1. Professional Accountant's Interests, Perspective, Position, and Risks

This section provides an overview of important information related to the interests, perspective, position, and risks of an accounting manager or member of a team creating a financial report, an internal auditor or third party auditor evaluating such a report, a CFO signing off on such a report, or an audit committee evaluating the information expressed within a financial report.

This information is not a comprehensive summary of all considerations; rather it is a brief overview of considerations which would generally not be disputed.

> HINT: It is very important to recognize that the historical mediums used to express financial information such as paper and electronic forms of paper such as HTML or PDF are structured for presentation of information and therefore only understandable by humans. They were not structured to represent the meaning of the information. Digital mediums such as XBRL are structured to represent meaning and are therefore readable by machines such as computers. The meaning can also be used to present the information as desired. Understanding these differences helps professional accountants understand how to best employ these new mediums.

1.1. General Purpose Financial Statement

A general purpose financial statement is itself not an "economic entity". This is similar to how a "map" is not the same thing as the territory the map represents.

A general purpose financial statement is a high-fidelity representation of information about an economic entity that tries to be as true and fair as possible following a set of agreed upon accounting assumptions (e.g. going concern, recognition, measurement, and so forth). The general purpose financial report is a model that represents the financial position and financial condition of that economic entity.

Businesses, banks that provide businesses capital, equity markets that provide capital, and regulators have been using this financial reporting "system", "the model", for quite some time. And so, over the years they have been agreeing on and tuning this model. This has been going on for years and years. Standards setters act as referees.

The model is not perfect. Stakeholders within this system have complaints. For example, the historical cost assumption is questioned because of the big gap in book values as contrast to fair market value. Or, the equity markets say they want more information about non-financial items. As such, the standards setters make adjustments to the rules such as adding fair value measurement rules to the system. No stakeholder of this system gets 100% of what they desire, but the system works fairly well and is slowly adjusted to make the system work better.

And so, the system and the model exist in a state of perpetual refinement.

What we are doing with XBRL is to take this model which here-to-for has been represented on a piece of paper or a piece of "e-paper" and putting that existing model into machine-readable form. XBRL is a purpose-built syntax for representing financial or nonfinancial information in machine-readable form. XBRL is not the only

syntax that can do this. The semantic web stack's RDF/OWL/SHACL could be used, or Prolog, or other ontology-like thing. To be effective, that syntax needs to be able to capture the currently used model effectively and, in some way, make the system better, faster, and/or cheaper.

What is particularly interesting with respect to the model of a financial report is that it has a lot of very nice "features" that make it incredibly amenable to being represented logically using a model and worked on with a computer. First, the model is based on the "double-entry bookkeeping model" (DEBITS = CREDITS) which provides what amounts to a parity check that can be used to detect errors and distinguish an unintended error (i.e. mistake) from an intended error (i.e. fraud). Second, the model is based on the accounting equation[1], "Assets = Liabilities + Equity" which adheres to that same double entry bookkeeping model which provides what can be called "scaffolding" or "keystones" for the financial reporting model. Third, every financial reporting scheme created provides a conceptual framework (i.e. US GAAP, IFRS, IPSAS, GAS, FAS, FRF for SMEs, etc.) which defines a set of core "elements of a financial statement[2]" used within that financial reporting scheme (e.g. assets, liabilities, equity, comprehensive income, investments by owners, distributions to owners, revenues, expenses, gains, losses[3]) that reconcile to the accounting equation, expand that high-level scaffolding as required by that financial reporting scheme, intentionally interrelated those core elements which cause what is referred to as "articulation[4]" where the core financial statements (balance sheet, income statement, changes in equity, cash flow statement) are all carefully "intertwined" which provides yet another layer of quality control.

Finally, such a financial reporting scheme is a very narrow use case as contrast to a broad general use case. Those that operate within this system using this model within this very narrow and well-defined domain are all highly trained "experts". Certified Public Accountants (CPAs) or Chartered Accountants (CAs) have four or more years of specific university training and are required to take a national certification exam and are certified. Certified Financial Analysts (CFAs), likewise take many of the same university courses as CPAs and also pass a rigorous and comprehensive certification exam. Further, these experts have been honing, and honing, and honing their common understanding of "terms" and "associations between terms" and "structures" and "rules" for over a hundred years now. All this information has been documented in the Accounting Standards Codification (ASC) for US GAAP or the IFRS standards for IFRS, etc. If you compare and contrast the different financial reporting schemes, they are far more similar than they are different.

What I am pointing out here is that financial reporting is not like all other reporting domains or others trying to exchange information within their respective domain. There are other domains that likewise have experts within their domains, good boundaries, etc. And there are others still where the users are not experts, they have no specific common training, and the domains they are trying to represent with ontology-like things are very broad and so they tend to struggle to create a common model. And because the user base is so broad, the domain is so broad, it is no

[1] Accounting Equation, http://xbrlsite.azurewebsites.net/2019/Core/master-ae/

[2] Comparison of Elements of Financial Statements, http://xbrlsite.azurewebsites.net/2019/Core/ElementsOfFinancialStatements.pdf

[3] SFAC 6, http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/

[4] Articulation, https://youtu.be/xMNIJ-k1zYc

wonder that they cannot agree on a model, believe that there is no "perfect way to represent the truth…", and are not really motivated by any specific goal or objective to agree so they tend to get stuck in philosophical debates.

Users of financial reporting schemes already understand that the goal is to agree and to create something that works. The financial reporting model already works. What is different now is that before the agreement was achieved using best practices and paper-based reports that were not machine-readable. But now, many of these reports are readable by machines and a skillful craftsman using the right tools can poke and prod financial reports and understand things that were impossible to understand before because performing tasks manually was so time consuming and costly. This opens up a whole new world of possibilities.

Something that seems to be true is that this financial reporting system appears to have been designed for something like a computer all along. But computers did not exist in 1211 when double entry bookkeeping was invented, or in 1494 when it was documented by Luca Pacioli, or in 1929 after the stock market crash when US GAAP was established, or computers were not widely used in 1973 when they began creating IFRS. So, financial reporting was being practiced using paper or what amounts to "e-paper" which is not machine readable. But financial reporting schemes have now found their rightful home here in the digital age or information age or what some people are calling the fourth industrial revolution or the age of artificial intelligence.

It is far more natural for financial reporting to be practiced using computers than using paper.

Financial reporting is central to all enterprise reporting. This is because enterprises live or die based on their financial performance. Enterprise information systems are primarily configured to capture the activities of the enterprise and in general, all enterprise activities ultimately trickle down to being reportable activities. Even if reporting is not explicitly financial reporting, information contained in the reports should conform to the general enterprise information model and the reports should be structured in a semantically consistent manner for each and within each enterprise. It's therefore imperative that any reporting model consider the flow of information through an enterprise and ensure that the model is general enough to handle the reporting of all enterprise information and is specific enough to handle the special case requirements of financial reporting.

It would be absurd for each enterprise to be forced to use one common semantic model for all of their internal and external reporting. It would be likewise absurd for each enterprise to develop their own unique reporting model. A middle ground is for all three needs to be met with one common reporting scheme that was configurable for each individual enterprise, a proven and rock-solid model that each enterprise did not have to independently invent, and a global open standard model that met the needs of the enterprise but also the needs of the global financial reporting supply chains that exist.

XBRL plus the ideas of the Standard Business Report Model (SBRM) could be that enterprise global standard common business report model. That model does not require the use of the XBRL technical syntax internally, but it does allow it and for the logical model of whatever syntax is used, say RDF/OWL/SHACL or Prolog or really any other syntax, to be converted to the same logical model used by XBRL.

That is what the *Special Theory of Machine-based Automated Communication of Semantic Information of Financial Statements*[5] strives to point out.

1.2. Special Purpose Financial Statements

The same ideas related to general purpose financial statements apply to special purpose financial statements. Also, these same ideals also apply to internal reporting including management accounting.

1.3. Financial Reports Tell a Story

A financial report tells a story. The story which is communicated by a financial report does not change based on the medium used to tell that story. The meaning conveyed by the financial information articulated by the creator of the financial report and the meaning of the financial information derived by the users of the financial report should be the same. Both the creator and consumer should walk away with the same message or story. Creators of a financial report go to great lengths to tell the story, or convey meaning, which they believe best reflects the financial condition and financial position of the reporting economic entity providing the financial report.

Creators and users of a financial report are free to interpret the information communicated by the message/story of that financial report as they see fit. But, the information itself, the facts, should be identical for both the creator and user. Reported information is facts. For example, if a fact is reported and the fact is deemed to relate to the consolidated entity, be as of December 31, 2019, for the US GAAP concept "Cash and cash equivalents", being expressed in US dollars; then the meaning of the fact should not be in dispute between two different parties who are using the same piece of financial information. However, any party is free to interpret the facts as they deem appropriate.

Consider this scenario:

> Two economic entities, A and B, each have information about their financial position and financial performance. They must communicate their information to an investor who is making investment decisions which will make use of the combined information so as to draw some conclusions. All three parties (economic entity A, economic entity B, investor) are using a common set of basic logical principles (facts, statements, deductive reasoning, etc.), common financial reporting standard terms and associations between terms (terms, associations, structures, assertions for a reporting scheme US GAAP, IFRS, IPSAS, etc.), and a common world view so they should be able to communicate this information fully, so that any inferences which, say, the investor draws from economic entity A's information should also be derivable by economic entity A itself using common basic logical principles, common financial reporting standards (terms, associations, structures, assertions), and common world view; and vice versa; and similarly for the investor and economic entity B.

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

1.4. Modeling System Dynamics

An **area of knowledge** is a highly organized socially constructed aggregation of shared knowledge for a distinct subject matter. An area of knowledge has a specialized insider vocabulary or "jargon", underlying assumptions (axioms, theorems, constraints, restrictions, assertions), and persistent open questions that have not necessarily been resolved (i.e. flexibility is necessary, change can occur).

Accounting is an area of knowledge. You can explain aspects of the accounting area of knowledge, such as the nature of a financial report, using a logical theory which explains a logical model. A logical theory can be tested and proven by providing a proof. When all the details are worked out, you have a best practice based proven method.

Knowledge can be represented in human-readable form, in machine-readable form, or in a machine-readable form that can be effectively converted into human-readable form.

You can think about an area of knowledge as being characterized in a spectrum with two extremes:

- **Kind area of knowledge**: clear information, clear rules, lots of patterns, lots of rules, repetitive patterns, and typically unchanging tasks.
- **Wicked area of knowledge**: obscure data, few or no rules, constantly changing tasks, and abstract ideas.

An area of knowledge can have aspects of both extremes, but tends to lean toward one side of the spectrum or the other.

Financial accounting and reporting tend to lean more toward the "kind" end in many ways, particularly the *quantitative aspects* of accounting and reporting. The *qualitative aspects* may more in the wicked side of the spectrum.

There is "pressure" that pushes an area of knowledge in both directions. Some system stakeholders tend to like clarity which allows the system stakeholders to effectively achieve what the system is trying to achieve. "Gaming the system" is minimized by the stakeholders of the system to optimize the functioning of the system, satisfying the purpose of the system.

Others focus on "gaming the system" or "spinning" things to take advantage of "cracks" or "flaws" in the system.

For example, things like picking alternatives that provide for the most favorable tax position, favorable impact on the perception of a company in the stock market.

This "gaming the system" or "spin" is similar to arbitrage; taking advantage of the "slack" or "tolerance" or "cracks" in the system to satisfy one participant's specific self-interests.

This system of financial accounting and reporting is not natural, it is a man-made logical system. Because the system is made by man, it is not perfect. How you perceive the system can be impacted by the lens used to view the logical system.

Think of the logical system as if it were a game. Every game has rules. When you play the game, you can have the perspective of whether you are following the rules (right/wrong) or whether you are achieving the goal of the system (win/lose). The self interest of the system stakeholder can influence one's perspective.

Keeping the dynamics which impact the logical system as clear as possible helps one understand the moving pieces of the logical system. One needs to be able to differentiate unintended ambiguity that exists within such a logical system and the intensions of the stakeholders of the system. Making these moving puzzle pieces clear helps one understand the system better.

A system can be describe using principles and/or a system can be described by rules. The principles and rules should not contradict one another.

Confusing the system dynamics makes it much more difficult to model the dynamics of the system. Sensemaking[6] is the process of determining the deeper meaning or significance or essence of the collective experience for those within an area of knowledge. Sensemaking is the process of understanding system dynamics so that the system dynamics can be modeled per the objectives of the stakeholders of the system.

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

1.5. Machines augmenting humans

A knowledge based system is a system that draws upon the knowledge of humans that has been represented in machine-readable form and stored in a fact database and knowledge base of rules. The system applies problem solving logic using a problem solving method to solve problems that normally would require human effort and thought to solve. The knowledge based system supplies an explanation and justification mechanism to support conclusions reached by the knowledge base system and presents that information to the user of the system. Using the knowledge based system, humans augmented by the machine capabilities, much like an electronic calculator enabling a human to do math quicker, will empower professional accountants who know how to leverage the use of such systems. Human software collaboration is how more work will get achieved in the digital age.

1.6. Getting the necessary software tools

The explanation above summarizes the important moving pieces systems which will be used to create XBRL-based digital financial reports. Per the *Law of Irreducible Complexity*[7], you cannot remove any piece of the system. Per the *Law of Conservation of Complexity*[8] you cannot remove complexity from the system, but you can move the complexity.

The *Law of Irreducible Complexity* is explained as follows: A single system which is composed of several interacting parts that contribute to the basic function, and where the removal of any one of the parts causes the system to effectively cease functioning.

The *Law of Conservation of Complexity* states: Every application has an inherent amount of irreducible complexity. The only question is: Who will have to deal with

[6] Sensemaking, http://xbrl.squarespace.com/journal/2021/11/18/sensemaking.html

[7] Wikipedia, *Law of Irreducible Complexity*, https://en.wikipedia.org/wiki/Irreducible_complexity

[8] Wikipedia, *Law of Conservation of Complexity*, https://en.wikipedia.org/wiki/Law_of_conservation_of_complexity

the complexity: the user of the system, the application developer that created the system, or the platform developer that is leveraged by the application developer?

Professional accountants will never tolerate the information technology department being involved in the process of creating financial reports.

1.7. Meaningful exchange of information

Meaningful exchange relates to exchange without disputes as to precise meaning, it means unambiguous interpretation, it means resolving conflicts and inconsistencies. It means harmony is maximized and dissonance is minimized.

Deciding what should go into a financial report can be subjective, subject to professional judgement. But how the report itself functions is completely objective, subject to logical, mechanical, and mathematical rules. A financial report is a logical system[9].

1.8. Separating facts from opinions

Senator Daniel Patrick Moynihan said: "Every man is entitled to his own opinion, but not to his own facts." Understanding the difference between a fact and an opinion is important.

There are at least three separate questions which must be answered by a professional accountant creating a disclosure for, or presenting information within a financial report. Understanding these three questions and separating them in one's mind helps one represent the financial information using digital medium appropriately and helps you understand the mechanics that are at work in such reports which may not be apparent at first.

The **first question** is, "Which disclosure(s) are appropriate?" This question requires professional judgment and can only be correctly answered by a qualified, trained professional accountant. The answer to the question tends to be part fact and part opinion. The **second question**, "How is the information best placed, shown and/or formatted within the financial report?" The answer to this question tends to be more based on arbitrary personal preference and therefore is more subjective, a matter of opinion, than based on fact. The **third question**, "Given a certain disclosure, what is the information being disclosed and how does that information relate to other reported information?" The answer to this question tends to be significantly more objective than subjective and is governed by rules of logic, mechanical relations rules, accounting relationship rules, and mathematics rules.

Fundamentally, how information in a report relates to other information in a report is objective. The decisions about how to best represent and where to present information in a financial report is a matter of professional judgment and opinion; but once included in a report the information within the report is objective and governed by the rules of logic, mechanics, accounting, and mathematics.

The financial reporting conceptual framework explicitly tries to make financial report disclosure as objective as possible. You can see this in the goals articulated for the

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

conceptual framework (per the FASB Special Report, *The Framework of Financial Accounting Concepts and Standards* (1998) which include[10]:

- Providing a set of common premises as a basis for discussion
- Provide precise terminology
- Helping to ask the right questions
- Limiting areas of judgment and discretion and excluding from consideration potential solutions that are in conflict with it
- Imposing intellectual discipline on what traditionally has been a subjective and ad hoc reasoning process

To put these questions in more concrete terms we will use an example. Say a reporting entity must release a financial report. The accountant can pick between options such as providing a balance sheet or a statement of net assets. Industry practice, common practice, professional judgement, and rules and regulations all come into play with this choice between available options. Further, the accountant knows that he or she is required to provide a cash flow statement; but that accountant can pick between using the direct method or the indirect method to create that cash flow statement, that is subjective.

But if a balance sheet is chosen by the accountant, then assets must be provided, liabilities and equity must be provided, and assets must equal liabilities and equity on that balance sheet. The model of the balance sheet is known, well understood, and an accountant has no latitude and gets no voice in saying what a balance sheet is; regulators and standards setters dictate those rules. Accountants and the financial information which exists can determine many of the line items which are appropriate for the balance sheet. These mechanics of a balance sheet are well understood by accountants, although they may not necessarily think of balance sheets in this way.

Other items are purely objective. For example, the accountant can choose to format zeros by showing a blank, showing a "0" or showing "-"; but the meaning is always the same, the mathematical notion of zero.

Understanding the distinction between what is a fact and what is an opinion helps accountants understand things that they can decide and where they simply need to follow the rules.

A *fact* is a statement that can be proven to be true or false using logic or evidence. A fact is something that exists and is objective. An *opinion* is a statement or expression of a person's feelings. Opinions indicate a belief. Opinions cannot really be proven, only expressed. Opinions are subjective. Opinions can be based on facts, preferences, beliefs, interpretations, emotions, whims, trends, fads, and even desired outcomes. Opinions can be meant to deliberately mislead others. Including certain facts, excluding certain facts, or misrepresenting facts are tactics for expressing an opinion.

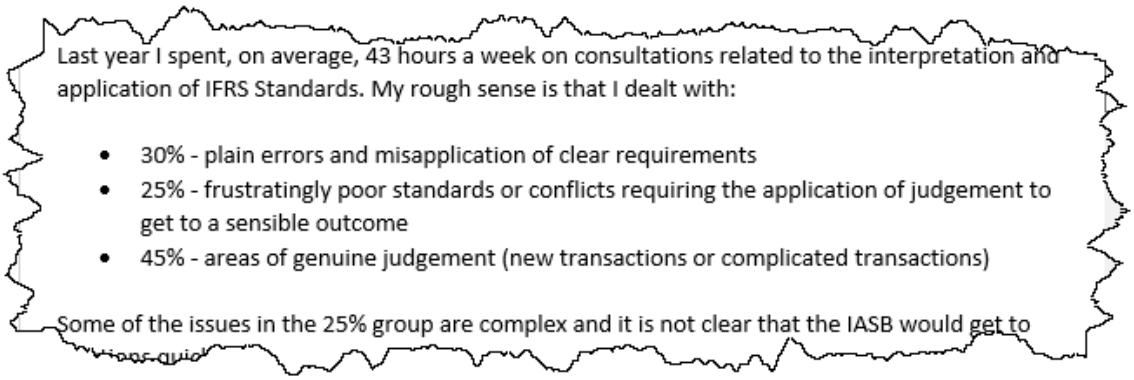
Sometimes there may be a fuzzy line between a fact and an opinion. Sometimes there are fuzzy lines between allowed accounting rule alternatives and ambiguity in the financial reporting scheme standards. Allowed alternatives and unintended ambiguity are not the same thing.

[10] *Willey GAAP 2020*, page 14, https://books.google.com/books?id=OybMDwAAQBAJ&pg=PA14

How digital mediums work, such as the XBRL medium, is based on facts, and indeed must be based on only the facts. XBRL is a global technical specification, an agreement on how XBRL works, technical specifications are objective.

1.9. Helpful stratification of financial reporting issues

A professional services accounting consultant for one of the Big 4 CPA firms who helps other accountants deal with and resolve accounting and reporting issues provided the following summary of the issues he deals with:



The following is a summary of the "moving pieces" of that stratification of issues. The first moving pieces is the accounting skills of the accountant that is dealing with the issue. The second moving piece is the clarity/ambiguity of the specific area of the accounting standards being used to figure out exactly how to apply the accounting rules to the specific issue that is being resolved. The third moving piece is the completeness of the financial reporting scheme; what transactions and complications can the financial reporting scheme handle.

There is one additional important detail that must be kept in the back of your mind when thinking of this stratification of issues that I am showing. Only the most "complex" and "unique" issues are escalated to that professional services consultant to be dealt with. That consultant is like "level 4" technical support where "level 1" tend to be dealt with by the individual accountant performing work, "level 2" might be escalated to the senior accountant on the project, "level 3" might be escalated to the accounting manager or audit partner that is in charge of the reporting engagement.

The point is that the percentages you see are the complete set of issues excecated to "level 4" issue resolution. Another breakdown of those categories might be something like:

- Obvious accounting requirements should be applied
    - Applied correctly due to appropriate accounting skill
    - Applied incorrectly due to mismatch of accounting skills
- Poor accounting standards (specific ambiguities; specific conflicts and contradictions)
    - Apply judgement sensibly to arrive at a sensible outcome
    - Apply judgement incorrectly to arrive at an inappropriate outcome

- New type of accounting transaction or reporting and/or complexity of an existing type of accounting transaction
    - Apply judgement sensibly and leveraging specific interpretations (step above) to arrive at a sensible outcome
    - Apply judgement incorrectly to arrive at an inappropriate outcome

Converting all of the above into "digital" processes that can be handled by machines such as computers such that, much like a calculator, a skilled accountant can use those tools such as Logical English and processes such as the Seattle Method and other digital artifacts to perform work in completely new ways first involves understanding exactly what is being digitized. That works takes the skills and experience of a professional accountant.

Trying to digitize something correctly and effectively when something so fundamental as the accounting and reporting rules have ambiguities and contradictions will simply not work.

Also, understanding exactly what is possible to automate and what is impossible to automate takes skills and experience in the areas of accounting and reporting, computer science, knowledge engineering, and artificial intelligence. Finding one person with all those skills is virtually impossible. Putting together the proper team of individual and enabling a team of individuals with those combined skills to interact effectively is no easy task.

The moving pieces of the puzzle of digital financial reporting involves putting those pieces together correctly and effectively. But I think that we can agree with the following:

1. Accountants do not have the same skill levels. Some are really good, some are really bad, and most are only average.
2. Accounting and reporting standards/rules are not perfect (frustratingly poor). Ambiguity exists within standards, inconsistencies exist, contradictions exist.
3. Both "objective stuff" (very obvious, everyone pretty much agrees) and "subjective stuff" (requires professional judgement) exists in financial reporting.
4. New stuff (e.g., no accounting standards exist yet) and new complexities to existing stuff (e.g., no accounting standards exist yet) pops up from time-to-time and will continue to pop up pretty much forever.
5. It is really hard to figure out "new stuff" and "new complexities to existing stuff" if the foundational accounting/reporting standards are frustratingly poor. This requires the best professional judgement.
6. Because accounting standards (all of them, not just IFRS) are "frustratingly poor"; it is even harder to figure out how to handle the "new stuff" and "new complexities to existing stuff".
7. Given all of the above, the highest value that an accountant can provide given all of the above is to have the skills and experience to overcome the complexities caused by the "frustratingly poor" accounting standards and handle "new stuff" and "new complexities to existing stuff" in a sensible a was as possible.
8. There is no way that a computer is ever going to be able to handle #7 above.
9. There is value if a computer can effectively do the "obvious stuff" or stuff where known good practices exists and can be leveraged, guide average accountants to do better and let good accountants focus on the highest value stuff.

10. If software is created to help accountants perform the tasks and processes necessary to do all of the above, that software will have value.

One final point. Think of how a calculator helps accountants add numbers up. No brainer to see the value to an accountant to perform that task. But if you wrap the "adding things up" with a process such as "add things up TWICE; and if the FIRST TOTAL and the SECOND TOTAL are the same, you have the RIGHT ANSWER" turns a calculator from a "thing" into a "useful tool of accountants". Process matters.

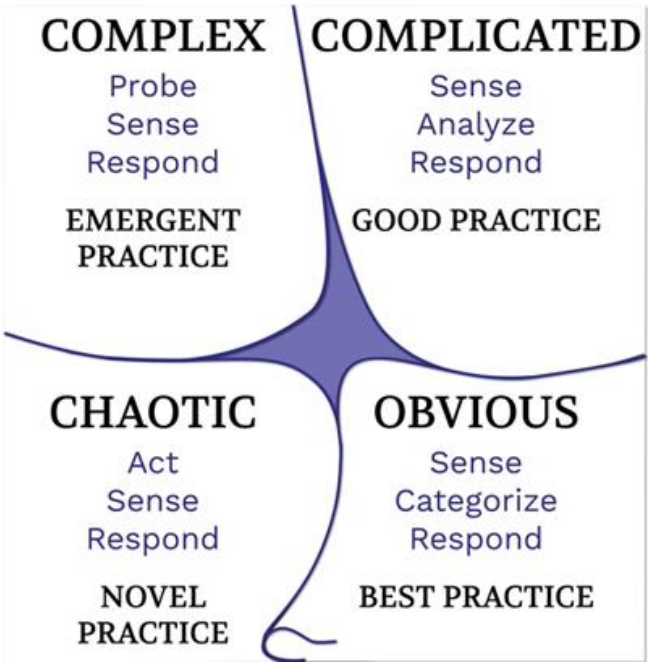
1.10. Best practices, good practices, emergent practices

The video; *Complexity, Cynefin, and Agile*[11]; helps you understand the notions of best practices, good practices, emergent practices, and novel practice.

Accounting, reporting, auditing, and analysis practices are not novel practices. Most practices in this area of knowledge are best practices. Consider the name "generally accepted accounting principles". Generally acceptable equals best practices.

However, there is room for professional judgement. There can be good practices as permissible alternative approaches. There can even be emergent practices. Emergent practices might even seem that they should not be permitted and perhaps even considered unpermitted. But acceptable emergent practices tend to become good practices eventually.

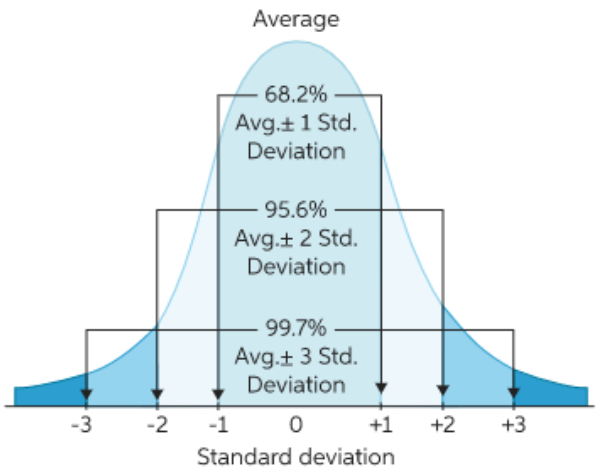
But the point here is that accounting, reporting, auditing, and analysis rules are definitely not chaotic and therefore novel practice.



The average accountant is, well, average. By average, I mean that accountants can be distributed per a bell-shaped curve, a standard normal distribution[12] with standard deviations[13] from average, as such:

[11] YouTube.com, *Complexity, Cynefin, and Agile*, https://youtu.be/-F4enP8oBFM

[12] Wikipedia, Normal Distribution, https://en.wikipedia.org/wiki/Normal_distribution



Best practices and good practices tend to act as "guardrails". For example, consider the notion of a reporting style within a financial reporting scheme. Companies can create a "classified balance sheet" or they could create and "unclassified balance sheet". Two different reporting styles, both are permitted. Even a "liquidation basis balance sheet" is permissible. Point is, there are many different ways of reporting information, financial statements are not, and should not, be static forms.

But financial reports are likewise not novel "art projects". Mike Willis describes the way accountants create reports today as being similar to highly skilled craftsmen assembling cars[14]:

> "These processes are time consuming and inefficient in a manner akin to the methods of automobile manufacturing prevalent during the early 20th Century, when highly skilled craftsmen assembled cars by hand prior to Henry Ford's innovations that include the assembly line and standardization of parts."

Each accountant can use whatever practice that they might feel is fitting. There could be additional types of balance sheet formats that, maybe, no one has ever reported yet.

However, the accountants creating those new types of balance sheets will ultimately need to be able to justify why they are using such practice to the community in which they exist. If that justification is made to the community; then that emergent practice can transition to become included within good practice or even best practices of the community.

Just because someone has a designation as being a 'professional' or 'licensed' does not mean they have perfect knowledge or judgement. In fact, based on my experience when creating the US GAAP and IFRS XBRL Taxonomies with guys like Tom Egan and Alan Tesira who are the best at financial reporting that I have seen, there are certainly others; professional knowledge is a bell-shaped curve. Most professional accountants stay in the 1 standard deviation area of accounting and do a good job. Some venture out 2 and 3 standard deviations, and still do a good job. But others get things wrong. Sometimes this is because they are in an

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[13] Wikipedia, Standard Deviation, https://en.wikipedia.org/wiki/Standard_deviation

[14] PriceWaterhouseCoopers, Mike Willis, *Disclosure Management: Streamlining the Last Mile*, https://www.pwc.com/gx/en/xbrl/pdf/pwc-streamlining-last-mile-report.pdf

unfamiliar industry. Other times their research is sloppy or they did not research at all. Other times they just misunderstand or misinterpret something. There are lots of ways to get things wrong.

What exacerbates this is that there is "unintentional ambiguity" in the accounting and financial reporting standards. Many accountants confuse that unintentional ambiguity with license for professional judgment. They are not the same thing. Unintentional ambiguity, by definition, was not intended, it is just a mistake in the rules. It is ambiguity that needs to be fixed by fixing the standards.

A case in point is Enron. There are some people that said that what Enron did was perfectly acceptable under the accounting rules. Enron and Arthur Anderson were punished because they "crossed the line" or "went outside the guardrails." But the thing is, the "line" was not clearly defined.

Machine-based accounting, reporting, auditing, and analysis knowledge will not be created by "average accountants". That machine-readable knowledge will be created by accountants that are very, very good. Then, that machine-readable knowledge will be available to average accountants, increasing the average accountant's knowledge per the machine-readable knowledge. That is the value of XBRL-based machine-readable accounting and reporting knowledge. That is the value of a knowledge based system; you can share the knowledge way, way easier and communicate knowledge more precisely.

But, machine-based knowledge will still not make accounting and reporting rules perfect. Consider the instant replay review in football. Teams have the ability now to challenge the calls of referees in NFL football games. If you watch some of the replays, which are facts that are undeniable, you can understand more precisely, but not necessarily perfectly, what is going on in a specific situation. When you can see those facts clearly, that makes the issue of the rules more important. What exactly is the rule? You can get closer and closer to perfection with instant replay reviews. But it is still not perfect. What the instant replay review does do is make the need for clear rules important. Referees should not be allowed to make ad hoc interpretations which are different. Neither should accountants in financial reporting.

1.11. Facts are more important than organization or formatting

What is more important to report, the facts themselves including the "packaging" such as formatting, or just the facts?

For example, a Journal of Accountancy article *FASB sees flexibility, relevance as cures to disclosure overload*[15] states that the FASB is asking for feedback on whether ordering and formatting should be:

- Flexible and based on relationships of particular items;
- Flexible and based on the importance of particular disclosures; or
- Fixed and uniform.

With technologies such as XBRL which allow financial information to be expressed digitally is there really a need to make a choice? All three options are possible at the same time. Is this list of options a remnant of the way of thinking constrained by old paradigms which are no longer applicable in a digital world? Why can't the user of financial information have all three options available and the user can pick which

[15] *FASB sees flexibility, relevance as cures to disclosure overload*, http://www.journalofaccountancy.com/news/2012/sep/20126364.html

reported facts are appropriate for their use of the information and which approach is best for them given their preferences and their perceived needs?

1.12. True and fair representation of financial information

Clearly the financial information provided by a reporting entity should not be "untrue" or "unfair". As such, by definition it should be "true" and "fair". Based on the rules, regulations, and common practices which exist; based on the informed professional judgment of the accounting team expressing the financial information; and considering all the other factors which must be considered when a reporting entity expresses its financial information, tells its story; that story should obviously be a true and fair representation of such financial information.

The story itself and the medium used to tell the story are two different pieces of the same puzzle.

Accounting teams are responsible for creating and verifying for themselves that they have created a true and fair representation of their financial information, regardless of which medium is used to express that information. And, regardless of which medium is used, that information must be: complete, correct, consistent, accurate. Each reported fact must have fidelity, which is to be a faithful representation. The set of all facts must fit together appropriately, the integrity must be sound. Considered holistically from all points of view, the multiple pieces of the system work together correctly, all things considered. If this is true and a report possesses these characteristics, and if it is true and fair, it is then considered to be a "valid" or desired result. The financial report can be considered a desired result, free from logical flaws, based on sound reasoning, in other words cogent.

Verification is the process of asserting truths and understanding for oneself that information is valid per those assertions. Verification can be internal, external, and/or independent third-party verification. Verification can be performed by humans manually, or verification can be performed by computers using automated processes. Automated verification tends to be cheaper and more reliable than human verification.

1.13. Mechanics of a financial report are not a mystery

The mechanics of the objects which comprise a financial report are not a mystery; rather, they tend to be well understood.

Below is an example of a basic disclosure of the types or components of property, plant and equipment. What do you know about this disclosure? You know that the disclosure is a roll up. You know that a roll up does, in fact, roll up; meaning that the parts of the roll up equal the total of the roll up. You know that the total concept of this specific type of disclosure is "property, plant, and equipment, net" because that is what is being disclosed. You know that the total of the roll up is expected to be presented as a line item of the balance sheet.

Property, Plant and Equipment, by Component [Line Items]	Period [Axis]	
	2010-12-31	2009-12-31
Property, Plant and Equipment, by Component [Roll Up]		
Land	1,000,000	1,000,000
Machinery and equipment, gross	2,000,000	2,000,000
Furniture and fixtures, gross	6,000,000	6,000,000
Accumulated depreciation	(1,000,000)	(1,000,000)
Property, plant and equipment, net	8,000,000	8,000,000

You cannot add a second total to this or any other roll up as a roll up only has one total. It would not make logical sense to add a second total to a roll up. Having two totals in a roll up is illogical or irrational; even morbid or pathological.

What does make sense is to add another line item which makes up a part of the total of the roll up, somewhere in the list of existing line items. For example, adding a line item between *Land* and *Machinery and equipment, gross* such as "Airplanes" might make logical sense.

The fragment of a financial report below provides a different disclosure. This disclosure is a roll forward of the product liability accrual of some economic entity providing this disclosure:

Schedule of Accrued Liabilities [Line Items]	Period [Axis]		
	2013-01-01 - 2013-12-31	2012-01-01 - 2012-12-31	2011-01-01 - 2011-12-31
Balance at beginning of period	26,987,000	12,742,000	8,972,000
Acquisition			3,151,000
Deferral of new extended warranty revenue	20,191,000	22,344,000	8,659,000
Recognition of extended warranty deferred revenue	(12,789,000)	(8,099,000)	(8,040,000)
Balance at end of period	34,389,000	26,987,000	12,742,000

A roll forward and a roll up are not the same thing, each is a different pattern of mathematical relationships.

A roll forward does not have a total. It may look like a total to the untrained eye, but rather than totaling a set of facts, a roll forward reconciles a fact between two periods for the changes between the two periods. The formula for a roll forward is: Beginning balance + additions – subtractions = ending balance". The formula for a roll up is "Line item A + line item B + line item *N* = Total".

The concept used to describe the fact used to represent the beginning and ending balance is the same for a roll forward; but the period of the concept is different for the beginning and ending balances. It would make no sense to have a third period for one roll forward. It would likewise make no sense to have the concept "Land" as a participant of the changes that are being represented by this roll forward. The concept "Land" is a balance, not a change in a balance.

Below we show one final example of a disclosure. This disclosure has a roll forward, a roll up, and both the roll forward and roll forward are further broken down by a restructuring type.

Restructuring Cost and Reserve [Line Items]	Period [Axis]					
	2010-01-01 - 2010-12-31			2009-01-01 - 2009-12-31		
	Restructuring Type [Axis]			Restructuring Type [Axis]		
	Facility Closing [Member]	Severance [Member]	All Restructuring Types [Domain]	Facility Closing [Member]	Severance [Member]	All Restructuring Types [Domain]
Restructuring Reserve [Roll Forward]						
Restructuring reserve, beginning balance	97,000,000	204,000,000	301,000,000	94,000,000	200,000,000	294,000,000
Restructuring charge	(1,000,000)	0	(1,000,000)	(4,000,000)	(4,000,000)	(8,000,000)
Cash payments	(4,000,000)	(4,000,000)	(8,000,000)	(6,000,000)	(6,000,000)	(12,000,000)
Accrual adjustment	0	(1,000,000)	(1,000,000)	(1,000,000)	0	(1,000,000)
Translation adjustment	30,000,000	5,000,000	35,000,000	14,000,000	14,000,000	28,000,000
Restructuring reserve, ending balance	122,000,000	204,000,000	326,000,000	97,000,000	204,000,000	301,000,000
Restructuring Reserve [Roll Up]						
Current portion of restructuring reserve	96,000,000	204,000,000	300,000,000	96,000,000	204,000,000	300,000,000
Long-term portion of restructuring reserve	26,000,000	0	26,000,000	1,000,000	0	1,000,000
Restructuring reserve	122,000,000	204,000,000	326,000,000	97,000,000	204,000,000	301,000,000

The point is this: the logical, mechanical, and mathematical rules related to how each of these representations of a disclosure exist. These logical, mechanical, and mathematical relations are not a matter of opinion. Other accounting relations also exist which are likewise not a matter of opinion. If you have a "property, plant and equipment, net, components" disclosure one would expect a "property, plant, and equipment, net" line item on the balance sheet. Every report fragment in a financial report works this way, having some set of logical, mechanical, accounting, and mathematical relations. It is expected that all this information "tick and tie" and that it "cross-cast and foot".

A financial report is a system[16]. All systems have patterns[17]. Software leverages patterns[18].

1.14. Defining true and fair representation

So what is a true and fair or faithful representation of financial information? We stated above in general terms that a true and fair representation is: complete, correct, consistent, accurate, is identified as having fidelity, and is identified as having integrity. If all these exist we can distinguish the financial report as being "valid".

But these terms are rather general. Looking at verification at a slightly more detailed level we might see the following traits as being important to distinguishing a financial report as a true and fair representation of a reporting entity's financial information:

- **All financial report formats convey the same message**: A financial statement can be articulated using paper and pencil, Microsoft Word, PDF, HTML, XBRL, or other format. But while the format may change, the message communicated, the story you tell, the meaning conveyed, should not change. Each format should communicate the same message, regardless of the medium used to convey that message.

[16] Systems Theory: Method to my Madness, http://xbrl.squarespace.com/journal/2019/12/29/systems-theory-method-to-my-madness.html

[17] YouTube, The Science of Patterns, https://www.youtube.com/watch?v=kh6KMW8J3RQ

[18] Charles Hoffman, CPA and Hamed Mousav, *Putting the Expertise into an XBRL-based Knowledge Based System for Creating Financial Reports*, http://pesseract.azurewebsites.net/PuttingTheExpertiseIntoKnowledgeBasedSystem.pdf

- **Information fidelity and integrity**: A financial report is internally consistent. A financial statement foots, cross casts, and otherwise "ticks and ties". The accountant community understands this and many times this fact disappears into unconsciousness because it is so ingrained in the minds of professional accountants. Of course things foot and cross cast; of course the pieces tie together. Said another way, a financial statement must be correct, complete, consistent, and accurate. Only trained accounting professionals who understand how the XBRL medium works to convey meaning can tell if all financial statement computations are properly articulated and verified to be correct.
- **Justifiable/defensible report characteristics**: Facts reported and the characteristics which describe those reported facts should be both justifiable and defensible by an accounting entity reporting such facts.
- **Consistency between periods**: Generally financial information expressed within one period should be consistent with the financial information expressed within subsequent periods, where appropriate. Clearly new information will be added and information which becomes irrelevant will be removed from a financial report. Changes between report elements which existed in both periods should be justifiable/defensible as opposed to arbitrary and random.
- **Consistency with peer group**: If your company chooses one approach and a peer chooses another report element selection choice; clearly some good reason should probably exist. This is not to say differences would not or should not occur. Rather, why the differences exist should make sense and be explainable. Generally financial information between two peers should be more consistent as compared to inconsistent.
- **Logical representations indicated by understandable renderings**: Human readable renderings of facts; characteristics that describe facts; parenthetical explanations which further describe such facts; and other such representation structures should make sense and be consistent with other similar representation structures. While there may be differences of opinion as to how to format or present such information; there should be significantly less or no dispute about the logic of a machine readable representation.
- **Unambiguous business meaning**: A financial report should be unambiguous to an informed reader. The business meaning conveyed by a financial report should be clear to the creator of the financial report and likewise clear to the users of that financial report. Both the creator and users should walk away with the same message or story. Users of the report are free to interpret the meaning of the facts conveyed. A financial report should be usable by regulators, financial institutions, analysts, investors, economists, researchers, and others to desire to make use of the information the report contains as they see fit.

Again, we don't think we are enlightening any accountants with this information. What we are doing is bringing this information into the fore front of your consciousness for a particular reason. There is something which is new.

What is new, and what must occur for these new digital mediums such as XBRL and financial reports expressed using XBRL to be successful, is for accountants to be able to perform these same tasks using these new digital mediums. And because

computers can read these new mediums and understand what it is reading, computers can both help accountants with these verification tasks and point out situations where financial reports do not possess these distinguishing features. It is not hard to imagine that a computer can help understand if a financial report "ticks and ties", "cross casts and foots" according to the rules of the medium used to convey that information.

If two third party auditors were to review the XBRL-based representation of a financial report, both parties should come up with the same factual information being conveyed[19]. The two auditors may have professional disagreements as to what facts should be reported, perhaps the best associations between facts, perhaps assertions that represent the relations between facts. But, the two parties should never be able to disagree on the actual facts and other statements that exist in an XBRL-based report and what information the facts and other statements are conveying.

But, to achieve this how to use such a digital medium must be well understood, the semantics or meaning of the medium must be well defined, and the mechanics of such a medium must be understood and the same for all parties involved in the creation or use of a financial report expressed using such medium. Stakeholder harmony is maximized; dissonance is minimized.

To achieve this agreement, what is necessary is a clear theory as to the dynamics and mechanics of how a financial report logical system operates[20].

1.15. Advantages of double-entry bookkeeping procedures, processes, and techniques to digital financial reports

Accounting, which has existed for 7,000 years[21], even before the creation of formal number systems, is constantly evolving. Accounting is about to go through another significant phase in that evolution process.

Single-entry bookkeeping[22] is how 'everyone' would do accounting. In fact, that is how accounting was done before double-entry bookkeeping was invented.

Double-entry bookkeeping[23] adds an additional important property to the accounting system, that of a clear strategy to identify errors and to remove them from the system. Even better, it has a side effect of clearly firewalling errors as either accident or fraud. This then leads to an audit strategy. Double-entry bookkeeping is how professional accountants do accounting.

Double-entry bookkeeping was the invention of medieval merchants and was first documented by the Italian mathematician and Franciscan Friar Luca Pacioli[24]. Double-entry bookkeeping is one of the greatest discoveries of commerce and its significance is difficult to overstate.

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[19] Charles Hoffman, CPA, *Auditing XBRL-based Financial Reports*, http://xbrlsite.azurewebsites.net/2019/Library/AudtingXBRLBasedFinancialReports.pdf

[20] Charles Hoffman, CPA and Rene van Egmond, *Financial Report Semantics and Dynamics Theory*, http://xbrl.squarespace.com/fin-report-sem-dyn-theory/

[21] Wikipedia, *History of Accounting*, retrieved June 10, 2017, https://en.wikipedia.org/wiki/History_of_accounting

[22] Wikipedia, *Single-entry Bookkeeping System*, retrieved August 30, 2016, https://en.wikipedia.org/wiki/Single-entry_bookkeeping_system

[23] Wikipedia, *Double-entry Bookkeeping System*, retrieved August 30, 2016, https://en.wikipedia.org/wiki/Double-entry_bookkeeping_system

[24] Wikipedia, *Luca Pacioli*, retrieved August 30, 2016, https://en.wikipedia.org/wiki/Luca_Pacioli

Which came first, double-entry bookkeeping or the enterprise[25]? Was it double-entry bookkeeping and what it offered that enable the large enterprise to exist; or did the large enterprise create the need for double-entry bookkeeping?

Accountants think differently than non-accountants, it is part of their training. Non-accountants don't realize this and accountants tend to forget or take this for granted. The quality difference between the set of facts that makes up a financial report and all the support for that financial report tends to be much higher than the quality level of non-financial information that is managed by a non-accountant. Why? Because double-entry bookkeeping is ingrained in the processes, procedures, and techniques of professional accountants.

Accounting, reporting, auditing, and analysis will all benefit from structured information such as XBRL, artificial intelligence and other knowledge based systems, digital distributed ledgers, Lean Six Sigma philosophies, and other such technology innovations.

What information technology professionals see as redundancies and opportunities for error are really more similar to a parity check[26] or a checksum[27] and opportunities for making certain that you are not making a mistake.

Every accountant learns that when analyzing an account: beginning balance + additions – subtractions = ending balance. If you know any three values, you can always find the fourth value. But if you know all four values then you can prove that all the values are accurate. The same is true about the facts contained within a financial report. Say *Revenues*, *Cost of Revenues*, and *Gross Profit* are reported in a financial report. If you know those three facts and you know that there is a business rule that specifies that *Gross Profit* = *Revenues* – *Cost of Revenues* and the facts and

[25] Ian Grigg, *Triple Entry Accounting, A Very Brief History of Accounting, Which Came First - Double Entry or the Enterprise?,* http://iang.org/papers/triple_entry.html

[26] Wikipedia, *Parity check*, retrieved December 6, 2016, https://en.wikipedia.org/wiki/Parity_bit

[27] Wikipedia, *Checksum*, retrieved December 6, 2016, https://en.wikipedia.org/wiki/Checksum

the business rule are consistent with your expectation; you can rely on the information as being accurate. Apply this technique to all the facts of an XBRL-based digital financial report and you get a near zero defect report.

Accountants, don't under estimate the value of double-entry bookkeeping and the other processes, procedures, and techniques employed to make sure that everything "ticks and ties" and "cross casts and foots". These useful techniques, even perhaps better referred to as ingrained medieval traditions, should make their way into XBRL-based digital financial reports. These medieval techniques are still very relevant even in the digital age. Don't let an information technology professional convince you otherwise.

1.16. Quantitative and qualitative; objective and subjective

Reporting entities have flexibility to provide/present disclosures differently as long as all the required disclosures are met and other compliance rules are complied with. The primary financial statements and notes to the financial statements are an organization or presentation of required disclosures.

Accountants creating financial reports use both **quantitative measures** and **qualitative measures** to provide such disclosures.

"*Quantitative measures*" means that you use an actual number to disclose an amount or to show a change. For example, "net income for the year was $1,000,000" is a quantitative measure.

"*Qualitative measures*" means perhaps not showing an actual number, but rather providing information in other ways such as using relative terms. For example, disclosing an entity's objective for holding or issuing derivative instruments, background information necessary for understanding those instruments, strategies used to meet those objectives, and information helpful in understanding derivative activity is a qualitative measure.

Some disclosures tend to be rather **objective** in nature requiring little professional judgment. Other disclosures can be quite **subjective**, calling on a professional accountant to use their experience and judgment to provide the appropriate useful information.

"*Objective*" means that judgment is based on the facts of the situation and are not based on or influenced by arbitrary personal feelings, preferences, tastes, whims, or opinions. For example, the fact that balance sheets are included in financial reports and assets are part of a balance sheet is objective and there is no room for judgment.

"*Subjective*" means that judgment can be based on or influenced by personal feelings, preferences, tastes, whims, trends, fads, motivations, objectives, or opinions. For example, whether a certain subsequent event is material and how to best disclose that event can be subjective, requiring significant professional judgment.

The overarching guidance to disclosing information is whether that information is **useful** in making decisions. To be useful, the information possesses the following characteristics: **relevance**, **reliability**, **comparability**, and **consistency**.

"*Relevance*" means that the financial information makes a difference when making a decision. The information matters.

"*Reliability*" means that the financial information is free from bias and errors.

"*Comparability*" means that a standard set of financial reporting principles are used. But given options, reporting entities are free to choose between allowed alternatives. For example, one company might use FIFO for valuing inventories and another uses LIFO.

"*Consistency*" means that a reporting entity uses the same standard accounting principle and reporting approach/method from period to period. For example, a reporting entity cannot flip-flop between FIFO and LIFO each reporting period.

A few specific aspects relating to comparability and consistency are worth pointing out because they are often confused. Users of financial information often expect that every aspect of every reporting entity's financial report be comparable to every other reporting entity's financial reports. This is simply not the case. Financial reports are not, and should not, be a 'form' which is filled in by an accountant. One strength of US GAAP is its ability to let reporting entities report useful information specific to that entity[28].

Financial information reported by entities in the same industry sector tends to be more comparable than financial information reported by entities in different industry sectors.

A reporting entity's disclosures from period to period tend to be very comparable. While what disclosure information is considered useful by a given reporting entity for a given event, transaction, or other circumstance; once the disclosure approach is selected then the company specific disclosure of that information from period to period tends to be very consistent and comparable for any given reporting entity.

Accountants creating a financial report use disclosure rules/requirements, guiding principles, and their judgment when weaving together an appropriate financial report.

Some financial report disclosures tend to take the shape of very specific and objective quantitative measures. For example, the disclosure of earnings per share is an example of such a specific quantitative measure. These sorts of disclosures are like an "on/off" switch; either the disclosure is required or it is not and if it is required, what must be presented or disclosed is crystal clear. There may be judgment involved in computing or measuring the amount disclosed, but the need for the disclosure itself tends to be objective.

Other disclosures take the shape of being more subjective in nature and use more qualitative measures. For example in the derivative instruments example used above, the meaning of a business acquisition or divestiture to the overall financial position of a reporting entity and/or which information about the acquisition or divestiture is the important information depends on many different criteria and it is the role of professional accountants to exercise their judgment and determine the appropriate disclosures, all things considered, using known guiding principles.

Understanding which disclosures tend to take which shape and otherwise understanding these moving pieces is critical for financial report taxonomy creation,

[28] Intermediate Components, https://youtu.be/jqZWI_Tmhaq

financial report creation, and analysis of financial information expressed by these taxonomies and financial reports[29].

There are times when a certain specific financial disclosure in two different financial reports will be very different, each reporting different facts. Both financial disclosures being appropriate for the circumstances and both satisfy prescribed disclosure rules/requirements, both being useful, etc.

1.17. Identifiable, definitive, discrete set of pieces

The information contained within any financial report is an identifiable, definitive, discrete set of reported facts. Those facts have an identifiable, definitive, discrete set of characteristics. Those facts and characteristics have an identifiable, definitive, discrete set of relations between other facts. Those facts and characteristics have an identifiable, definitive, discrete set of properties. These facts, characteristics, properties, and their relations must be clear, consistent, logically coherent, and unambiguous as opposed to vague, inconsistent, incoherent, and ambiguous.

While determining what must be reported and how it is reported can at times be subjective in nature and require significant professional judgment; once that judgment has been exercised and once the information is provided the facts, characteristics, relations, and properties of that reported information is in no way subjective and open to judgment. Rather, facts are judged using rules of logic, structural relations, mechanical relations, and mathematical computations.

All facts, characteristics, relations, and properties can be identified; they are physical objects which can be observed. As such, they are objective. The mechanics of the objects which comprise a financial report are not a mystery; rather, they tend to be well understood and objective.

Below is a summary of the risks which could lead to a financial report being invalid and the risk mitigation assertion or verification task which would assure that the risk goes unrealized. Terminology of the *Financial Report Semantics and Dynamics Theory*[30] is used to clearly state the report objects, relations, and properties which must be examined either using automated processes or manual processes to verify that object property. The risk and mitigation is independent of whether the verification task is performed by a party which is or is not independent. The risk mitigation task might be completed using an automated process, a manual process, or a combined automated/manual process.

Risk	Risk Mitigation Assertion (Verification task)
Full inclusion: All relevant facts, characteristics which describe facts and distinguish one fact from another fact, parenthetical explanations of facts, and relations between facts/characteristics are not included in the financial report.	**Completeness**: All relevant facts, characteristics of facts, parenthetical explanations of facts, and relations between facts/characteristics have been included.

[29] Charles Hoffman, CPA, *Demystifying the Role of Ontologies in XBRL-based Digital Financial Reporting*, http://xbrlsite.azurewebsites.net/2019/Library/DemystifyingOntologies.pdf

[30] *Financial Report Semantics and Dynamics Theory*, http://xbrl.squarespace.com/fin-report-sem-dyn-theory/

Risk	Risk Mitigation Assertion (Verification task)
False inclusion: No facts, characteristics which describe facts, parenthetical explanations of facts, or relations between facts/characteristics which should not be included have been included.	**Existence**: No facts, characteristics which describe facts, parenthetical explanations of facts, relations between facts/characteristics are included within financial report which should not be included.
Inaccuracy: Property of a fact, characteristic, component, or relation is inaccurate. *(For example, mathematical relations and model logical structure relations.)*	**Accuracy**: The properties of all facts, characteristics, components, parenthetical explanations, relations between facts/characteristics which are included in the financial report are accurate, correct, and complete.
Infidelity: All facts, characteristics, parenthetical explanations, and relations considered as a whole do not possess the required fidelity when considered as a whole. Fidelity = faithful representation.	**Fidelity**: Considered as a whole; the facts, characteristics, parenthetical explanations, and relations between facts/characteristics properly reproduces the financial and nonfinancial facts, characteristics, and relations of the reporting entity and provide a true and fair representation of such financial information.
Integrity not intact: Integrity between facts/characteristics is inappropriate.	**Integrity**: Considered as a whole, the facts and characteristics of those facts reflect the true and proper relations between such facts and characteristics.
Inconsistency: The facts, characteristics, parenthetical explanations, relations and their properties expressed are inconsistent with prior reporting periods or with peers of the reporting entity.	**Consistency**: The facts, characteristics, parenthetical explanations, relations between facts/characteristics, and their properties are consistent with prior periods and with the reporting entities peers, as is deemed appropriate.
Not presented fairly: The financial report is not presented fairly, in all material respects, and are not a true and fair representation in accordance with the financial reporting framework applied.	**True and fair representation**: The financial report is a true and fair representation of the information of the reporting entity. An auditor might say presented fairly, in all material respects, and provide a true and fair representation in accordance with the financial reporting framework applied.

1.18. Many aspects of financial reporting are standardized

Financial statement disclosures, in some cases should be a hand-crafted work of art, but not in most cases. Most professional accountants do not desire to be artists; rather they endeavor to comply with financial reporting rules. There are some required disclosures. Other disclosures are required if a reporting entity reports certain specific financial statement line items. Other financial statement disclosures are required if the financial statement line item has certain specific characteristics. Other financial statement disclosures are common practice or purely optional. This information can be organized in different ways. Financial statement disclosures are not random.

As there are price differences between hand-crafted furniture and the furniture which you might purchase at, say, IKEA or at a high end furniture store; there are likewise

different prices or costs incurred to taking different approaches to creating financial statement disclosures.

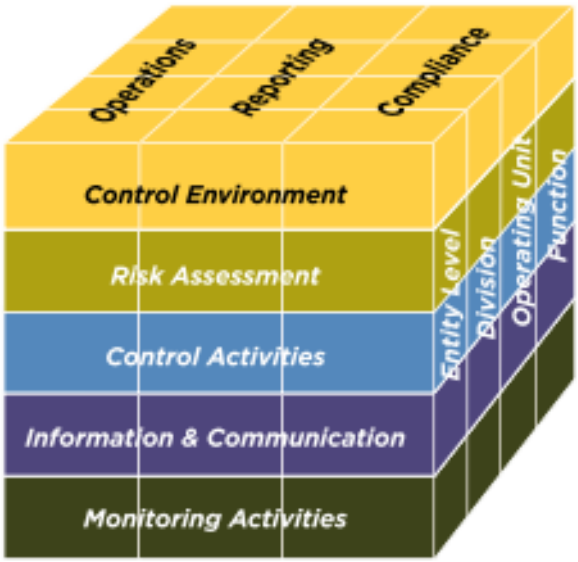
Generally disclosures for financial statement accounts are made if a line item of such account appears on a primary financial statement.

> HINT: Jon Rowden and Mike Willis make the following statement in their white paper *Making Sense of XBRL In the US and the UK*[31], "The accountants' skill and expertise can then be applied to and focused on disclosures where there is a problem, rather than turning each disclosure note into something resembling the accounting equivalent of a hand-crafted work of art."

Not every part of a financial report needs to be a hand-crafted work of art. Some do. That is where accountants need to spend the majority of their focus.

1.19. COSO Framework

The *COSO Enterprise Risk Management Framework*[32] is a way of thinking about risk and internal accounting controls within an organization.



1.20. Financial reporting is getting increasingly complex

Financial reporting is complex and the trend is to become even more complex. Transactions are becoming increasingly complicated, products and services of reporting entities get more and more complex, and financial instruments become more complicated[33]. Technology can contribute to simplifying financial reporting.

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[31] Making Sense of XBRL in the US and the UK, http://searchworks.stanford.edu/view/9320284

[32] COSO Enterprise Risk Management Framework, http://xbrl.squarespace.com/journal/2021/4/13/coso-enterprise-risk-management-framework.html

[33] *Will simpler also be better?*, http://www.journalofaccountancy.com/issues/2015/apr/financial-reporting-auditing-complexity.html

1.21. Differentiating US GAAP alternatives from US GAAP ambiguity

Financial reporting needs clear, consistent, logically coherent, and unambiguous standards to support the creation of quality financial information in financial reports. This is contrast to financial reporting standards which might be vague, inconsistent, logically incoherent, or ambiguous.

Consistent and having allowed alternative and options are different situations which people commonly confuse.

In the financial reporting world we can live with clear, known alternatives or options. Professional accountants use their judgment to pick and choose amongst those known alternatives or options; applying what they consider the best alternative given all available alternatives or options. Exercising professional judgment is and should be part of financial reporting.

What financial reporting cannot live with are diverse interpretations which result in different results based on the exact same facts due to standard definitions and principles that are vague, inconsistent, logically incoherent, or ambiguous. A different understanding of the exact same facts is not judgement; it is lack of clarity, lack of consistency, lack of coherence, and ambiguity. You can have different interpretations of facts, that is judgment.

The vagueness, inconsistencies, logically incoherent, and ambiguities in the definitions and principles used in financial reporting standards are not alternatives or options; they are unintended errors in the standards.

Accounting professionals determine the difference between errors and differences in interpretation.

The FASB or IASB and others in the financial reporting supply chain aspire to create clear, consistent, logically coherent, and unambiguous definitions and principles which make up financial reporting standards. The definitions and principles are consciously, deliberately, methodically, and rigorously worked out specifications of the concepts and ideas which are used to express information in financial reports which are then used within the financial reporting supply chain. Vagueness, inconsistencies, incoherence, and ambiguities are minimized.

1.22. Role of ontologies and conceptual models in reducing ambiguity

When humans try and describe complicated things such as financial reporting standards in books it is easy to inadvertently make mistakes which contribute to vagueness, inconsistencies, incoherence, and ambiguities because the only way to check the meaning which is written is manually using humans.

However, when financial reporting standards are described using machine-readable formats[34] to express such information; then machines can be used to help humans check to make sure there is no vagueness, inconsistencies, logical incoherence, or ambiguities in the definitions and principles which make up the standards. Machines

[34] See the paper *An analysis of fundamental concepts in the conceptual framework using ontology technologies* which can be found here: http://xbrl.squarespace.com/journal/2015/4/19/accountants-understand-utility-of-ontology-for-reducing-ambi.html

will never be able to check everything, but there are certain things they can do better than humans.

The financial accounting conceptual framework created by the FASB contributes to this clear, consistent, logically coherent, and unambiguous terminology and principles by providing a disciplined framework[35] which can be used to think about financial accounting. A discussion of the framework in a FASB special report states in part:

- Providing a set of common premises as a basis for discussion
- Provide precise terminology
- Helping to ask the right questions
- Limiting areas of judgment and discretion and excluding from consideration potential solutions that are in conflict with it
- Imposing intellectual discipline on what traditionally has been a subjective and ad hoc reasoning process

However, given the idiosyncratic tendencies of humans, interpretations which reflect the arbitrary peculiarities of individuals can sometimes slip in or mistakes can be made when expressing such terminology. Further, parts of our understanding of financial reporting can be incorrect and can evolve and improve and may even simply change over time.

If different groups of professional accountants use different terminology for the same concepts and ideas to express the exact same truths about financial reporting; those professional accountants should be able to inquire as to why these arbitrary terms are used, identify the specific reasoning for this, and specifically identify concepts and ideas which are the exact same as other concepts and ideas but use different terminology or labels to describe what is in fact exactly the same thing; and to also understand the subtleties and nuances of concepts and ideas which are truly different from other concepts and ideas.

If idiosyncrasies result only in different terms and labels which are used to express the exact same concepts and ideas, then mappings can be created to point out these different terms used to express the same concepts and ideas. Such mappings make dialogue more intelligible and could get groups to accept a single standardized term or set of terminology for the purpose of interacting with common repositories of information, such as XBRL-based financial filings of public companies.

If the difference in terminology and expression are rooted in true and real theoretical differences between professional accountants, and the different terms express and point out important subtleties and nuances between what seemed to be the same terms; then these differences can be made explicit and discussed, in a rigorous and deliberate fashion within the accounting profession once the differences are made explicit.

While accumulating and articulating this information in the form of books and other human readable resources adds to the discipline and rigor of clearly, logically, coherently, unambiguously defining concepts and ideas; articulating this information in machine-readable fashion takes the discipline and rigor to an entirely new level.

[35] Per FASB Special Report, *The Framework of Financial Accounting Concepts and Standards* (1998)

Further, other new and interesting possibilities and flexibility are opened up because this information is expressed in machine-readable form.

And so while many professional accountants believe the purpose of the US GAAP XBRL Taxonomy is simply being something necessary for public companies to create and provide XBRL-based financial reports to the SEC; the reality is that it is much, much more than this[36].

The US GAAP XBRL Taxonomy is a communications tool which will improve the clarity, logical coherence, consistency, reduce ambiguity, and improve overall quality of US GAAP based financial reporting for both public and private companies. The US GAAP XBRL Taxonomy is an ontology-like thing[37].

Below we provide three examples of vagueness, inconsistencies, logical incoherence, or ambiguousness observed in the financial reports of public companies which have been submitted to the SEC in digital form using the global standard XBRL. Because the financial reports are XBRL-based and therefore machine-readable 100% of the population of financial reports can be tested.

These three examples are intended to show the possibilities which are opened up because information is structured and therefore machine-readable.

1.22.1. Inconsistent financial position segmentation schemes

Wiley GAAP 2011 (page 46 to 48) points out inconsistencies in the financial position segmentation schemes used within the Accounting Standards Codification (ASC). Different schemes are required for various reporting purposes and depending upon specific circumstances. However, those different schemes use inconsistent and sometimes conflicting terminology. The *Wiley GAAP 2011* goes as far as providing a standard taxonomy which organizes and specifically describes these segmentations:

<table>
<tr><td colspan="7">The Parent Holding Company
Owns subsidiaries, land and headquarters building that they all use</td></tr>
<tr><td><u>Subsidiary 1</u>
Division a
Business i</td><td><u>Subsidiary 2</u>
Business iv</td><td><u>Subsidiary 3</u>
Business v
2 Product Lines</td><td><u>Subsidiary 4</u>
2 Similar Businesses
Business vi</td><td><u>Subsidiary 5</u>
2 Similar Businesses
Business viii</td><td><u>Subsidiary 6</u>
Business ix</td><td><u>Subsidiary 7</u>
2 Nonsimilar Businesses
Business x</td></tr>
<tr><td>Asset Group (a)</td><td>Asset Group (d) with Primary Asset</td><td>Asset Group (e) and Disposal Group (f)</td><td>Asset Group (g)</td><td>Asset Group (i)</td><td>Asset Group (j)</td><td>Asset Group (k)
Reporting Unit (6)</td></tr>
<tr><td>Reporting Unit (1)
Division b
Business ii | Business iii
Asset Group (b) | Asset Group (c)</td><td>Reporting Unit (2)</td><td>Reporting Unit (3)</td><td>Reporting Unit (4)
Business vii
Asset Group (h)</td><td colspan="2">Reporting Unit (5)</td><td>Business xi
Asset Group (1)
Reporting Unit (7)</td></tr>
<tr><td colspan="2">Operating Segment A</td><td>Operating Segment B</td><td>Operating Segment C</td><td colspan="2">Operating Segment D</td><td>Operating Segment E</td></tr>
<tr><td colspan="2">Reportable Segment I</td><td></td><td>Reportable Segment II</td><td colspan="2">Reportable Segment III</td><td>Reportable Segment IV</td></tr>
</table>

When trying to decipher the segmentation of entities in XBRL-based public company financial filings to the SEC it should be possible to locate the root economic entity[38] and then navigate down the hierarchy of segments. I have no data on whether it is or is not possible or to what extent the hierarchy can be navigated; however, for a

[36] Charles Hoffman, CPA, *Demystifying the Role of Ontologies in XBRL-based Digital Financial Reporting*, http://xbrlsite.azurewebsites.net/2019/Library/DemystifyingOntologies.pdf

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

[38] The SEC refers to this as the entity of focus.

small minority of public companies it is not even possible to identify the root economic entity. Out of 6,751 entities analyzed[39], the root economic entity could be found for 6,720 or 99.5% but not for 31 public companies or .5%. The fact that 99.5% of root economic entities can be found is evidence that some scheme for discovering the starting point of entity segmentation is very possible. No attempt was made to analyze the next layer of segmentation because there is so much inconsistency between public company XBRL-based financial reports.

It would be very hard to get the XBRL-based information consistent given the inconsistency in US GAAP itself.

1.22.2. Variability in reporting Income (loss) from equity method investments

Per an analysis of 9,679[40] public company XBRL-based financial filings to the SEC, 1,048 or about 11% of economic entities reported the line item *Income (loss) from equity method investments*. Of the 1,048 public companies which reported that line item; the following is a summary of where on the income statement the line item was reported:

- 624 entities (60%) reported the line item before tax directly as part of income (loss) from continuing operations before tax
- 132 entities (12%) reported the line item with income tax expense (benefit), between income (loss) from continuing operations before and after tax
- 128 entities (12%) reported the line item as part of nonoperating income (loss)
- 20 entities (2%) reported the line item as part of revenues
- 10 entities (less than 1%) reported the line item as part of costs and expenses
- 8 entities (less than 1%) reported the line item as part of operating expenses
- 126 entities (12%) reported this information in some other manner which was not specifically identified.

As a professional accountant, I did not even realize that this sort of variability was allowed. Intuitively, I was surprised and found it hard to believe that this amount of variability was useful. Other accountants I spoke with were likewise surprised that income (loss) from equity method investments could be reported in so many locations on the income statement. I am not saying that any of these reporting entities did anything wrong. I am simply making an observation. Financial analysts I spoke with said this idiosyncrasy was one of the top 10 things that needed to be changed about financial reporting. These observations raise the following questions in my mind.

- What is the purpose of this variability? Are there legitimate reasons why entities which use US GAAP have so much flexibility with this line item and not nearly the flexibility with other line items?

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[39] Understanding Public Company XBRL-based Financial Report Quality, see http://xbrl.squarespace.com/journal/2015/4/7/understanding-public-company-xbrl-based-financial-report-qua.html

[40] This analysis was done on 2013 information and can be found here, http://xbrl.squarespace.com/journal/2014/10/14/options-for-dealing-with-line-items-that-bounce-around-incom.html

- Why exactly does this variability exist for this line item, but other line items do not have nearly so much variability? Are the accounting standards ambiguous? Was it a conscious choice to allow this level of variability, or was it caused by a sloppily written accounting standard?

I am not saying that I have appropriate answers to these questions. However, I do believe that these are reasonable questions.

1.22.3. Exchange gains (losses) in two locations in cash flow statement

An analysis of 6,751 entities showed that 2,169 or 32% reported the line item Exchange gains (losses) from foreign currency transactions on their cash flow statement[41]. Of those 2,169 entities; there were two approaches to reporting that line item:

- 2,068 or 95%: Beginning balance in cash + Net changes in cash = Ending balance in cash *(i.e. exchange gains are included within net change in cash)*
- 101 or 5%: Beginning balance in cash + Net changes in cash + Exchange gains (losses) from cash transactions = Ending balance in cash *(i.e. exchange gains are included in the roll forward between beginning and ending cash, not within net changes in cash)*

Originally, the US GAAP XBRL Taxonomy provided for only the first alternative which was used by the majority of public companies. Eventually, the US GAAP XBRL Taxonomy was modified to include both alternatives.

When talking with a number of other professional accountants, one indicated that the second alternative was a reporting error and the alternative used by the 95% of public companies was the only allowed alternative. Another accountant stated that there was nothing that prohibited the less used alternative.

These questions come to my mind about this situation:

- Are there really two (or maybe even more) ways of computing the value of the line item net change in cash?
- If alternatives exist, what is the specific reason for the alternative? What is the specific benefit that this variability provides?
- Would there be benefit to only having one alternative in order to improve financial report comparability?

Again, to be clear I am not saying that I know the answer to these questions or that any public company is doing anything incorrectly; rather am only raising the questions based on this observation.

1.23. Financial Reporting Standards in the Future

It would be very hard to argue against the statement "a financial reporting scheme should describe clearly and completely what is permitted and what is not permitted per some financial reporting scheme".

[41] An earlier version of this analysis can be found here, http://xbrl.squarespace.com/journal/2009/11/24/issue-relating-to-effect-of-exchange-rate-on-cash-and-cash-e.html

Standards setters and regulators specifying what should be reported obviously should be clear and complete. Ambiguity, inconsistencies, and contradictions in financial reporting standards is not helpful to anyone.

So, how "clear" and "complete" are financial reporting standards today? Sure, the standards are a moving target. Sure, there is complexity. Sure, there are perhaps political reasons or other reasons why standards setters and regulators intentionally inject ambiguity.

Two things to keep in the back of your mind relating to specifying accounting and reporting rules "clearly" and "completely" are:

1. How financial reporting rules are represented for humans and how that same information might be represented for machines such as computers would be different.
2. Machines will be used more and more in the future to help get financial reporting standards "clear" and "complete".

This is a lot like using something like the Unified Modeling Language[42] (UML) to specify software application functionality as contrast to just putting a bunch of information into a Microsoft Word document and then giving that to a programmer to use to create software. After all, UML was created for a reason. Tools such as UML help to cut down on ambiguity.

This can be, and many times has to be, taken even further. Z Notation[43] is a formal model-based language for describing the behavior of a system precisely. The ISO/IEC standard Z Notation specification includes the following examples of the kinds of systems that have been described using Z Notation:

- safety critical systems, such as railway signaling, medical devices, and nuclear power systems;
- security systems, such as transaction processing systems, and communications; and
- general systems, such as programming languages and floating-point processors.

If things are described in a written document, different people reading that document can interpret that document from their perspective. That perspective might be different that the perspective of another person. That leads to the problem of ambiguity in how a system actually works.

The chapter *Computational Professional Services*[44] helps you recognize how the future of describing financial reporting schemes might be very different that the past.

What the legal industry is doing with things like PROLEG are (a) interesting and (b) indicative of what will be happening in financial reporting. The document *PROLEG: An*

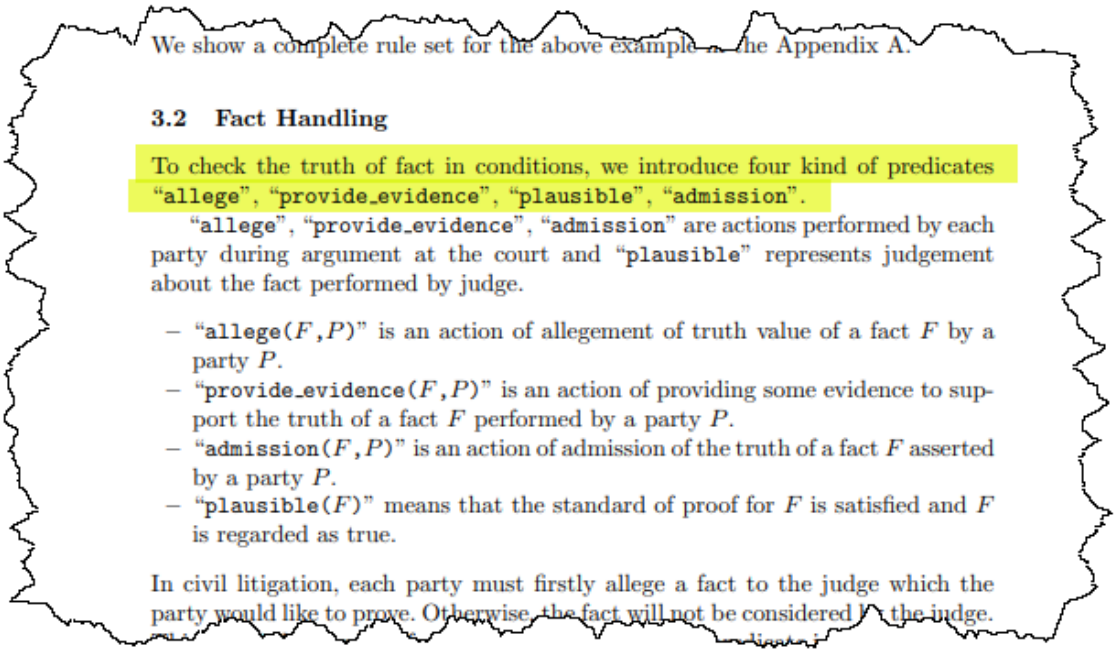
[42] Wikipedia, Unified Modeling Language, https://en.wikipedia.org/wiki/Unified_Modeling_Language
[43] *Understanding the Importance of Z Notation*, http://xbrl.squarespace.com/journal/2015/9/4/understanding-the-importance-of-z-notation.html
[44] *Computational Professional Services*, http://www.xbrlsite.com/mastering/Part00_Chapter01.A1_ComputationalProfessionalServices.pdf

Implementation of the Presupposed Ultimate Fact Theory of Japanese Civil Code by PROLOG Technology[45] helps one understand the possibilities.

The rules, which sometimes can be quite complex, for explaining what would be included within a financial statement line item, for example, would be expressed in something like PROLOG and then a software application would be able to help accountants figure out where to put something that needs to be reported in a financial report, how it is measured, and other such things.

Note that Logical English[46] is a general version of PROLEG that could, perhaps, be used to create a specific language for the accounting, reporting, auditing, and financial analysis area of knowledge.

Consider this example from PROLEG:



We show a complete rule set for the above example in the Appendix A.

3.2 Fact Handling

To check the truth of fact in conditions, we introduce four kind of predicates "`allege`", "`provide_evidence`", "`plausible`", "`admission`".

"`allege`", "`provide_evidence`", "`admission`" are actions performed by each party during argument at the court and "`plausible`" represents judgement about the fact performed by judge.

- "`allege`(F,P)" is an action of allegement of truth value of a fact F by a party P.
- "`provide_evidence`(F,P)" is an action of providing some evidence to support the truth of a fact F performed by a party P.
- "`admission`(F,P)" is an action of admission of the truth of a fact F asserted by a party P.
- "`plausible`(F)" means that the standard of proof for F is satisfied and F is regarded as true.

In civil litigation, each party must firstly allege a fact to the judge which the party would like to prove. Otherwise, the fact will not be considered by the judge.

Here is how I see this working. When an accountant creates a financial report, the accountant has to classify every line item using rules that are specified in the accounting standards. For example, when is something "Cash and Cash Equivalents" or something else? For example, if you have an overdraft, where do you put the line item? If the cash and cash equivalents is restricted, where do you put it? The balance sheet is easier than the income statement or the cash flow statement.

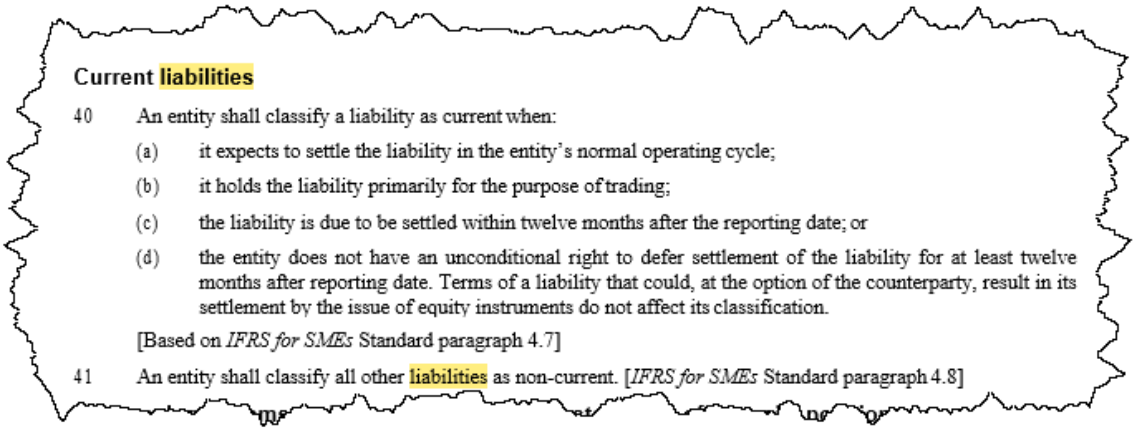
I see "fact handling" as a way to figure out precisely where something belongs. This is particularly useful on the income statement which can get complicated, and a lot of people get wrong.

Conceptual frameworks and financial reporting schemes define this information. I contend that organizing this information so that it is machine readable, but also readable by humans, makes it possible to (a) CHECK the rules to make sure the

[45] PROLEG: An Implementation of the Presupposed Ultimate Fact Theory of Japanese Civil Code by PROLOG Technology, Ken Satoh et.al., http://research.nii.ac.jp/~ksatoh/juris-informatics-papers/jurisin2010-ksatoh.pdf

[46] Logical English, http://xbrl.squarespace.com/journal/2020/11/29/logical-english.html

rules are complete and consistent and (b) provides for a much more dynamic oriented approach to working with the information rather than just reading it from a book or web site.



Current liabilities

40 An entity shall classify a liability as current when:

(a) it expects to settle the liability in the entity's normal operating cycle;

(b) it holds the liability primarily for the purpose of trading;

(c) the liability is due to be settled within twelve months after the reporting date; or

(d) the entity does not have an unconditional right to defer settlement of the liability for at least twelve months after reporting date. Terms of a liability that could, at the option of the counterparty, result in its settlement by the issue of equity instruments do not affect its classification.

[Based on *IFRS for SMEs* Standard paragraph 4.7]

41 An entity shall classify all other liabilities as non-current. [*IFRS for SMEs* Standard paragraph 4.8]

Lots and lots of possibilities.

1.24. Understanding Accounting Consistency and Comparability

The conceptual framework of the FASB uses the terms consistency and comparability in precise ways which may be different than how many people understand and define these terms.

Accounting *comparability* helps users of financial reports see similarities and differences between the reported transactions, events, circumstances, and other phenomenon when analysts try and compare information across entities. A part of accounting comparability is *consistency* of accounting practices across time periods which allows for the comparison across different periods for the same entity.

Entities must be consistent in applying their accounting policies to allow for comparability across time periods. For example, an entity cannot simply use the FIFO approach to valuing inventory in one period, change to LIFO in another period, and then back to FIFO. That is an inconsistent application of accounting policies.

While information across entities should be comparable that is not to mean that information is reported identically. For example, some entities report using a classified balance sheet, others use an unclassified balance sheet. Whether an entity uses a classified balance sheet or unclassified balance sheet has to do with industry accounting practices. A classified and unclassified balance sheet is not comparable at the level of current and noncurrent assets and liabilities because an unclassified balance sheet does not make that distinction. However, the balance sheets are comparable should you choose to compare them at the assets and liabilities and equity level. Likewise, a multi-step[47] income statement which reports gross profit is not directly comparable to a single-step income statement which does not report gross profit. However, there are levels of comparison which can be achieved and certain industry practices which, if followed, allow for more comparability.

[47] To better understand comparability, see this information on report frames, http://www.xbrlsite.com/2015/fro/us-gaap/html/ReportFrames/

Also, this is not to say that entities cannot change policies or other practices. They can. However, there are specified ways for doing so.

And so to be clear, there is no requirement that every line item of every financial report be directly comparable. It is very possible to compare entities which use different accounting practices and policies. Professional analysts understand how to perform appropriate comparisons. Having 100% consistency between entities is likewise not a requirement.

Stating that something is consistent with some description is different. Describing a financial report universally as having the relationship (business rules) "Assets = Liabilities and equity" and that a financial report is consistent with that description or rule is a different way to view consistency. This view is just as valid, just describing somethings slightly different.

Said another way, the variability of intermediate components within a financial report is a consciously included feature, not a bug[48].

1.25. Contrasting comparability and uniformity

Per SFAS 8[49] issued by the FASB, page 19, QC23:

> "Comparability is not uniformity. For information to be comparable, like things must look alike and different things must look different. Comparability of financial information is not enhanced by making unlike things look alike any more than it is enhanced by making like things look different."

A form is uniformity. Financial statements are not forms. And while financial statements are not forms, they are likewise not random either.

It is important to understand what the FASB means by "comparability (including consistency)". That is explained in SFAS 8[50]. Here is the pertinent section of that document. This is well stated, very clear, and every word is worth reading:

Comparability:

- **QC20**. Users' decisions involve choosing between alternatives, for example, selling or holding an investment, or investing in one reporting entity or another. Consequently, information about a reporting entity is more useful if it can be compared with similar information about other entities and with similar information about the same entity for another period or another date.
- **QC21**. Comparability is the qualitative characteristic that enables users to identify and understand similarities in, and differences among, items. Unlike the other qualitative characteristics, comparability does not relate to a single item. A comparison requires at least two items.
- **QC22**. Consistency, although related to comparability, is not the same. Consistency refers to the use of the same methods for the same items, either

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[48] Intermediate Components, https://youtu.be/jqZWI_Tmhag

[49] FASB, *Statement of Financial Accounting Concepts No. 8*, page 19, http://www.fasb.org/cs/BlobServer?blobcol=urldata&blobtable=MungoBlobs&blobkey=id&blobwhere=1175822892635&blobheader=application/pdf

[50] FASB, *Statement of Financial Accounting Concepts No. 8*, page 19, http://www.fasb.org/cs/BlobServer?blobcol=urldata&blobtable=MungoBlobs&blobkey=id&blobwhere=1175822892635&blobheader=application/pdf

from period to period within a reporting entity or in a single period across entities. Comparability is the goal; consistency helps to achieve that goal.

- **QC23**. Comparability is not uniformity. For information to be comparable, like things must look alike and different things must look different. Comparability of financial information is not enhanced by making unlike things look alike any more than it is enhanced by making like things look different.
- **QC24**. Some degree of comparability is likely to be attained by satisfying the fundamental qualitative characteristics. A faithful representation of a relevant economic phenomenon should naturally possess some degree of comparability with a faithful representation of a similar relevant economic phenomenon by another reporting entity.
- **QC25**. Although a single economic phenomenon can be faithfully represented in multiple ways, permitting alternative accounting methods for the same economic phenomenon diminishes comparability.

US GAAP is an excellent financial reporting scheme because it strikes a good balance between the ability to compare and the ability to accurately report the financial condition and financial position of an economic entity. When trying to implement "comparisons" in software, it is very important to understand the goal of comparability the financial reporting scheme enables.

1.26. Comparing reported information

The first key idea one needs to understand is the difference between a "concept" and a "preferred label for a concept". For example, if you see "Revenue" in a financial report, the reporting entity might mean "Operating revenue" or they might mean "Operating and nonoperating revenue" or perhaps even something else. So while the label might say "Revenue", the concept they are reporting could be "Operating revenue" or perhaps even "Nonoperating revenue". And the first step needed to understand the differences between concepts is to get a list of those concepts.

After that, you can look at how different reporting entities use those concepts. Theoretically, if you are working with one specific industry group and the economic entities in that industry group all use the same reporting style, then you can think of that specific set of financial reports as a "form". One of the most consistent reporting styles of public companies is that which is used by those that report using the "interest-based revenues" approach. i.e. banks.

If you go to this web page[51] and grab the Excel spreadsheet with the link "Compare All Excel Code (ZIP)" and then run the algorithm (click the button), the algorithm goes and grabs the fundamental financial information from the balance sheet, income statement, cash flow statement, and statement of comprehensive income for 535 financial institutions that use an interest-based revenues style of reporting. (Takes about 15 minutes to get all that information).

The information is very consistent. For the 535 entities there are about 50 concepts. 535 times 50 equals a total of 26,750 facts that the Excel macro looks for. There are about 120 inconsistencies. 120 inconsistencies divided by 26,750 facts equals an inconsistency rate of .44% (less than 1%), or an accuracy rate of 99.55%.

[51] Proof (working prototype), http://www.xbrlsite.com/2015/Demos/Proof/Proof.html

But what if you wanted to use that same Excel algorithm to analyze a regulated public utility. How good would that algorithm be? Not as good because the reporting styles of banks and regulated public utilities is different.

What if you created a different algorithm for regulated public utilities and ran that against companies that were regulated public utilities. The success rate would likely be better.

But then, what if you wanted to compare a bank and a regulated public utility for some reason. How would that work? Well, you would have to map the reporting style of a regulated public utility to the reporting style of a bank that used interest-based revenues style of reporting. That requires accounting expertise and judgement.

So, what is the point?

- Financial reports are not "uniform" or forms. But when you compare economic entities that use the same reporting style, you can treat the information more like a form.
- When you cross reporting styles, comparisons are possible but require professional judgement.
- If you want to see how to compare, all the moving pieces, go look at the code of that Excel spreadsheet I referenced above.
- Automating comparisons using machines such as computers takes metadata, you have to document the patterns and then explain those patterns to the software in machine-readable form.

1.27. Summary of automated and manual verification tasks

The following is a summary of automated and manual verification tasks organized into somewhat of a digital disclosure checklist[52]:

[52] Disclosure checklist, http://www.xbrlsite.com/2014/Library/DisclosureChecklist.pdf

#	Goal or Desired State of Digital Financial Report	More information	Comments, examples, etc.	Automatable	Manual	FY 2013 (automatable tests only)	FY 2012 (automatable tests only)
1	XBRL technical syntax consistent with XBRL technical specification requirements	See		X		99.9%	99.9%
2	Consistent with requirements of EDGAR Filer automated and manual (EFM) syntax/semantics rules	See		X	X	97.9%	80.5%
3	Consistent and unambiguous report level representation or model structure	See	Tests arrangement of Network, Table, Axis, Member, Line Items, Abstracts, Concepts	X		99.9%	97.9%
4	Root entity of focus (economic entity, accounting entity) successfully and unambiguously detectable	See	If the entity of focus is not detected, unable to perform other tests	X		99.2%	98.8%
5	Current balance sheet date (document period end date) and income statement period (period context of document period end date) successfully and unambiguously detected	See		X		99.3%	99.8%
6	Fundamental accounting concept skeleton successfully and unambiguously detected and relations between concepts intact/sound	See		X		97.8%	97.9%
7	Primary financial statement roll up computations (balance sheet, income statement, statement of comprehensive income, cash flow statement) detected, intact, and foot	See	This has a dependency on discovery of fundamental accounting concepts. For example, if the concept "net cash flow" is not found, won't be able to find a roll up for net cash flow either.	X		90.1%	84.9%
8	Primary financial statements successfully discovered		This should be automatable, but if certain conditions exist it cannot be automated.	X	X	Generally successful	Generally successful
9	Primary financial statements foot and roll forward (cash flow statement, statement of changes in equity) appropriately		This is a duplicate of #7 which does not include the roll forwards; this is beyond the primary financials footing	X		Unknown	Unknown
10	Level 1 footnote disclosures appropriate		There is no way to automate this 100% unless the filer uses concepts from the US GAAP XBRL taxonomy.	X	X	Unknown	Unknown
11	Industry specific accounting concepts and relations valid		Similar to the fundamental accounting concepts, but for specific industries or activities	X	X	Unknown	Unknown
12	Level 2 policy text block disclosures appropriate				X	Fair	Unknown
13	Each Level 3 [Text Block] and related Level 4 detail disclosure match appropriately	See		X	X	Poor	Poor
14	Each Level 4 detail disclosure valid including representation structure, mathematical computations, intersections with other components, etc.	See	See the separate disclosure testing algorithm	X	X	Unknown	Unknown
15	Required disclosures discovered		Nature of business, basis of reporting, accounting policies and all other required disclosures are discovered	X		Unknown	Unknown
16	Reported prior period information consistent with prior report current period information where appropriate			X	X	Unknown	Unknown
17	Disclosure rules have been met and make sense		For example, if PPE exists on the balance sheet then PPE details should be discovered to be disclosed and PPE estimated useful lives should be discovered to be disclosed	X	X	Unknown	Unknown
18	Report element selection is justifiable, defensible, and otherwise appropriate				X	Unknown	Unknown
19	Reported facts appropriate				X	Unknown	Unknown
20	Variance analysis of reported facts as compared to peer or peer group appropriately explainable		Generally automatable using management by exception approach	X	X	Unknown	Unknown
21	Report element selection is consistent with peers or peer groups as appropriate				X	Unknown	Unknown
22	Disclosure checklist review for full inclusion		There is no way to automate the process of detecting things which should have been disclosed based on transactions, events, or other circumstances that are not included within report		X	Unknown	Unknown
23	True and fair representation of financial information of economic entity				X	Unknown	Unknown

1.28. Defining verification

Verification is the process of research, examination, and other tasks and steps required to prove or establish validity; evidence that establishes or confirms the accuracy or truth of something. Verification is a formal assertion of validity.

Validity can be defined as being well grounded; producing the desired result; free from logical flaw; based on sound reasoning; cogent. (i.e. complete, correct, consistent, accurate, has fidelity, has integrity)

Validity when it comes to an XBRL-based public company financial report which is submitted to the SEC is, arguably, that such a financial report is a true and fair representation of a reporting entities financial and nonfinancial information articulated by such a financial report.

A financial report can be said to be valid if it possesses certain traits which can be defined in general terms and for clarity are listed below to bring them into the reader's mind:

- **Completeness**: Having all necessary or normal parts, components, elements, or steps; entire.
- **Correctness**: Free from error; in accordance with fact or truth; right, proper, accurate, just, true, exact, precise.
- **Consistency**: Compatible or in agreement with itself or with some group; coherent, uniform, steady. Holding true in a group, compatible, not contradictory.
- **Accuracy**: Correctness in all details; conformity or correspondence to fact or given quality, condition; precise, exact; deviating only slightly or within acceptable limits from a standard.

While these four notions which relate to the "trueness" and "fairness" must exist for every fact reported by a financial report, they also need to exist when considering the financial report in its entirety.

Two other notions help bring the notion of trueness and fairness of information at the fact and at the report level into focus:

- **Fidelity**: Fidelity relates to the loyal adherence to fact or detail; exactness. The faithful representation of the facts and circumstances represented within a financial report properly reflect, without distortion, reality. High fidelity is when the reproduction (a financial report) with little distortion, provides a result very similar to the original (reality of company and environment in which company operates).
- **Integrity**: Integrity is holistic fidelity. Integrity relates to the fidelity of the report in its entirety, of all parts of a financial report, from all points of view. Integrity is holistic accuracy, accurate as a whole. Integrity is the quality or condition of being whole or undivided; completeness, entireness, unbroken state, uncorrupt. Integrity means that not only is each component of a financial report is correct but all the pieces of the financial report fit together correctly, all things considered.

To an accountant the notions of verification and validity and that a financial report must be complete, correct, consistent, and accurate as defined above are a statement of the obvious. We know this. Accountants have performed these tasks for hundreds of years and have a reputation for performing this task well. This is not new to accountants. Further, these traits which a financial report must possess are the obligations of those creating these reports; they are not options. Accountants don't pick and choose whether a financial report is to be true and fair; those traits must be true by definition.

1.29. Method for Creating High-quality XBRL-based Financial Report

The document, *Method for Creating High-quality XBRL-based Financial Report*[53], outlines a proven standard method of implementing a standard digital financial report using the XBRL technical syntax leveraging the extensibility features of XBRL which follow the forthcoming OMG *Standard Business Report Model* (SBRM)[54].

This document itself is not a methodology, rather this document will be used to back into a methodology which can be used to implementing a digital financial report in the syntax of one's choice. The intent of this document is to summarize know-how. This know-how, when documented in the form of a useful method, eliminates the need for others to re-invent the wheel. Rather than re-inventing the wheel; others can simply leverage a well-thought-through, world-class approach that has been designed, created, rigorously tested, and carefully engineered leveraging approaches that have been proven to work results.

These best practice approaches and techniques that has been generally demonstrated as superior to any known alternatives because the techniques produce

[53] Charles Hoffman, CPA and Rene van Egmond, *Method for Creating High-quality XBRL-based Financial Report*, http://xbrlsite.azurewebsites.net/2019/Prototype/sbrm/SBRM-Method.pdf

[54] *OMG Standard Business Report Model (SBRM) Initial Submission Information*, http://xbrl.squarespace.com/journal/2019/11/15/omg-standard-business-report-model-sbrm-initial-submission-i.html

results that are superior to those achieved by other means or because it has become a standard way of doing things are documented in this resource. It is anticipated that others will improve upon this method over time.

1.30. The Finance Factory

Deloitte is articulating a vision of what they call ***The Finance Factory***. I buy into that vision. Here is how Deloitte describes The Finance Factory:

> The finance factory handles core finance processes, and connects to finance centres of excellence and outsourcing partners in a hub-and-spoke model.
>
> There's no paper, anywhere. Employees use cloud-based apps on mobile devices to transact their business, and highly standardized, simplified, workflow-enabled business processes handle the rest. Automated controls and intelligent process monitoring and analytics keep watch over core, extended and outsourced process performance, exceptions and service levels to help minimize rework. Finance managers receive event-driven, real-time updates thanks to new integration tools and advances in in-memory processing.
>
> The close process is continuous, if not yet real-time. A daily soft close is the new norm, made possible by visual close management tools, integrated sub-ledgers, daily time capture, journal workflows, reconciliation tools, as well as automation of consolidation, foreign exchange, allocation and intercompany transfers. Finance teams now simulate pre-close results and can support the continuous development of the MD&A throughout the close process.

The description of the vision is maturing. Last year I heard the term "lights-out finance" explained in broad brush strokes. Now, I would point you to these Deloitte documents that help paint the details of the vision:

- *Close, Consolidate, Report*[55]
- *The Future of Operational Finance*[56]
- *Modernizing Finance in Private Companies*[57]
- Finance 2025[58]

Others[59] provide insights into the possibilities but refer to the same thing using different terms. "Financial Transformation" and "Finance Digital Transformation" and "The Modern Finance Platform" and "Digital Finance" and "Mirror World" are some of the different terms are used.

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[55] Deloitte, *Close, Consolidate, Report*, https://www2.deloitte.com/content/dam/Deloitte/nl/Documents/cfo/deloitte-nl-cfo-point-of-view-close-consolidate-and-report.pdf

[56] Deloitte, *The Future of Operational Finance*, https://www2.deloitte.com/content/dam/Deloitte/nl/Documents/strategy/deloitte-nl-so-the-future-of-operational-finance.pdf

[57] Deloitte, *Modernizing Finance in Private Companies*, https://www2.deloitte.com/ca/en/pages/audit/articles/finance-trends.html

[58] Deloitte, *Finance 2025*, https://www2.deloitte.com/content/dam/Deloitte/us/Documents/finance-transformation/us-ft-crunch-time-V-finance-2025.pdf

[59] *Deloitte's Vision: The Finance Factory*, http://xbrl.squarespace.com/journal/2019/2/20/deloittes-vision-the-finance-factory.html

I summarized all of this information in a document that I call *Exploring the Notion of The Finance Factory*[60]. While it is very doubtful that the vision that Deloitte paints for what a finance department will look like in 2025 will be realized in such a short time for all organizations is doubtful, particularly in such a short period of time; what is clear is that change is on its way.

Many aspects of accounting, reporting, auditing, and analysis are painful, monotonous, onerous, gruelling; even barbaric given the tools that are available today for performing these tasks in a digital environment.

While many things might never change, other things will change. No one has a crystal ball that can accurately predict exactly what will change and when. But, thinking that nothing will change is absurd and increasing risky.

There is always room for improvement in the accounting information systems that keep an organization running or in the supply chain that provides capital via the capital markets.

1.31. Adapting to Changes Caused by the Fourth Industrial Revolution

We are in the midst of the fourth industrial revolution[61]. Here is a list of the all four industrial revolutions:

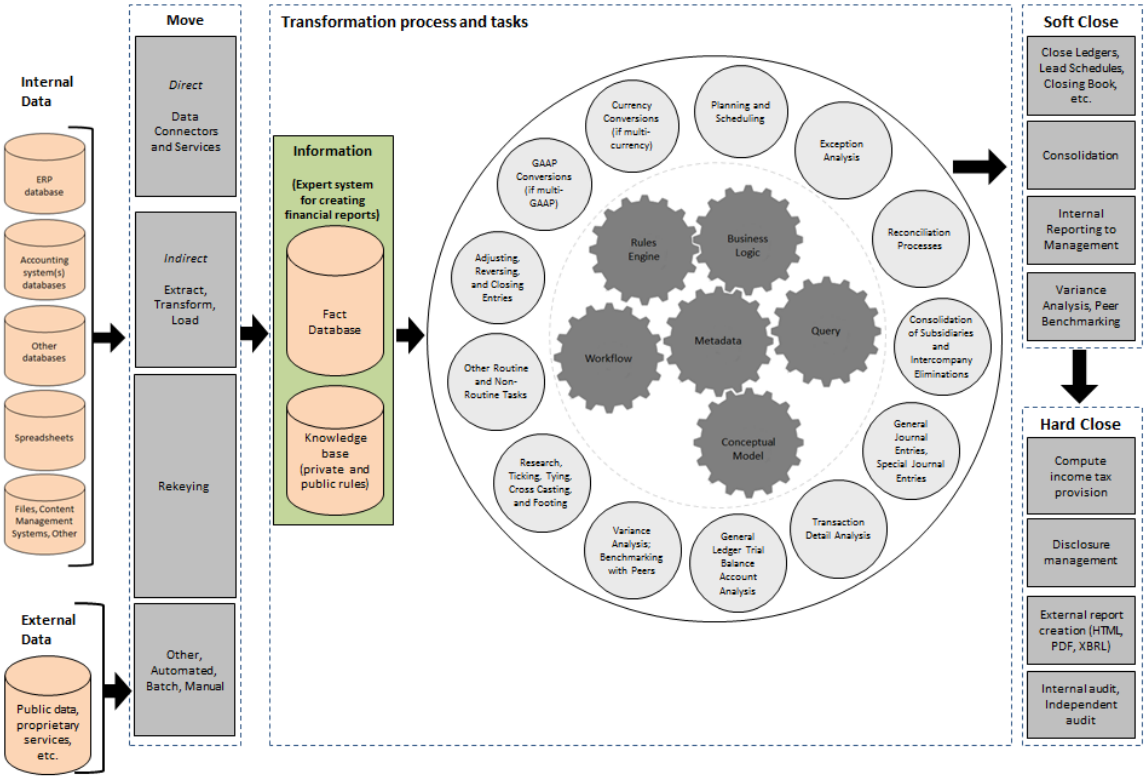
- Mechanization, water power, steam power.
- Mass production, assembly line, electricity.
- Computer and automation.
- Cyber physical systems.

Each of the Big 4 public accounting firms acknowledges that changes caused by the fourth industrial revolution will be big and they recommend that their clients adapt.

Artificial intelligence will be a big part of this change.

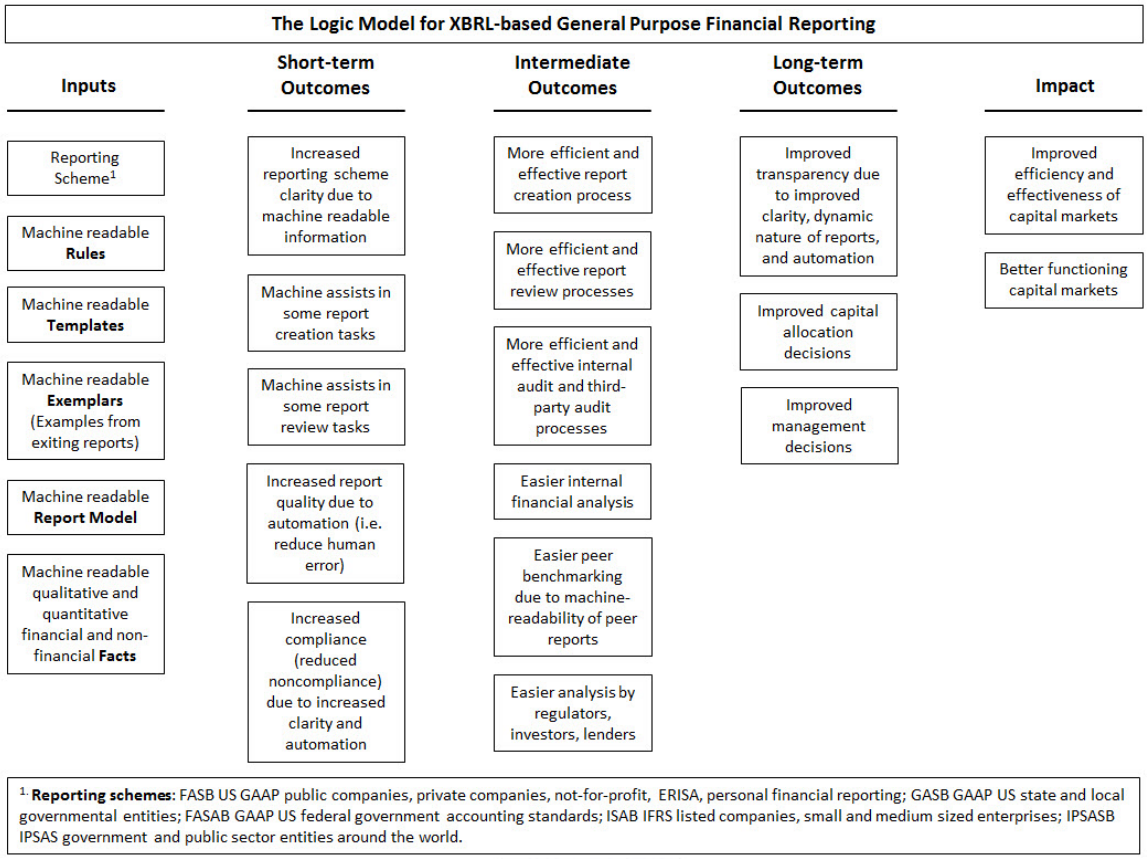
[60] Charles Hoffman, CPA, *Exploring the Notion of The Finance Factory*, http://xbrlsite.azurewebsites.net/2019/Library/ExploringNotionOfFinanceFactory.pdf

[61] Adapting to Changes Caused by the Fourth Industrial Revolution, http://xbrl.squarespace.com/journal/2019/8/4/adapting-to-changes-caused-by-the-fourth-industrial-revoluti.html



1.32. Business Case for XBRL-based Digital Financial Reporting

The following graphic summarizes the business case for XBRL-based digital financial reporting in one graphic:



This is a summary of the approximate size of the market by financial reporting scheme:

Market segment	Approximate market size
Public companies financial reporting using US GAAP to SEC	About **10,000** public companies in US
Private company financial reporting in support of commercial loans to banks and others using US GAAP	About **27.9 million** private companies in US; **18,500** private companies with 500 employees or more
Not-for-profit entities financial reporting for commercial loans, federal grants using US GAAP	About **320,000** not-for-profit entities
State and local governmental entities financial reporting using governmental accounting standards; CAFR in US, IPSAS in rest of world	About **90,000** state and local governmental entities (probably similar number or double in the rest of the world)
Listed companies reporting under IFRS	About **10,000 to 30,000** globally
SMEs (small and medium size entities) reporting under IFRS	About **23 million in Europe, 40 million in China, 1.9 million in India, 2.4 Brazil** (private companies, SMEs)
Employee benefit plan annual audit reports, Department of Labor's Employee Benefits Security Administration (EBSA)	About **800,000** audited plans in US under ERISA; similar reporting in Australia, about **300,000** plans
Personal financial statements	About **1,000,000** high-net worth individuals or more