Illustrating the Benefits of a Best Practice Method for Creating XBRL-based Financial Reports

Understanding how high-quality XBRL-based financial reports can be created consistently and reliably

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"Hope is not a solid engineering principle." *Unknown*

Executive summary:

- An XBRL-based financial report is a logical system.
- That logical system can use machine-based knowledge to verify that the system is verified to be consistent, valid, complete, sound, and fully expressed to the extent that machine-readable information is provided.
- Leaving out an assertion can lead to quality problems in reported information.
- This method yields high-quality XBRL-based financial reports reliably and repeatedly and is held out to be a best practice.

An XBRL-based financial report is a logical system. To some degree, that logical system can be described by any number of "ontology-like things[1]" that help prove that the financial report is consistent, valid, complete, and sound. To what degree depends on the terms, relations and assertions defined by the "ontology-like thing" describing the system.

This document illustrates how machine-based knowledge can be used to verify such a logical system as an XBRL-based financial report and the benefits in terms of report quality that can be realized. This approach is documented in *Method of Implementing a Standard Digital Financial Report Using the XBRL Syntax*[2].

A best practice is a method or technique that has been generally accepted as superior to any other known alternatives because it produces results that are superior to those achieved by other means or because it has become a standard way of doing things. Per that definition, this method is a best practice.

Best practices exist and are preferable to approaches which provide an inconsistent or inferior result.

Prior to reading this document it is strongly suggested that the reader understand the important background information provided by the document *Computer Empathy*[3].

Overview of Method

This section provides a succinct overview of the method used to achieve what we are illustrating.

Hope is not a solid engineering principle. The creation of this method is an engineering design process exercise, not a philosophical exercise, political discussion, or religious debate. This method was consciously and deliberately derived by taking the best practices of many implementations of XBRL related to financial reporting, take the practices that are proven to be superior to other practices, avoiding practices that are found to cause undesirable results or other issues, and combining all known, proven, and tested best practices into this one implementation method.

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[1] *Ontology-like Things for Industry*, http://xbrl.squarespace.com/journal/2019/7/13/ontology-like-things-for-industry.html

[2] Charles Hoffman, CPA, and Rene van Egmond, *Method of Implementing a Standard Digital Financial Report Using the XBRL Syntax*,
http://xbrlsite.azurewebsites.net/2019/Library/MethodForImplementingStandardFinancialReportUsingXBRL.pdf

[3] Charles Hoffman, CPA, *Computer Empathy*,
http://xbrlsite.azurewebsites.net/2018/Library/ComputerEmpathy.pdf

This method can be effectively used for XBRL-based reporting using the US GAAP and IFRS reporting schemes to the SEC or IFRS reporting to the ESMA. Most importantly, this method is safe and reliable for implementation within individual economic entities for accounting process automation and the automation of reporting processes.

Put succinctly, this method is a proven and tested method for creating high quality XBRL-based financial reports for any reporting scheme. It is highly likely that this method is also useful for accounting, reporting, auditing, and analysis of financial reports.

Ontology Like Things

The method is based on knowledge engineering practices and conscious knowledge of the ontology spectrum and what it takes to effectively represent knowledge[4] in machine-readable form that is also human-readable.
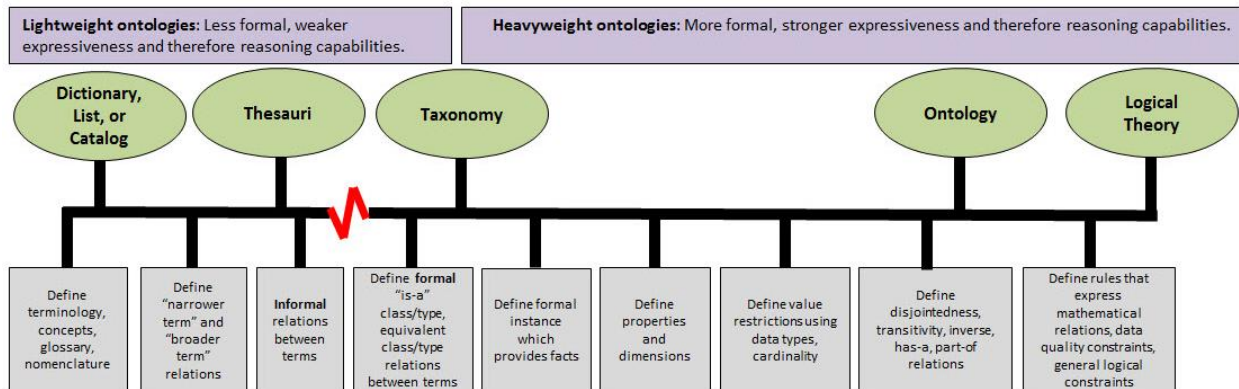
There are many types of "ontology-like things". The following definition of ontology is taken from the textbook *Ontology Engineering*[5] by Elisa Kendall and Deborah McGuinness:

Ontology - a model that specifies a rich description of the

- terminology, concepts, nomenclature;
- relationships among and between concepts and individuals; and
- sentences distinguishing concepts, refining definitions and relationships (constraints, restrictions, regular expressions)

relevant to a particular domain or area of interest.

I would modify this definition slightly to make it more appropriate for commercially deployable solutions for business. I try to incorporate the insightful understanding of Michael Uschold

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[4] *Ontology Spectrum*, http://xbrl.squarespace.com/journal/2019/4/27/ontology-spectrum.html
[5] Elisa Kendall and Deborah McGuinness, *Ontology Engineering*, https://www.amazon.com/Ontology-Engineering-Synthesis-Lectures-Semantic/dp/1681733080

from his presentation *Ontologies and Semantics for Industry*[6]. The essence of the definition is the same as the previous textbook definition, but I want to make a few things more explicit. What I came up with is the following definition:

An **ontology or ontology-like thing** is a model that specifies a rich and *flexible* description of the *important relevant*

- **terms** (terminology, concepts, nomenclature);
- **relations** (relationships among and between concepts and individuals); and
- **assertions**: (axioms, theorems, sentences distinguishing concepts, refining definitions and relationships including constraints, restrictions, regular expressions); and
- **world view**: (reasoning assumptions, identity assumptions, etc.)

relevant to a particular domain or area of interest, which generally allows for some certain specific variability, and as consciously unambiguously and completely as is necessary and practical in order to achieve a specific goal or objective or a range of goals/objectives. It enables a community to agree on important common terms for capturing meaning or representing a shared understanding of and knowledge in some domain where flexibility/variability is necessary.

And so, the reason for creating an "ontology-like thing" is to make the meaning of a set of terms, relations, and assertions explicit, so that both humans and machines can have a common understanding of what those terms, relations, and assertions mean. "Instances" or "sets of facts" (a.k.a. individuals) can be evaluated as being consistent with or inconsistent with some defined ontology-like thing created by some community. The level of accuracy, precision, fidelity, and resolution expressively encoded within some ontology-like thing depends on the application or applications being created that leverage that ontology-like thing.

An **ontological commitment** is an agreement by a community to use some ontology-like thing in a manner that is consistent with the theory of how some domain operates, represented by the ontology-like thing. The commitment is made in order to achieve some specific goal or goals established by the community sharing the ontology-like thing.

I reconcile that definition above to the common components of an ontology that I summarize in the document *Demystifying the Role of Ontologies in XBRL-based Digital Financial Reporting*[7] as follows:

- **Terms**

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[6] Michael Uschold, *Ontologies and Semantics for Industry*, https://www.slideshare.net/UscholdM/ontologies-and-semantics-for-industry
[7] Charles Hoffman, CPA, *Demystifying the Role of Ontologies in XBRL-based Digital Financial Reporting*, pages 7-9, http://xbrlsite.azurewebsites.net/2019/Library/DemystifyingOntologies.pdf

- o Simple terms (primitive, atomic)
- o Functional component terms (complex functional terms)
- o Properties (qualities, traits)
- **Relations**
  - o Type relations (class/type relations, "type-of" or "is-a" or "class-subclass" or "general-special")
  - o Functional relations (structural relations, "has-a" or "part-of" or "has-part" or "whole-part")
  - o Property attribution (has property)
- **Assertions**
  - o **Axioms** (Axioms describe self-evident logical principles related to a domain that no one would argue with.)
  - o **Theorems** (rules; Theorems are logical deductions which can be proven by constructing a chain of reasoning by applying axioms or other theorems in the form of IF…THEN statements.)
  - o **Restrictions** (restrictions, constraints, limitations, ranges)
- **Individuals**
  - o Instance (facts)
- **World view**
  - o Closed world assumption
  - o Unique name assumption
  - o Negation as failure

Following this method, a formally defined logical system[8] can be created that is:

- **Consistent** (no theorems of the system contradict one another)
- **Valid** (no false inference from a true premise is possible)
- **Complete** (if an assertion is true, then it can be proven; i.e. all theorems exists in the system)
- **Sound** (if any assertion is a theorem of the system; then the theorem is true)
- **Fully expressed** (if an important term exists in the real world; then the term can be represented within the system)

Ontology-like things for accounting, reporting, auditing, and analysis require high-quality and therefore they require highly expressive ontology-like things.

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[8] Wikipedia, *Logical System*, https://en.wikipedia.org/wiki/Logic#Logical_systems

Logical Description of a Financial Report

I have provided a number of different resources that describe the logical model of a financial report. The first iteration was *Financial Report Semantics and Dynamics Theory*[9]. That explanation is, at best, informal. Realizing that a financial report is a specialization of the more general business report, we created the *Logical Description of a Business Report*[10]. That logical theory is also informal and consistent with the first theory. Another description is *Open Source Framework for Implementing XBRL-based Digital Financial Reporting*[11]. That representation is also informal and intended to be consistent with the first two. Finally, I created a more formal prototype representation of what I personally believe OMG's *Standard Business Report Model* (SBRM)[12] will be. But, at best, that is only a bit more formal and still intended to be consistent with all of the above descriptions of that same model.

As explained in the document *Leveraging Functional Components for XBRL-based Digital Financial Reporting*[13], I have been able to explain the logical model of a business report enough to get three very consistent but an inconsistent level of implementation completeness of coverage of the model by three different software vendors.

And so, it seems pretty clear that the logical model of a business report can be represented using an "ontology-like thing" and that logical model provides leverage.

It is the intent of this document to show how an XBRL-based report intersects with the logical model of a business report. I will use these terms of my most current prototype[14] in this document related to a financial report which is, again, a specialization of the more general business report.

Ultimately, and highly likely, there will be a formal representation of this business report model probably in UML, in OWL, and to some degree in XBRL.

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[9] Charles Hoffman, CPA and Rene van Egmond, *Financial Report Semantics and Dynamics Theory*, http://xbrl.squarespace.com/fin-report-sem-dyn-theory/
[10] Charles Hoffman, CPA and Rene van Egmond, *Logical Theory Describing a Business Report*, http://xbrlsite.azurewebsites.net/2019/Library/LogicalTheoryDescribingBusinessReport.pdf
[11] *Open Source Framework for Implementing XBRL-based Digital Financial Reporting*, http://xbrlsite.azurewebsites.net/2019/Framework/FrameworkEntitiesSummary.html
[12] *Prototype SBRM Represented in XBRL*, http://xbrl.squarespace.com/journal/2019/7/14/prototype-sbrm-represented-in-xbrl.html
[13] Charles Hoffman, CPA, *Leveraging Functional Components for XBRL-based Digital Financial Reporting*, http://xbrlsite.azurewebsites.net/2019/Library/LeveragingFunctionalComponents.pdf
[14] *Prototype SBRM Representation in XBRL*, http://xbrlsite.azurewebsites.net/2019/SBRM/sbrm_ModelStructure.html

Implementations of Financial Report by Software Applications

I am going to use examples from two different software applications to illustrate this best practice method for implementing XBRL-based reports. One software application called the Evidence Package is a commercial product of XBRL Cloud[15]. The evidence package is a set of HTML files that are generated. As such, I can download those files and make them available to you, complements of XBRL Cloud. (Thank you XBRL Cloud.)

The second software application that I am using to illustrate this best practice method for implementing XBRL-based reports is Pesseract[16]. Pesseract is a locally installed software application that was created using Microsoft.Net. You can download, install, and then run everything that you see in this document using that software application. We are calling the application a working proof of concept currently because it does not provide specific functionally that would quality this software to be a product currently.

And so, should you choose to do so you can interact with this XBRL-based financial report to the extent that you deem appropriate for your needs.

Information about the Taxonomy and Report Used in Illustration

To create this illustration, I am using an XBRL-based instance and XBRL Taxonomy created for *International Public Sector Accounting Standards XBRL Taxonomy Prototype Project*[17] that I created to test this method. The reason I am using this XBRL taxonomy and XBRL instance is so that I can (a) have a smaller taxonomy than US GAAP or IFRS to demonstrate, (b) overcome the issues of the US GAAP XBRL Taxonomy and IFRS XBRL Taxonomy, (c) use a freely available reporting scheme anyone can download and use, and (d) consistent in terms of flexibility and variability as US GAAP and IFRS.

This XBRL instance and XBRL taxonomy exercises all the complexity that you would find in any of the 6,000 public companies that submit reports to the SEC using US GAAP or the 400 foreign issuers that submit reports to the SEC using IFRS. To be clear, while this XBRL taxonomy and XBRL instance is small; this is a well-thought-out set of tests.

To help understand that the IPSAS prototype is representative of financial reports created using the US GAAP and IFRS reporting schemes, for many examples illustrated we provide information that helps you compare and contrast to these two major reporting schemes.

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[15] *XBRL Cloud Evidence Package for IPSAS XBRL instance*, http://xbrlsite.azurewebsites.net/2019/Library/Core/evidence-package/contents/index.html#ReportProperties.html
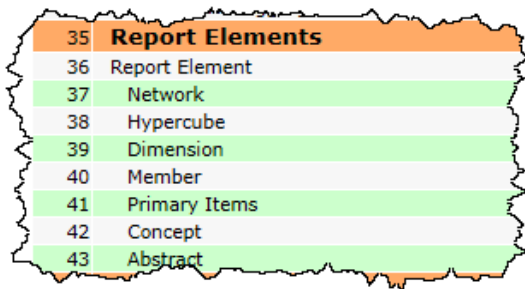[16] *Pesseract*, http://pesseract.azurewebsites.net/
[17] *International Public Sector Accounting Standards XBRL Taxonomy Prototype Project*, http://xbrl.squarespace.com/journal/2019/1/16/international-public-sector-accounting-standards-xbrl-taxono.html

Business Report Model

As said, a financial report is a special type of the more general business report. As such, the things that are defined within an XBRL taxonomy all fit into the business report model. See the following set of examples that illustrate this point.

Report Elements

The SBRM prototype has the notion of a "Report Element" or sbrm:ReportElement[18] as can be seen in the human readable rendering[19]. As the SBRM of a business report states, the information model definition of a business report is constructed out of report elements. These are the report elements defined by the SBRM:

This is a summary of the report elements[20] provided by the XBRL Cloud evidence package that shows the report elements that make up the IPSAS sample XBRL-based financial report:

Report Elements			
	All	Added	
Networks	14	14	100%
Tables	14	1	7%
Axes	8	0	0%
Members	18	7	39%
Line Items	14	1	7%
Abstracts	38	1	3%
Concepts	114	0	0%

Essentially, ever XBRL element defined in the XBRL taxonomy[21] fits into one of these 7 categories. Said another way, every XBRL element defined within any XBRL taxonomy that will ever be created will fit into one of the SBRM model sbrm:ReportElement categories.

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[18] sbrm:ReportElement, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ReportElement.html
[19] *SBRM terms, report element*, lines 36 to 43,
http://xbrlsite.azurewebsites.net/2019/SBRM/sbrm_ModelStructure.html
[20] Report elements summary, http://xbrlsite.azurewebsites.net/2019/Library/Core/evidence-package/contents/index.html#ReportElementsSummary.html
[21] IPSAS XBRL taxonomy schema, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/ipsas/taxonomy/ipsas.xsd

In fact, if you queried the approximately 6,000 public companies 10-Ks that submit reports to the SEC, you found find these report elements by report element type:

		Parent						
		Network 477,041	Table 232,230	Axis 386,912	Member 1,216,391	LineItems 232,690	Abstract 732,409	Concept 3,165,249
Child	Network	0	0	0	0	0	0	0
	Table	1,261	1	0	0	45	230,899	24
	Axis	1	386,888	0	0	3	20	0
	Member	3	0	450,091	766,221	4	72	0
	LineItems	183	232,181	0	0	107	217	2
	Abstract	474,310	22	0	1	113,059	144,471	546
	Concept	46	26	11	137	1,222,427	1,929,257	13,346

Relations Between Report Elements

The following is a summary of the relations between the report elements as represented by XBRL presentation relations[22] within the XBRL taxonomy which describes company's report relations:

Child	Parent						
	Network	Table	Axis	Member	LineItems	Abstract	Concept
[Network]	0	0	0	0	0	0	0
[Table]	14	0	0	0	0	0	0
[Axis]	0	43	0	0	0	0	0
[Member]	0	0	43	12	0	0	0
[LineItems]	0	14	0	0	0	0	0
[Abstract]	0	0	0	0	24	14	0
[Concept]	0	0	0	0	0	155	0

These are the rules that are represented by the allowed model structure relations for an IPSAS report[23]:

	Parent						
Child	Network	Table	Axis	Member	LineItems	Abstract	Concept
Network	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL
Table	OK	Disallowed	Disallowed	Disallowed	Disallowed	OK	Disallowed
Axis	Disallowed	OK	Disallowed	Disallowed	Disallowed	Disallowed	Disallowed
Member	Disallowed	Disallowed	OK	OK	Disallowed	Disallowed	Disallowed
LineItems	Disallowed	OK	Disallowed	Disallowed	Disallowed	Disallowed	Disallowed
Abstract	OK	Disallowed	Disallowed	Disallowed	OK	OK	Not Advised
Concept	Disallowed	Disallowed	Disallowed	Disallowed	OK	OK	Not Advised

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[22] IPAAS presentation relations, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/ipsas/taxonomy/company-pre.xml

[23] IPSAS model structure rules, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/ipsas/model-structure/ModelStructure-rules-ipsas-def.xml

Each of these relations is an sbrm:StructureRule[24].

Each of these model structure rules fit within the sbrm:StructuralRule which is line # 82 in the SBRM documentation.

Reporting Styles

You can begin to understand the variability that exists within a financial report by considering the reporting styles of IPSAS. This concept sbrm:ReportingStyles appears to be missing from the SBRM model. This is an error, it will be added.

Each reporting style which is shown below is used to organize a set of consistency cross checks[25].

Report Frame Code	Description
IPSAS-BSC-ISFUNC6-SCI1-CF1	Balance sheet CLASSIFIED, cash flow statement NORMAL, income statement by FUNCTION
IPSAS-BSC-ISNATU1-SCI1-CF1	Balance sheet CLASSIFIED, cash flow statement NORMAL, income statement by NATURE
IPSAS-BSN-ISFUNC6-SCI1-CF1	Balance sheet NET ASSETS, cash flow statement NORMAL, income statement by function
IPSAS-BSN-ISNATU1-SCI1-CF1	Balance sheet NET ASSETS, cash flow statement NORMAL, income statement by nature
IPSAS-BSU-ISFUNC6-SCI1-CF1	Balance sheet UNCLASSIFIED, cash flow statement, income statement by FUNCTION
IPSAS-BSU-ISNATU1-SCI1-CF1	Balance sheet UNCLASSIFIED, cash flow statement, income statement by NATURE
NotCurrentlySupported	Not supported

For example, there are three balance sheet formats provided for in the IPSAS prototype: BSC, BSN, and BSU. BSC is a classified balance sheet. BSN is an alternative classified balance sheet. BSU is an unclassified balance sheet (order of liquidity). If there were more balance sheet styles, each could be added until the complete set of possible style alternatives is provided for.

By contrast to these six prototype reporting styles for IPSAS based financial reports, US GAAP has approximately 65 reporting styles that 92% of all reporting entities use and perhaps 500 reporting styles in total[26].

Fundamental Accounting Concept Consistency Cross Check Rules

If you read the conceptual framework, it states explicitly that entities creating reports have flexibility in the way they represent their financial report line items. As such, this results in

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[24] sbrm:StructureRule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/StructuralRule.html
[25] Machine readable IPSAS prototype reporting styles, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/ipsas/fac/Documentation/rss.xml
[26] *Making the Case for Reporting Styles*,
http://xbrlsite.azurewebsites.net/2017/library/MakingTheCaseForReportingStyles.pdf

variability in the subtotals that are used by economic entities creating reports. This variability is provided for using the reporting styles which are used to organize different sets of consistency cross check rules[27] which organize fundamental accounting concepts in different ways. You can see this by looking at a set of consistency cross check rules validation results:

Entity	Period	ID	Test	Result	Am...	Evaluation
1234567...	2020-FY	FAC_CONSISTENCY_1	fac:Equity = (fac:EquityAttributableToParent + fac:EquityAttributableToNoncontrollingInterest)	True	0	fac:Equity[ipsas:Equity[6,000]] = (fac:EquityAttributableToParent[ipsas:ControllingInterest[4,000]] + fac:EquityAttributableToNoncontrollingInterest[ipsas:NoncontrollingInterest[2,000]])
1234567...	2020-FY	FAC_CONSISTENCY_16	fac:IncomeLossFromContinuingOperationsAfterTax = (fac:IncomeLossFromContinuingOperationsBeforeTax - fac:IncomeTaxExpenseBenefit)	True	0	fac:IncomeLossFromContinuingOperationsAfterTax[ipsas:SurplusDeficitFromContinuingOperations[500]] = (fac:IncomeLossFromContinuingOperationsBeforeTax[ipsas:SurplusDeficitFromContinuingOperationsBeforeEquityMethodAssociatesJointVentures[1,000]] - fac:IncomeTaxExpenseBenefit[ipsas:ShareSurplusDeficitEquityMethodAssociatesJointVentures[500]])
1234567...	2020-FY	FAC_CONSISTENCY_17	fac:NetIncomeLoss = (fac:IncomeLossFromContinuingOperationsAfterTax + fac:IncomeLossFromDiscontinuedOperationsNetOfTax)	True	0	fac:NetIncomeLoss[ipsas:SurplusDeficit[500]] = (fac:IncomeLossFromContinuingOperationsAfterTax[ipsas:SurplusDeficitFromContinuingOperations[500]] + fac:IncomeLossFromDiscontinuedOperationsNetOfTax[ipsas:GainLossFromDiscontinuedOperations[0]])
1234567...	2020-FY	FAC_CONSISTENCY_18	fac:NetIncomeLoss = (fac:NetIncomeLossAttributableToParent + fac:NetIncomeLossAttributableToNoncontrollingInterest)	True	0	fac:NetIncomeLoss[ipsas:SurplusDeficit[500]] = (fac:NetIncomeLossAttributableToParent[ipsas:SurplusDeficitAttributableToOwnersControllingEntity[400]] + fac:NetIncomeLossAttributableToNoncontrollingInterest[ipsas:SurplusDeficitAttributableToNoncontrollingInterest[100]])
1234567...	2020-FY	FAC_CONSISTENCY_2	fac:Assets = fac:LiabilitiesAndEquity	True	0	fac:Assets[ipsas:Assets[12,000]] = fac:LiabilitiesAndEquity[ipsas:LiabilitiesAndNetAssetsEquity[12,000]]
1234567...	2020-FY	FAC_CONSISTENCY_25	fac:NetCashFlow = (fac:NetCashFlowFromOperatingActivities + fac:NetCashFlowFromInvestingActivities + fac:NetCashFlowFromFinancingActivities)	True	0	fac:NetCashFlow[ipsas:NetCashFlow[(1,000)]] = (fac:NetCashFlowFromOperatingActivities[ipsas:NetCashFlowFromUsedInOperatingActivities[(1,000)]] + fac:NetCashFlowFromInvestingActivities[ipsas:NetCashFlowsFromUsedInInvestingActivities[2,000]] + fac:NetCashFlowFromFinancingActivities[ipsas:NetCashFlowsFromUsedInFinancingActivities[(2,000)]])
1234567...	2020-FY	FAC_CONSISTENCY_3	fac:Assets = (fac:CurrentAssets + fac:NoncurrentAssets)	True	0	fac:Assets[ipsas:Assets[12,000]] = (fac:CurrentAssets[ipsas:CurrentAssets[5,000]] + fac:NoncurrentAssets[ipsas:NoncurrentAssets[7,000]])
1234567...	2020-FY	FAC_CONSISTENCY_38	fac:IncomeLossFromContinuingOperationsBeforeTax = (fac:OperatingAndNonoperatingRevenues - fac:OperatingAndNonoperatingCostsAndExpenses)	True	0	fac:IncomeLossFromContinuingOperationsBeforeTax[ipsas:SurplusDeficitFromContinuingOperationsBeforeEquityMethodAssociatesJointVentures[1,000]] = (fac:OperatingAndNonoperatingRevenues[ipsas:Revenue[7,000]] - fac:OperatingAndNonoperatingCostsAndExpenses[ipsas:Expenses[6,000]])
1234567...	2020-FY	FAC_CONSISTENCY_4	fac:Liabilities = (fac:CurrentLiabilities + fac:NoncurrentLiabilities)	True	0	fac:Liabilities[ipsas:Liabilities[6,000]] = (fac:CurrentLiabilities[ipsas:CurrentLiabilities[5,000]] + fac:NoncurrentLiabilities[ipsas:NoncurrentLiabilities[1,000]])
1234567...	2020-FY	FAC_CONSISTENCY_5	fac:LiabilitiesAndEquity = (fac:Liabilities + fac:Equity)	True	0	fac:LiabilitiesAndEquity[ipsas:LiabilitiesAndNetAssetsEquity[12,000]] = (fac:Liabilities[ipsas:Liabilities[6,000]] + fac:Equity[ipsas:Equity[6,000]])
1234567...	2020-FY	FAC_CONSISTENCY_8	fac:NetCashFlowDiscontinued = (fac:NetCashFlowFromOperatingActivitiesDiscontinued + fac:NetCashFlowFromInvestingActivitiesDiscontinued + fac:NetCashFlowFromFinancingActivitiesDiscontinued)	True	0	fac:NetCashFlowDiscontinued[0] = (fac:NetCashFlowFromOperatingActivitiesDiscontinued[0] + fac:NetCashFlowFromInvestingActivitiesDiscontinued[0] + fac:NetCashFlowFromFinancingActivitiesDiscontinued[0])

Any number of fundamental accounting concepts[28] (each of which are a sbrm:ReportElement) could be created, likewise any number of relations could be articulate in the form of consistency cross check rules for those fundamental accounting concepts, sbrm:ConsistencyCrosschedkRule, line 77[29].

Every financial reporting scheme has a set of high level fundamental accounting concepts[30]. It is quite possible that the set of fundamental accounting concepts could be shared between reporting schemes. Certainly, it is possible to map between the fundamental accounting concepts of different reporting schemes.

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[27] Consistency Cross Check Rules for IPSAS prototype, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/ipsas/fac/Rules_Consistency/rss.xml
[28] Fundamental accounting concepts for IPSAS prototype, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/ipsas/fac/fac.xsd
[29] sbrm:ConsistencyCrosscheckRule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ConsistencyCrosscheckRule.html
[30] Comparison of Financial Reporting Scheme High Level Concepts, http://xbrlsite.azurewebsites.net/2018/Library/ReportingSchemes-2018-12-30.pdf

Imputed Line Items

Not all line items are reported consistency within the report of an economic entity. For example, some economic entities explicitly report "Noncurrent assets", other don't provide that line item explicitly. As such, unreported line items that are used in the consistency cross check rules must be derived from other information which is reported.

Examples of IPSAS impute rules[31] are shown below.

Line	Financial Statement Location	Rule Code	Rule (XBRL Formula XPath 2.0 Format)	
1		IS-Impute-613	if ($OtherOperatingIncomeExpenses = 0 and not($OperatingExpenses = 0) and not($OperatingIncomeLoss = 0) and not($GrossProfit = 0)) then ($OtherOperatingIncomeExpenses = $OperatingIncomeLoss - $GrossProfit + $OperatingExpenses) else ($OtherOperatingIncomeExpenses = $OperatingExpenses)	If OtherOperatingIncomeExpenses = 0 and OperatingExpenses <> 0 and OperatingIncomeLoss <> 0 and GrossProfit <> 0 Then OtherOperatingIncomeExpenses = OperatingIncomeLoss - GrossProfit + OperatingExpenses End If
2	Balance sheet	BS-Impute-01	if (($Assets = 0) and ($NoncurrentAssets = 0) and not($Assets = $LiabilitiesAndEquity) and ($CurrentAssets = $LiabilitiesAndEquity)) then ($Assets = $CurrentAssets) else ($Assets = $Assets)	If Assets = 0 and NoncurrentAssets = 0 and Assets <> LiabilitiesAndEquity and CurrentAssets = LiabilitiesAndEquity Then Assets = CurrentAssets End If
3	Balance sheet	BS-Impute-02	if (($Assets = 0) and not($LiabilitiesAndEquity = 0) and ($CurrentAssets = $LiabilitiesAndEquity)) then ($Assets = $CurrentAssets) else ($Assets = $Assets)	If Assets = 0 and LiabilitiesAndEquity <> 0 and CurrentAssets = LiabilitiesAndEquity Then Assets = CurrentAssets End If
4	Balance sheet	BS-Impute-03	if (($Assets = 0) and ($NoncurrentAssets = 0) and not($LiabilitiesAndEquity = 0) and ($LiabilitiesAndEquity = $Liabilities + $Equity)) then ($Assets = $CurrentAssets) else ($Assets = $Assets)	If Assets = 0 and NoncurrentAssets = 0 and LiabilitiesAndEquity <> 0 and (LiabilitiesAndEquity = Liabilities + Equity) Then Assets = CurrentAssets End If
5	Balance sheet	BS-Impute-04	if ($NoncurrentAssets = 0 and not($Assets = 0) and not($CurrentAssets = 0)) then ($NoncurrentAssets = $Assets - $CurrentAssets) else ($NoncurrentAssets = $NoncurrentAssets)	If NoncurrentAssets = 0 and Assets <> 0 and CurrentAssets <> 0 Then NoncurrentAssets = Assets - CurrentAssets End If

This is done using impute rules. Every impute type rule in any XBRL taxonomy ever created can be categorized in the sbrm:ImputRule[32] (line 77)

By contrast, US GAAP has approximately 130 impute rules[33] for the approximately 100 reporting styles currently in use.

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[31] Impute rules for IPSAS prototype, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/ipsas/fac/documentation/ImputeRulesList.html

[32] sbrm:ImputeTypeRule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ImputeTypeRule.html

[33] Impute rules for US GAAP, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/us-gaap/fac/documentation/ImputeRulesList.html

Fact Sets

As the SBRM report points out, a business report is made up of fact sets. Here are all the **fact sets** in the IPSAS prototype report. (XBRL Cloud's summary is very similar, but not quite the same[34]):

Enter text to filter ... ▾
⊟ 1110 - Statement - Statement of Financial Position, Classified ◆ Statement of Financial Position, Classified [Table]
Assets [Roll Up]
Liabilities and Net Assets/Equity [Roll Up]
⊟ 1160 - Statement - Classes of Share Capital (Parenthetical) ◆ Share Capital, by Class [Table]
Share Capital, by Class [Set] [Hierarchy]
⊟ 1211 - Statement - Statement of Financial Performance, by Function ◆ Statement of Financial Performance, by Function [Table]
Surplus (Deficit) [Roll Up]
⊟ 1240 - Statement - Surplus (Deficit) Breakdown by Controlling and Noncontrolling Interest (Parenthetical) ◆ Surplus (Deficit) Breakdown
Surplus (Deficit) Breakdown [Roll Up]
⊟ 1290 - Statement - Statement of Financial Performance, Comparison of Budgeted and Actual Amounts ◆ Statement of Financial Performance, Comparison of Bugeted and Actual Amounts [Table]
Surplus (Deficit) from Continuing Operations [Roll Up]
⊟ 1300 - Statement - Changes in Equity, Prior Period Adjustments ◆ Statement of Changes in Equity, Prior Period Adjustments [Table]
Accumulated Surpluses (Deficits), Prior Period Adjustments [Adjustment]
⊟ 1400 - Statement - Changes in Equity ◆ Statement of Changes in Equity [Table]
Share Capital Reconciliation [Roll Forward]
Reserves Reconciliation [Roll Forward]
Accumulated Surpluses (Deficits) Reconciliation [Roll Forward]
Noncontrolling Interest Reconciliation [Roll Forward]
Net Assets/Equity Reconciliation [Roll Forward]
⊟ 1600 - Statement - Cash Flow Statement, Direct Method ◆ Cash Flow Statement, Direct Method [Table]
Net Cash Flow [Roll Up]
Cash and Cash Equivalents Reconciliation [Roll Forward]
⊟ 2220 - Disclosure - Property, Plant and Equipment, Net Subclassifications ◆ Property, Plant and Equipment, Net, Subclassifications [Table]
Property, Plant and Equipment, Net [Roll Up]
⊟ 2221 - Disclosure - Property, Plant, and Equipment, Net Subclassifications (Alternative) ◆ Property, Plant and Equipment Components
Property, Plant, and Equipment, Net, Components [Roll Up]
⊟ 2230 - Disclosure - Property, Plant, and Equipment Reconciliations ◆ Property, Plant and Equipment Reconciliations [Table]
Land [Reconciliation] [Roll Forward]
Buildings, Net [Reconciliation] [Roll Forward]
Machinery, Net [Reconciliation] [Roll Forward]
Furniture and Fixtures, Net [Reconciliation] [Roll Forward]
Property, Plant and Equipment, Net [Reconciliation] [Roll Forward]
⊟ 8900 - Disclosure - Analysis of Revenue ◆ Sales Analysis, by Customer [Table]
Sales Analysis, by Customer [Set] [Hierarchy]
⊟ 9990 - Document - Document Information ◆ Document Information [Table]
Document Information [Set] [Hierarchy]
⊟ 9995 - Document - Entity Information ◆ Entity Information [Table]
Entity Information [Set] [Hierarchy]

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[34] XBRL Cloud component perspective, xbrlsite.azurewebsites.net/2019/Library/Core/evidence-package/contents/index.html

Each fact set that exists within any XBRL-based report is consistent with the sbrm:FactSet[35]. Every fact set created in any reporting scheme[36] or any profile of XBRL[37] fits this fact set model.

Concept Arrangement Patterns

Each of the 24 fact set has a concept arrangement pattern. A concept arrangement pattern, line 9 sbrm:ConceptArrangementPattern[38], is the arrangement of the concepts and abstract report elements that are used to represent a fact set. Here is a list of the IPSAS report fact sets from the Pesseract application which uses the synonym "Block" to refer to what SBRM calls FactSet.


```
Assets [Roll Up]
Liabilities and Net Assets/Equity [Roll Up]
Share Capital, by Class [Set] [Hierarchy]
Surplus (Deficit) [Roll Up]
Surplus (Deficit) Breakdown [Roll Up]
Surplus (Deficit) from Continuing Operations [Roll Up]
Accumulated Surpluses (Deficits), Prior Period Adjustments [Adjustment]
Share Capital Reconciliation [Roll Forward]
Reserves Reconciliation [Roll Forward]
Accumulated Surpluses (Deficits) Reconciliation [Roll Forward]
Noncontrolling Interest Reconciliation [Roll Forward]
Net Assets/Equity Reconciliation [Roll Forward]
Net Cash Flow [Roll Up]
Cash and Cash Equivalents Reconciliation [Roll Forward]
Property, Plant and Equipment, Net [Roll Up]
Property, Plant, and Equipment, Net, Components [Roll Up]
Land [Reconciliation] [Roll Forward]
Buildings, Net [Reconciliation] [Roll Forward]
Machinery, Net [Reconciliation] [Roll Forward]
Furniture and Fixtures, Net [Reconciliation] [Roll Forward]
Property, Plant and Equipment, Net [Reconciliation] [Roll Forward]
Sales Analysis, by Customer [Set] [Hierarchy]
Document Information [Set] [Hierarchy]
Entity Information [Set] [Hierarchy]
```

The IPSAS report has the following concept arrangement patterns:

- Hierarchy or Set: 4
- Roll Up: 8
- Roll Forward: 11
- Adjustment: 1

---
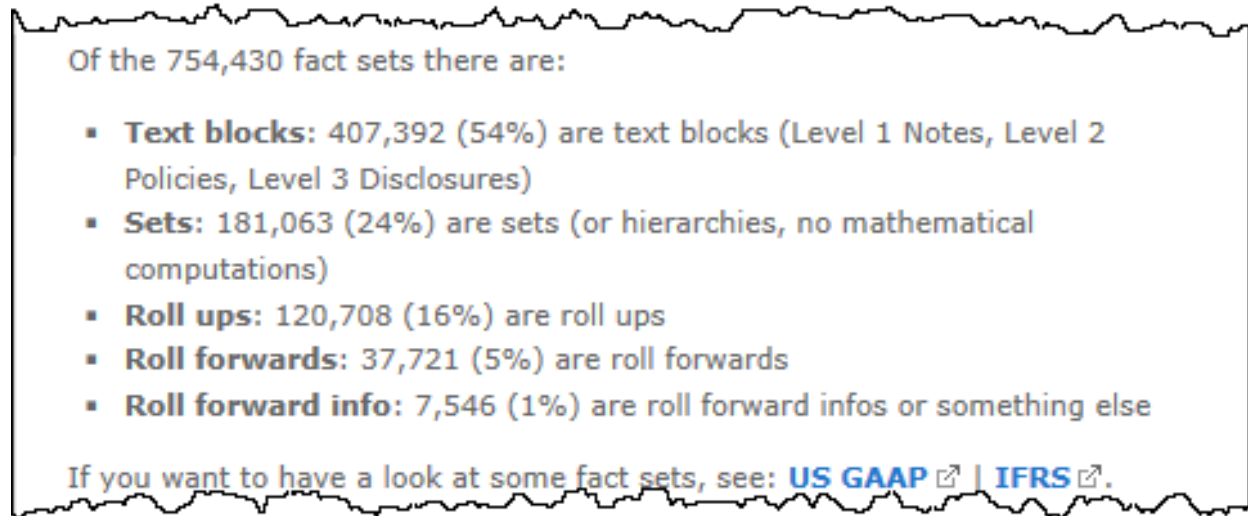
[35] sbrm:FactSet, http://xbrlsite.azurewebsites.net/2019/Framework/Details/FactSet.html
[36] Comparison of Reporting Scheme High Level Concepts, http://xbrlsite.azurewebsites.net/2018/Library/ReportingSchemes-2018-12-30.pdf
[37] Comparison of XBRL Financial Report Profile and General Profile, http://xbrlsite.azurewebsites.net/2018/Library/Profiles-2018-10-22.pdf
[38] sbrm:ConceptArrangementPattern, http://xbrlsite.azurewebsites.net/2019/Framework/Details/ConceptArrangementPattern.html

By contrast, each 754,430 fact set with each of the 6,023[39] XBRL-based reports submitted to the SEC using US GAAP can be broken down into the following five concept arrangement patterns:

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** ☒.

IFRS XBRL-based reports can similarly be broken down into fact sets with identifiable concept arrangement patterns.

Information Model Description (for each Fact Set)

Each fact set has an information model description[40]. The following shows the information for one fact set, Share Capital Reconciliation [Roll Forward][41], that is represented as one of the 24 fact sets within the IPSAS prototype report.

Note that each of these terms below should perhaps be added to the SBRM terms.

---

[39] Breaking Down the Pieces of an XBRL-based Digital Financial Report, http://xbrl.squarespace.com/journal/2019/4/9/breaking-down-the-pieces-of-an-xbrl-based-digital-financial.html
[40] sbrm:InformationModelDefinition, http://xbrlsite.azurewebsites.net/2019/Framework/Details/InformationModelDefinition.html
[41] XBRL Cloud representation, http://xbrlsite.azurewebsites.net/2019/Library/Core/evidence-package/contents/index.html#Rendering-StatementOfEquitySchedule-ipsas_StatementOfChangesInEquityTable.html

Information model structure

Label	Report Element Class	Period	Balance	Preferred Label Role	Name
⌄ Statement of Changes in Equity [Table]	[Table]			Standard Label	ipsas:StatementOfChangesInEquityTable
⌄ Legal Entity [Axis]	[Axis]			Standard Label	frm:LegalEntityAxis
Consolidated Entity [Member]	[Member]			Standard Label	frm:ConsolidatedEntityMember
⌄ Report Date [Axis]	[Axis]			Standard Label	frm:ReportDateAxis
Reported as of March 18, 2020 [Member]	[Member]			Standard Label	company:ReportedAsOfMarch182020Member
⌄ Reporting Scenario [Axis]	[Axis]			Standard Label	frm:ReportingScenarioAxis
Actual [Member]	[Member]			Standard Label	frm:ActualMember
⌄ Share Capital Reconciliation [Roll Forward]	[Abstract]			Standard Label	ipsas:ShareCapitalReconciliationRollForward
Share Capital, Opening Balance	[Concept] Monetary	As Of	Credit	Period Start Label	ipsas:ShareCapital
Share Capital, Contributions	[Concept] Monetary	For Period	Credit	Standard Label	ipsas:ShareCapitalContributions
Share Capital, Distributions	[Concept] Monetary	For Period	Debit	negatedLabel	ipsas:ShareCapitalDistributions
Share Capital, Other Increase (Decrease)	[Concept] Monetary	For Period	Credit	Standard Label	ipsas:ShareCapitalOtherIncreaseDecrease
Share Capital, Closing Balance	[Concept] Monetary	As Of	Credit	Period End Label	ipsas:ShareCapital

Fact table

#	Reporting Entity	Period	Concept	Legal Entity [Axis]	Report Date [Axis]	Reporting Scenario [Axis]	Fact Value	Unit	Rounding	Parenthetical
1	1234567890 http://regulator.gov/id	2019-12-31	Share Capital, Opening Balance	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	1000	USD	0	
2	1234567890 http://regulator.gov/id	2018-12-31	Share Capital, Opening Balance	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	1000	USD	0	
3	1234567890 http://regulator.gov/id	2020-01-01/2020-12-31	Share Capital, Contributions	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	2000	USD	0	
4	1234567890 http://regulator.gov/id	2019-01-01/2019-12-31	Share Capital, Contributions	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	3000	USD	0	
5	1234567890 http://regulator.gov/id	2020-01-01/2020-12-31	Share Capital, Distributions	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	1000	USD	0	
6	1234567890 http://regulator.gov/id	2019-01-01/2019-12-31	Share Capital, Distributions	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	2000	USD	0	
7	1234567890 http://regulator.gov/id	2020-01-01/2020-12-31	Share Capital, Other Increase (Decrease)	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	-1000	USD	0	
8	1234567890 http://regulator.gov/id	2019-01-01/2019-12-31	Share Capital, Other Increase (Decrease)	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	-1000	USD	0	
9	1234567890 http://regulator.gov/id	2020-12-31	Share Capital, Closing Balance	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	1000	USD	0	
10	1234567890 http://regulator.gov/id	2019-12-31	Share Capital, Closing Balance	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	1000	USD	0	
49	1234567890 http://regulator.gov/id	2020-01-01/2020-12-31	Share Capital, Contributions	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	2000	USD	0	
50	1234567890 http://regulator.gov/id	2019-01-01/2019-12-31	Share Capital, Contributions	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	3000	USD	0	
51	1234567890 http://regulator.gov/id	2020-01-01/2020-12-31	Share Capital, Distributions	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	1000	USD	0	
52	1234567890 http://regulator.gov/id	2019-01-01/2019-12-31	Share Capital, Distributions	Consolidated Entity [Member]	Reported as of March 18, 2020 [Member]	Actual [Member]	2000	USD	0	

Business rules description

Label	Report Element Class	Balance	Weight	Name
⌄ Statement of Changes in Equity [Table]	[Table]		0	ipsas:StatementOfChangesInEquityTable
⌄ Share Capital, Closing Balance	[Concept] Monetary	Credit	1	ipsas:ShareCapital
Share Capital, Opening Balance	[Concept] Monetary	Credit	1	ipsas:ShareCapital
Share Capital, Contributions	[Concept] Monetary	Credit	1	ipsas:ShareCapitalContributions
Share Capital, Distributions	[Concept] Monetary	Debit	-1	ipsas:ShareCapitalDistributions
Share Capital, Other Increase (Decrease)	[Concept] Monetary	Credit	1	ipsas:ShareCapitalOtherIncreaseDecrease

Business rules validation results

Label	Rendered Value	Op	Reported Value	Calculated Value	Balance	Result	Name
⌄ **Share Capital Reconciliation [Roll Forward]**							ipsas:ShareCapitalReconciliationRollForward
Share Capital, Opening Balance	1,000	+	1,000		Credit		ipsas:ShareCapital
Share Capital, Contributions	2,000	+	2,000		Credit		ipsas:ShareCapitalContributions
Share Capital, Distributions	(1,000)	-	1,000		Debit		ipsas:ShareCapitalDistributions
Share Capital, Other Increase (Decrease)	(1,000)	+	-1,000		Credit		ipsas:ShareCapitalOtherIncreaseDecrease
Share Capital, Closing Balance	1,000	+	1,000	1,000	Credit	Verified	ipsas:ShareCapital

Report elements

Label	Report Element Class	Period	Balance	Name
Statement of Changes in Equity [Table]	[Table]			ipsas:StatementOfChangesInEquityTable
Legal Entity [Axis]	[Axis]			frm:LegalEntityAxis
Consolidated Entity [Member]	[Member]			frm:ConsolidatedEntityMember
Report Date [Axis]	[Axis]			frm:ReportDateAxis
Reported as of March 18, 2020 [Member]	[Member]			company:ReportedAsOfMarch182020Member
Reporting Scenario [Axis]	[Axis]			frm:ReportingScenarioAxis
Actual [Member]	[Member]			frm:ActualMember
Share Capital Reconciliation [Roll Forward]	[Abstract]			ipsas:ShareCapitalReconciliationRollForward
Share Capital, Opening Balance	[Concept] Monetary	As Of	Credit	ipsas:ShareCapital
Share Capital, Contributions	[Concept] Monetary	For Period	Credit	ipsas:ShareCapitalContributions
Share Capital, Distributions	[Concept] Monetary	For Period	Debit	ipsas:ShareCapitalDistributions
Share Capital, Other Increase (Decrease)	[Concept] Monetary	For Period	Credit	ipsas:ShareCapitalOtherIncreaseDecrease
Share Capital, Closing Balance	[Concept] Monetary	As Of	Credit	ipsas:ShareCapital

Rendering

All the information above plus common knowledge of a business report yields the following human-readable rendering of this fact set:

Component: (Network and Table)		
Network	1400 - Statement - **Changes in Equity**	
Table	Statement of Changes in Equity [Table]	

Reporting Entity [Axis]	1234567890 http://regulator.gov/id	
Reporting Scenario [Axis]	Actual [Member]	
Report Date [Axis]	Reported as of March 18, 2020 [Member]	
Legal Entity [Axis]	Consolidated Entity [Member]	
Unit [Axis]	USD	

	Period [Axis] ▼	
Share Capital Reconciliation [Roll Forward]	2020-01-01/2020-12-31	2019-01-01/2019-12-31
Share Capital Reconciliation [Roll Forward]		
Share Capital, Opening Balance	1,000	1,000
Share Capital, Contributions	2,000	3,000
Share Capital, Distributions	(1,000)	(2,000)
Share Capital, Other Increase (Decrease)	(1,000)	(1,000)
Share Capital, Closing Balance	1,000	1,000

A similar set of information exists for each of the other 23 fact sets within the IPSAS prototype financial report.

Reporting Checklist Rules

Financial reports are not forms where each economic entity reports the same information. Financial reports are variable meaning that while some disclosures are required such as a balance sheet, income statement, statement of comprehensive income, statement of changes in equity, cash flow statement,

nature of business, significant accounting policies, and revenue recognition policy; other disclosures are only provided if a specific circumstance occurs for an economic entity triggering the requirement for the disclosure. Further, alternatives exist for representing a disclosure and the arbitrary preferences and professional judgement play a role in determining what disclosures will exist within a financial report.

That said, it is possible to represent the rules for when a disclosure must be provided and in the SBRM those rules are classified into the category sbrm:ReportingChecklistRule[42]. Every reporting checklist rule fits into that same category of rules. Below you see a screen shot of the IPSAS reporting checklist rules[43]:

That tree view can be easier to read if it is rendered as a flat list[44]:

Clearly this is only a portion of the reporting checklist rules that might be provided for a reporting scheme, remember that the IPSAS is only a prototype.

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[42] sbrm:ReportingChecklistRule,
http://xbrlsite.azurewebsites.net/2019/Framework/Details/ReportingChecklistRule.html
[43] XBRL definition relations defining IPSAS reporting checklist rules,
http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/ipsas/disclosure-mechanics/ReportingChecklist-ipsas-rules-def.xml
[44] Reporting checklist rules for IPSAS flat list, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/ipsas/disclosure-mechanics/ReportingChecklist-ipsas-rules.html

Below you see the validation result of checking an XBRL-based financial report created using the IPSAS reporting scheme prototype against the set of reporting checklist rules:

By way of contrast, you can have a look at the 2017 Microsoft 10-K reporting checklist rules validation result[45]:

Disclosure Mechanics Rules

As stated, a financial report can be broken down into some number of fact sets. For the IPSAS prototype report there were 24 fact sets as we pointed out earlier. Each of those 24 fact sets is disclosing something.

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[45] 2017 Microsoft 10-K Reporting Checklist Validation Result,
http://xbrlsite.azurewebsites.net/2017/Prototypes/Microsoft2017/Disclosure%20Mechanics%20and%20Reporting%20Checklist.html

The IPSAS accounting standards are used to specify what must be disclosed. This information is summarized within a set of is called an sbrm:Disclosure[46]. Because the quantity of disclosures are quite large, a mechanism was added called sbrm:Topic[47] to facilitate the organization of disclosures into topics. The following is the set of sbrm:Disclosure items provided for the IPSAS prototype[48] organized by sbrm:Topic:

IPSAS Disclosures (with topics)

IPSASB | Handbook of Pronouncements

Taxonomy scheme (elements) | Presentation relations (disclosures and topics) | Definition relations (disclosures and topics) | Labels | References | XML Infoset | ZIP (Download)

Line	Label	Type	Reference	Name
1	Disclosures	Network		http://xbrlsite.azurewebsites.net/2019/ipsas/disclosures/role/Disclosures
2	Components of Financial Report	Heading	IPSAS 1 21	topics:ComponentsOfFinancialReport
3	Face Statements	Heading	IPSAS 1 21	topics:FaceStatements
4	Statement of Financial Position	Topic	IPSAS 1 21 a	topics:StatementOfFinancialPosition
5	Net Assets/Equity Subclassifications	Disclosure	IPSAS 1 88	disclosures:NetAssetsEquitySubclassifications
6	Statement of Financial Position, Classified	Disclosure	IPSAS 1 88	disclosures:StatementOfFinancialPositionClassified
7	Statement of Financial Position, Classified (Alternative)	Disclosure	IPSAS 1 88	disclosures:StatementOfFinancialPositionClassifiedAlternative
8	Statement of Financial Position, Liquidity	Disclosure	IPSAS 1 88	disclosures:StatementOfFinancialPositionLiquidity
9	Statement of Financial Performance	Topic	IPSAS 1 21 b	topics:StatementOfFinancialPerformance
10	Statement of Financial Performance, by Function	Disclosure	IPSAS 1 102	disclosures:StatementOfFinancialPerformanceByFunction
11	Statement of Financial Performance, by Nature	Disclosure	IPSAS 1 102	disclosures:StatementOfFinancialPerformanceByNature
12	Statement of Financial Performance, Comparison of Budget and Actual Amounts	Disclosure	IPSAS 1 21 e	disclosures:StatementOfFinancialPerformanceComparisonOfBudgetAndActual
13	Statement of Changes in Net Assets/Equity	Topic	IPSAS 1 21 c	topics:StatementOfChangesInNetAssetsEquity
14	Prior Period Adjustment	Disclosure	IPSAS 1 124	disclosures:PriorPeriodAdjustment
15	Statement of Changes in Net Assets/Equity	Disclosure	IPSAS 1 118	disclosures:StatementOfChangesInNetAssetsEquity
16	Cash Flow Statement	Topic	IPSAS 1 21 d	topics:CashFlowStatement
17	Cash Flow Statement, Direct Method	Disclosure	IPSAS 2 18	disclosures:CashFlowStatementDirectMethod
18	Nature of Economic Entity	Heading	IPSAS 1 150 b	topics:NatureOfEconomicEntity
19	Nature of Entity	Disclosure	IPSAS 1 150	disclosures:NatureOfEntity
20	Basis of Presentation	Heading	IPSAS 1 127 a	topics:BasisOfPresentation
21	Basis of Presentation	Disclosure	IPSAS 1 132 a	disclosures:BasisOfPresentation
22	Summary of Significant Accounting Policies	Heading	IPSAS 1 21 f	topics:SummaryOfSignificantAccountingPolicies

Each disclosure is represented as an XBRL element[49].

Each disclosure is represented within the IPSAS XBRL Taxonomy. Here is the information model structure for the disclosure of the subclassifications of Property, Plant and Equipment[50]:

Component: (Network and Table)

Network	2221 - Disclosure - **Property, Plant, and Equipment, Net Subclassifications (Alternative)**
Table	Property, Plant and Equipment Components [Table]

Reporting Entity [Axis]	1234567890 http://regulator.gov/id		
Reporting Scenario [Axis]	Actual [Member]		
Report Date [Axis]	Reported as of March 18, 2020 [Member]		
Legal Entity [Axis]	Consolidated Entity [Member]		
Unit [Axis]	USD		

Property, Plant and Equipment Components [Line Items]	Period [Axis] ▼		
	2020-12-31	2019-12-31	2018-12-31
Property, Plant, and Equipment, Net, Components [Roll Up]			
Land	1,000	1,000	1,000
Buildings, Net	1,000	1,000	1,000
Furniture and Fixtures, Net	1,000	1,000	1,000
Machinery, Net	1,000	1,000	1,000
Property, Plant and Equipment, Net	4,000	4,000	4,000

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

[47] sbrm:Topic, http://xbrlsite.azurewebsites.net/2019/Framework/Details/Topic.html

[48] IPSAS Disclosures Organized by topic, http://xbrlsite.azurewebsites.net/2019/Prototype/ipsas/Metadata/disclosures_ModelStructure.html

[49] Disclosures represented as an XBRL taxonomy schema, http://xbrlsite.azurewebsites.net/2019/Prototype/ipsas/Metadata/disclosures.xsd

[50] Disclosure of Subclassifications of Property, Plant and Equipment, IPSAS prototype, XBRL Cloud, http://xbrlsite.azurewebsites.net/2019/Library/Core/evidence-package/contents/index.html#Rendering-PropertyPlantAndEquipmentDetails-ipsas_PropertyPlantEquipmentComponentsTable.html

Each disclosure has a set of mechanical rules which specify what that disclosure must look like. For example, the Subclassifications of Property Plant and Equipment disclosure:

- Has the name **disclosures:PropertyPlantAndEquipmentNetSubclassifications**
- It is represented using the hypercube, **ipsas:PropertyPlantEquipmentComponentsTable**
- The disclosure is a **roll up** (sbrm:RollUp[51])
- The roll up total, which always must exist, is represented using the concept **ipsas:PropertyPlantAndEquipmentNet**

These four things must always be true for this specific disclosure. These rules are represented in machine-readable form using XBRL definition relations[52].

Those XBRL definition relations can be rendered in a controlled natural language and presented to the user as the following human-readable representation: (this is Pesseract)

All of the disclosure rules for each individual disclosure can be grouped into an XBRL Taxonomy schema[53].

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[51] sbrm:RollUp, http://xbrlsite.azurewebsites.net/2019/Framework/Details/RollUp.html
[52] XBRL definition relations for disclosure mechanics rule, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/ipsas/disclosure-mechanics/1388-rules-def.xml
[53] XBRL taxonomy schema with disclosure rules, http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/ipsas/disclosure-mechanics/disclosure-mechanics-ipsas.xsd

And finally, the representation of a disclosure within a financial report can be tested against the machine-readable disclosure rules and a line of reasoning provided to a software application user as to whether the information about a provided disclosure in a report is consistent with or inconsistent with that expectation represented in the sbrm:DisclosureMechanicsRule[54].

This process can be repeated for each and every fact set that is used to represent each and every disclosure. Here are the disclosure mechanics validation results for the IPSAS prototype report:

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[54] sbrm:DisclosureMechanicsRule,
http://xbrlsite.azurewebsites.net/2019/Framework/Details/DisclosureMechanicsRule.html

Primary Information

#	Disclosure	Category	Level	Pattern	Disclosure F...	Disclosure C...	Applicable	Representation Concept [TEXT BLOCK]	Representation Concept DETAIL
1	Assets Roll Up	Unknown	Level4Detail	RollUp	True	N/A	False	NOT-EXPECTED	Assets
2	Cash Flow Statement, ...	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Net Cash Flow
3	Document Information	Unknown	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Document Title
4	Entity Information	Unknown	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Economic Entity Name
5	Liabilities and Net Asse...	Unknown	Level4Detail	RollUp	True	N/A	False	NOT-EXPECTED	Liabilities and Net Assets/Equity
6	Prior Period Adjustment	Unknown	Level4Detail	Adjustment	True	CONSISTENT	True	NOT-EXPECTED	Accumulated Surpluses (Deficits)
7	Property, Plant, and E...	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Property, Plant and Equipment, Net
8	Property, Plant, and E...	Unknown	Level4Detail	RollUp	False	N/A	False	NOT-EXPECTED	NOT-FOUND
9	Property, Plant, and E...	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Property, Plant and Equipment, Net
10	Revenue Detail by Cus...	Unknown	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Revenue
11	Share Capital by Class	Unknown	Level4Detail	Hierarchy	True	CONSISTENT	True	NOT-EXPECTED	Share Capital
12	Statement of Changes...	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Equity
13	Statement of Financial ...	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Surplus (Deficit)
14	Statement of Financial ...	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Surplus (Deficit) from Continuing Operations before Equity M...
15	Statement of Financial ...	State...	UNKNOWN	Component	True	CONSISTENT	True	-	-
16	Surplus (Deficit) Break...	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Surplus (Deficit)

Here is a similar example for a US GAAP report[55]:

Disclosure Mechanics and Reporting Checklist

Entity Registrant Name:	MICROSOFT CORPORATION (SEC Filing Page)	Document Type:	10-K
CIK:	0000789019	Fiscal Year / Period:	2017 / FY

Disclosures Found: 48 of 70 (69%)

Disclosures Consistent: 68 of 70 (97%) | Disclosures Inconsistent: 2 of 70 (3%)

Show: ○All ○Only Consistencies ○Only Inconsistencies ◉Only Reported ○Only Not Reported   ☐ Show Level 1 Note And Policy Concept Columns

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

Note that the Microsoft disclosure mechanics checklist only contains approximately 65 disclosures, as such not 100% of all disclosures are being tested. This is because there are only approximately 65 disclosures for which disclosure rules have been created for US GAAP.

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[55] 2017 Microsoft 10-K disclosure mechanics validation results,
http://xbrlsite.azurewebsites.net/2017/Prototypes/Microsoft2017/Disclosure%20Mechanics%20and%20Reporting%20Checklist.html

By contrast, 100% of the disclosure of the IPSAS prototype report have been tested.

Intersections between Fact Sets

Thus far we have looked at individual fact sets. However, fact sets can be intersected. For example, the line item Property, Plant and Equipment, Net, Total of the balance sheet which reports the summary of PPE is always intersected to the disclosure of the subclassifications which make up the details of PPE:

Below you see the assets rollup fact set of the balance sheet[56] of the IPSAS prototype financial report.

Intersections

The line item "Property, Plant, and Equipment, Net, Total" on the balance sheet intersects with other fact sets. Basically, the same fact exists within four different fact sets:

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[56] Balance sheet of IPSAS prototype, http://xbrlsite.azurewebsites.net/2019/Library/Core/evidence-package/contents/index.html#Rendering-StatementOfFinancialPositionClassified-ipsas_StatementOfFinancialPositionClassifiedTable.html

Property, plant and equipment components [Roll Up]

Component: (Network and Table)				
Network	2221 - Disclosure - **Property, Plant, and Equipment, Net Subclassifications (Alternative)**			
Table	Property, Plant and Equipment Components [Table]			

Reporting Entity [Axis]	1234567890 http://regulator.gov/id		
Reporting Scenario [Axis]	Actual [Member]		
Report Date [Axis]	Reported as of March 18, 2020 [Member]		
Legal Entity [Axis]	Consolidated Entity [Member]		
Unit [Axis]	USD		

Property, Plant and Equipment Components [Line Items]	2020-12-31	2019-12-31	2018-12-31
Property, Plant, and Equipment, Net, Components [Roll Up]			
Land	1,000	1,000	1,000
Buildings, Net	1,000	1,000	1,000
Furniture and Fixtures, Net	1,000	1,000	1,000
Machinery, Net	1,000	1,000	1,000
Property, Plant and Equipment, Net	4,000	4,000	4,000

Property, plant and equipment [Roll Forward]

Component: (Network and Table)		
Network	2230 - Disclosure - **Property, Plant, and Equipment Reconciliations**	
Table	Property, Plant and Equipment Reconciliations [Table]	

Reporting Entity [Axis]	1234567890 http://regulator.gov/id
Reporting Scenario [Axis]	Actual [Member]
Report Date [Axis]	Reported as of March 18, 2020 [Member]
Legal Entity [Axis]	Consolidated Entity [Member]
Unit [Axis]	USD

Property, Plant and Equipment, Net [Reconciliation]	2020-01-01/2020-12-31	2019-01-01/2019-12-31
Property, Plant and Equipment, Net [Reconciliation]		
Property, Plant and Equipment, Net, Opening Balance	4,000	4,000
Property, Plant and Equipment, Net, Additions	4,000	4,000
Property, Plant and Equipment, Net, Disposals	(4,000)	(4,000)
Property, Plant and Equipment, Net, Revaluations	0	0
Property, Plant and Equipment, Net, Other Increase (Decrease)	0	0
Property, Plant and Equipment, Net, Closing Balance	4,000	4,000

Intersections exist between other fact sets as well.

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Mathematical Business Rules

The following shows the mathematical business rules, sbrm:MathematicalRule[57], for the current period assets roll up for the balance sheet. If you go to the XBRL Cloud representation[58] you can see (a) the prior period roll up computation mathematical validation results and (b) similar validation results for every mathematical computation represented in the entire report. The rules describe each mathematical computation and the validation results show that the report is consistent with the expectation provided by the roll up rules.

Label	Rendered		Reported	Calculated	Balance	Decimals	Message
Assets, Total [Roll Up]							
Current Assets, Total [Roll Up]							
Cash and Cash Equivalents	1,000	+	1,000	1,000	DR	INF	
Receivables, Net, Current	1,000	+	1,000	1,000	DR	INF	
Inventory	1,000	+	1,000	1,000	DR	INF	
Prepaid Expenses	500	+	500	500	DR	INF	
Investments, at Cost	500	+	500	500	DR	INF	
Other Current Assets	1,000	+	1,000	1,000	DR	INF	
Current Assets, Total	5,000	+	5,000	5,000	DR	INF	OK
Noncurrent Assets, Total [Roll Up]							
Property, Plant, and Equipment, Net, Total	4,000	+	4,000	4,000	DR	INF	
Investment in Affiliates	0	+	0	0	DR	INF	
Receivables, Net, Noncurrent	0	+	0	0	DR	INF	
Other Noncurrent Assets	3,000	+	3,000	3,000	DR	INF	
Noncurrent Assets, Total	7,000	+	7,000	7,000	DR	INF	OK
Assets, Total	12,000		12,000	12,000	DR	INF	OK

Every fact set that has mathematical relations can be verified to be consistent with expectations if the expectations are provided in machine-readable rules. These same rules explain the mathematical relations of a financial report fact set that represents some disclosure.

Conclusion

An XBRL-based financial report is a logical system. The logical model of a business report plays an important role in understanding, representing, and verifying the consistency of an XBRL-based financial report. This method, which leverages the SBRM business report logical model, shows how an XBRL-based financial report can be proven to be consistent, valid, complete, sound, and fully expressed using this method.

Remember that financial reports are not forms and therefore the variability and flexibility that exists within such financial reports must be managed by some ontology-like thing to keep report quality high.

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[57] sbrm:MathematicalRule, http://xbrlsite.azurewebsites.net/2019/Framework/Details/MathematicalRule.html
[58] Mathematical rules for assets roll up, http://xbrlsite.azurewebsites.net/2019/Library/Core/evidence-package/contents/index.html#BusinessRulesSummary.html

For More Information

For more examples see the *Summary of Human Readable Renderings*[59] provided for a number of reporting schemes.

For a self-guided tour of an XBRL-based report, please see *Self Guided Tour of XBRL-based Financial Report*[60].

Want more details? You can get all of my lab notes from my blog:

http://xbrl.squarespace.com/blog-archive/

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[59] Summary of Human Readable Renderings, http://xbrl.squarespace.com/journal/2019/3/23/summary-of-human-readable-renderings.html
[60] Self Guided Tour of XBRL-based Financial Report, http://xbrl.squarespace.com/journal/2019/4/16/self-guided-tour-of-xbrl-based-financial-reports.html