Essence of Financial Reporting

An expository paper that describes the essence of financial reporting and the general purpose financial report and thoughts related to digitizing such financial reports

By

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"Truth is ever to be found in simplicity; and not in the multiplicity and confusion of things." Sir Isaac Newton

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Introduction

The motivation of this paper is to explain the essence of financial reporting and the general purpose financial report for the objective of helping others understand how to digitize general purpose financial reports.

The information in this paper is based on my work over 20+ years doing just that. In 1998 I came up with the idea of what became XBRL[1], brought that idea to my professional association the American Institute of Certified Public Accountants (AICPA) and XBRL[2] was created and became a global standard[3].

It took those 20+ years to put all the pieces together and figure out how XBRL-based digital financial reporting can work effectively to meet the needs of the institution of accountancy.

My background is accounting, not information technology, knowledge engineering, artificial intelligence, XML, or any of the "technical stuff" that is needed to make XBRL-based digital financial reporting work effectively. I am a business professional. Further, I am not a "specialist" in any particular area, I am more of a "generalist" that has a broad understanding but deep enough to be dangerous.

But I took it upon myself to go through a process of "sensemaking[4]" to understand XBRL, XML, artificial intelligence, knowledge engineering, financial reporting using US GAAP, financial reporting using IFRS, financial reports submitted to the Securities and Exchange Commission (SEC), and other areas that were necessary to understand in order to put all the pieces together effectively.

The results of all my work are documented on my blog which served as my brainstorming tool[5]. To begin to understand the information on my blog should you be interested, I would suggest the blog post "The End (Start Here)"[6].

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1 *Ten Years Ago, the XBRL Journey Began*, http://xbrl.squarespace.com/journal/2008/4/21/ten-years-ago-the-xbrl-journey-began.html

2 XBRL International, https://www.xbrl.org/

3 AICPA, *The Story of Our New Language*, https://us.aicpa.org/content/dam/aicpa/interestareas/frc/accountingfinancialreporting/xbrl/downloadabledocuments/xbrl_09_web_final.pdf

4 *Sensemaking*, http://xbrl.squarespace.com/journal/2021/11/18/sensemaking.html

5 XBRL.Squarespace.com, http://xbrl.squarespace.com/blog-archive/

6 *The End (Start Here)*, http://xbrl.squarespace.com/journal/2022/4/4/the-end-start-here.html

That blog post provides information about my theory, my method, the best examples and samples of XBRL-based digital financial reports that I have put together, explanations of everything I think you might want to know, and a resource, *Mastering XBRL-based Digital Financial Reporting*[7], that is evolving into a book that is a far better synthesis of all this information.

This may seem like a lot of "stuff" for people to try and understand. The good news is that the average accountant does not need to understand all this "stuff". Who needs to understand this is software engineers that build the software that hides all of this complexity "under the hood" and enables accountants to use this technology effectively in the performance of their day-to-day tasks.

XBRL-based digital financial reporting makes a lot of sense given that we are in the "information age" or "digital age". XBRL-based digital general purpose financial reports are just another innovation in a long line of innovations related to financial accounting and reporting[8].

What I have created I offer not as an end, but rather as a starting point for others to build on. What I have created works to do specific, important things; but it is not perfect. Few things that humans tend to create are perfect. Whether it gets the job done or not is yet to be determined. XBRL-based digital financial reporting will continue to evolve and be improved even more.

Digital financial reporting and XBRL-based digital general purpose financial reports will not replace 100% of all paper-based or "e-paper" reporting. Digital financial reporting will not automate everything like some would have you believe. One should not be overly optimistic about what is possible, judge using evidence and facts. But one should not be completely pessimistic either. Changes to financial reporting and the general purpose financial report will unfold over time.

The past 20 years did not bring us to the end of the journey, it has brought the institution of accountancy to the beginning of a journey.

I am going to begin this explanation by providing an overview of the bigger picture. Then, I will provide additional details that expand on or amplify that overview in the remainder of this document.

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[7] Charles Hoffman, CPA, *Mastering XBRL-based Digital Financial Reporting*, http://xbrl.squarespace.com/mastering-xbrl/

[8] *Accounting: Our First Communications Technology*, http://xbrl.squarespace.com/journal/2021/10/23/accounting-our-first-communications-technology.html

In addition, I am providing a set of appendices that expands on the overview by delivering additional details should the reader desire to dive into this material.

But first, we will start with the bigger picture that will assist the reader in pulling their understanding together effectively.

Overview

This section provides an overview of the essence of financial reports.

A financial report is a special type of business report that serves a specific purpose. The features of such financial reports have been developed over many thousands of years and exist for specific reasons.

There are five core aspects of a financial report that need to be understood since they lay the foundation for understanding the general purpose financial report. Those five core aspects of a financial report are:

1. **Debits = Credits**: Financial reporting is grounded in the double-entry bookkeeping model which is a mathematical model[9] and is a de facto global standard sometimes referred to as the Venetian Method[10] which was documented by Luca Pacioli in 1494.
2. **Accounting Equation**: The foundation of accounting is the accounting equation[11] which states that "Assets = Liabilities + Equity" or some other mathematically equivalent version of that same equation such as "Net Assets = Assets – Liabilities" or "Assets = Liabilities + Beginning Equity + Comprehensive Income + Investments by Owners - Distributions to Owners".
3. **Core Set of Interrelated Elements**: There are many different financial reporting schemes but each financial reporting scheme defines a set of core elements that are mathematically interrelated. An example of core elements are the 10 elements defined within SFAC 8[12] by the FASB for US GAAP which are: Assets, Liabilities, Equity, Comprehensive Income, Investments by Owners, Distributions to Owners, Revenues, Expenses, Gains,

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[9] David P. Ellerman, *The Mathematics of Double Entry Bookkeeping*, https://ellerman.org/wp-content/uploads/2012/12/DEB-Math-Mag.CV_.pdf

[10] Jane Gleeson-White, *Double Entry: How the Merchants of Venice Created Modern Finance*, https://www.amazon.com/gp/product/B007Q6XKA8/

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

[12] *SFAC 6 Updated by SFAC 8*, http://xbrl.squarespace.com/journal/2022/2/24/sfac-6-updated-by-sfac-8.html

Losses. The IFRS conceptual framework similarly defines a set of core elements as does every other financial reporting scheme[13].

4. **Articulation**: The set of primary financial statements (balance sheet, income statement, other comprehensive income, changes in equity, cash flow statement) of a general purpose financial statement are intentionally interconnected mathematically and therefore depend upon one another.
5. **Inherent Variability**: Financial reporting schemes intentionally allow different intermediate components to be provided by reporting entities (e.g. subtotals) or to be excluded from reports all together which leads to inherent variability within those reports. The purpose of this variability is to allow reporting entities to provide details of their unique aspects which tends to enhance the richness of information reported about a reporting economic entity.

The bottom line here that needs to be understood is that financial statements are not forms; yet such financial reports are not random either. This is intentional. This is a feature of financial reports. These fundamental mechanics of general purpose financial reports must both be factored into and leveraged by digital versions of such financial reports.

The set of primary financial statements and many of the details that further describe those statements in financial statement notes are the result of entering transactions into an accounting system that follows the double-entry bookkeeping mathematical model, aggregating and grouping those transactions, following accounting rules specified by someone such as a standards setter or regulator within a financial reporting scheme which has defined the core elements of the financial statements which are mathematically interconnected that are used in that aggregation/grouping process, and have what amounts to different permissible "reporting styles" that can be used to represent a general purpose financial report that is permitted per the financial reporting scheme that is being utilized to create the report. Every general purpose financial report works in this manner; these are the fundamental mechanics of such reports.

And so, while not "forms" and not being "random" either; there are **patterns** that exist within general purpose financial reports. Those

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13 *Comparison of Elements of Financial Statements*, http://xbrlsite.azurewebsites.net/2020/master/ElementsOfFinancialStatements.pdf

patterns can be described logically and be leveraged and financial reports can be effectively digitized.

Effectively, reporting entities create their report using some report model. That report model must follow some permitted reporting style. As stated, reports, and therefore reporting styles used, must follow the double-entry bookkeeping model, the accounting equation, the core set of mathematically interrelated elements, and the interconnections between the primary financial statements (e.g. articulation) must be adhered to.

While reporting entities can define almost whatever subtotals they might desire; there are known and understood "common practices" or good practices that tend to be followed to avoid sending unnecessary "red flags" to the users of such general purpose financial reports.

While it seems to be the case that standards setters tend to avoid defining intermediate components (e.g. subtotals); common practices and good practices emerge over time. For example, the notion of "Gross Profit (Loss)" may not be defined by standards setters but a lot of reporting economic entities tend to use that subtotal.

Effectively, you can think of the information being represented within a financial report as a set of declarative sentences that are "true" and propositions that make assertions about those declarative sentences which must also be true. Another name for this as used in domain of logic is the logical statement[14].

At its essence, a general purpose financial report is a set of logical statements that conforms to a logical model.

Terms are used by a reporting entity to define report line items, **structures** are used as a mechanism for separating and organizing the many fragments of a report, **associations** are created between terms within structures, assertions and other **rules** are provided to describe mathematical associations, and **facts** are reported that are described by that report model.

These terms, structures, associations, rules, and facts form a report **model**.

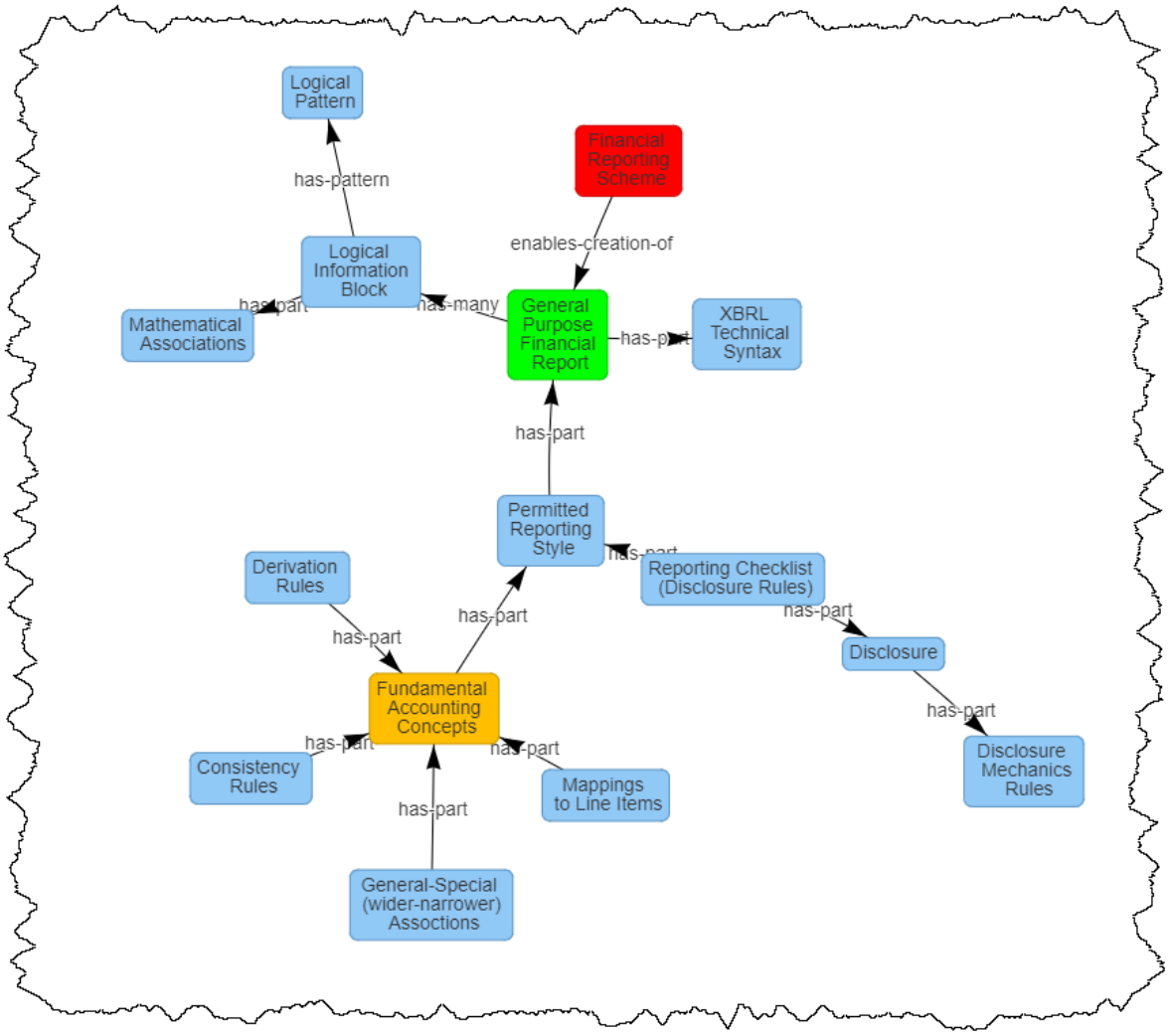
That report model must be complete (pieces cannot be missing), it must be consistent (there should be no inconsistencies or contradictions), and it must precisely (should reflect what came out of the accounting system) represent the information that is expressed by those logical

[14] Wikipedia, *Statement (Logic)*, https://en.wikipedia.org/wiki/Statement_(logic)

statements within the report and its report model which provides a "true and fair" representation of the financial status and financial performance of the reporting economic entity.

Those logical statements can leverage a higher-level meta model (a model that all report models must follow) which represents the types of things that constitute a financial report and the information that is used to verify that such reports are logically consistent, properly functioning, "true and fair" representations of financial information.

The graphic below provides a high-level summary of what is being described, the essence of a general purpose financial report[15]:



A complete description of the dynamics and mechanics of a general purpose financial report is provided in the *Logical Theory Describing*

[15] Essence of Financial Reporting, http://xbrlsite.com/seattlemethod/EssenceOfFinancialReporting.html

Financial Report[16]. A method for implementing XBRL-based digital financial reports using these ideas in software is documented by the *Seattle Method*[17].

This logical theory and method are implemented in multiple software applications including:

- XBRL Cloud's Evidence Package[18]
- Pesseract[19], a working proof of concept
- Luca[20], a tool being developed for creating financial reports
- Auditchain Pacioli[21], which is a logic and rules engine that understands both the logical theory and Seattle Method.
- Auditchain Suite[22], which is a multi-faceted tool for working with XBRL-based digital financial reports

XBRL-based financial reports submitted by public companies to the SEC and listed companies to the ESMA must conform to both the rules specified by the global standard XBRL technical specification in terms of report syntax; in addition, those reports must also conform to the rules of mathematics and logical (e.g. semantics).

And so there you have a high-level overview of a general purpose financial report and information about how that high-level overview was described by a logical theory, can be processed using a method, and implemented in software that proves the logical theory.

What follows is the remainder of this paper is additional helpful details that help professional accountants and software engineers get their heads around XBRL-based digital financial reporting and communicate with one another effectively in order to create computer software that serves the real needs of professional accountants.

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16 Charles Hoffman, CPA, *Logical Theory Describing Financial Report* (Terse), http://xbrlsite.com/seattlemethod/LogicalTheoryDescribingFinancialReport_Terse.pdf

17 Charles Hoffman, CPA, *Seattle Method*, http://xbrlsite.com/seattlemethod/SeattleMethod.pdf

18 XBRL Cloud, https://www.xbrlcloud.com/cleanscore.html

19 Pesseract, http://pesseract.azurewebsites.net

20 Luca, https://general.luca.report/

21 Auditchain, *Pacioli Logic and Rules Engine*, https://docs.auditchain.finance/auditchain-protocol/pacioli-logic-and-rules-engine

22 Auditchain Suite, https://suite.auditchain.finance/about

Narrative with Examples

This section provides an explanation of the essence of financial reports in narrative form with examples that help the reader understand financial reports at a high level.

Approximately 6,000 public companies submit general purpose financial reports to the Securities and Exchange Commission (SEC) making use of the US GAAP financial reporting scheme. Similarly, approximately 400 public companies that are foreign issuers submit general purpose financial reports to the SEC using IFRS. US GAAP and IFRS are common financial reporting schemes. Let us focus on those that report using US GAAP.

The conceptual framework defines ten elements of financial statements in SFAC 8[23]: assets, liabilities, equity, comprehensive income, investments by owners, distributions to owners, revenues, expenses, gains, losses. That conceptual framework is not an accounting standard, but it is used as a framework for creating accounting standards. The account standards for US GAAP are provided by the Accounting Standards Codification (ASC)[24].

The rules specified by the ASC are used to create US GAAP based financial reports. Approximately 31% of all public companies use the same reporting style, about 1,947 companies. A reporting style[25] is a particular type of balance sheet, income statement, cash flow statement combination.

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[23] FASB, Concept Statements, Conceptual Framework for Financial Reporting—Chapter 4, *Elements of Financial Statements*, https://fasb.org/page/PageContent?pageId=/standards/concepts-statements.html

[24] FASB, Accounting Standards Codification, https://asc.fasb.org/

[25] *Fundamental Accounting Concepts and Reporting Styles*, http://www.xbrlsite.com/mastering/Part02_Chapter05.L_FundamentalAccountingConceptAndReportingStyles.pdf

#	Reporting style	Filings Count	Filings With No Errors	Sum Errors (all filings)	Average Errors per Filing	Percent Without Error	Cum	Cum %
1	COMID-BSC-CF1-ISM-IEMIB-OILY-SPEC6	1,947	1,645	454	.2	84%	1,947	31.2%
2	COMID-BSC-CF1-ISS-IEMIB-OILY-SPEC1	874	745	214	.2	85%	2,821	45.2%
3	COMID-BSC-CF1-ISS-IEMIB-OILY-SPEC2	786	692	127	.2	88%	3,607	57.8%
4	INTBX-BSU-CF1-ISS-IEMIX-OILN	480	426	71	.1	89%	4,087	65.5%
5	COMID-BSC-CF1-ISS-IEMIB-OILY	178	162	30	.2	91%	4,265	68.3%
6	COMID-BSC-CF1-ISM-IEMIX-OILY-PARK	163	149	18	.1	91%	4,428	70.9%
7	COMID-BSC-CF1-IS3-IEMIB-OILN	130	93	49	.4	72%	4,558	73.0%
8	COMID-BSC-CF1-ISM-IEMIB-OILY-SPEC9	124	106	20	.2	85%	4,682	75.0%
9	COMID-BSC-CF1-IS6-IEMIX-OILN	108	92	24	.2	85%	4,790	76.7%
10	INSBX-BSU-CF1-ISS-IEMIX-OILN	95	87	9	.1	92%	4,885	78.2%
11	COMID-BSC-CF1-IS8-IEMIB-OILN	78	56	35	.4	72%	4,963	79.5%
12	COMID-BSC-CF1-ISM-IEMIB-OILY-SPEC5	65	44	[illegible]	.4	68%	5,028	80.5%

Of all 6,000 public companies that report to the SEC using US GAAP, about 80% use one of 11 common reporting styles.

To understand reporting styles, consider two public companies: Microsoft and Wells Fargo Bank. In the graphic above, Microsoft uses the first and most common financial reporting style whereas Wells Fargo Bank uses #4 which is the same reporting style used by most banks.

Without going into accounting details, you can imagine that a software company such as Microsoft and a bank such as Wells Fargo have considerably different financial statements because they are different types of reporting entities. US GAAP is intentionally designed for this type of situation.

Each different reporting style uses different:

- Fundamental accounting concepts
- Consistency crosscheck rules to make sure the relations between fundamental accounting concepts are adhered to
- Derivation rules to logically derive fundamental accounting concepts that are not explicitly reported
- Mapping rules that are used to determine which report line item is used to report a fundamental accounting concept
- Type-subtype rules (also known as "wider-narrower" associations or "general-special" associations) to make sure line items are reported with the proper mathematical relations
- Disclosure rules (also known as reporting checklist) because different reporting styles have different disclosure requirements
- Disclosure mechanics rules because different disclosures are constructed in different ways

But every financial report is required to follow the same fundamental rules of mathematics, the same rules of logic, and certain rules of accounting and reporting that are universally applicable to all financial reports.

A general purpose financial report is a set of fragments. Those fragments are provided in a specific sequence. Each report fragment should be complete, consistent, and precise and there should be no inconsistencies or contradictions between financial report fragments.

If all of the above is deemed to be OK, the it can be said that the financial report is a "true and fair" representation of the financial position and financial performance of an economic entity.

In addition to the above; should a report be represented using XBRL, not only does all of the above need to be correct; but the report must also conform to the XBRL technical format.

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Appendix: Bookkeeping vs Accounting vs Reporting

The following is an explanation of what bookkeeping is, what accounting is, and what reporting is and how they relate to one another.

- **Bookkeeping** is a mechanical process of recording transactions. Bookkeeping is the **action** of accounting. *Bookkeeping is a record keeping process*.
- **Accounting** is about determining what constitutes the transactions that are recorded. Accounting is the **language** used by bookkeeping. *Accounting is a communications tool*.
- **Financial reporting** and the general purpose financial report specifically are about communicating specific accounting and nonaccounting information about the financial position (status or state) and financial performance (performance or flow) about a specific reporting economic entity using the language of accounting and the rules of a financial reporting scheme.

Understanding the distinction between these three things is helpful in understanding essence of financial reports.

Appendix: Classic Transactions

The book *The Joy of Accounting*[26] introduced me to the notion of "classic transactions". That same idea was introduced to me by ACTUS[27] which uses the term "financial contracts" and "operating (or trade) contracts" to explain the same idea.

Fundamentally, transactions that are entered into an accounting system can be grouped into patterns. Those patterns can be leveraged.

For more information related to accounting transactions, please see this resource[28].

Appendix: Financial Reporting Scheme

A financial reporting scheme is a mechanism for performing financial reporting. Financial reporting schemes tend to be created by standards setters, regulators, and other such groups. Here is a comparison of financial reporting schemes that I created[29]:

Reporting Scheme	US GAAP issued by FASB	IFRS issued by IASB	FRF for SMEs issued by AICPA	IPSAS issued by IPSASB	GAS issued by GASB	AAS issued by AASB	FAS issued by FASAB
URL	https://www.fasb.org	https://www.ifrs.org/	https://www.aicpa.org/interestareas/frc/accountingfinancialreporting/pcfr.html	https://www.ipsasb.org	https://www.gasb.org	https://www.aasb.gov.au	http://www.fasab.gov
Reporting Scheme description	United States Generally Accepted Accounting Standards	International Financial Reporting Standards	Financial Reporting Framework for Small- and Medium-Sized Entities	International Public Sector Accounting Standards	General purpose financial reporting by state and local governmental entities	Australian Accounting Standards	Federal Accounting Standards (United States)
Location of Standards	https://asc.fasb.org/ (free access, but you have to register)	https://www.ifrs.org/issued-standards/list-of-standards/	https://www.aicpa.org/content/dam/aicpa/interestareas/frc/accountingfinancialreporting/pcfr/downloadabledocuments/frf-sme/frf-smes-framework.pdf	http://www.ifac.org/publications-resources/2018-handbook-international-public-sector-accounting-pronouncements	https://gars.gasb.org/ (free access, but you have to register) https://www.gasb.org/jsp/GASB/Page/GASBSectionPage&cid=1176160042391	https://www.aasb.gov.au/Pronouncements.aspx	http://www.fasab.gov/document-by-chapter
Conceptual Framework	https://www.fasb.org/pdf/con8.pdf	https://www.ifrs.org/issued-standards/list-of-standards/conceptual-framework/	https://www.aicpa.org/content/dam/aicpa/interestareas/frc/accountingfinancialreporting/pcfr/downloadabledocuments/frf-sme/frf-smes-framework.pdf	https://www.ifac.org/system/files/publications/files/A10-IPSAS-01_1.pdf	https://www.gasb.org/cs/ContentServer?c=GASBContent_C&cid=1176156649588&d=&pagename=GASB%2FGASBContent_C%2FProjectPage	https://www.aasb.gov.au/admin/file/content105/c9/ConceptualFramework05-19.pdf	http://files.fasab.gov/pdffiles/handbook_sffac_1.pdf http://files.fasab.gov/pdffiles/2018_fasab_handbook.pdf
Approximate number of reporting entities	About 10,000 public entities; 27.9 million private entities; 18,500 private companies with 500 employees or more; 320,000 not-for-profit entities.	Estimated to be about 10,000 listed companies in Europe perhaps 30,000 globally; probably 25 million private small and medium (SME) entities globally.	Intended for the approximately 27.9 million private companies in the US; would tend to be economic entities on the smaller side.	Unknown, estimate at least 100,000 based on state and local government numbers in US.	Estimated 90,000 state and local governmental entities in the US.	Estimated to be about 1,068,052 listed companies and private small and medium (SME) entities.	The Federal Register indicates there are over 430 departments, agencies, and sub-agencies.
Master Term:	http://xbrlsite.azurewebsites.net/2019/Core/core-usgaap/	http://xbrlsite.azurewebsites.net/2019/Core/core-ifrs/	http://xbrlsite.azurewebsites.net/2019/Core/core-frfsme/		http://xbrlsite.azurewebsites.net/2019/Core/core-gas/	http://xbrlsite.azurewebsites.net/2019/Core/core-aas/	
Assets	Assets	Assets	Assets	Assets; Other Resources	Assets and Deferred Inflow of Resources	Assets	Assets
Liabilities	Liabilities	Liabilities	Liabilities	Liabilities; Other Obligations	Liabilities and Deferred Outflow of Resources	Liabilities	Liabilities
Equity or Net Assets	Equity (or Net Assets)	Equity (or Net Assets)	Equity (or Net Assets)	Net Financial Position	Net Position	Equity (or Net Assets)	Net Position
Comprehensive Income	Comprehensive Income	Income and Expenses	Net income	Surplus or Deficit	Change in Net Position	Income and Expenses	Change in Net Position (Implied)
Investments by Owners	Investments by Owners	Contributions from Holders of Equity Claims	Investments by Owners	Ownership Contributions	Increase in Net Position (Implied)	Contributions from Holders of Equity Claims	Increase in Net Position (Implied)
Distributions to Owners	Distributions to Owners	Distributions to Holders of Equity Claims	Distributions to Owners	Ownership Distributions	Decrease in Net Position (Implied)	Distributions to Holders of Equity Claims	Decrease in Net Position (Implied)
Revenues	Revenues	Income	Revenues	Revenues	Inflow of Resources	Income	Revenues
Expenses	Expenses	Expenses	Expenses	Expenses	Outflow of Resources	Expenses	Expenses
Gains	Gains		Gains				
Losses	Losses		Losses				

Something to keep in the back of your mind about financial reporting schemes is that they are created by humans, humans make mistakes, and standards setters creating financial reporting schemes do so using their perspective and not the perspective of the average accountant that has to create financial reports.

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26 Peter Frampton & Mark Robilliard, The Joy of Accounting, Part 2: Classic Transactions

27 ACTUS, *Algorithmic Contract Types Unified Standards*, https://www.actusfrf.org/about

28 Accounting Basics, http://xbrlsite.azurewebsites.net/2022/library/AccountingBasics.pdf

29 *Comparison of Elements of Financial Statements*, http://xbrlsite.azurewebsites.net/2020/master/ElementsOfFinancialStatements.pdf

Appendix: Comparison of Conceptual Frameworks

A conceptual framework is a tool created by a standards setter of anyone else creating a financial reporting scheme that helps them think about and set ground rules for creating such financial reporting schemes.

Over the years, I have looked at multiple conceptual frameworks for financial reporting schemes. In particular, I have analyzed the following conceptual frameworks in detail:

- US GAAP[30], in particular what is now SFAC 8 Chapters 4 (Elements of Financial Statements) and Chapter 7 (Presentation)
- IFRS[31]
- Financial Reporting Framework for Small and Medium-Sized Entities (FRF for SMEs) published by the AICPA[32]
- IPSAS[33]
- General Purpose Financial Statements – Simplified Disclosures for For-Profit and Not-for-Profit Tier 2 Entities (Australia, for SMEs)[34]

There are a lot of similarities between the conceptual frameworks, which makes sense. All of these conceptual frameworks have pretty much evolved from US GAAP and UK GAAP.

An important thing to understand about the conceptual frameworks is that they have the perspective of a standards setter, not the perspective of someone that does accounting and/or creates financial reports for a living.

Further, each of these conceptual frameworks is an artifact of the industrial age. These standards setters could be using a modeling-based approach which would improve the quality of their conceptual framework and standards.

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30 FASB, The Conceptual Framework, https://www.fasb.org/Page/PageContent?PageId=/the-conceptual-framework/the-conceptual-framework.html

31 IFRS Foundation, *Conceptual Framework for Financial Reporting*, https://www.ifrs.org/issued-standards/list-of-standards/conceptual-framework/

32 AICPA, *Financial Reporting Framework for Small and Medium-Sized Entities*, https://www.aicpa.org/resources/download/financial-reporting-framework-for-small-and-medium-sized-entities

33 International Public Sector Accounting Standards Board, *Public Sector Conceptual Framework*, https://www.ipsasb.org/projects/public-sector-conceptual-framework

34 AASB, *General Purpose Financial Statements – Simplified Disclosures for For-Profit and Not-for-Profit Tier 2 Entities*, https://www.aasb.gov.au/admin/file/content105/c9/AASB1060_Amendments_03-20.pdf

Appendix: Describing Logical Systems

As stated, a financial report is a logical system. A logical system can be explained using a logical theory. A logical theory is an abstract conceptualization[35] of specific important details of some area of knowledge. The logical theory provides a way of thinking about an area of knowledge by means of deductive reasoning to derive logical consequences of the logical theory.

A **logical theory** enables a community of stakeholders trying to achieve a specific goal or objective or a range of goals/objectives to agree on important logical statements used for capturing meaning or representing a shared understanding of and knowledge in some area of knowledge.

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

- **Logical theory**: A *logical theory* is a set of models that are consistent with and permissible per that logical theory.
- **Model**: A *model*[36] is a set of structures that are consistent with and permissible interpretations of that model.
- **Structure**: A *structure* is a set of logical statements which describe the structure.
- **Logical statement**: A *logical statement*[37] is a declaration, proposition, claim, assertion, belief, idea, or fact about or related to the area of knowledge to which the logical theory relates. There are four broad categories of logical statements:
  - **Terms**: *Terms* are logical statements that define ideas used by the logical theory such as "assets", "liabilities", "equity", and "balance sheet".
  - **Associations**: *Associations* are logical statements that describe permissible interrelationships between the terms such as "assets is part-of the balance sheet" or "operating expenses is a type-of expense" or "assets = liabilities + equity" or "an asset is a 'debit' and is 'as of' a specific point in time and is always a monetary numeric value".

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35 Wikipedia, *Conceptual Model*, https://en.wikipedia.org/wiki/Conceptual_model

36 Wikipedia, *Model Theory*, https://en.wikipedia.org/wiki/Model_theory

37 Wikipedia, Statement (Logic), https://en.wikipedia.org/wiki/Statement_(logic)

- **Rules**: *Rules* are logical statements that describe what tend to be assertions in the form of IF…THEN…ELSE types of relationships such as "IF the economic entity is a not-for-profit THEN net assets = assets - liabilities; ELSE assets = liabilities + equity".
- **Facts**: *Facts* are logical statements about the numbers and words that are provided by an economic entity within a business report. For example, the financial report, a type of business report, might state "assets for the consolidated legal entity Microsoft as of June 20, 2017 was $241,086,000,000 expressed in US dollars and rounded to the nearest millions of dollars.

Fundamentally, a logical theory is a set of logical statements. Those logical statements can be represented in human-readable form or they could be expressed in machine-readable form. Once in machine-readable form, those logical statements can be interrogated using software applications. To the extent that this can be performed effectively; software tools can assist professional accountants, financial analysts, and others working with those logical statements.

A logical system is said to be **consistent** with a logical theory if there are no contradictions with respect to the logical statements made by the logical theory that describes the logical system.

A logical theory can have high to low **precision** and high to low **coverage** with respect to describing a logical system.

Precision is a measure of how precisely the information within a logical theory has been represented as contrast to reality of the logical system for the area of knowledge. *Coverage* is a measure of how completely information in a logical theory has been represented relative to the reality of the logical system for the area of knowledge.

When a logical system is consistent and it has high precision and high coverage the logical system can be considered a **properly functioning logical system**. When a logical system is properly functioning, it creates a virtuous cycle[38].

A logical theory conveys knowledge and that knowledge can be represented within a knowledge graph. For more detailed information

[38] Charles Hoffman, CPA, *Virtuous Cycle*, http://xbrl.squarespace.com/journal/2020/4/29/virtuous-cycle.html

related to logical theories and logical systems, please see *Logical Systems*[39].

Appendix: Financial Report Knowledge Graph

As described in detail in the document *Financial Report Knowledge Graphs*[40], a financial report is a knowledge graph.

General purpose financial reports are a tool created by humans to serve a purpose. There are no natural representations of the world the way it "really is," just many purposeful selections, abstractions, and simplifications, some of which are more useful than others for satisfying a particular goal.

A general-purpose financial report is a true and fair representation of information about an economic entity. A financial report is not the actual economic entity, it merely conveys fairly high-fidelity information about a reporting economic entity that is generally of very high-quality because of the double-entry bookkeeping model and the nature of accounting.

Appendix: Logical Schema of Financial Reports

As stated, financial reports are knowledge graphs. Those knowledge graphs, if in machine-readable form, can have a logical schema that describes that financial report knowledge graph and makes sure a report conforms to that logical schema.

The notion of a logical schema is explained in the document Logical Schema of Financial Reports[41].

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[39] Charles Hoffman, CPA, *Logical Systems*, http://www.xbrlsite.com/mastering/Part02_Chapter05.A_LogicalSystems.pdf

[40] Charles Hoffman, CPA, *Financial Report Knowledge Graphs*, http://xbrlsite.azurewebsites.net/2021/Library/FinancialReportKnowledgeGraphs.pdf

[41] Charles Hoffman, CPA, *Logical Schema of Financial Reports*, http://xbrlsite.com/seattlemethod/LogicalSchemaOfFinancialReports.pdf

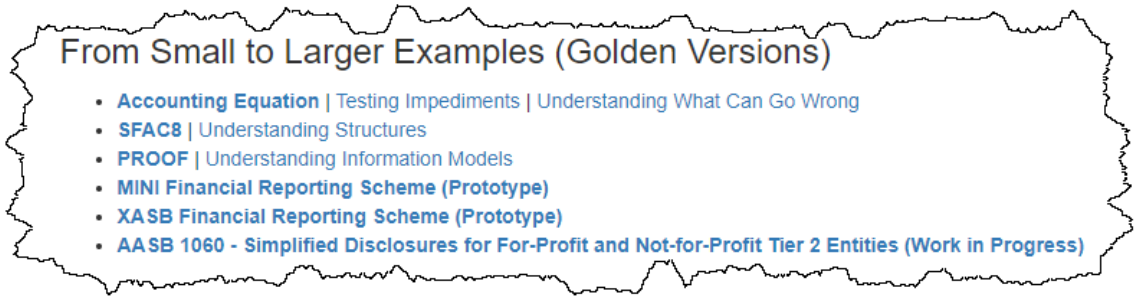
Appendix: Expert System for Creating Financial Reports

As is explained in the document *Expert System for Creating Financial Reports Explained in Simple Terms*[42]; expert systems can be constructed for creating financial reports that leverage the characteristics of a general purpose financial report.

Appendix: Examples and Samples

There are a tremendous number of examples and samples of XBRL-based reports, report models, and base taxonomy on my blog[43].

But I have whittled the set down to the bare minimum that someone trying to master XBRL-based reports should understand and carefully crafted a "golden" sent of example that are small, succinct, ultra-high quality, and are excellent for understanding reports, report models, and base taxonomies. These examples can be accessed from the "Resources" page of the Seattle Method[44]:



42 Charles Hoffman, CPA, *Expert System for Creating Financial Reports Explained in Simple Terms*, http://xbrlsite.azurewebsites.net/2022/Library/ExpertSystemForCreatingFinancialReports.pdf

43 Charlie's Examples, http://xbrlsite.azurewebsites.net/2020/master/Dashboard.html

44 XBRL Site, Seattle Method, *Resources*, http://xbrlsite.com/seattlemethod/resources.html