Of (instant)	Debit	ae	*Filer label:* Assets *Documentation:* *References:* Publisher: FASB; Reference Name: SFAC; Reference Information: Paragraph: 25; URIDate: 2019-10-22; URI: https://www.fasb.org/jsp/FASB/Document_C/DocumentPage?cid=1218220132802&acceptedDisclaimer=true; Number: 6 *Name:* ae:Assets	1
2	Equity	Monetary	As Of (instant)	Credit	ae	*Filer label:* Equity *Documentation:* *References:* Publisher: FASB; Reference Name: SFAC; Reference Information: Paragraph: 49; URIDate: 2019-10-22; URI: https://www.fasb.org/jsp/FASB/Document_C/DocumentPage?cid=1218220132802&acceptedDisclaimer=true; Number: 6 *Name:* ae:Equity	1
3	Liabilities	Monetary	As Of (instant)	Credit	ae	*Filer label:* Liabilities *Documentation:* *References:* Publisher: FASB; Reference Name: SFAC; Reference Information: Paragraph: 35; URIDate: 2019-10-22; URI: https://www.fasb.org/jsp/FASB/Document_C/DocumentPage?cid=1218220132802&acceptedDisclaimer=true; Number: 6 *Name:* ae:Liabilities	1

STRUCTURES[13,14]

In addition to the three simple terms, one functional term is defined to represent the balance sheet structure: Balance Sheet [Hypercube]:

#	Label	Prefix	Standard label, Documentation, References, Concept name	Count
1	Balance Sheet [Hypercube]	ae	*Filer label:* Balance Sheet [Hypercube] *Documentation:* *References:* NONE *Name:* ae:BalanceSheetHypercube	1

ASSOCIATIONS[15,16]:

The association between the three terms and the balance sheet structure are provided. Some additional infrastructure report elements are provided to help organize the representation:

#	Label	Report Element Class	Period Type	Balance	Name
1	**Balance Sheet [Hypercube]**	[Table]			ae:BalanceSheetHypercube
2	**Balance Sheet [Line Items]**	[Line Items]			ae:BalanceSheetLineItems
3	*Balance Sheet [Set]*	[Abstract]			ae:BalanceSheetSet
4	Assets	[Concept] Monetary	As Of	Debit	ae:Assets
5	Liabilities	[Concept] Monetary	As Of	Credit	ae:Liabilities
6	Equity	[Concept] Monetary	As Of	Credit	ae:Equity

[13] Machine-readable structures, http://xbrlsite.azurewebsites.net/2020/core/master-ae/ae.xsd
[14] Human-readable structures, http://xbrlsite.azurewebsites.net/2020/core/master-ae/evidence-package/contents/ReportElements-Tables.html
[15] Machine-readable associations, http://xbrlsite.azurewebsites.net/2020/core/master-ae/ae-pre.xml
[16] Human-readable associations, http://xbrlsite.azurewebsites.net/2020/core/master-ae/evidence-package/contents/NetworkStructure-N0-RE6.html

ASSERTIONS[17,18]:

The mathematical relationship between the terms Assets, Liabilities, and Equity are represented.

#	Label	Result	Rule
1	$Assets = ($Liabilities + $Equity) (CONSISTENCY_5)	Pass	$Assets = ($Liabilities + $Equity)

FACTS[19,20]:

We can create a set of facts to exercise the logical system. Facts representing Assets of $5,000, liabilities of $1,000, and equity of $4,000 were created.

#	Reporting Entity [Axis]	Period [Axis]	Concept	Fact Value	Unit	Rounding	Parenthetical 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	

And so, the model above is used to explain the details of the human-readable representation that is also machine-readable below in the alternative Inline XBRL format[21]:

Inline XBRL Business Report

Component: (Network and Table)	
Network	**01-Balance Sheet** (http://www.xbrlsite.com/ae/role/BalanceSheet)
Table	Balance Sheet [Hypercube]

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

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

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

[17] Machine-readable assertions, http://xbrlsite.azurewebsites.net/2020/core/master-ae/Consistency-5-Code-BS01-formula.xml
[18] Human-readable assertions, http://xbrlsite.azurewebsites.net/2020/core/master-ae/evidence-package/contents/BusinessRulesSummary.html
[19] Machine-readable facts, http://xbrlsite.azurewebsites.net/2020/core/master-ae/instance.xml
[20] Human-readable facts, http://xbrlsite.azurewebsites.net/2020/core/master-ae/evidence-package/contents/NetworkFacts-N0-RE6.html
[21] Human-readable and machine-readable facts using Inline XBRL, http://xbrlsite.azurewebsites.net/2020/core/master-ae/instance.html

PROPERLY FUNCTIONING: CONSISTENT, PRECISE, AND COMPLETE:

The logical system can be called **properly functioning** because all of the statements within the logical system are **consistent** with one another (i.e. there are no contradictions, there are no inconsistencies), it can be established that the logical system created **precisely** reflects the reality of the logical system (we just made the numbers up for ABC Company), and a **complete** set of statements seem to be included within the logical system.

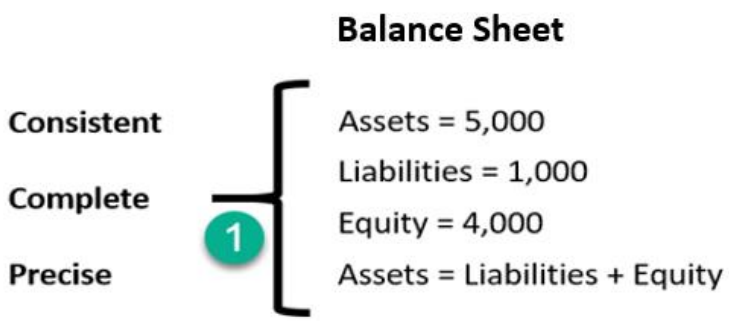
A software application can take all of the statements made within the machine-readable version of this logical system and perform work. Below you see a human-readable rendering of a Balance Sheet that was created from the XBRL-based representation of the accounting equation logical system:

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

Result	Rule
Pass	$Assets = $Liabilities + $Equity

The logical system of the accounting equation is therefore *consistent*, *precise*, and *complete* because all the statements are consistent with one another within the logical system, the logical system reflects the formal truths we wish to convey precisely, and a complete set of statements describe the logical system.

This graphic below shows a synopsis of the information and we can look at this synopsis and see that the logical system appears to be properly functioning because this is a relatively simple logical system:



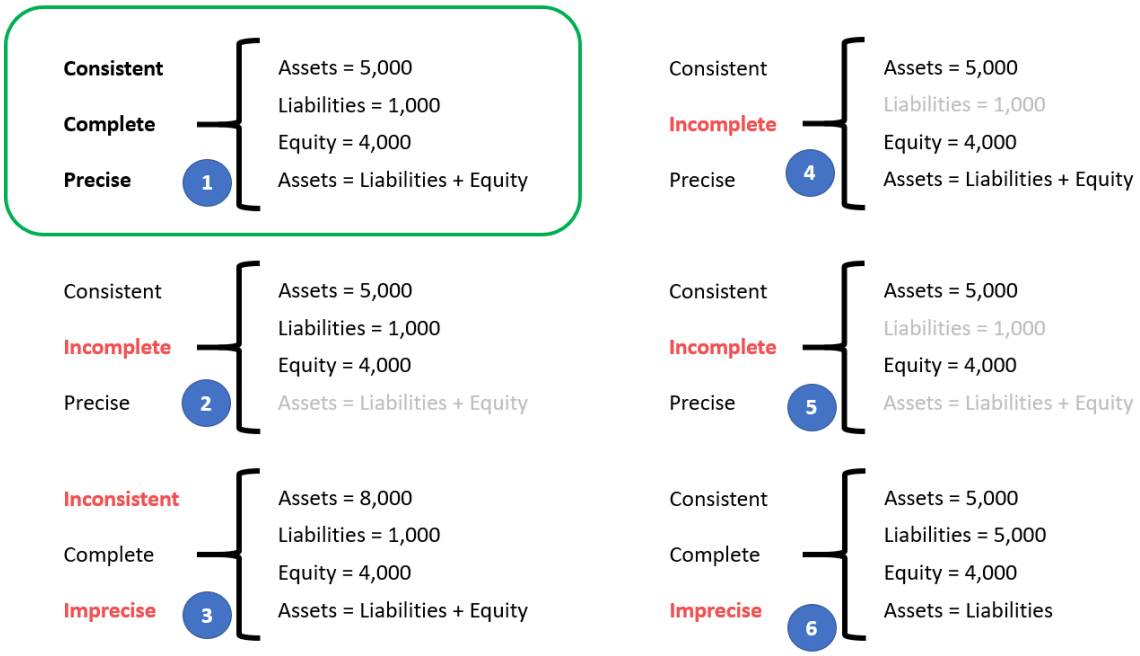
And so, above we have shown one permissible interpretation or model of the logical system that is consistent with our logical theory.

Now, we want to use this base logical system that is properly functioning to explain the sorts of things that can make the system inconsistent, incomplete, or imprecise. This will help you to better understand what is entailed in creating a properly functioning logical system.

Properly and Improperly Functioning Logical Systems

Below you can see examples of each of six possible states of the accounting equation logical system. For example, the logical system can be functioning improperly if a single statement is left out, if one statement contradicts another statement within the logical system, if a statement is imprecise with respect to reality; all of these situations impact (a) the logical system and (b) what information is necessary to include within the logical system.

Here is a graphic depicting the first 6 states including the first which is a properly functioning logical system:



In the following sections I want to make some adjustments to the logical system which make the logical system either inconsistent, incomplete, or imprecise and explain why the system is then not a properly functioning logical system. To the six examples above I will add three additional examples. I made videos that explain each of these impediments to a properly

functioning logical system which you can see in this video playlist, Understanding the Financial Report Logical System[22].

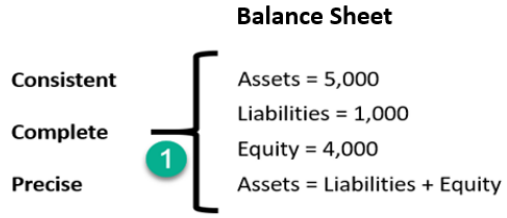
Before we get to the improperly functioning logical systems, let's take one final look at the properly functioning logical system so that you can compare and contrast the properly functioning and improperly functioning logical systems.

State 1: Properly Functioning Logical System

For completeness, I want to start by mentioning again our properly functioning logical system which is consistent, complete, and precise. It can be helpful to contrast other states to this state to understand the difference between properly functioning logical systems and improperly functioning systems.

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

Result	Rule
Pass	$Assets = $Liabilities + $Equity



Again, this is considered a properly functioning logical system because (a) all the statements within the system are **consistent**; (b) the set of statements that describe the system is **complete**; and (c) the information conveyed by the system is **precise** in its representation of reality. Further, we are formally declaring this "reality"[23] to be our base understanding.

Also, we need to be explicit. We defined three terms "Assets", "Liabilities", and "Equity".

Now, you may know what those three terms are; but a computer does not. You have to define what you work with relative to something that you know. Imagine our system defines four terms, "fac:Assets", "fac:Liabilities", "fac:Equity", and "fac:LiabilitiesAndEquity"[24]. You understand your system but you have to map every external system into your system[25]. Your internal system understands more that the accounting equation system (i.e. you have LiabilitiesAndEquity). You have to be able to compute that value based on some other system's

[22] Understanding the Financial Report Logical System, https://www.youtube.com/playlist?list=PLqMZRUzQ64B7EWamzDP-WaYbS_W0RL9nt
[23] YouTube, *Reality*, https://youtu.be/eq2Jw6waaCI
[24] Fundamental accounting concepts, http://xbrlsite.azurewebsites.net/2020/core/master-ae/fac.xsd
[25] Mapping from accounting equation to fundamental accounting concepts in our system, http://xbrlsite.azurewebsites.net/2020/core/master-ae/fac-mapping-definition.xml

information[26]. It is perfectly reasonable for our system to create a concept LiabilitiesAndEquity and compute that value even though the accounting equation logical system does not have that explicit value.

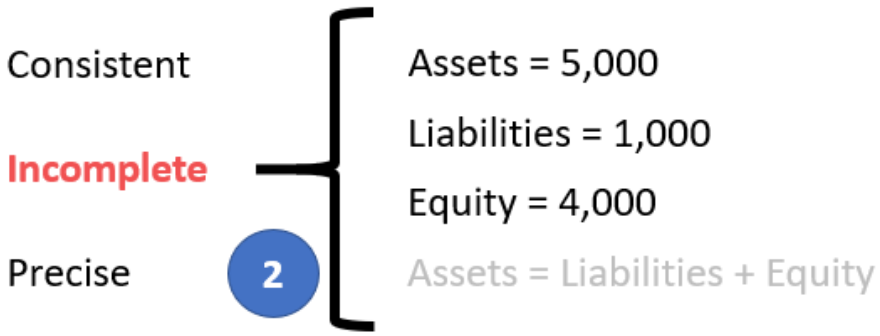
The point is that different economic entities have different models; but all models of a financial reporting scheme are reconcilable from/to one another in some manner[27].

State 2: Incomplete Coverage by Rules

The logical system #2 below is intended to show exactly the same information as our #1 properly functioning logical system, except that #2 leaves out the rule "Assets = Liabilities and Equity" which is showed as grayed out (i.e. because it is assumed to be missing from the logical system.

Coverage is a measure of how well you do or can represent a domain of information within a logical system. "Do" is about using the tools you have correctly and effectively. "Can" is about the capabilities of the tools you are using to represent the rule.

For example, if your logical system neglects to include the rule "Assets = Liabilities + Equity" or if your tools don't provide the capabilities to allow you to represent that rule; then there is the possibility that the facts being represented to be represented incorrectly and the system will not detect the inconsistency. As such, that logical system has **incomplete coverage**.



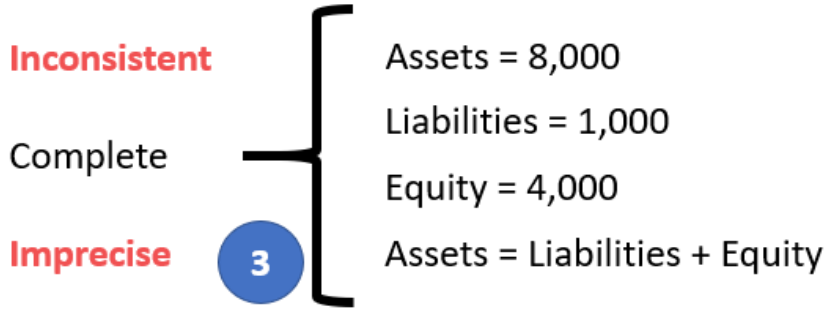
While this specific state #2 does have the Assets, Liabilities, and Equity facts consistent with the absent rule; the system is still incomplete because the coverage can be improved by adding the

[26] XBRL Formula to derive the value for LiabilitiesAndEquity, http://xbrlsite.azurewebsites.net/2020/core/master-ae/fac-ImputeRule-LiabilitiesAndEquity-formula.xml
[27] Charles Hoffman, CPA, *Special Theory of Machine-based Automated Communication of Semantic Information of Financial Statements*, http://xbrl.squarespace.com/journal/2019/12/30/special-theory-of-machine-based-automated-communication-of-s.html

missing rule. If that missing rule is added, then the logical system can be considered complete again.

State 3: Inconsistent and Imprecise

All the statements in the system must be consistent for the logical system to be considered properly functioning. If statements are inconsistent, the logical system is not is not properly functioning. In this system #3, the values for Assets, Liabilities, and Equity are inconsistent with the rule "Assets = Liabilities + Equity". From looking at the information provided, it is impossible to know exactly which of the three facts are incorrect; it is only possible to understand that the statements made within the logical system is inconsistent. It could be the case that the rule is incorrect.



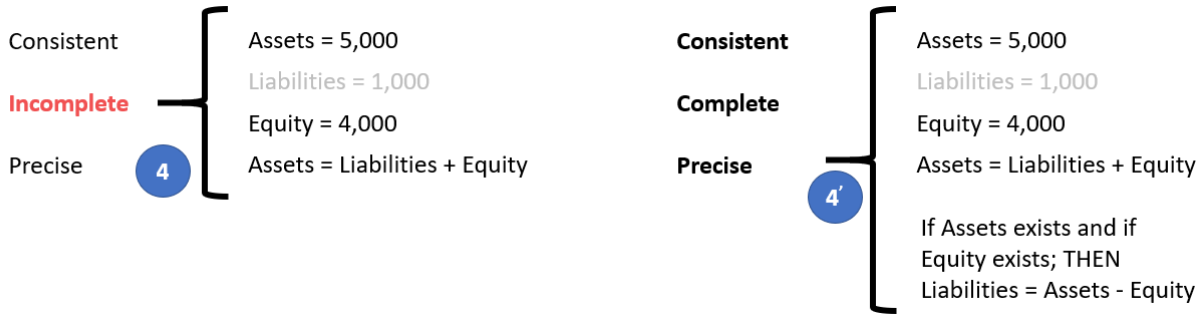
However, given that we know from state #1 that the value for Assets is 5,000 and not 8,000; the facts in this system is imprecise because the fact for Assets does not reflect reality.

State 4: Unreported Facts

In state #4, the situation is that the economic entity representing information in their report neglected to include the fact for Liabilities. Whether it is the case that a fact can, or cannot, be left unreported is a decision that can be made by the stakeholders of the system.

If it is the case that it is decided that the fact "Liabilities" can be omitted if both Assets and Equity are reported; then you must provide a rule to derive the value of Liabilities when that fact is not reported. Below you see that the system has been adjusted in state #4' to add the rule "IF Assets exists and if Equity exists; THEN Liabilities = Assets - Equity"[28].

[28] Here is the impute or derivation rule that would be added to the accounting equation logical system for this situation, http://xbrlsite.azurewebsites.net/2020/core/master-ae/ImputeRule-Key-1-Code-BS-Impute-01-formula.xml



If it were likewise true that either Assets[29] or Equity[30] could also be left unreported, similarly derivation rules could be created for each of those facts. Note that XBRL Formula chaining[31] can be used to physically derive unreported facts if any one of these three facts remain unreported. Note that it is impossible to derive missing information if any two of the facts remain unreported. Adding the derivation rule makes the system complete.

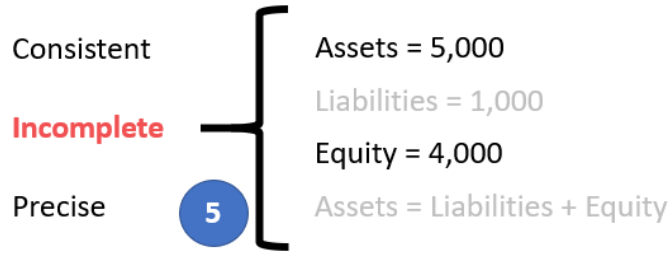
Allowing certain line items of a report to go unreported specifies the need to create rules to derive missing information. Or saying this another way, omitting the possibility of unreported facts negates the need for creating derivation rules.

A second downside of allowing unreported facts is that you lose the parity check or cross check if facts can go unreported. Said another way, it would be considered best practice to not leave important high-level financial report line items to go unreported.

State 5: Incomplete

Similar to state #4, in state #5 the logical system is incomplete because both (a) the fact Liabilities is unreported and also (b) the consistency rule "Assets = Liabilities + Equity" is missing from the logical system. Because both a fact and the rule are missing from the logical system, it would be impossible to deduce the value of Liabilities in this case. There is not enough information in the logical system to allow Liabilities to be derived. At a minimum, a consistency crosscheck rule[32] plus the derivation rule to impute Liabilities[33] would be necessary.

[29] XBRL Formula rule for deriving Assets, http://xbrlsite.azurewebsites.net/2020/core/master-ae/ImputeRule-Key-3-Code-BS-Impute-03-formula.xml
[30] XBRL Formula rule for deriving Equity, http://xbrlsite.azurewebsites.net/2020/core/master-ae/ImputeRule-Key-2-Code-BS-Impute-02-formula.xml
[31] Deriving Facts Using XBRL Formula Chaining (Example), http://xbrl.squarespace.com/journal/2019/4/24/deriving-information-using-xbrl-formula-chaining-example.html
[32] XBRL Formula consistency crosscheck rule Assets = Liabilities + Equity, http://xbrlsite.azurewebsites.net/2020/core/master-ae/Consistency-5-Code-BS01-formula.xml
[33] XBRL Formula derivation rule to impute Liabilities, http://xbrlsite.azurewebsites.net/2020/core/master-ae/ImputeRule-Key-1-Code-BS-Impute-01-formula.xml

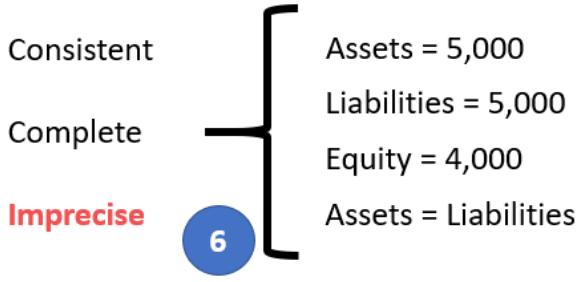


Again, consistent with state #4; Assets and Equity would require similar rules and there is no parity check of reported information.

State 6: Imprecise

A logical system is a true and fair representation of some agreed upon realism. **Precision** is a measure of how precisely you do or can represent the information of a domain within a logical theory. The reality that we formalized in state #1 indicates that "Assets = Liabilities + Equity". Yet, in the state #6 example, the rule "Assets = Liabilities" was provided. Further, the values of Assets and Liabilities are, in fact, consistent with the rule that has been provided.

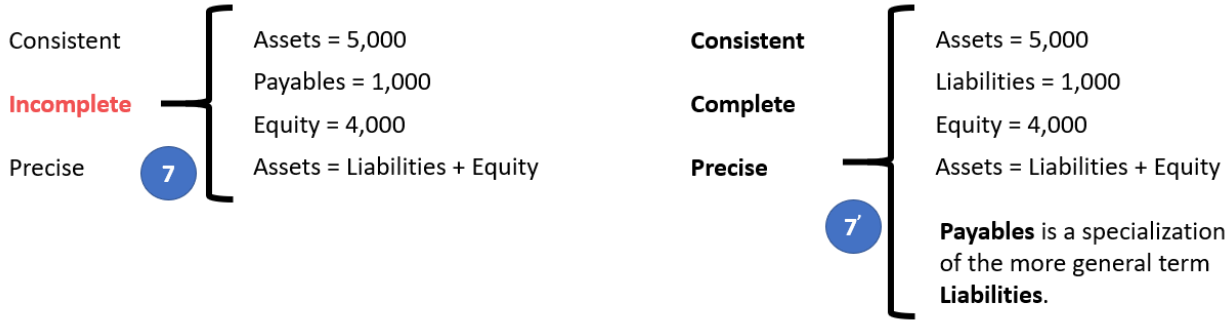
Remember that in state #1 we formalized our truth to be that "Assets = Liabilities + Equity". As such, this logical system can be described as being imprecise. To make this logical system precise, all that needs to be done is to fix the rule.



State 7: Extension Concept

In state #7 on the left, what we are trying to convey is that the economic entity reported the fact for Liabilities using the extension concept "Payables" that it had created. If a fact is represented using an extension concept created by a reporting entity; then a "general-special" or "wider-narrower" or "class-equivalentClass" association must be created to indicate to software applications of the relationship so that information can be used correctly. State #7' on

the right, the rule "Payables is a specialization of the more general term Liabilities" has been added to the logical system which allows the system to operate effectively[34].

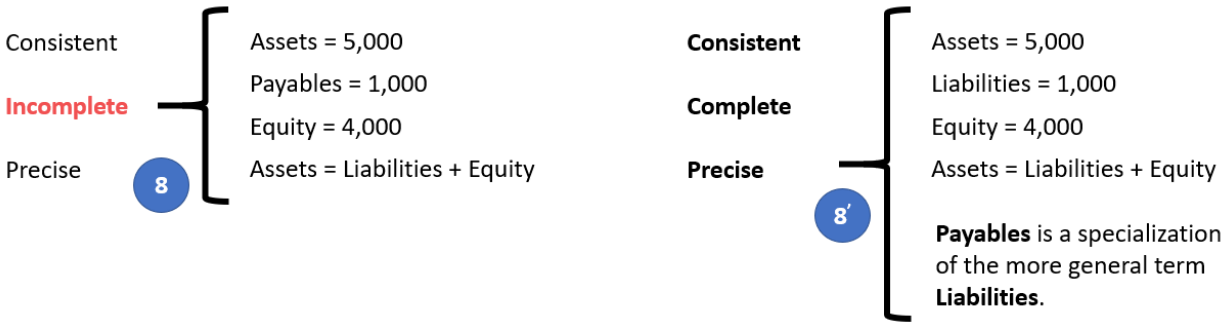


State 8: Base Taxonomy Wider/Narrower Concept Use

State #8 on the left below is similar to state #7 in that a different concept is used to report a fact; but while state #7 focuses on using an extension concept; state #8 points out that using a wider or narrower base taxonomy concept gives exactly the same result.

Now, our base state #1 does not have the concept "Payables"; but let's assume for a moment that it does have the concept "Payables". Also suppose that there was no information in the base logical system indicating the relationship between "Payables" and any other concept. If a fact is represented using a BASE TAXONOMY CONCEPT by a reporting entity; then a "general-special" or "wider-narrower" or "class-equivalentClass" association must exist in that base taxonomy to indicate that some concept is a permissible alternative for some other concept.

State #8' on the right adds the rule "Payables is a specialization of the more general term Liabilities"[35].

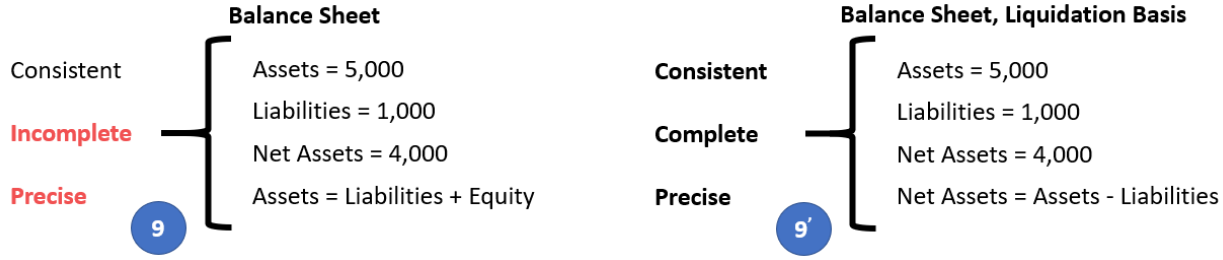


[34] XBRL Definition relations showing example of a mapping rule, http://xbrlsite.azurewebsites.net/2020/core/master-ae/fac-mapping-definition.xml
[35] XBRL Definition relations showing example of a mapping rule, http://xbrlsite.azurewebsites.net/2020/core/master-ae/fac-mapping-definition.xml

State 9: Defining a Completely New Structure

State #9 below on the left focuses on the structure as contrast all the prior examples which focused on the terms and rules. If a new structure is created, the new structure must be referenced to the base taxonomy and the new structure needs to be explained using machine-readable rules[36]. Even base taxonomy structures need to be defined in order to be referred to[37]. When you say "Balance Sheet" you know what that means. But a machine does not know.

A base taxonomy should (a) provide all necessary structures separately, not intermingle different models in the same set of associations and (b) define what each structure must look like. Remember, computers are like babies and need to be led by the hand in order to understand the details you need them to understand.



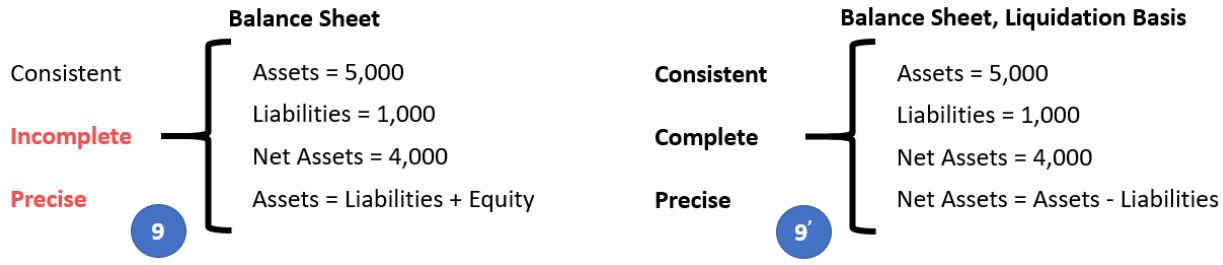
Finally, in our case we have only one disclosure, the Balance Sheet. In our case, the Balance Sheet is always required to be reported per this logical system. As such, that rule is stated in a machine-readable reporting checklist[38]. Other logical systems with more disclosures will have more rules relating to when a disclosure is required to be provided in a report.

State 10: Organizing Disclosures Using Topics

State #10 points out that while the accounting equation logical system has one structure, the balance sheet, ultimately if a complete financial reporting scheme were represented one might have hundreds or even thousands of disclosures. Disclosures can be organized into topics[39].

[36] XBRL Definition relations used to represent structure rules, http://xbrlsite.azurewebsites.net/2020/core/master-ae/dm-1355-rules-def.xml
[37] XBRL taxonomy schema used to define "Balance Sheet", http://xbrlsite.azurewebsites.net/2020/core/master-ae/disclosures.xsd
[38] XBRL Definition relations used to represent a reporting checklist or disclosure rules, http://xbrlsite.azurewebsites.net/2020/core/master-ae/reporting-checklist-rules-def.xml
[39] XBRL taxonomy schema used to represent topics, http://xbrlsite.azurewebsites.net/2020/core/master-ae/topics.xsd

Then, rather than having one flat list of disclosures, they can be organized into a handy hierarchy[40].



More Complex Examples

While the accounting equation logical system is small, it can be used to demonstrate incredibly sophisticated functionality. To see more sophisticated examples, see my *Modern Approach to Creating Financial Reporting Scheme* examples[41] and the document *Proving Financial Reports are Properly Functioning Logical Systems*[42] which starts with the accounting equation logical system, then models the slightly larger SFAC 6 elements of a financial statement logical system, the common elements of a financial report logical system, a MINI financial reporting scheme logical system, and then contrasts that to the Microsoft 10-K financial report logical system.

What all this shows is how rules are used to specify permissible manipulations of a logical system.

Finally, when representing information within XBRL presentation relations, use these rules to make sure you don't make any mistakes in your representation[43].

		Parent						
		Network	Table	Axis	Member	Line Items	Abstract	Concept
Child	Network	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL
	Table	OK	Disallowed	Disallowed	Disallowed	Disallowed	OK	Disallowed
	Axis	Disallowed	OK	Disallowed	Disallowed	Disallowed	Disallowed	Disallowed
	Member	Disallowed	Disallowed	OK	OK	Disallowed	Disallowed	Disallowed
	Line Items	Disallowed	OK	Disallowed	Disallowed	Disallowed	Disallowed	Disallowed
	Abstract	OK	Disallowed	Disallowed	Disallowed	OK	OK	Disallowed
	Concept	Disallowed	Disallowed	Disallowed	Disallowed	OK	OK	Disallowed

[40] XBRL definition relations used to create a hierarchy of disclosures, http://xbrlsite.azurewebsites.net/2020/core/master-ae/disclosures-with-topics-def.xml
[41] *Modern Approach to Creating a Financial Reporting Scheme*, http://xbrl.squarespace.com/journal/2019/12/19/modern-approach-to-creating-a-financial-reporting-scheme.html
[42] *Proving Financial Reports are Properly Functioning Logical Systems*, http://xbrlsite.azurewebsites.net/2019/Library/ProvingFinancialReportAreProperlyFuncioning.pdf
[43] XBRL definition relations to represent structure rules for report element relations, http://xbrlsite.azurewebsites.net/2020/prototype/sbrm/sbrm-structure-rules-strict-def.xml