

1. Method

Information wants to be free from imperfections. Even the most insightful, intelligent software applications is only as smart as the information that is available to it. Inconsistent or contradictory input will result in confusing, dumb, inappropriate behavior from even the smartest artificial intelligence software applications.

Professional accountants are responsible for creating true and fair representations of the financial position and financial performance of economic entities be that information represented in human readable form or machine readable form.

In the hands of someone with little to no knowledge, XBRL-based digital financial reports can be created but they will very likely be clumsy, ugly, barely functional, and of poor quality. But in the hands of a skilled craftsmen with the right tools and a conscious understanding of good practices or even a best practices method; then what will likely be produced is an elegant, high-quality XBRL-based financial report that is of utility, reliability, beauty, and durability. Provably free from imperfections.

This section provides a comprehensive introduction to a proven, tested, best-practices based **method and framework for creating XBRL-based digital financial reports**. To thoroughly understand this method and framework, please read *Method of Implementing a Standard Digital Financial Report Using the XBRL Syntax*¹. To understand how this method was derived, please see *Understanding Method*². Alternatively, try *Method – Terse Explanation*³.

Why force each and every individual enterprise to re-invent the wheel and figure out how to implement XBRL-based digital financial reporting? Why not hide the technical complexity behind the scenes, leaving business professionals to work with only the logic of the reported information.

The *Seattle Method*⁴ is the most updated version of my method. This document will eventually be updated to follow that documentation.

1.1. Overview of Method

Automation is about removing friction, driving costs down, speeding processes up, and improving efficiency and productivity. Automation is about improving processes in order to deliver goods and services that are better for less cost. Automation is about effective human-machine collaboration. Automation is about reducing the mechanical, monotonous, routine tasks that humans need to perform and letting computers take over those repetitive tasks so that humans focus on the higher value add tasks that they perform best.

The purpose of this method is to create ongoing repeatable processes that are reliable because the processes can be controlled thus achieving verifiable high-quality of complicated information where the creators of report models are permitted to modify the model and thus modifications must be controlled. This is the case with financial information and financial reports. This results in effective automation. With

¹ *Method of Implementing a Standard Digital Financial Report Using the XBRL Syntax*, <http://www.xbrlsite.com/2020/Theory/SBRM-Method.pdf>

² *Understanding Method*, <http://xbrlsite.azurewebsites.net/2020/Library/UnderstandingMethod.pdf>

³ *Method – Terse Explanation*, <http://xbrlsite.azurewebsites.net/2020/library/MethodTerse.pdf>

⁴ Charles Hoffman, CPA, *Seattle Method*, <http://www.xbrlsite.com/seattlemethod/>

the implementation of self-service rules, business professionals can control their processes.

Rules provide control; control leads to high-quality; high-quality enables effective, reliable automation.

Old technologies are making it increasingly difficult to keep up with today's fast paced information exchange. New technologies such as structured information, knowledge graphs, artificial intelligence, and digital distributed ledgers offer significant and compelling opportunities to make accounting, reporting, auditing, and analysis tasks and processes more efficient and effective. A Forbes⁵ article points out that organizations are already using artificial intelligence to create more intelligent products, create more intelligent services, and improve internal business processes.

This method can be employed to create modern accounting processes.

But figuring out how to employ these new technologies and finding people with the necessary skills and experience to analyze systems and fix problems can be challenging. What if there were a standards-based proven best practices method you could use to improve your productivity?

A business report is effectively a knowledge graph. Using the right techniques, this business report knowledge graph can be readable and understandable to machine-based processes as well as by humans. A financial report is a specialized type of business report. This method uses world-class proven good practice approaches to XBRL-based digital financial reporting.

Enter global standard technologies.

XBRL International's *Extensible Business Reporting Language*⁶ (**XBRL**) is a global standard syntax for representing business information in machine readable form. Essentially, an XBRL-based financial report is a machine-readable knowledge graph⁷.

OMG's *Standard Business Report Model*⁸ (**SBRM**) is a logical conceptualization of a business report. SBRM formally documents a logical conceptualization of a business report in both human-readable and machine-readable models. This enables a machine-readable report to be represented in literally any syntax and implemented using any primary problem-solving logic paradigm⁹.

XBRL is one syntax; but you could also use JSON (JavaScript Object Notation), RDF (Resource Description Format), PROLOG (Programming Logic), Cypher, CSV, Excel, relational database, or literally any other technical syntax which you might prefer.

Used together, XBRL and SBRM allow for the creation of a **reliable best practice method**¹⁰ for automating accounting, reporting, auditing, and analysis tasks and

⁵ Bernard Marr, Forbes, *3 Important Ways Artificial Intelligence Will Transform Your Business And Turbocharge Success*, <https://www.forbes.com/sites/bernardmarr/2020/08/03/3-important-ways-artificial-intelligence-will-transform-your-business-and-turbocharge-success/>

⁶ XBRL International, *Extensible Business Reporting Language (XBRL)*, <https://www.xbrl.org/>

⁷ Financial Report Knowledge Graphs, <http://xbrl.azurewebsites.net/2021/Library/FinancialReportKnowledgeGraphs.pdf>

⁸ OMG, *Standard Business Report Model (SBRM)*, <https://www.omg.org/intro/SBRM.pdf>

⁹ Implementing Knowledge Graphs, <http://xbrl.squarespace.com/journal/2021/9/20/implementing-knowledge-graphs.html>

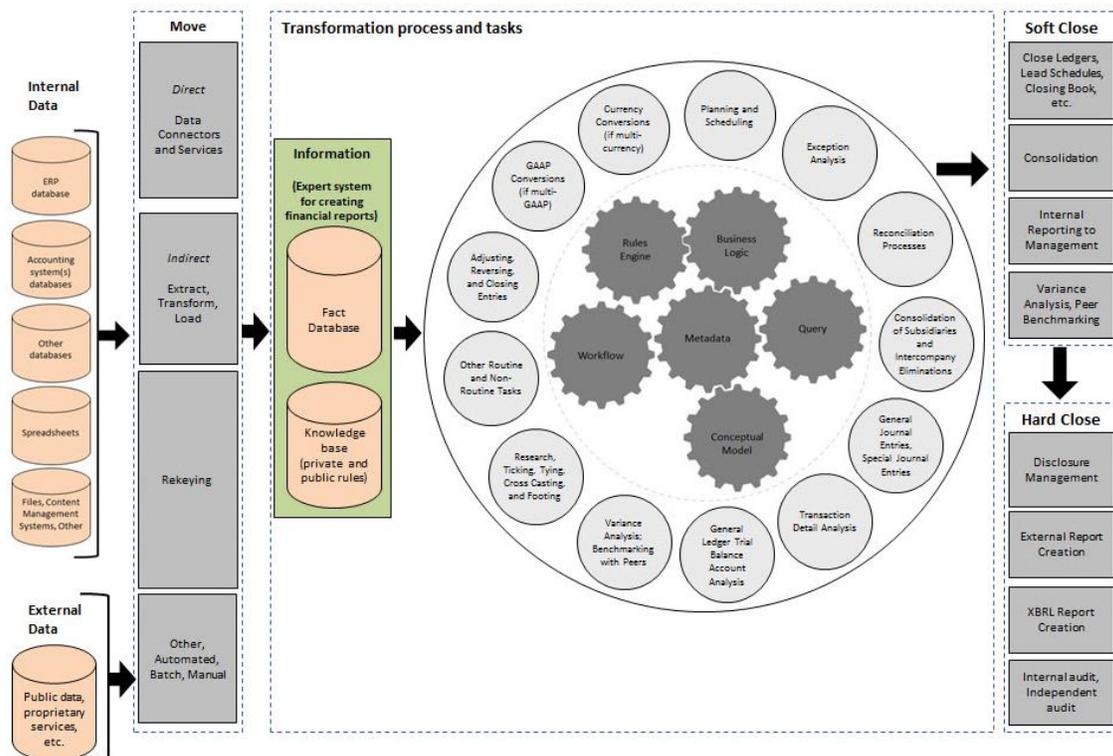
¹⁰ *Understanding Method (Abridged)*, http://xbrl.azurewebsites.net/2020/Library/UnderstandingMethod_Abridged.pdf

processes. This method's underpinning is a *Logical Theory Describing Financial Report*¹¹. What technology you use is up to you.

The following three implementations leverage this method:

- Luca which is a business report creation application that is browser-based¹².
- Pacioli is a rules/reasoning/logic engine that can be used for many things including the verification of XBRL-based financial reports¹³.
- Pesseract is a working proof of concept that can be used to view and verify XBRL-based financial reports¹⁴.

Luca, Pacioli, and Pesseract are all interoperable and support this method.



The global standard ISO Prolog¹⁵ is a modern standard approach to logic programming. ISO Prolog is a modern approach to processing a knowledge graph.

The XBRL technical syntax can be transformed bidirectionally to other technical formats such as RDF/OWL/SHACL, Graph Databases (GQL), relational databases (SQL), PROLOG, PSOA¹⁶.

¹¹ *Logical Theory Describing Financial Report*, <http://xbrl.squarespace.com/logical-theory-financial-rep/>

¹² Luca, <http://luca.yaxbri.com/>

¹³ Pacioli Power User Tool, <https://pacioli.auditchain.finance/tools/PowerUserTool.swinb>

¹⁴ Pesseract, <http://pesseract.azurewebsites.net>

¹⁵ International Standards Organization, ISO/IEC 13211-1:1995, Information technology — Programming languages — Prolog — Part 1: General core, <https://www.iso.org/standard/21413.html>

¹⁶ Primary Logic Processing Paradigms, <http://xbrl.squarespace.com/journal/2020/9/15/primary-problem-solving-logic-paradigms.html>

As *The Knowledge Graph Cookbook: Recipes that Work*¹⁷ points out, “The basic rule is that context tagging and classification should take place as soon as possible after the content is created.” For accounting information, this is generally at time of transaction entry.

While different organizations might prefer different implementation syntaxes and logic/rule/reasoning processing tools; the fundamental accounting logic behind the accounting information is the same across all organizations and are based on the double-entry accounting model and the accounting equation¹⁸.

Continuous accounting, continuous reporting, artificial intelligence assisted audits, algorithmic regulation, computational professional services, automated analysis all offer unprecedented opportunities to modernize accounting processes. But what are your challenges?

Information is entered into systems after transaction entry: The reality of many if not most finance processes is that a significant amount of information is managed using spreadsheets and that is where context tagging and classification occur.

The fix? Enter context tagging and classification information sooner, preferably at time of transaction entry.

Complex disparate systems trap information: The reality of many if not most finance processes is many dissimilar systems making information integration complex. Often, complexity is self-inflicted such as an incorrectly set up chart of accounts or a less than adequate mapping between the chart of accounts and a report writer or audit lead schedules.

The fix? Take the time to set up your accounting systems correctly.

Missing metadata: Far too often information necessary to flow data through a system is entered into the system at the end of a process instead of at the beginning of a process. This missing metadata makes it impossible to automate processes.

The fix? Establish standard metadata, enter that metadata as early in the process as possible, enable information to flow through the process where possible.

Missing information: Commonly, information necessary for a system to be automated is not available to the system and therefore information is supplemented by manually created spreadsheets.

The fix? Bring more and more tasks and processes into core systems and where possible avoid supplementing information using spreadsheets.

Overly manual process control mechanisms: Process control mechanisms today tend to be overworked accounting professionals that have to manually control process output quality within systems that push far too much work to the end of the process. This manual approach is expensive, not reliable enough many times letting errors slip through the systems, and cause more important work to be delayed or simply left undone.

¹⁷ Andreas Blumauer and Helmut Nagy, *The Knowledge Graph Cookbook: Recipes that Work*, page 47, <https://www.poolparty.biz/wp-content/uploads/2020/04/the-knowledge-graph-cookbook.pdf>

¹⁸ Essence of Accounting, <http://xbrlsite.azurewebsites.net/2020/Library/EssenceOfAccounting.pdf>

The fix? Human-machine collaboration. Augment manual processes with automated processes and let machines help overworked humans get work done. Leverage Lean Six Sigma philosophies and techniques.

Communications issues: The typical professional accountant does not really grasp the possibilities that technology offers to improve processes accurately. Computer scientists do not tend to understand important nuances of accounting, reporting, auditing, and analysis and therefore cannot build systems precisely or set priorities effectively. Most accountants focus on getting work done allocating little to no effort towards process improvement.

The fix? It will take far less time for a professional accountant to learn what is necessary to communicate effectively with computer scientists than it would for a computer scientist to understand the important subtleties and nuances of accounting, reporting, auditing, and analysis. Take the time to improve your skills. If you don't want to make the investment, then hire a good consultant that has.



Wrap all of this within a standard digital distributed ledger¹⁹ to create what amounts to blockchain-anchored XBRL at the report level or transaction level to increase transparency and trust to provide an audit trail. This offers a standards-based ecosystem²⁰ for creating modern accounting, reporting, auditing, and analysis processes.

The beneficiaries of such standards-based approaches will be everyone. The losers if such standards are not created will likewise be everyone in terms of higher costs, less effectiveness, and less efficiency.

Using this method, enterprises can reliably and effectively stream a high-quality machine-readable XBRL-based global standard knowledge graph of a complete,

¹⁹ IEEE, Blockchain Standards, <https://blockchain.ieee.org/standards>

²⁰ Auditchain, *Decentralized Continuous Audit & Reporting Protocol Ecosystem*, <https://auditchain.com/Auditchain-Whitepaper.pdf>

consistent, and provably correct general purpose financial statement. Further, an entire record-to-report process can be automated effectively. This method provides both the flexibility and the control necessary.

As the Harvard Business Review points out²¹, the digital transformation is about talent, not technology. The coming digital transformation is primarily about people and the realization that effective digital transformation involves changes to organizational dynamics and how work gets done. The digital transformation is a paradigm shift. Don't use old, outdated mental maps to evaluate and understand the possibilities; it is important to update your mental map.

1.2. *Utility of Method*

Why is a method necessary? Those reasons are discussed in this section.

1.2.1. *Importance of Meta-models*

A meta-model is a model whose purpose is to describe and process models that subscribe to that meta-model. Models and meta-models both prescribe and describe what is permissible and what is not permissible per some model or meta-model.

One reason for this is to be sure each model is consistent with the specification provided by the meta-model. The following is a summary of the utility of this method:

- Clear scope and purpose providing a framework and theory for thinking about financial reports.
- Formally documented and unambiguous specification.
- Open and freely available.
- Verified and tested leaving no stone unturned, no question unanswered, or argument about how the framework and theory work.
- World-class thinking about the problem of XBRL-based digital financial reporting.

Benefits provided by the method include:

- **Process Automation:** Because the method is thorough and complete, processes can be effectively automated. How exactly can you be sure your financial report is a true and fair representation of the financial position and financial performance of your entity without testing it to be sure the report is working effectively? If you cannot measure it, you cannot control it.
- **Risk Reduction:** Process automation and automated verification reduces the risk of noncompliance. Hope and chance are not good strategies for complying with statutory and regulatory reporting rules.
- **Social Cooperation and Benefit:** Being able to effectively exchange information between processes which enables the automation of those processes provides social benefit. Among those benefits are cost reduction, process quality improvement, ability to provide new products/services, and

²¹ Becky Frankiewicz and Tomas Chamorro-Premuzic, Harvard Business Review, *Digital Transformation Is About Talent, Not Technology*, <https://hbr.org/2020/05/digital-transformation-is-about-talent-not-technology>

improved functioning of capital markets resulting from these process improvements.

1.2.2. Custom, Product, Commodity

The difference between "custom", a "product", and a "commodity" is explained in this blog post, *Properties of Products*²². In summary,

- **Custom:** Means unique to each individual customer. No attempt is made to standardize.
- **Product:** Found repeatable patterns (**clusters**), created a product for each pattern. Standards can be used. (As Malcom Gladwell explained in a TED Talk, "The answer is that there is no best pickle or spaghetti sauce. But there are best clusters of pickles and spaghetti sauces.")
- **Commodity:** Generalize the product so much that it is fungible, indistinguishable. Standards can be used.

An XBRL-based digital financial report should be indistinguishable in terms of quality. Are their customers that consciously want low quality? That would be absurd. As such, *high-quality XBRL-based digital financial reports should be a commodity*.

"Custom" is not scalable. While standard approaches do allow scalability.

Companies should not compete as to whether they can or cannot create high-quality XBRL-based reports.

1.2.3. Financial Report Levels

To clearly and precisely understand XBRL-based digital financial reporting and the target level of this method, it helps to think of the spectrum of financial reports in terms of levels similar to how levels are helpful in understanding the capabilities of self-driving cars²³. The term "self-driving" means different things to different people so it makes it difficult to have a precise conversation about that topic. But breaking the description into a spectrum of descriptions is very helpful to the communication process.

This is similarly true for the levels of an XBRL-based digital financial report. Below we will break down a financial report into helpful levels that will enable a precise and clear discussion. We will provide a very brief description, a little bit of information, and a link to specific examples that instantiate a report per each specific level. The marginal difference between each level is very helpful in providing the reader with a solid understanding of the different levels.

Here is an overview of the levels related to financial reporting as I see them beginning with the least functional in terms of both human and machine use of the information from with a financial report.

- **Level 0:** Not machine readable. *An example of level 0 is a clay tablet, papyrus, or paper as the report medium.*

²² Markus Andrezak, *Properties of Products*, <http://ueberproduct.de/en/properties-of-products/>

²³ Truecar, The 5 Levels of Autonomous Vehicles, <https://www.truecar.com/blog/5-levels-autonomous-vehicles/>

- **Level 1²⁴**: Machine readable, nonstandard, structured for presentation. *PDF, HTML, or XHTML are examples of level 1.*
- **Level 2²⁵**: Machine readable, nonstandard, structured for meaning, no taxonomy (a.k.a. dictionary), no rules, no report model. *An XBRL-based report without an XBRL taxonomy schema, without XBRL relations and resources, and without XBRL Formulas is an example.*
- **Level 3²⁶**: Machine readable, global standard syntax, structured for meaning, with taxonomy (a.k.a. dictionary), incomplete rules, incomplete high-level report model. *An XBRL-based report with a XBRL taxonomy schema, with XBRL relations and resources, but without XBRL Formulas is an example.*
- **Level 4²⁷**: Machine readable, global standard syntax, structured for meaning, with taxonomy (a.k.a. dictionary), complete set of rules provided, incomplete high-level report model. *An XBRL-based report with a XBRL taxonomy schema, with XBRL relations and resources, and with XBRL Formulas that completely describes the report is an example.*
- **Level 5²⁸**: Machine readable, global standard syntax, structured for meaning, with taxonomy (a.k.a. dictionary), complete set of rules provided, complete global standard high-level report model, yields PROVEN properly functioning system and UNDERSTANDABLE report information. *An XBRL-based report with all the characteristics of level 4, plus consistency cross checks, type-subtype relations, consistent modeling of XBRL presentation relations, information that describes the correct representation of every disclosure within the report, and a reporting checklist that describes all required disclosures is an example.*
- **Level 6**: All of Level 5 PLUS blockchain-anchored XBRL to increase trust. *An XBRL-based report with all the characteristics of level 5, plus information within a digital distributed ledger that assures no one has tampered with the report is an example.*
- **Level 7**: All of Level 6 PLUS blockchain-anchored transactions and events. *An XBRL-based report with all the characteristics of level 6, plus information that indicates that assures no one has tampered with transactions is an example.*

The target of this method is Level 5 and above. Below Level 5 the functionality what we generally need from such reports in terms of quality and effective use of reported information in automated machine-based processes is not good enough.

Levels 6 and 7 offer additional features to this method.

1.3. Summary of Core Verification Provided by Method

The following is a succinct overview of the verification provide by this method. The primary objective is to control the modification of report models where report models

²⁴ Level 1 financial report example, <http://xbrlsite.azurewebsites.net/2021/reporting-scheme/proof/reference-level1/>

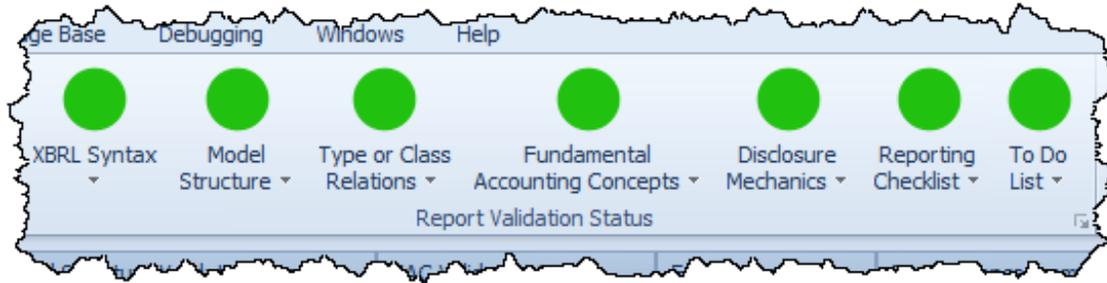
²⁵ Level 2 financial report example, <http://xbrlsite.azurewebsites.net/2021/reporting-scheme/proof/reference-level2/>

²⁶ Level 3 financial report example, <http://xbrlsite.azurewebsites.net/2021/reporting-scheme/proof/reference-level3/>

²⁷ Level 4 financial report example, <http://xbrlsite.azurewebsites.net/2021/reporting-scheme/proof/reference-level4/>

²⁸ Level 5 financial report example, <http://xbrlsite.azurewebsites.net/2021/reporting-scheme/proof/reference-level5/>

can be modified by report creators. Financial reporting is included within this use case. What this means is that modifications to the report model are controlled and limited to what is permitted by the method. This graphic provides somewhat of a “dashboard” for understanding this method verification processes:



The dashboard has seven categories that are explained as follows:

1. **XBRL Syntax:** This category of rules is provided by XBRL International in the form of a machine-readable set of rules referred to as a conformance suite²⁹. This conformance suite is 100% automatable via computer-based processes and used to be sure the XBRL technical format is consistent with the expectations of the XBRL Technical specification. The XBRL conformance suite has helped software vendors get their XBRL technical syntax consistent and today about 99.99% of all XBRL-based financial reports are consistent with expectation. But, this checks only the information FORMAT, not the MEANING conveyed by the information.
2. **Model Structure:** This category of rules overcomes missing information related to the relationship between the categories of report elements that are used to structure a financial report model. While the permissible sorts of XBRL calculation relations and XBRL definition relations and certain aspects of XBRL presentation relations are specified by the XBRL technical specification; information about the permissible associations between the categories of report elements as shown by the matrix below are not specified. The model structure rules simply explicitly specify these rules:

		Parent						
		Network	Table	Axis	Member	Line Items	Abstract	Concept
Child	Network	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

3. **Type or class relations** (a.k.a. type-subtype relations): This category of rules specifies allowed subtype relations for each type defined in an XBRL taxonomy. Other terms for this are “is-a” relations or “general-special” relations or “wider-narrower” relations. An example would be a type-subtype

²⁹ XBRL International, XBRL 2.1, <https://specifications.xbrl.org/work-product-index-group-base-spec-base-spec.html>

- rule that specifies that “Accounts Payable” is a sub type of the “Current Liabilities” type. This prevents the inadvertent use of “Accounts Payable” as a part of “Noncurrent Liabilities” or “Equity”, etc.
4. **Fundamental accounting concepts:** This category of rules specifies information that helps detect common inconsistencies and contradictions within a financial report³⁰. Consistency cross checks are created³¹ against expectation. There are many examples of the types of errors that have been known to commonly occur³². For example, for US GAAP XBRL-based financial reports submitted to the SEC a common error was to use the concept “us-gaap:NoncurrentAssets” to represent information for which the concept “us-gaap:AssetsNoncurrent” should have been used.
 5. **Disclosure mechanics:** This category of rules is used to specify the permissible representations of each specific disclosure. For example, the disclosure “Components of Inventories” would be specified to be a “roll up” mathematical relation which uses the concept “us-gaap:InventoryNet” or a permissible alternative to represent that total. Disclosure mechanics rules likewise specify that the concept “us-gaap:ScheduleOfInventoriesTextBlock” should be used to represent the Level 3 disclosure text block disclosure.
 6. **Reporting checklist:** This category of rules is used to specify the permissible sets of disclosures that are required to exist within a financial report. For example, the fact that a balance sheet is always required to be included can be specified, as would be the case for an income statement, statement of cash flow, or statement of changes in equity. The fact that a combined statement of comprehensive income and income could be used as an alternative can be specified. Finally, if a specific line item such as “Inventories” is provided on the balance sheet, the fact that an inventories policy and inventories disclosure must be provided can be specified.
 7. **To do list:** This category of rules is for cases where either (a) a rule CANNOT be specified in machine-readable terms because the rules language used is not expressive enough to represent the rule or (b) a rule COULD have been represented but it simply HAS NOT been represented and therefore manual work is necessary to verify report logic that could have been automated.

And so, XBRL Syntax validation provides only a small subset of what can be verified to be correctly represented within an XBRL-based financial report. Categories 2 through 6 must either be (a) also represented using machine-readable rules and verified using automated processes or (b) verified using manual processes which are less reliable and therefore more prone to error.

³⁰ 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>

³¹ Consistency cross check rules, http://xbrlsite.azurewebsites.net/2019/Library/Signals_2019-03-31.jpg

³² High-quality examples of errors, <http://xbrl.squarespace.com/journal/2017/4/29/high-quality-examples-of-errors-in-xbrl-based-financial-repo.html>

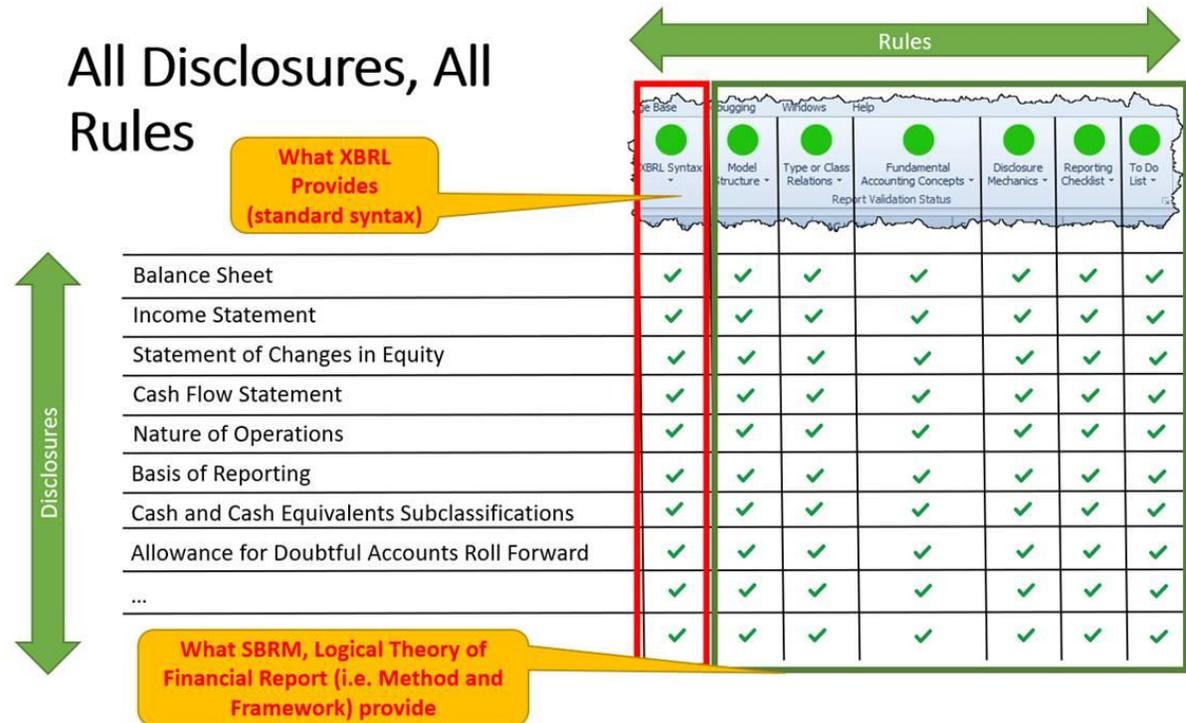
1.4. Using Method: Provably Complete, Consistent, Precise

The objective of the method is to empower you, the report creator, and the software applications you use with the knowledge you need to avoid creating clumsy, ugly, barely functionally reports of poor quality. This is achieved by embedding good practices-based functionality within software that keeps you on track and consciousness as to what you are doing when you create an XBRL-based financial report. The result. Elegant, beautiful, provably high-quality XBRL-based financial reports that are properly functioning logical systems.

1.4.1. Divide and Conquer

In terms of **verification tasks**; XBRL Syntax validation, category 1 above, provides only a small subset of what must be verified to be correctly represented within an XBRL-based financial report. Categories 2 through 6 must either be (a) also represented using machine-readable rules and therefore verifiable using automated processes or (b) verified using manual processes which are less reliable and therefore more prone to error; which tends to be impractical. Category 7 must always be verified using manual processes; no way to automate these tasks.

All verification tasks, categories 1 through 7, must be performed for **each fragment** of an XBRL-based financial report to prove that each individual fragment is consistent, complete, and precise and that **any intersection between one report fragment** and some other report fragment is consistent (i.e., does not contradict or is not inconsistent with some other report fragment). The graphic below summarizes this visually:



If 100% of the rule categories (verification) are specified for 100% of the disclosures (fragments) that exist within an XBRL-based report; then a control mechanism is provided to verify that the financial information conveyed within an XBRL-based

report is consistent with specified statutory and regulatory rules and other structural, mechanical, mathematical, and logical rules.

System specific rules such as the SEC Edgar Filer Manual rules or the ESMA's European Single Electronic Format (ESEF) are simply further restrictions and therefore additional rules; just another column in the grid above. Additional columns of rules can be added, but no columns can be removed.

For example, if one desired to add the XBRL US "Data Quality Checks", then a new column is simply added. Want to add a "spell checker"? That can be added also. But you simply cannot remove an existing column because then errors can slip into the system.

If such a control mechanism is provided; then as shown in *Effective Automation of Record to Report Process*³³ and as explained in *Understanding Digital*³⁴, accounting, reporting, auditing, and analysis tasks and processes **can be automated to the degree that such rules exist to enable such automation**. Humans (a) deal with exceptions and (b) perform any necessary manual checks.

Further, when such processes leverage Lean Six Sigma philosophies and techniques³⁵, financial report quality can be controlled (as contrast to making mistakes and then spending hours and hours of human effort to detect and correct errors).

The best way to understand the need for this method and the process control mechanisms that it provides is to understand the impediments to creating a properly functioning logical system. We do that in a later section below by looking at the impediments to properly functioning logical systems. But before we do that we want to start with a small report and build up to larger and larger reports so you can get a sense of how this method actually works.

Remember the following. Control is achieved by using rules. Rules guarantee high-quality. High quality results in effective automation. Because the method is thorough and complete, processes can be effectively automated. How exactly can you be sure your financial report is a true and fair representation of the financial position and financial performance of your entity without testing it to be sure the report is working effectively? If you cannot measure it, you cannot control it.

Process automation and automated verification reduces the risk of noncompliance. Hope and chance are not good strategies for complying with statutory and regulatory reporting rules.

Being able to effectively exchange information between processes which enables the automation of those processes provides social benefit. Among those benefits are cost reduction, process quality improvement, ability to provide new products/services, and improved functioning of capital markets resulting from these process improvements.

So, we will start small and explain step-by-step how this method works. We will start with a tiny financial report where we represent the apex of double entry accounting, the accounting equation. From the accounting equation we increase the

³³ Effective Automation of Record to Report Process, <http://xbrl.squarespace.com/journal/2020/11/3/effective-automation-of-record-to-report-process.html>

³⁴ Understanding Digital, <http://xbrlsite.azurewebsites.net/2020/Library/UnderstandingDigital.pdf>

³⁵ Lean Six Sigma, http://www.xbrlsite.com/mastering/Part01_Chapter02.K_LeanSixSigma.pdf

number of disclosures (fragments) from one to three. Common elements of financial reports increase things more. Proof adds sophistication of reported components. Then the MINI Financial Reporting Scheme helps you see what a basic financial reporting scheme looks like³⁶. Finally, we apply this method to a real XBRL-based financial report, the Microsoft 10-K.

But, let's start small and grow your understanding!

1.4.2. Accounting Equation

The accounting equation represents the fundamental model of double entry accounting: $Assets = Liabilities + Equity$. This implies three terms: Assets, Liabilities, Equity. A report created to represent the accounting equation in the form of an XBRL-based digital financial report would include:

- Three terms: Assets, Liabilities, Equity
- One structure: Balance Sheet
- Three associations: Assets is part of a Balance Sheet; Liabilities is part of a Balance Sheet; Equity is part of a Balance Sheet.
- One rule: $Assets = Liabilities + Equity$
- Three facts: Assets of 5000; Liabilities of 1000; Equity of 4000

There are other unimportant details that you could deal with but which we will ignore here such as labels, languages, currency units, and so forth. All of these details are handled by XBRL and the examination of a detailed example can help you understand those details³⁷.

Our focus is on a higher. We want to help you see that a report is made up of blocks of information, that disclosures are represented using these blocks of information, and that you can determine whether your report contains all the required disclosures represented by the blocks of information.

Visually, this is what our tiny accounting equation report would look like in an application that can load such an XBRL-based digital financial report:

The screenshot displays an XBRL viewer interface. On the left, the 'Components' pane shows a tree view with '01-Balance Sheet' selected. The main area shows a 'Balance Sheet [Arithmetic]' table for the period 2019-12-31. The table data is as follows:

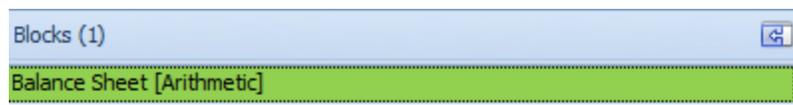
Balance Sheet [Line Items]	2019-12-31
Balance Sheet [Arithmetic]	
Assets	5,000
Liabilities	1,000
Equity	4,000

³⁶ Updated Luca Documentation and Tutorials, <http://xbrl.squarespace.com/journal/2021/10/11/updated-luca-tutorial-documentation-learn-about-digital-fina.html>

³⁷ Accounting Equation represented using XBRL, <http://xbrl.azurewebsites.net/2020/master/ae/index.html>

The following provides a summary of the details we will be focusing on from an XBRL-based financial report. We will be focusing on these specific details in the other report examples as we build up to what an accountant would consider to be a real example of a financial report.

Information Blocks:



Disclosures:

Primary Information									
#	Disclosure	Category	Level	Pattern	Disclosure Found	Disclosure Consistent	Applicable	Representation Concept [TEXT BLOCK]	Representation Concept DETAIL
1	Balance Sheet	Unknown	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Assets

Reporting checklist:

#	Disclosure	Checklist Category	Reason Disclosure Must Exist	Discovered	Expectation Met	Link to Disclosure Mechanics
0	Reporting Checklist					
1	Balance Sheet	Required disclosure	Disclosure always required	True	CONSISTENT	Balance Sheet

We are going to take the time to describe what you should be focusing on as you proceed through the coming examples. The objective is to see and understand the similarities, or patterns, that exist for each of these small reports and also for the larger “real” XBRL-based digital financial report.

In this accounting equation example, we see that:

- We have one information block, “Balance Sheet [Arithmetic]”
- That single information block is used to represent the one disclosure in this example, “Balance Sheet” disclosure.
 - This disclosure follows the mechanical rules for representing that disclosure using the XBRL technical syntax.
- The reporting checklist specifies that the disclosure “Balance Sheet” is required to exist.

All of the above is enforced using XBRL-based machine-readable rules that, when processed by a logic/rules/reasoning engine, can determine if a block of information is properly functioning.

Our focus here is not on those rules or how the rules are processed. Our focus is on the blocks of information; that each block of information can be verified to be properly functioning, complete, and precise; and that if we can do this for one block of information then the same technique can be applied to other blocks of information in a similar manner.

The accounting equation example has exactly one block of information that is used to represent one disclosure that is the one required fragment that needs to exist within this tiny financial report we have specified as the accounting equation. But let’s now expand our example slightly.

1.4.3.SFAC 6

SFAC 6 represents the *Elements of Financial Statements*³⁸ defined by the FASB in SFAC 6. SFAC 6 builds on the accounting equation and adds a handful of additional elements. The elements are: Assets, Liabilities, Equity, Comprehensive Income, Revenues, Expenses, Gains, Losses, Investments by Owners, Distributions to Owners. The 10 elements are organized into three structures: Balance sheet, Comprehensive Income, Changes in Equity. There are three rules that describe the mathematical relationships of the elements: Assets = Liabilities + Equity; Comprehensive Income = Revenues - Expenses + Gains - Losses; Equity^{T1} = Equity^{T0} + Comprehensive Income + Investments by Owners - Distributions to owners.

We are not going to explain all the details, but will rather focus on the specific details which help the reader see the patterns we are pointing out.

The screenshot shows a software interface with a left sidebar for 'Components (3)' and a main area for 'Component: (Network and Table)'. The sidebar lists three components: 01-Balance Sheet, 02-Comprehensive Income, and 03-Changes in Equity. The main area displays a table for the Balance Sheet for the period 2020-12-31 to 2019-12-31. The table shows Assets (3,500), Liabilities (0), and Equity (3,500).

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

Information Blocks:

The screenshot shows a software interface with a 'Blocks (3)' section. It lists three blocks: Balance Sheet [Arithmetic], Comprehensive Income [Roll Up], and Changes in Equity [Roll Forward].

Disclosure mechanics:

Show more information									
Primary Information									
#	Disclosure	Category	Level	Pattern	Disclosure Found	Disclosure Consistent	Applicable	Representation Concept [TEXT BLOCK]	Representation Concept DETAIL
1	Balance Sheet	Unknown	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Assets
2	Changes in Equity	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Equity
3	Comprehensive Income	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Comprehensive Income

Reporting checklist:

#	Disclosure	Checklist Category	Reason Disclosure Must Exist	Discovered	Expectation Met	Link to Disclosure Mechanics
0	Reporting Checklist					
1	Balance Sheet	Required disclosure	Disclosure always required	True	CONSISTENT	Balance Sheet
2	Comprehensive Income	Required disclosure	Disclosure always required	True	CONSISTENT	Comprehensive Income
3	Changes in Equity	Required disclosure	Disclosure always required	True	CONSISTENT	Changes in Equity

³⁸ SFAC 6 representation, <http://xbrlsite.azurewebsites.net/2020/master/sfac6/index.html>

We do want to introduce the notion of articulation, the fact that the three disclosures provided are intentionally and inextricably linked together:

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

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

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

The point here is that we have three information blocks as contrast to the one of the first example, we have three disclosures as contrast to the one of the first example, and that all three disclosures are intentionally mathematically interconnected.

Our tiny financial report is growing! Let us now grow it some more.

1.4.4. Common Elements of Financial Statement

The common elements of financial statements builds on SFAC 6 by adding a hand full of additional report elements which enables the construction of a more recognizable balance sheet and adds report elements for a cash flow statement.

In addition, this example highlights the notion that different economic entities creating financial reports might use different structures to represent reported information. For example, a for profit economic entity would likely use a "Balance Sheet" whereas a not-for-profit economic entity might use a "Statement of Net Assets".

While different economic entities might report using different styles of information structures; each disclosure can be represented as a specific block of information which has specific mechanical, mathematical, logical, and other such relations. But fundamentally, they are blocks of information; only different blocks of information.

And so, a financial report that would represent the common elements of a financial statement might look something like the following³⁹:

³⁹ Common Elements of Financial Statement (Four Statement Model), <http://xbrlsite.azurewebsites.net/2020/master/common/index.html>

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The screenshot displays the XBRL software interface. On the left, the 'Components (7)' pane shows a tree view of components, with '01-Balance Sheet' selected. Below it, 'Component Properties' are listed for the selected component. On the right, the 'Rendering' pane shows a 'Balance Sheet' table for the reporting entity 'GH259400TOMPUOL565II' in USD for the period 2020-12-31. The table is structured as follows:

Balance Sheet [Line Items]	2020-12-31	2019-12-31
Assets [Roll Up]		
Current Assets	500	0
Noncurrent Assets	3,000	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 Interests	3,000	0
Equity Attributable to Noncontrolling Interests	500	0
Equity	3,500	0
Liabilities and Equity	3,500	0

Information Blocks:

The 'Blocks (9)' pane lists the following information blocks:

- Assets [Roll Up]
- Liabilities and Equity [Roll Up]
- Net Assets [Roll Up]
- Comprehensive Income [Roll Up]
- Comprehensive Income [Roll Up]
- Comprehensive Income [Roll Up]
- Assets Roll Forward [Roll Up] [Roll Forward]
- Net Cash Flow [Roll Up]
- Changes in Equity [Roll Forward]

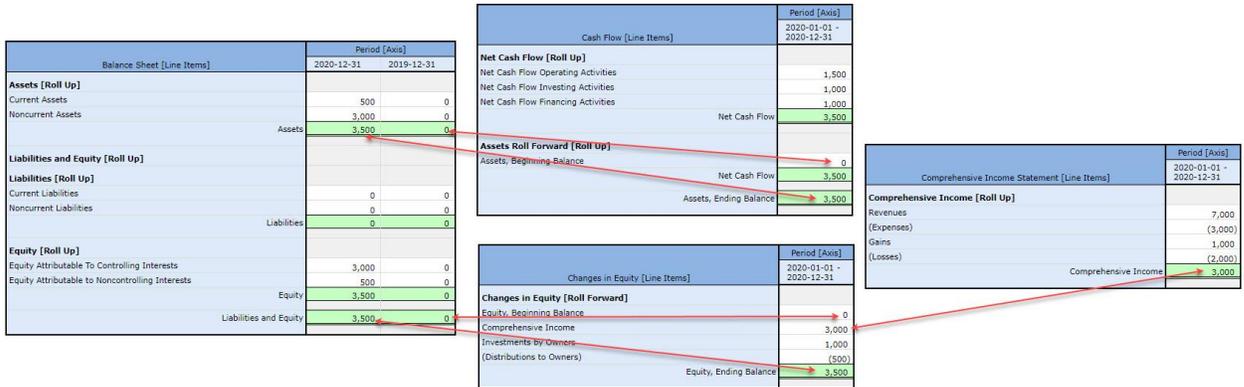
Disclosure mechanics:

#	Disclosure	Category	Level	Pattern	Disclosure Found	Disclosure Consistent	Applicable	Representation Concept [TEXT BLOCK]	Representation Concept DETAIL
1	Assets Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Assets
2	Assets Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Assets
3	Balance Sheet	Unknown	UNKNOWN	Component	True	CONSISTENT	True	-	-
4	Cash Flow Statement	Unknown	UNKNOWN	Component	True	CONSISTENT	True	-	-
5	Changes in Equity	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Equity
6	Comprehensive Income	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Comprehensive Income
7	Comprehensive Income 2	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Comprehensive Income
8	Comprehensive Income 3	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Comprehensive Income
9	Liabilities and Equity Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Assets
10	Net Assets Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Net Assets
11	Net Cash Flow Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Net Cash Flow

Reporting checklist:

#	Disclosure	Checklist Category	Reason Disclosure Must Exist	Discovered	Expectation Met	Link to Disclosure Mechanics
0	Reporting Checklist					
1	Balance Sheet	Required disclosure	Disclosure always required, satisfied by Assets Roll Up and Liabilities an...	True	CONSISTENT	Balance Sheet
2	Assets Roll Up	Part of disclosure	Satisfies Balance Sheet disclosure	True	CONSISTENT	Assets Roll Up
3	Liabilities and Equity Roll Up	Part of disclosure	Satisfies Balance Sheet disclosure	True	CONSISTENT	Liabilities and Equity Roll Up
4	Cash Flow Statement	Required disclosure	Disclosure always required, satisfied by Net Cash Flow Roll Up and Ass...	True	CONSISTENT	Cash Flow Statement
5	Net Cash Flow Roll Up	Part of disclosure	Satisfies Cash Flow Statement disclosure	True	CONSISTENT	Net Cash Flow Roll Up
6	Assets Roll Forward	Part of disclosure	Satisfies Cash Flow Statement disclosure	True	CONSISTENT	Assets Roll Forward
7	Comprehensive Income	Required disclosure	Disclosure always required	True	CONSISTENT	Comprehensive Income
8	Comprehensive Income 2	Required disclosure	Disclosure always required	True	CONSISTENT	Comprehensive Income 2
9	Comprehensive Income 3	Required disclosure	Disclosure always required	True	CONSISTENT	Comprehensive Income 3
10	Net Assets Roll Up	Possible disclosure	Disclosure is present	True	CONSISTENT	Net Assets Roll Up
11	Changes in Equity	Required disclosure	Disclosure always required	True	CONSISTENT	Changes in Equity

Articulation⁴⁰:



And so, the number of information blocks and disclosures continues to grow, but the patterns we see are exactly the same but are only increasing in volume.

1.4.5. Proof

In the subsequent examples, we take the information structures that are provided in the example and then represent them as an XBRL-based financial report. We have done this for the accounting equation, SFAC 6 Elements of Financial Statements, and the Common Elements of Financial Statements.

The PROOF representation takes the opposite approach.

The PROOF⁴¹ example model was created by observing the full set of about 6,023 US GAAP based financial reports submitted to the SES and about 406 IFRS based financial reports submitted to the SEC, examining 100% of the information patterns we find and then combining all those information patterns into a single report we call PROOF.

As we will show, all the logical information artifacts we see in the PROOF representation can be leveraged to represent, say, the Microsoft 10-K financial report⁴². Likewise, these logical artifacts can be likewise used to represent the financial reports of Apple, Amazon, Google/Alphabet, Facebook, Salesforce⁴³.

⁴⁰ Common Elements of Financial Statement, Articulation,

<http://xbrl.azurewebsites.net/2020/core/master-common/ArticulationFourStatementModel.jpg>

⁴¹ Understanding Proof, <http://xbrl.azurewebsites.net/2020/Library/UnderstandingProof.pdf>

⁴² Microsoft Analysis, <http://xbrl.squarespace.com/journal/2020/4/13/microsoft-xbrl-based-report-analysis.html>

⁴³ Software Companies Prototype, <http://xbrl.squarespace.com/journal/2020/4/2/software-companies-prototype.html>

Likewise, these logical artifacts are all that you need to represent any one of the 6,023 10-K financial reports which submits information using XBRL to the SEC using the US GAAP or IFRS financial reporting schemes⁴⁴.

Here is a summary of those logical artifacts:

financial reports submitted to the SEC by public companies:

- **Total reports:** 6,023
- **Total facts reported:** 8,532,275
- **Average facts per report:** 1,416
- **Total networks in all reports:** 462,786
- **Average networks per report:** 77
- **Total fact sets in all reports:** 754,430
- **Average fact sets per report:** 125
- **Average fact sets per network:** 1.6
- **Average facts per network:** 18
- **Average facts per fact set:** 11

Of the 754,430 fact sets there are:

- **Text blocks:** 407,392 (54%) are text blocks (Level 1 Notes, Level 2 Policies, Level 3 Disclosures)
- **Sets:** 181,063 (24%) are sets (or hierarchies, no mathematical computations)
- **Roll ups:** 120,708 (16%) are roll ups
- **Roll forwards:** 37,721 (5%) are roll forwards
- **Roll forward info:** 7,546 (1%) are roll forward infos or something else

If you want to have a look at some fact sets, see: [US GAAP](#) | [IFRS](#).

over 20 different financial reporting schemes, but they all represent the

Similar results were achieved with another earlier analysis of 6,751 US GAAP based 10-K financial reports⁴⁵.

Further, these logical artifacts that are used for US GAAP and IFRS will work for literally any other financial reporting scheme⁴⁶. A financial reporting scheme by definition (a) follows the rules of the double entry accounting model, (b) follows the rules of the accounting equation in some form, and (c) defines some set of elements of financial statements. And so, this very basic representation of SFAC 6 elements of

⁴⁴ Breaking down the pieces, <http://xbrl.squarespace.com/journal/2019/4/9/breaking-down-the-pieces-of-an-xbrl-based-digital-financial.html>

⁴⁵ Analysis of 6,751 XBRL-based Public Company 10-Ks Submitted to SEC, http://www.xbrlsite.com/mastering/Part05_Chapter08.F_AnalysisOf675110Ks.pdf

⁴⁶ Comparison of Financial Reporting Schemes, <http://xbrlsite.azurewebsites.net/2020/master/ElementsOfFinancialStatements.pdf>

financial statements⁴⁷ can be created for any financial reporting scheme; you simply use the terms and associations defined by that specific financial reporting scheme.

Finally, if I am incorrect and there is some other logical artifact that is necessary to represent financial reports from some other financial reporting scheme; that logical artifact simply needs to be added to the PROOF logical artifacts, explained the PROOF until it does meet that need.

And so, here are the logical artifacts of the PROOF representation⁴⁸:

The screenshot displays the 'Component View' of an XBRL model. On the left, a list of components is shown, with '01-Balance Sheet' selected. The main area on the right shows the details for the selected component, including its reporting entity (GH259400TOMPUOLS65II), unit (USD), and a table of values for the periods 2020-12-31 and 2019-12-31.

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

⁴⁷ SFAC 6 representation, <http://xbrlsite.azurewebsites.net/2020/master/sfac6-basic/>

⁴⁸ PROOF representation, <http://xbrlsite.azurewebsites.net/2020/master/proof/index.html>

Information Blocks:

Blocks (11)	
Balance Sheet [Arithmetic Expression] [Hierarchy]	
Comprehensive Income [Roll Up]	
Changes in Equity [Roll Forward]	
Prior Period Errors [Adjustment]	
Variance Analysis [Roll Up]	
Weighted Average Grant Date Fair Value [Roll Forward Info]	
Financial Highlights [Set] [Hierarchy]	
Basis of Reporting [Text Block]	
Nature of Operations [Text Block]	
Revenue Recognition Policy [Text Block]	
Segment Revenues [Set] [Hierarchy]	

Disclosures:

Primary Information									
#	Disclosure	Category	Level	Pattern	Disclosure Found	Disclosure Consistent	Applicable	Representation Concept [TEXT BLOCK]	Representation Concept DETAIL
1	Balance Sheet	Unknown	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Assets
2	Basis of Reporting	Unknown	Level1TextBlock	TextBlock	True	CONSISTENT	True	Basis of Reporting [Text Block]	NOT-EXPECTED
3	Changes in Equity	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Equity
4	Financial Highlights	Unknown	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Revenues
5	Income Statement	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Comprehensive Income
6	Nature of Operations	Unknown	Level1TextBlock	TextBlock	True	CONSISTENT	True	Nature of Operations [Text Block]	NOT-EXPECTED
7	Prior Period Errors	Unknown	Level4Detail	Adjustment	True	CONSISTENT	True	NOT-EXPECTED	Equity
8	Revenue Recognitio...	Unknown	Level1TextBlock	TextBlock	True	CONSISTENT	True	Revenue Recognition Policy [Text Block]	NOT-EXPECTED
9	Segment Revenues	Unknown	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Revenues
10	Stock Plan Activity	Unknown	Level4Detail	RollForwar...	True	CONSISTENT	True	NOT-EXPECTED	Nonvested Fair Value
11	Variance Analysis	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Comprehensive Income

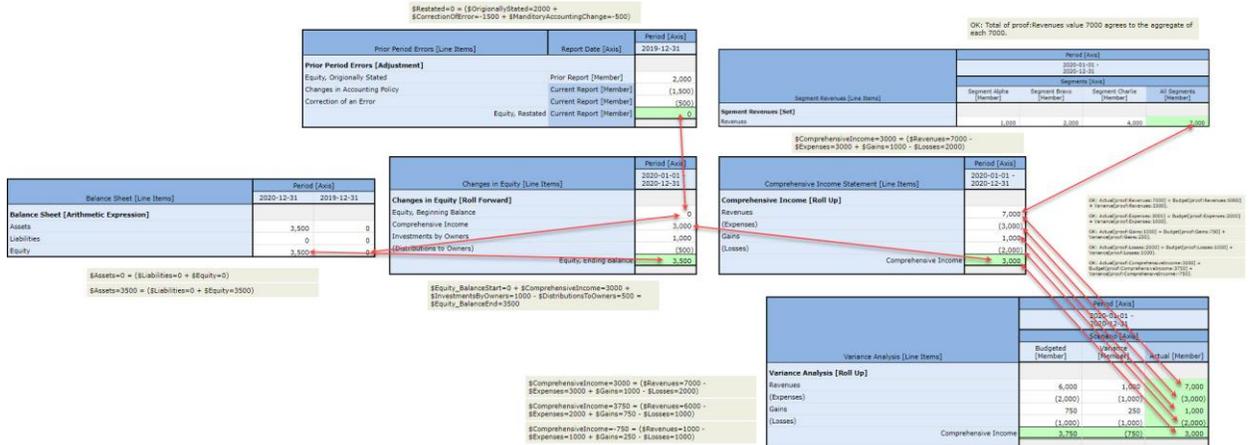
Reporting Checklist:

#	Disclosure	Checklist Category	Reason Disclosure Must Exist	Discovered	Expectation Met	Link to Disclosure Mechanics
0	Reporting Checklist					
1	Balance Sheet	Required disclosure	Disclosure always required	True	CONSISTENT	Balance Sheet
2	Income Statement	Required disclosure	Disclosure always required	True	CONSISTENT	Income Statement
3	Changes in Equity	Required disclosure	Disclosure always required	True	CONSISTENT	Changes in Equity
4	Financial Highlights	Possible disclosure	Disclosure is present	True	CONSISTENT	Financial Highlights
5	Prior Period Errors	Possible disclosure	Disclosure is present	True	CONSISTENT	Prior Period Errors
6	Variance Analysis	Possible disclosure	Disclosure is present	True	CONSISTENT	Variance Analysis
7	Segment Revenues	Possible disclosure	Disclosure is present	True	CONSISTENT	Segment Revenues
8	Stock Plan Activity	Possible disclosure	Disclosure is present	True	CONSISTENT	Stock Plan Activity
9	Basis of Reporting	Required disclosure	Disclosure always required	True	CONSISTENT	Basis of Reporting
10	Nature of Operations	Required disclosure	Disclosure always required	True	CONSISTENT	Nature of Operations
11	Revenue Recognition Policy	Required disclosure	Disclosure always required	True	CONSISTENT	Revenue Recognition Policy

Articulation⁴⁹:

⁴⁹ Proof, Articulation,
<http://xbrl.azurewebsites.net/2020/master/proof/ProofMathematicalComputations.jpg>

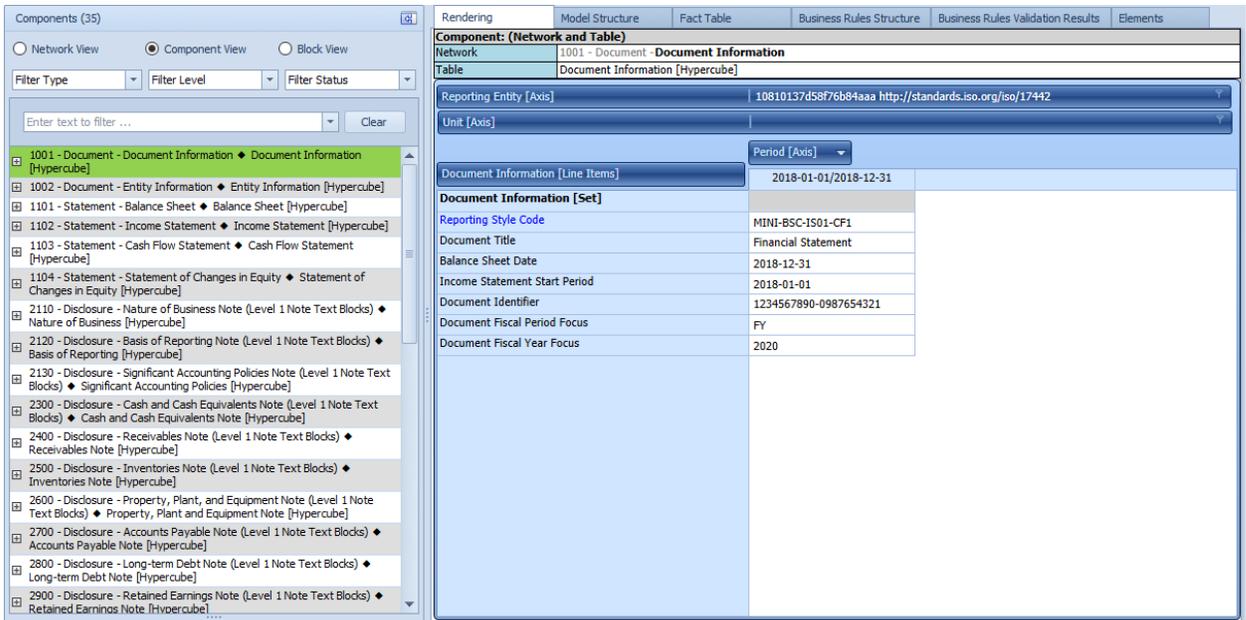
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And so again the volume continues to increase but the shape or pattern that each new information block and all the logical artifacts necessary to describe the information block, and therefore disclosures represented using that information block, do not change.

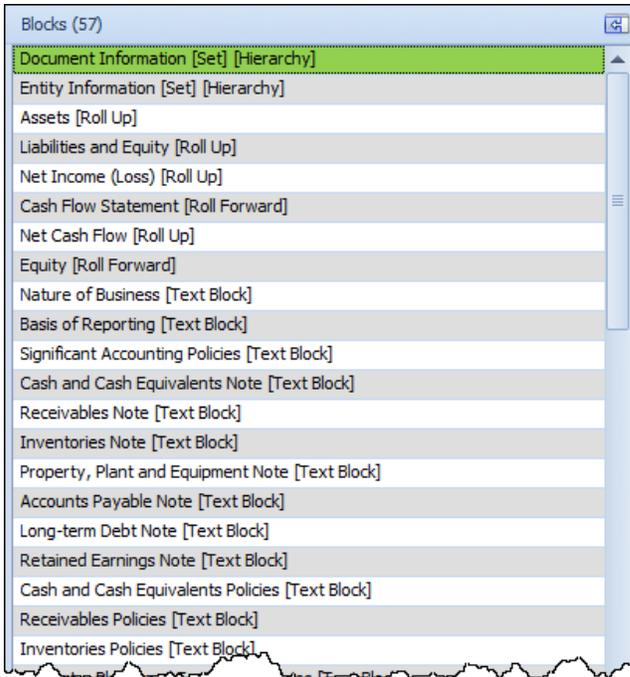
1.4.6.MINI

Our final example, which I refer to as the MINI financial reporting scheme⁵⁰ which has some interesting characteristics related to internal financial reporting, rounds out our examples. The MINI is represented more like a complete financial reporting scheme than a single report. It does not have all the sophisticated information models of the PROOF, but it ties information together in another way using the accounting system trial balance.



Information Blocks:

⁵⁰ MINI Financial Reporting Scheme, <http://xbrlsite.azurewebsites.net/2019/Prototype/mini/documentation/Home.html>



Disclosure Mechanics:

Primary Information										
#	Disclosure	Category	Level	Pattern	Disclosure Found	Disclosure Consistent	Applicable	Representation Concept [TEXT BLOCK]	Representation Concept DETAIL	
1	Accounts Payable Roll Forward	Unknown	Level3TextBlock/Level4Detail	RollForward	True	CONSISTENT	True	Accounts Payable Roll Forward [Text Block]	Accounts Payable	
2	Accounts Payable Subclassifications	Unknown	Level3TextBlock/Level4Detail	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	Level3TextBlock	TextBlock	True	CONSISTENT	True	Basis of Reporting [Text Block]	NOT-EXPECTED	
6	Cash and Cash Equivalents Roll Forward	Unknown	Level3TextBlock/Level4Detail	RollForward	True	CONSISTENT	True	Cash and Cash Equivalents Roll Forward [Text Block]	Cash and Cash Equivalents	
7	Cash and Cash Equivalents Subclassifications	Unknown	Level3TextBlock/Level4Detail	RollUp	True	CONSISTENT	True	Cash and Cash Equivalents Subclassifications [Text Block]	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/Level4Detail	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/Level4Detail	RollForward	True	CONSISTENT	True	Inventories Roll Forward [Text Block]	Inventories	
15	Inventories Subclassifications	Unknown	Level3TextBlock/Level4Detail	RollUp	True	CONSISTENT	True	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/Level4Detail	RollUp	True	CONSISTENT	True	Long-term Debt Maturities [Text Block]	Long-term Debt	
18	Long-Term Debt Roll Forward	Unknown	Level3TextBlock/Level4Detail	RollForward	True	CONSISTENT	True	Long-term Debt Roll Forward [Text Block]	Long-term Debt	
19	Long-Term Debt Subclassifications	Unknown	Level3TextBlock/Level4Detail	RollUp	True	CONSISTENT	True	Long-term Debt Subclassifications [Text Block]	Long-term Debt	
20	Nature of Entity	Unknown	Level3TextBlock	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/Level4Detail	RollForward	True	CONSISTENT	True	Property, Plant, and Equipment Roll Forward [Text Block]	Property, Plant and Equipment	
23	Property, Plant, and Equipment, Net Subclassifications	Unknown	Level3TextBlock/Level4Detail	RollUp	True	CONSISTENT	True	Property, Plant, and Equipment Subclassifications [Text Block]	Property, Plant and Equipment	
24	Receivables Roll Forward	Unknown	Level3TextBlock/Level4Detail	RollForward	True	CONSISTENT	True	Receivables Roll Forward [Text Block]	Receivables	
25	Receivables Subclassifications	Unknown	Level3TextBlock/Level4Detail	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	Level3TextBlock	TextBlock	True	CONSISTENT	True	Significant Accounting Policies [Text Block]	NOT-EXPECTED	
28	Statement of Changes in Equity	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Equity	
29	Transactions Groupings	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Check Sum Changes	
30	Trial Balance	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Check Sum	

Reporting Checklist:

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#	Disclosure	Checklist Category	Reason Disclosure Must Exist	Discovered	Expectation Met	Link to Disclosure Mechanics
0	Reporting Checklist					
1	Document Information	Required disclosure	Disclosure always required	True	CONSISTENT	Document Information
2	Inventories Subclassifications	Possible disclosure	Disclosure is present	True	CONSISTENT	Inventories Subclassifications
3	Inventories Roll Forward	Possible disclosure	Disclosure is present	True	CONSISTENT	Inventories Roll Forward
4	Transactions Groupings	Possible disclosure	Disclosure is present	True	CONSISTENT	Transactions Groupings
5	Trial Balance	Possible disclosure	Disclosure is present	True	CONSISTENT	Trial Balance
6	Entity Information	Required disclosure	Disclosure always required	True	CONSISTENT	Entity Information
7	Balance Sheet, Classified	Required disclosure	Disclosure always required, satisfied by Assets Roll Up and Liabilities and Equity...	True	CONSISTENT	Balance Sheet, Classified
8	Assets Roll Up	Part of disclosure	Satisfies Balance Sheet, Classified disclosure	True	CONSISTENT	Assets Roll Up
9	Liabilities and Equity Roll Up	Part of disclosure	Satisfies Balance Sheet, Classified disclosure	True	CONSISTENT	Liabilities and Equity Roll Up
10	Income Statement	Required disclosure	Disclosure always required	True	CONSISTENT	Income Statement
11	Cash Flow Statement, Direct Method	Required disclosure	Disclosure always required, satisfied by Net Cash Flow Roll Up and Cash and Ca...	True	CONSISTENT	Cash Flow Statement, Direct Method
12	Net Cash Flow Roll Up	Part of disclosure	Satisfies Cash Flow Statement, Direct Method disclosure	True	CONSISTENT	Net Cash Flow Roll Up
13	Cash and Cash Equivalents Summary Roll Forward	Part of disclosure	Satisfies Cash Flow Statement, Direct Method disclosure	True	CONSISTENT	Cash and Cash Equivalents Summary Roll Forward
14	Statement of Changes in Equity	Required disclosure	Disclosure always required	True	CONSISTENT	Statement of Changes in Equity
15	Basis of Presentation	Required disclosure	Disclosure always required	True	CONSISTENT	Basis of Presentation
16	Nature of Entity	Required disclosure	Disclosure always required	True	CONSISTENT	Nature of Entity
17	Significant Accounting Policies	Required disclosure	Disclosure always required	True	CONSISTENT	Significant Accounting Policies
18	Cash and Cash Equivalents Roll Forward	Line item exists, then disclosure required	Required because line item mini:CashAndCashEquivalents was reported	True	CONSISTENT	Cash and Cash Equivalents Roll Forward
19	Cash and Cash Equivalents Subclassifications	Line item exists, then disclosure required	Required because line item mini:CashAndCashEquivalents was reported	True	CONSISTENT	Cash and Cash Equivalents Subclassifications
20	Receivables Roll Forward	Line item exists, then disclosure required	Required because line item mini:Receivables was reported	True	CONSISTENT	Receivables Roll Forward
21	Receivables Subclassifications	Line item exists, then disclosure required	Required because line item mini:Receivables was reported	True	CONSISTENT	Receivables Subclassifications
22	Inventories Roll Forward	Line item exists, then disclosure required	Required because line item mini:Inventories was reported	True	CONSISTENT	Inventories Roll Forward
23	Inventories Subclassifications	Line item exists, then disclosure required	Required because line item mini:Inventories was reported	True	CONSISTENT	Inventories Subclassifications
24	Property, Plant, and Equipment, Net Roll Forward	Line item exists, then disclosure required	Required because line item mini:PropertyPlantAndEquipment was reported	True	CONSISTENT	Property, Plant, and Equipment, Net Roll Forward
25	Property, Plant, and Equipment, Net Subclassifications	Line item exists, then disclosure required	Required because line item mini:PropertyPlantAndEquipment was reported	True	CONSISTENT	Property, Plant, and Equipment, Net Subclassifications
26	Accounts Payable Roll Forward	Line item exists, then disclosure required	Required because line item mini:AccountsPayable was reported	True	CONSISTENT	Accounts Payable Roll Forward
27	Accounts Payable Subclassifications	Line item exists, then disclosure required	Required because line item mini:AccountsPayable was reported	True	CONSISTENT	Accounts Payable Subclassifications
28	Retained Earnings Roll Forward	Line item exists, then disclosure required	Required because line item mini:RetainedEarnings was reported	True	CONSISTENT	Retained Earnings Roll Forward
29	Long-Term Debt Subclassifications	Line item exists, then disclosure required	Required because line item mini:LongtermDebt was reported	True	CONSISTENT	Long-Term Debt Subclassifications
30	Long-Term Debt Roll Forward	Line item exists, then disclosure required	Required because line item mini:LongtermDebt was reported	True	CONSISTENT	Long-Term Debt Roll Forward
31	Long-Term Debt Maturities	Line item exists, then disclosure required	Required because line item mini:LongtermDebt was reported	True	CONSISTENT	Long-Term Debt Maturities

Again, the volume of information blocks and disclosures continues to increase, but the logical model of the information still follows identifiable patterns and it is possible to verify that the report is properly functioning, completely described, consistent with expectations, and precise.

1.4.7. Microsoft 10-K (Recast version)

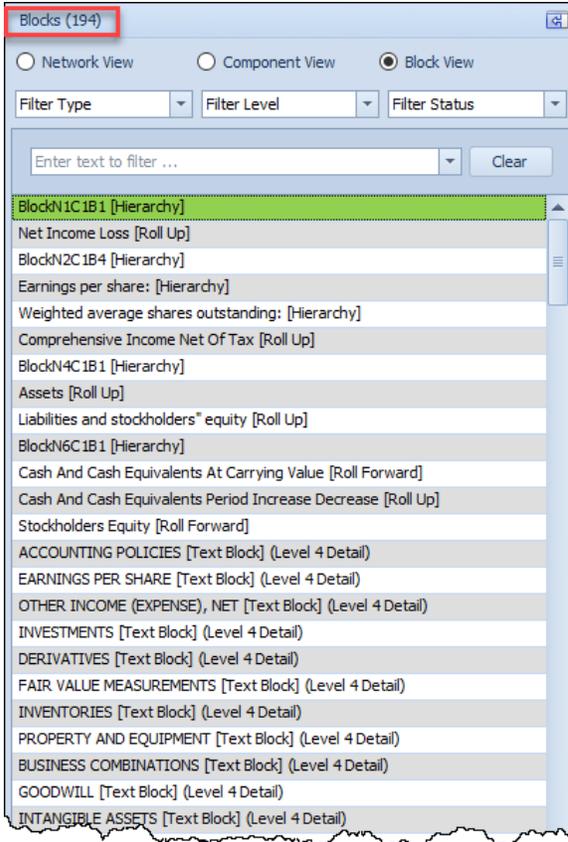
The volume now increases to the size of a real financial report. The Microsoft 2017 10-K, which I have analyzed extensively⁵¹, was modified to add a complete set of rules that describes the report similar to how all the prior sample reports were completely described.

The Microsoft reports has 194 information blocks, 124 disclosures, 2035 facts, 128 Networks.

The screenshot displays the XBRL software interface for the Microsoft 2017 10-K. The left pane shows a tree view of components, with '100000 - Document - Document and Entity Information' selected. The main rendering area shows a table of facts for the 'Document and Entity Information' component. The table has columns for 'Statement [Line Items]', 'Unit [Axis]', and 'Period [Axis]' (2017-07-31, 2016-07-01/2017-06-30, 2016-12-31). The facts include various attributes such as 'Document Type' (10-K), 'Amendment Flag' (false), 'Document Fiscal Year Focus' (2017), 'Trading Symbol' (MSFT), 'Entity Registrant Name' (MICROSOFT CORPORATION), 'Entity Central Index Key' (0000789019), 'Current Fiscal Year End Date' (-06-30), 'Entity Well-known Seasoned Issuer' (Yes), 'Entity Current Reporting Status' (Yes), 'Entity Voluntary Filers' (No), 'Entity Filer Category' (Large Accelerated Filer), 'Entity Common Stock, Par Value Per Share' (USD/shares / shares), 'Entity Common Stock, Shares Outstanding' (7,702,243,979), 'Entity Public Float' (466,500,000,000), and 'I.R.S. Employer Identification No.' (911144442).

Information Blocks:

⁵¹ Microsoft XBRL-based Report Analysis, <http://xbrl.squarespace.com/journal/2020/4/13/microsoft-xbrl-based-report-analysis.html>



Disclosure Mechanics⁵²:

#	Disclosure	Category	Level	Pattern	Disclosure Found	Disclosure Consist...	Applicable	Representation Concept [TEXT BLOCK]	Representation Concept DETAIL
1	Accelerated Share Repurchases [Hierarchy]	Disclosure	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Stock Repurchase Program Authorized Amount
2	Accumulated Other Comprehensive Income (Loss), by Equity Co...	Disclosure	Level3TextBlock/Level4Detail	RollForward	True	CONSISTENT	True	Schedule Of Accumulated Other Comprehensive I...	Stockholders Equity
3	Assets [Roll Up]	Statement	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Assets
4	Assumptions Used in Estimating Fair Value of Stock Award Grant...	Disclosure	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Share Based Compensation Arrangement By Sha...
5	Balance Sheet	Statement	Level4Detail	Component	True	CONSISTENT	True	-	-
6	Balance Sheet, Parenthetical, by Legal Entity [Hierarchy]	Statement	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Allowance For Doubtful Accounts Receivable Cur...
7	Basis of Reporting Note [Note Level]	Disclosure	Level1TextBlock	TextBlock	True	CONSISTENT	True	NOT-EXPECTED	Allowance For Doubtful Accounts Receivable Cur...
8	Business Acquisition, Pro Forma Information [Hierarchy]	Disclosure	Level3TextBlock/Level4Detail	Hierarchy	True	CONSISTENT	True	Business Acquisition Pro Forma Information [Text ...	Business Acquisitions Pro Forma Revenue
9	Business Acquisitions, by Acquisition [Roll Up]	Disclosure	Level3TextBlock/Level4Detail	RollUp	True	CONSISTENT	True	Schedule Of Business Acquisitions By Acquisition [...	Business Combination Recognized Identifiable As...
10	Cash and Cash Equivalents Summary [Roll Forward]	Statement	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Cash And Cash Equivalents At Carrying Value
11	Cash Flow Statement [Roll Forward]	Statement	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Cash And Cash Equivalents Period Increase Deor...
12	Commitments Note [Note Level]	Disclosure	Level1TextBlock	TextBlock	True	CONSISTENT	True	Commitments Disclosure [Text Block]	NOT-EXPECTED
13	Common Stock Outstanding [Roll Forward]	Disclosure	Level3TextBlock/Level4Detail	RollForward	True	CONSISTENT	True	Schedule Of Common Stock Outstanding Roll For...	Common Stock Shares Outstanding
14	Compensation and Employee Benefit Plans Note [Note Level]	Disclosure	Level1TextBlock	TextBlock	True	CONSISTENT	True	NOT-EXPECTED	NOT-EXPECTED
15	Compensation Cost for Share-based Payment Arrangements, All...	Disclosure	Level3TextBlock/Level4Detail	Hierarchy	True	CONSISTENT	True	Schedule Of Compensation Cost For Share Based...	Allocated Share Based Compensation Expense
16	Comprehensive Income (Loss) Note [Note Level]	Disclosure	Level1TextBlock	TextBlock	True	CONSISTENT	True	Comprehensive Income Note [Text Block]	NOT-EXPECTED
17	Contingencies Note [Note Level]	Disclosure	Level1TextBlock	TextBlock	True	CONSISTENT	True	Legal Matters And Contingences [Text Block]	NOT-EXPECTED
18	Corporate and Other Operating Income (Loss) Activity [Hierarchy]	Disclosure	Level3TextBlock/Level4Detail	Hierarchy	True	CONSISTENT	True	Reconciliation Of Operating Profit Loss From Seg...	Operating Income Loss
19	Cost of Sales Policy [Policy Text Block]	Disclosure	Level2TextBlock	TextBlock	True	CONSISTENT	True	Cost Of Sales Policy [Text Block]	NOT-EXPECTED
20	Debt Note [Note Level]	Disclosure	Level1TextBlock	TextBlock	True	CONSISTENT	True	Debt Disclosure [Text Block]	NOT-EXPECTED
21	Deferred Revenue By Segment [Hierarchy]	Disclosure	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Deferred Revenue
22	Deferred Revenue Note [Note Level]	Disclosure	Level1TextBlock	TextBlock	True	CONSISTENT	True	Deferred Revenue Disclosure [Text Block]	NOT-EXPECTED
23	Deferred Tax Assets and Liabilities [Roll Up]	Disclosure	Level3TextBlock/Level4Detail	RollUp	True	CONSISTENT	True	Schedule Of Deferred Tax Assets And Liabilities T...	Deferred Tax Assets Liabilities Net
24	Derivative Instruments in Statement of Financial Position Fair Val...	Disclosure	Level3TextBlock/Level4Detail	RollUp	True	INCONSISTENT	True	Schedule Of Derivative Instruments in Statement...	NOT-FOUND
25	Derivative Instruments in Statement of Financial Position Fair Val...	Disclosure	Level3TextBlock/Level4Detail	Hierarchy	True	INCONSISTENT	True	Schedule Of Derivative Instruments in Statement...	NOT-FOUND
26	Derivative Note [Note Level]	Disclosure	Level1TextBlock	TextBlock	True	CONSISTENT	True	Derivative Instruments And Hedging Activities Dis...	NOT-EXPECTED
27	Derivatives Policy [Policy Text Block]	Disclosure	Level2TextBlock	TextBlock	True	CONSISTENT	True	Derivatives Policy [Text Block]	NOT-EXPECTED
28	Dividends Declared [Hierarchy]	Disclosure	Level3TextBlock/Level4Detail	Hierarchy	True	CONSISTENT	True	Dividends Declared Table [Text Block]	Dividends Payable Date Of Record Day Month A...
29	Dividends Declared Summary [Hierarchy]	Statement	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Common Stock Dividends Per Share Declared

Reporting Checklist⁵³:

⁵² Disclosures, a complete list,
http://xbrl.azurewebsites.net/2020/Prototype/Microsoft/Microsoft2017_Discovery.jpg

⁵³ Full Microsoft reporting checklist,
<http://xbrl.azurewebsites.net/2020/master/msft/testing/ReportingChecklist.jpg>

MASTERING XBRL-BASED DIGITAL FINANCIAL REPORTING – PART 2: LOGICAL CONCEPTUALIZATION OF FINANCIAL REPORT
 – METHOD – CHARLES HOFFMAN, CPA

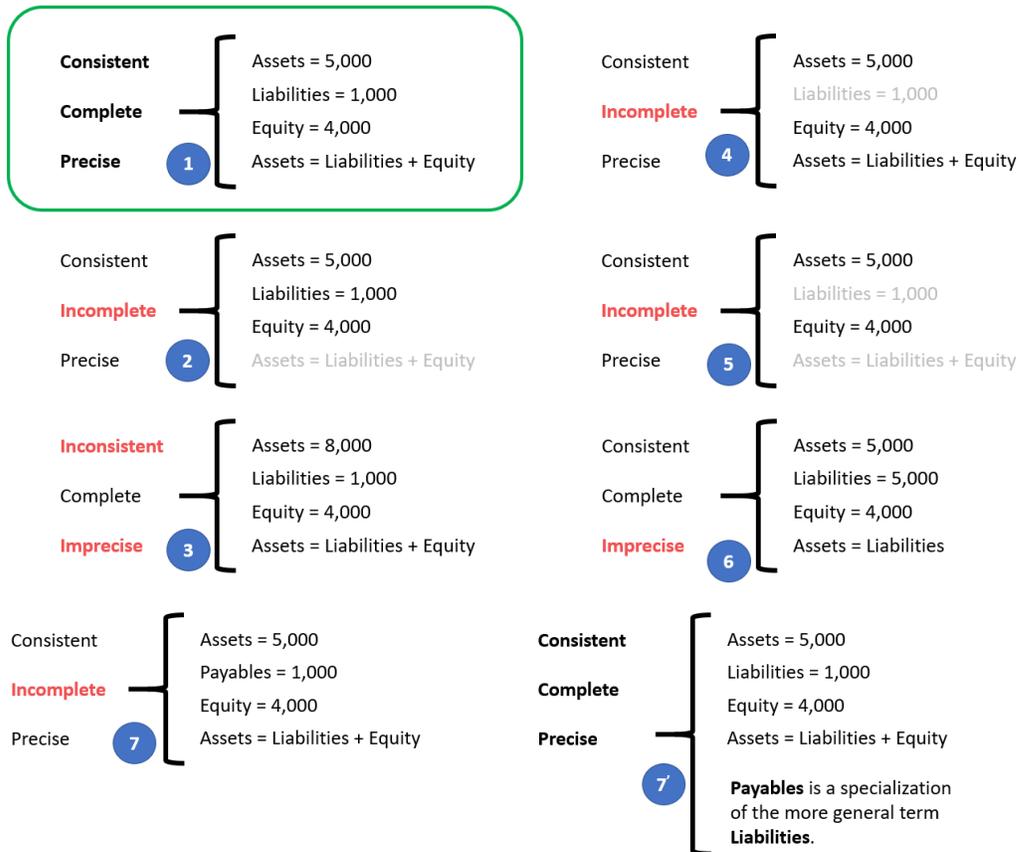
#	Disclosure	Checklist Category	Reason Disclosure Must Exist	Discovers	Expectation Met	Link to Disclosure Mechanics
0	Reporting Checklist					
1	Document and Entity Information [Hierarchy]	Required disclosure	Disclosure always required	True	CONSISTENT	Document and Entity Information [Hierarchy]
2	Income Statement, by Legal Entity [Roll-Up]	Required disclosure	Disclosure always required	True	CONSISTENT	Income Statement, by Legal Entity [Roll-Up]
3	Earnings Per Share Summary [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Earnings Per Share Summary [Hierarchy]
4	Weighted Average Shares Summary, Basic and Diluted [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Weighted Average Shares Summary, Basic and Diluted [Hierarchy]
5	Dividends Declared Summary [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Dividends Declared Summary [Hierarchy]
6	Income Statement, Parenthetical, by Legal Entity [Hierarchy]	Required disclosure	Disclosure is NOT present	False	N/A	Income Statement, Parenthetical, by Legal Entity [Hierarchy]
7	Statement of Comprehensive Income [Roll-Up]	Required disclosure	Disclosure always required	True	CONSISTENT	Statement of Comprehensive Income [Roll-Up]
8	Statement of Comprehensive Income Parenthetical [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Statement of Comprehensive Income Parenthetical [Hierarchy]
9	Balance Sheet	Required disclosure	Disclosure always required, satisfied by Assets [Roll-Up] and Liabilities and Equity [Roll-Up]	True	CONSISTENT	Balance Sheet
10	Assets [Roll-Up]	Part of disclosure	Satisfies Balance Sheet disclosure	True	CONSISTENT	Assets [Roll-Up]
11	Liabilities and Equity [Roll-Up]	Part of disclosure	Satisfies Balance Sheet disclosure	True	CONSISTENT	Liabilities and Equity [Roll-Up]
12	Balance Sheet, Parenthetical, by Legal Entity [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Balance Sheet, Parenthetical, by Legal Entity [Hierarchy]
13	Cash Flow Statement [Roll Forward]	Required disclosure	Disclosure always required	True	CONSISTENT	Cash Flow Statement [Roll Forward]
14	Cash and Cash Equivalents Summary [Roll Forward]	Required disclosure	Disclosure is present	True	CONSISTENT	Cash and Cash Equivalents Summary [Roll Forward]
15	Statement of Changes in Equity [Roll Forward]	Required disclosure	Disclosure always required	True	CONSISTENT	Statement of Changes in Equity [Roll Forward]
16	Significant Accounting Policies Note [Note Level]	Required disclosure	Disclosure always required	True	CONSISTENT	Significant Accounting Policies Note [Note Level]
17	Earnings Per Share Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Earnings Per Share Note [Note Level]
18	Other Nonrecurring Income and Expense Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Other Nonrecurring Income and Expense Note [Note Level]
19	Investments in Debt and Equity Instruments, Cash And C...	Required disclosure	Disclosure is present	True	CONSISTENT	Investments in Debt and Equity Instruments, Cash And C...
20	Derivative Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Derivative Note [Note Level]
21	Fair Value Measurements Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Fair Value Measurements Note [Note Level]
22	Inventory Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Inventory Note [Note Level]
23	Property, Plant and Equipment Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Property, Plant and Equipment Note [Note Level]
24	Mergers, Acquisitions and Dispositions Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Mergers, Acquisitions and Dispositions Note [Note Level]
25	Goodwill Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Goodwill Note [Note Level]
26	Intangible Assets Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Intangible Assets Note [Note Level]
27	Debt Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Debt Note [Note Level]
28	Income Tax Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Income Tax Note [Note Level]
29	Restructuring and Related Activities Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Restructuring and Related Activities Note [Note Level]
30	Deferred Revenue Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Deferred Revenue Note [Note Level]
31	Contingencies Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Contingencies Note [Note Level]
32	Contingencies Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Contingencies Note [Note Level]
33	Stockholders Equity Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Stockholders Equity Note [Note Level]
34	Comprehensive Income (Loss) Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Comprehensive Income (Loss) Note [Note Level]
35	Employee Stock Ownership Plan (ESOP) Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Employee Stock Ownership Plan (ESOP) Note [Note Level]
36	Segment Reporting Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Segment Reporting Note [Note Level]
37	Quarterly Financial Information Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Quarterly Financial Information Note [Note Level]
38	Nature of Operations Note [Note Level]	Required disclosure	Disclosure always required	True	CONSISTENT	Nature of Operations Note [Note Level]
39	Base of Reporting Note [Note Level]	Required disclosure	Disclosure always required	True	CONSISTENT	Base of Reporting Note [Note Level]
40	Revenue Recognition Policy [Policy Text Block]	Required disclosure	Disclosure always required	True	CONSISTENT	Revenue Recognition Policy [Policy Text Block]
41	Use of Estimates [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Use of Estimates [Policy Text Block]
42	Foreign Currency Policy [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Foreign Currency Policy [Policy Text Block]
43	Cost of Sales Policy [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Cost of Sales Policy [Policy Text Block]
44	Product Inventory [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Product Inventory [Policy Text Block]
45	Research, Development, and Computer Software [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Research, Development, and Computer Software [Policy Text Block]
46	Share-based Compensation, Options, and Incentive Plans ...	Required disclosure	Disclosure is present	True	CONSISTENT	Share-based Compensation, Options, and Incentive Plans ...
47	Income Taxes Policy [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Income Taxes Policy [Policy Text Block]
48	Fair Value of Financial Instruments [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Fair Value of Financial Instruments [Policy Text Block]
49	Investments Policy [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Investments Policy [Policy Text Block]
50	Derivatives Policy [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Derivatives Policy [Policy Text Block]
51	Trade and Other Accounts Receivable Policy [Policy Text B...	Required disclosure	Disclosure is present	True	CONSISTENT	Trade and Other Accounts Receivable Policy [Policy Text B...
52	Inventory Policy [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Inventory Policy [Policy Text Block]
53	Property, Plant and Equipment Policy [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Property, Plant and Equipment Policy [Policy Text Block]
54	Goodwill [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Goodwill [Policy Text Block]
55	Finite-lived Intangible Assets [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Finite-lived Intangible Assets [Policy Text Block]
56	New Accounting Pronouncements Policy [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	New Accounting Pronouncements Policy [Policy Text Block]
57	Earnings Per Share [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Earnings Per Share [Policy Text Block]
58	Segment Reporting Policy [Policy Text Block]	Required disclosure	Disclosure is present	True	CONSISTENT	Segment Reporting Policy [Policy Text Block]
59	Valuation Allowances And Reserves Balance [Roll Forward]	Required disclosure	Disclosure is present	True	CONSISTENT	Valuation Allowances And Reserves Balance [Roll Forward]
60	New Accounting Pronouncement or Change in Accounting ...	Required disclosure	Disclosure is present	True	CONSISTENT	New Accounting Pronouncement or Change in Accounting ...
61	New Accounting Pronouncement Effect on Balance Sheet (...)	Required disclosure	Disclosure is present	True	CONSISTENT	New Accounting Pronouncement Effect on Balance Sheet (...)
62	Net Income (Loss) Available to Common Shareholders [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Net Income (Loss) Available to Common Shareholders [Hierarchy]
63	Weighted Average Number of Shares Outstanding, Dilute...	Required disclosure	Disclosure is present	True	CONSISTENT	Weighted Average Number of Shares Outstanding, Dilute...
64	Earnings Per Share, Basic and Diluted [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Earnings Per Share, Basic and Diluted [Hierarchy]
65	Business Acquisitions, by Acquisition [Roll-Up]	Required disclosure	Disclosure is present	True	CONSISTENT	Business Acquisitions, by Acquisition [Roll-Up]
66	Finite-lived Intangible Assets Acquired as Part of Business ...	Required disclosure	Disclosure is present	True	CONSISTENT	Finite-lived Intangible Assets Acquired as Part of Business ...
67	Business Acquisition, Pro Forma Information [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Business Acquisition, Pro Forma Information [Hierarchy]
68	Finite-lived Intangible Assets, Acquired, by Major Class [Roll-Up]	Required disclosure	Disclosure is present	True	CONSISTENT	Finite-lived Intangible Assets, Acquired, by Major Class [Roll-Up]
69	Long-term Debt Maturities [Roll-Up]	Required disclosure	Disclosure is present	True	CONSISTENT	Long-term Debt Maturities [Roll-Up]
70	Deferred Revenue by Segment [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Deferred Revenue by Segment [Hierarchy]
71	Common Stock Outstanding [Roll Forward]	Required disclosure	Disclosure is present	True	CONSISTENT	Common Stock Outstanding [Roll Forward]
72	Accelerated Share Repurchases [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Accelerated Share Repurchases [Hierarchy]
73	Dividends Declared [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Dividends Declared [Hierarchy]
74	Compensation Cost for Share-based Payment Arrangements...	Required disclosure	Disclosure is present	True	CONSISTENT	Compensation Cost for Share-based Payment Arrangements...
75	Assumptions Used in Estimating Fair Value of Stock Award...	Required disclosure	Disclosure is present	True	CONSISTENT	Assumptions Used in Estimating Fair Value of Stock Award...
76	Share-based Compensation Arrangements Activity, by Ass...	Required disclosure	Disclosure is present	True	CONSISTENT	Share-based Compensation Arrangements Activity, by Ass...
77	Share-based Compensation Arrangements Activity, by Ass...	Required disclosure	Disclosure is present	True	CONSISTENT	Share-based Compensation Arrangements Activity, by Ass...
78	Employee Purchase Shares [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Employee Purchase Shares [Hierarchy]
79	Reconciliation of Revenue from Segments to Consolidated...	Required disclosure	Disclosure is present	True	CONSISTENT	Reconciliation of Revenue from Segments to Consolidated...
80	Reconciliation of Operating Profit (Loss) from Segments to...	Required disclosure	Disclosure is present	True	CONSISTENT	Reconciliation of Operating Profit (Loss) from Segments to...
81	Corporate and Other Operating Income (Loss) Activity [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Corporate and Other Operating Income (Loss) Activity [Hierarchy]
82	Revenue from External Customers, by Products or Services...	Required disclosure	Disclosure is present	True	CONSISTENT	Revenue from External Customers, by Products or Services...
83	Quarterly Financial Information [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Quarterly Financial Information [Hierarchy]
84	Quarterly Financial Information, Parenthetical [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Quarterly Financial Information, Parenthetical [Hierarchy]
85	Fair Value of Assets and Liabilities Measured on Recurring...	Required disclosure	Disclosure is present	True	CONSISTENT	Fair Value of Assets and Liabilities Measured on Recurring...
86	Reconciliation of Assets Measured at Fair Value on Recurring...	Required disclosure	Disclosure is present	True	CONSISTENT	Reconciliation of Assets Measured at Fair Value on Recurring...
87	Derivative Instruments in Statement of Financial Position F...	Required disclosure	Disclosure mechanics are INCONSISTENT therefore cannot determine if disclo...	True	INCONSISTENT (N)	Derivative Instruments in Statement of Financial Position F...
88	Derivative Instruments in Statement of Financial Position F...	Required disclosure	Disclosure mechanics are INCONSISTENT therefore cannot determine if disclo...	True	INCONSISTENT (N)	Derivative Instruments in Statement of Financial Position F...
89	Gains (Losses) on Derivative Instruments [Roll-Up]	Required disclosure	Disclosure is present	True	CONSISTENT	Gains (Losses) on Derivative Instruments [Roll-Up]
90	Realized Gain (Loss) on Investments [Roll-Up]	Required disclosure	Disclosure is present	True	CONSISTENT	Realized Gain (Loss) on Investments [Roll-Up]
91	Investments Classified by Contractual Maturity Date, Cate...	Required disclosure	Disclosure is present	True	CONSISTENT	Investments Classified by Contractual Maturity Date, Cate...
92	Investments Classified by Contractual Maturity Date, Est...	Required disclosure	Disclosure is present	True	CONSISTENT	Investments Classified by Contractual Maturity Date, Est...
93	Inventory, Net (Current) [Roll-Up]	Line item exists, then disclosure requi...	Required because line item base InventoryNet was reported	True	CONSISTENT	Inventory, Net (Current) [Roll-Up]
94	Property, Plant and Equipment, Net, by Type [Roll-Up]	Line item exists, then disclosure requi...	Required because line item base PropertyPlantAndEquipmentNet was reported	True	CONSISTENT	Property, Plant and Equipment, Net, by Type [Roll-Up]
95	Finite-lived Intangible Assets, Net, by Major Class [Roll-Up]	Line item exists, then disclosure requi...	Required because line item base FiniteLivedIntangibleAssetsNet was reported	True	CONSISTENT	Finite-lived Intangible Assets, Net, by Major Class [Roll-Up]
96	Indefinite-lived Intangible Assets, by Major Class [Roll-Up]	Line item exists, then disclosure requi...	NOT required, because line item base IndefiniteLivedIntangibleAssetsExcludi...	False	N/A	Indefinite-lived Intangible Assets, by Major Class [Roll-Up]
97	Goodwill [Roll Forward]	Line item exists, then disclosure requi...	Required because line item base Goodwill was reported	True	CONSISTENT	Goodwill [Roll Forward]
98	Finite-lived Intangible Assets, Future Amortization Expen...	Required disclosure	Disclosure is present	True	CONSISTENT	Finite-lived Intangible Assets, Future Amortization Expen...
99	Deferred Tax Assets and Liabilities [Roll-Up]	Line item exists, then disclosure requi...	Required because line item base DeferredTaxAssetsAndLiabilitiesNet was reported	True	CONSISTENT	Deferred Tax Assets and Liabilities [Roll-Up]
100	Reconciliation of Statutory to Effective Income Tax Rate...	Line item exists, then disclosure requi...	Required because line item base IncomeTaxExpenseBenefit was reported	True	CONSISTENT	Reconciliation of Statutory to Effective Income Tax Rate...
101	Income Tax Expense (Benefit), Current and Deferred Det...	Line item exists, then disclosure requi...	Required because line item base IncomeTaxExpenseBenefit was reported	True	CONSISTENT	Income Tax Expense (Benefit), Current and Deferred Det...
102	Restructuring Reserve, by Type of Cost [Roll Forward]	Line item exists, then disclosure requi...	Required because line item base RestructuringReserve was reported	True	CONSISTENT	Restructuring Reserve, by Type of Cost [Roll Forward]
103	Unrecognized Tax Benefits, Excluding Amounts Pertaining...	Required disclosure	Disclosure is present	True	CONSISTENT	Unrecognized Tax Benefits, Excluding Amounts Pertaining...
104	Income before Income Tax, Domestic and Foreign [Roll-Up]	Line item exists, then disclosure requi...	Required because line item base IncomeTaxFromContinuingOperationsBeforeIn...	True	CONSISTENT	Income before Income Tax, Domestic and Foreign [Roll-Up]
105	Restructuring Reserve [Roll Forward]	Required disclosure	Disclosure is present	True	CONSISTENT	Restructuring Reserve [Roll Forward]
106	Restructuring Charges [Roll Forward]	Required disclosure	Disclosure is present	True	CONSISTENT	Restructuring Charges [Roll Forward]
107	Restructuring Charges [Hierarchy]	Alternative representation	Alternative to possible disclosure Restructuring Charges [Roll-Up]	True	CONSISTENT	Restructuring Charges [Hierarchy]
108	Compensation and Employee Benefits Plans Note [Note Level]	Required disclosure	Disclosure is present	True	CONSISTENT	Compensation and Employee Benefits Plans Note [Note Level]
109	Long-term Debt Instruments, by Instrument [Hierarchy]	Required disclosure	Disclosure is present	True	CONSISTENT	Long-term Debt Instruments, by Instrument [Hierarchy]
110	Long-term Debt Instruments, by Instrument [Roll-Up]	Alternative representation	Not necessary, satisfied by Long-term Debt Instruments, by Instrument [Hier...	True	N/A	Long-term Debt Instruments, by Instrument [Roll-Up]
111	Future Minimum Payments, Present Value of Net Minimum...	Required disclosure	Disclosure is present	True	CONSISTENT	Future Minimum Payments, Present Value of Net Minimum...
112	Future Minimum Payments Due Under Operating Leases of...	Required disclosure	Disclosure is present	True	CONSISTENT	Future Minimum Payments Due Under Operating Leases of...
113	Leases of Lessee Note [Note Level]	Required disclosure	Disclosure is NOT present	False	N/A	Leases of Lessee Note [Note Level]
114	Accumulated Other Comprehensive Income (Loss), by Equ...	Line item exists, then disclosure requi...	Required because line item base AccumulatedOtherComprehensiveIncomeLoss...	True	CONSISTENT	Accumulated Other Comprehensive Income (Loss), by Equ...
115	Long-lived Assets in Individual Foreign Countries, by Ge...	Required disclosure	Disclosure is present	True	CONSISTENT	Long-lived Assets in Individual Foreign Countries, by Ge...
116	Revenue from External Customers Attributed to Foreign C...	Required disclosure	Disclosure is present	True	CONSISTENT	Revenue from External Customers Attributed to Foreign C...
117	Share-based Compensation, Restricted Stock Units Award...	Required disclosure	Disclosure is present	True	CONSISTENT	Share-based Compensation, Restricted Stock Units Award...
118	Other Nonrecurring Income (Expense) [Roll-Up]	Required disclosure	Disclosure is present	True	CONSISTENT	Other Nonrecurring Income (Expense) [Roll-Up]
119	Revenue from External Customers, by Geographic Area [Hierarchy]	Required disclosure	Disclosure is NOT present	False	N/A	Revenue from External Customers, by Geographic Area [Hierarchy]
120	Unsubstantiated Information [Hierarchy]	Required disclosure	Disclosure is NOT present	False	N/A	Unsubstantiated Information [Hierarchy]

1.5. Understanding Errors that Can Occur which Method Detects and Prevents (Comparison of States)

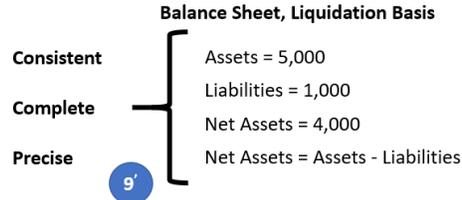
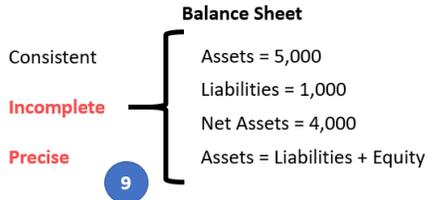
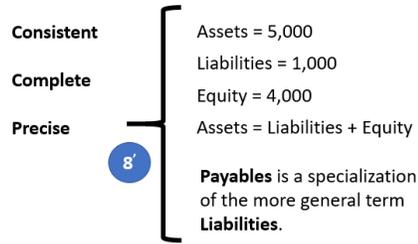
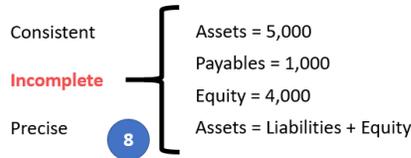
You can understand the types of errors that can occur in the Microsoft 10-K or any US GAAP or IFRS based XBRL-based financial report by looking at the types of errors that can exist in the accounting equation representation. This section explains those error types.

The following is a comparison of 9 states of the same simple financial report logical system, the accounting equation⁵⁴. The point of using such a simple financial report logical system is to explain specific things that can go wrong so that a reader can understand why each of the categories of rules are necessary. These 9 states can occur in any financial report with one fragment, two fragments, or 194 fragments like the Microsoft 10 K.

There are many ways to get a report wrong. Here is a summary of all nine states with the first state outlined in green being the only properly functioning logical system proven to be complete, consistent, and precise:



⁵⁴ Accounting equation, <http://xbrlsite.azurewebsites.net/2020/master/ae/index.html>



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. 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*⁵⁵.

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 use that as a baseline for comparing and contrasting the properly functioning and improperly functioning logical systems so that you can understand they sorts of errors that could occur in any XBRL-based financial report.

1.5.1.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

Balance Sheet

Consistent
Complete
 Precise

1

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

⁵⁵ Understanding the Financial Report Logical System, https://www.youtube.com/playlist?list=PLqMZRUzQ64B7EWamzDP-WaYbS_W0RL9nt

precise in its representation of reality. Further, we are formally declaring this “reality”⁵⁶ 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”⁵⁷. You understand your system but you have to map every external system into your system⁵⁸. Your internal system understands more that the accounting equation system (i.e. you have LiabilitiesAndEquity and the rule “LiabilitiesAndEquity = Liabilities + Equity”). You have to be able to compute that value based on some other system’s information⁵⁹. 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 manner⁶⁰.

1.5.2.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**.

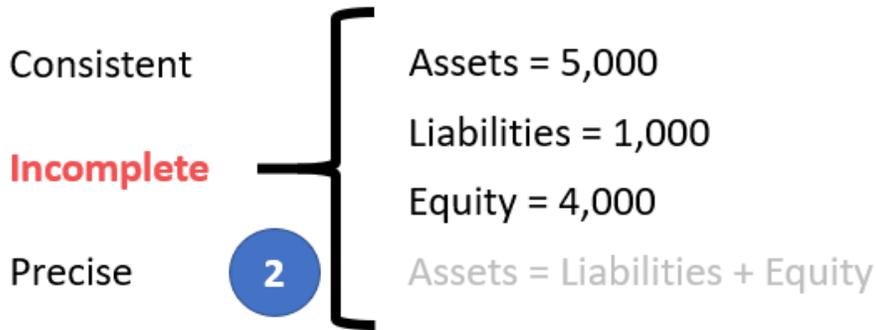
⁵⁶ YouTube, *Reality*, <https://youtu.be/eq2Jw6waaCI>

⁵⁷ Fundamental accounting concepts, <http://xbrlsite.azurewebsites.net/2020/core/master-ae/fac.xsd>

⁵⁸ Mapping from accounting equation to fundamental accounting concepts in our system, <http://xbrlsite.azurewebsites.net/2020/core/master-ae/fac-mapping-definition.xml>

⁵⁹ XBRL Formula to derive the value for LiabilitiesAndEquity, <http://xbrlsite.azurewebsites.net/2020/core/master-ae/fac-ImputeRule-LiabilitiesAndEquity-formula.xml>

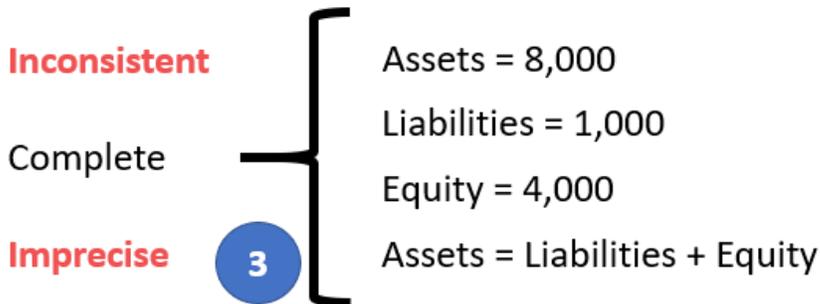
⁶⁰ Charles Hoffman, CPA, *Special Theory of Machine-based Automated Communication of Semantic Information of Financial Statements*, <http://xbrl.squarespace.com/journal/2019/12/30/special-theory-of-machine-based-automated-communication-of-s.html>



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

1.5.3.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 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.



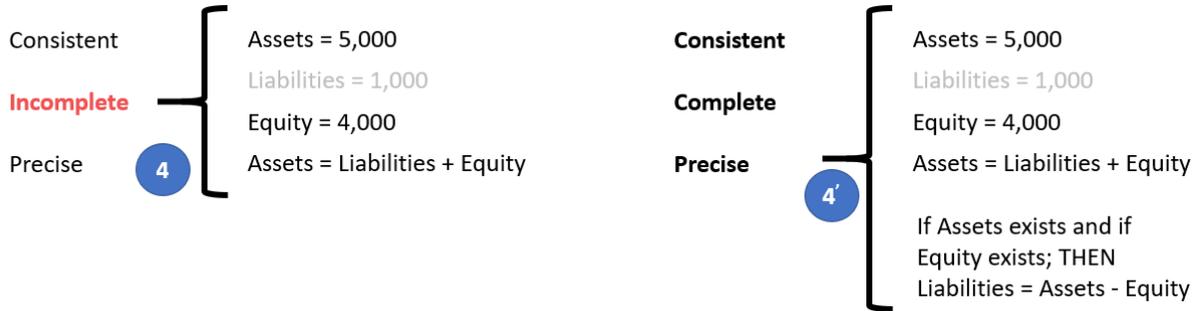
However, given that we know from state #1 that the value for Assets is 5,000 and not 8,000; the facts in this system is imprecise because the fact for Assets does not reflect reality. (We have, for the purposes of explaining these examples, defined reality and in that reality Assets = 5,000.)

- **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"⁶¹. (NOTE that this rule should actually be "IF Assets exists and if Equity exists and if not(exists) Liabilities; THEN Liabilities = Assets - Equity")



If it were likewise true that either Assets⁶² or Equity⁶³ could also be left unreported, similarly derivation rules could be created for each of those facts. Note that XBRL Formula chaining⁶⁴ 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 good or best practice to not leave important high-level financial report line items to go unreported.

1.5.4.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.

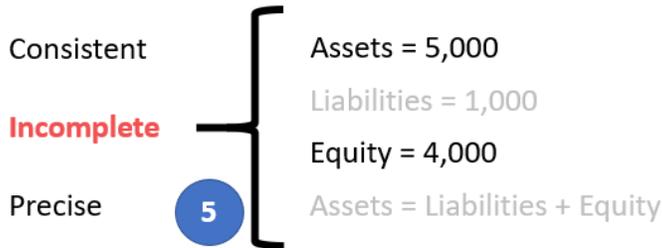
⁶¹ Here is the impute or derivation rule that would be added to the accounting equation logical system for this situation, <http://xbrlsite.azurewebsites.net/2020/core/master-ae/ImputeRule-Key-1-Code-BS-Impute-01-formula.xml>

⁶² XBRL Formula rule for deriving Assets, <http://xbrlsite.azurewebsites.net/2020/core/master-ae/ImputeRule-Key-3-Code-BS-Impute-03-formula.xml>

⁶³ XBRL Formula rule for deriving Equity, <http://xbrlsite.azurewebsites.net/2020/core/master-ae/ImputeRule-Key-2-Code-BS-Impute-02-formula.xml>

⁶⁴ Deriving Facts Using XBRL Formula Chaining (Example), <http://xbrl.squarespace.com/journal/2019/4/24/deriving-information-using-xbrl-formula-chaining-example.html>

At a minimum, a consistency crosscheck rule⁶⁵ plus the derivation rule to impute Liabilities⁶⁶ would be necessary.

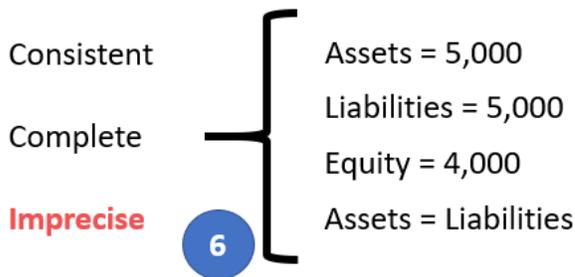


Again, consistent with state #4; Assets and Equity would require similar rules and there is no parity check of reported information.

1.5.5.State 6: Imprecise

A logical system is a true and fair representation of some agreed upon realism within some area of knowledge. **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 “Assets = Liabilities” and make that rule consistent with our reality which states that “Assets = Liabilities + Equity”.



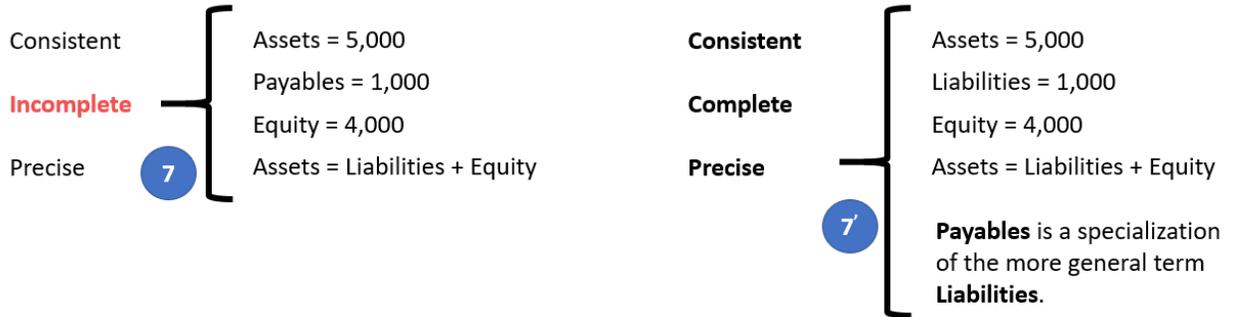
1.5.6.State 7: Extension Concept

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

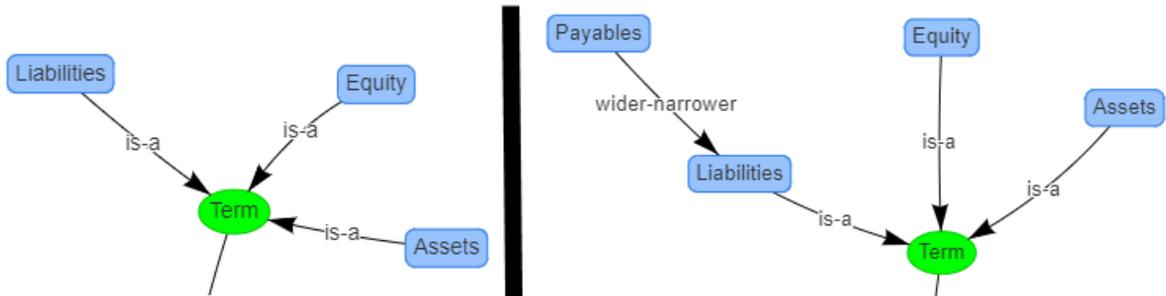
⁶⁵ XBRL Formula consistency crosscheck rule Assets = Liabilities + Equity, <http://xbrl.azurewebsites.net/2020/core/master-ae/Consistency-5-Code-BS01-formula.xml>

⁶⁶ XBRL Formula derivation rule to impute Liabilities, <http://xbrl.azurewebsites.net/2020/core/master-ae/ImputeRule-Key-1-Code-BS-Impute-01-formula.xml>

a specialization of the more general term Liabilities” has been added to the logical system which allows the system to operate effectively⁶⁷.



And so, the graphic below shows a fragment of the knowledge graph on page 9 above before and after the information that “Payables is a specialization of the more general term Liabilities,” was added. On the left you see State 7, the taxonomy before the information was added and on the right you see “Payable” being added as an extension concept indicating that there is a “wider-narrower” relationship between Payables and Liabilities. Therefore, a machine based process can utilize the information per State 7’ because the process understands Liabilities in the taxonomy, understands the “wider-narrower” relationship therefore knowing that “Payables” is a type of Liability.



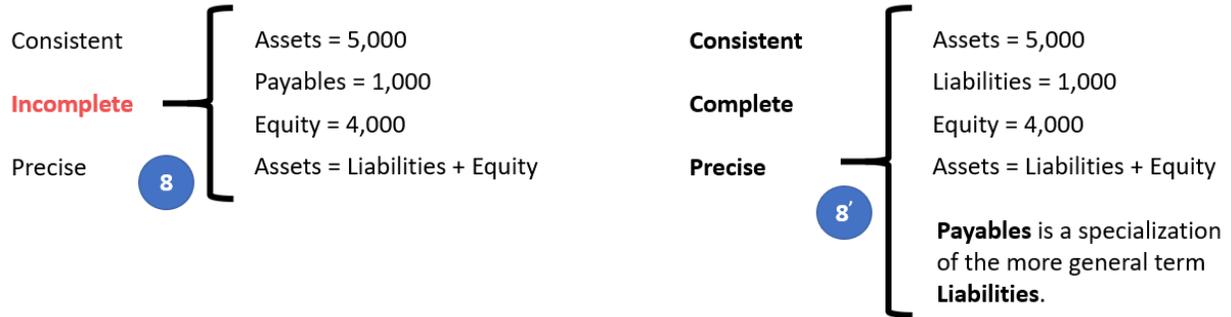
1.5.7.State 8: Base Taxonomy Wider/Narrower Concept Use

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.

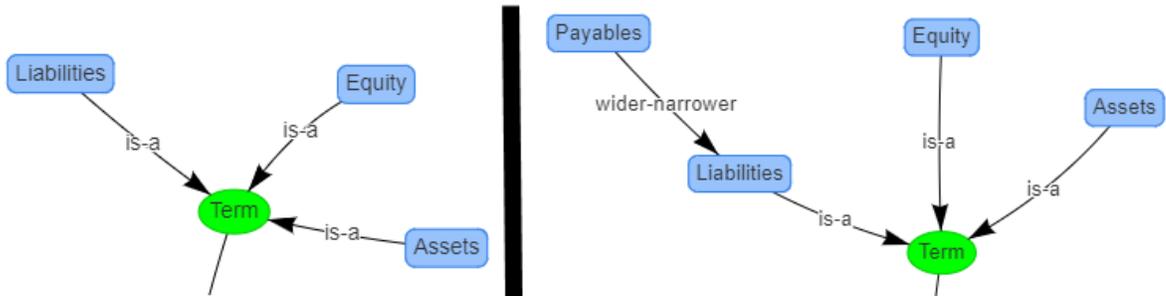
Now, our base state #1 does not have the concept “Payables”; but let’s assume for a moment that it does have the concept “Payables”. Also suppose that there was no information in the base logical system indicating the relationship between “Payables” and any other concept. If a fact is represented using 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.

⁶⁷ XBRL Definition relations showing example of a mapping rule, <http://xbrlsite.azurewebsites.net/2020/core/master-ae/fac-mapping-definition.xml>

State #8' on the right adds the rule "Payables is a specialization of the more general term Liabilities"⁶⁸.



And so, the graphic below shows a fragment of the knowledge graph on page 9 above before and after the information that "Payables is a specialization of the more general term Liabilities," was added. On the left you see State 8, the base taxonomy before the information was added and on the right you see "Payable" being added as an extension concept indicating that there is a "wider-narrower" relationship between Payables and Liabilities. Therefore, a machine based process can utilize the information per State 8' because the process understands Liabilities in the base taxonomy, understands the "wider-narrower" relationship therefore knowing that "Payables" is a type of Liability, and therefore can understand what you are conveying.



1.5.8.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 rules⁶⁹. Even base taxonomy structures need to be defined in order to be referred to⁷⁰. When you say "Balance Sheet" you know what that means. But a machine does not know.

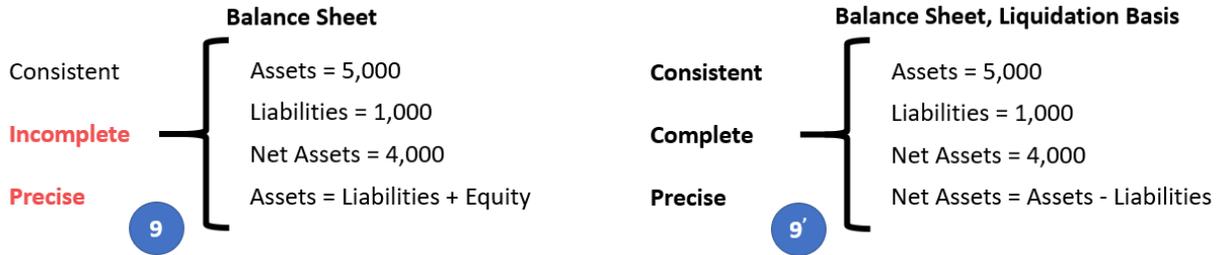
A base taxonomy should (a) provide all necessary structures separately, not intermingle different models in the same set of associations and (b) define what each structure must look like. Remember, computers are like babies and need to be led

⁶⁸ XBRL Definition relations showing example of a mapping rule, <http://xbrlsite.azurewebsites.net/2020/core/master-ae/fac-mapping-definition.xml>

⁶⁹ XBRL Definition relations used to represent structure rules, <http://xbrlsite.azurewebsites.net/2020/core/master-ae/dm-1355-rules-def.xml>

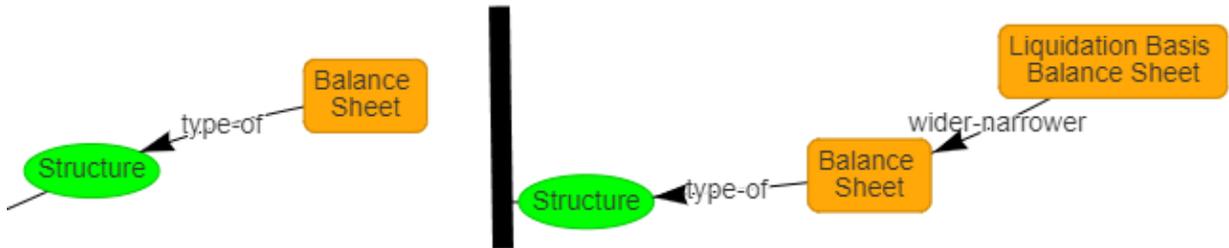
⁷⁰ XBRL taxonomy schema used to define "Balance Sheet", <http://xbrlsite.azurewebsites.net/2020/core/master-ae/disclosures.xsd>

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 checklist⁷¹. Other logical systems with more disclosures will have more rules relating to when a disclosure is required to be provided in a report.

Similar to how “Payables” was added as an extension of the terms in the logical system; we can extend the structures to include a “Liquidation Basis Balance Sheet” structure which is a specialization of a Balance Sheet:



And such, an automated process will be able to understand the new structure because it is related to an existing structure. Other structures could be added in this same manner and only identified as a type of structure. But if you want to understand what that structure is, you need to associate any newly defined structure relative to some existing structure. Humans will only understand the difference by reading the documented associated with the new structure.

⁷¹ 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>