

Thoughts on Auditing XBRL-formatted Information

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This document summarizes a number of thoughts related to the “audit requirement” for financial information that is conveyed using the XBRL format.

Consider the following fragment of a financial report, the components of inventory disclosure. The information from that inventory components disclosure is shown below conveyed in two forms. The first form is the formatting that accountants have been working with for the past 100 years or so which is a representation of the information on “paper” or a human readable version of paper such as electronic word processor documents, HTML, or PDF. The second representation is the same disclosure of inventory components represented in a viewer tool used for XBRL-based information.

Word processor, HTML, or PDF representation (human readable):

Note XX - Inventories

The following is a summary of the components of inventory as of December 31:

	2016	2015
Finished goods	\$1,000,000	\$1,000,000
Work in process	1,000,000	1,000,000
Raw materials	1,000,000	1,000,000
Supplies and other	1,000,000	1,000,000
Inventory, net	\$4,000,000	\$4,000,000

XBRL viewer software application representation (human readable and machine readable):

Component: (Network and Table)		
Network	5040 - Disclosure Inventory Components	
Table	Inventory Components [Table]	
Reporting Entity [Axis]	0000000001 http://www.sec.gov/CIK	
Legal Entity [Axis]	Consolidated Entity [Domain]	
	Period [Axis] ▼	
Inventory Components [Line Items]	2016-12-31	2015-12-31
Inventory, Net [Roll Up]		
Finished Goods	1,000,000	1,000,000
Work in progress	1,000,000	1,000,000
Raw materials	1,000,000	1,000,000
Other	1,000,000	1,000,000
Total inventories, net	4,000,000	4,000,000

Conveying the same meaning

The first important point to understand is that both representations of information convey the same fundamental meaning. A human reader of either representation would highly likely walk away with the same meaning. In fact, if this was not true then something is fundamentally wrong with one of the approaches to representing information. The purpose of a general purpose financial report is to unambiguously report information about the financial position and financial condition of an economic entity. Arguably, this could be described as a “meaningful exchange” of information, an information exchange without disputes as to precise meaning. It means unambiguous interpretation. It means resolving conflicts and inconsistencies.

Consider the following scenario that I provide in my *XBRL-based Digital Financial Reporting Principles*¹,

Two public companies, A and B, each have some knowledge about their financial position and financial condition. They must communicate their knowledge 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 are using a common set of basic logical principles (facts known to be true, deductive reasoning, inductive reasoning, etc.) and common financial reporting standards (i.e. US GAAP, IFRS, etc.), so they should be able to communicate this information fully, so that any inferences which, say, the investor draws from public company A's input should also be derivable by public company A using basic logical principles and common financial reporting standards, and vice versa; and similarly for the investor and public company B.

It would be very hard to argue that the meaning of information changes based on the formatting of the information. Or, to say this in another way; if an XBRL-based representation of information and a representation of that information in from a word processor generated document or some other electronic format cannot be the same then XBRL-based representations would clearly have no value.

Syntax does not matter, meaning matters

As I explained in my popular YouTube video *How XBRL Works*², a computer cannot deal with anything that is not structured in some way. That “structure” is called syntax in technical jargon. Syntax is basically the physical ordering of the stuff the computer works with. Syntax relates to how you physically say something. Semantics³ relates to the meaning of what you say.

Something that professional accountants seem to be confused about is their relationship to the XBRL technical syntax. Consider an important point that is often missed. You know that word processor document that professional accountants have been working with for the past 25 years or so, that has a

¹ Charles Hoffman, *XBRL-based Digital Financial Reporting Principles*, principle #4, <http://xbrl.squarespace.com/digital-financial-reporting-pr/>

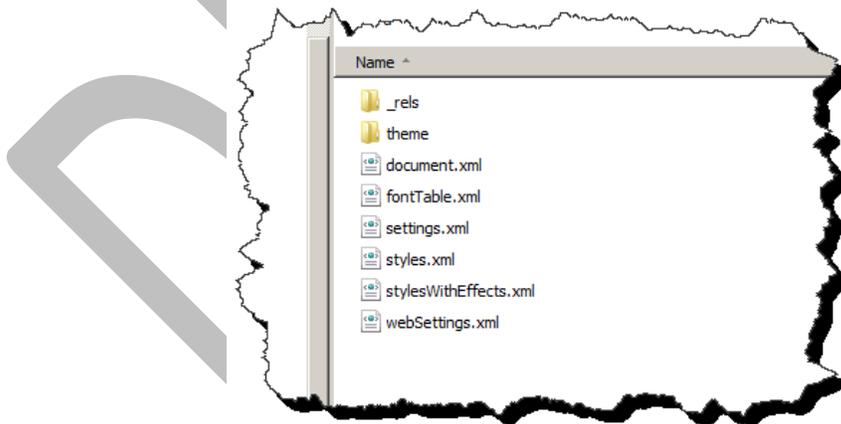
² YouTube, *How XBRL Works*, <https://www.youtube.com/watch?v=nATJBPOiTxM>

³ YouTube, *An Introduction to the Semantic Web for Noobs*, <https://www.youtube.com/watch?v=OGg8A2zfWKg>

syntax also. Here is what that syntax looks like for the human-readable representation of the inventory components disclosure shown above:

```
</w:t>
- <w:tr w:rsidR="000D72C0" w:rsidRPr="000D72C0" w:rsidTr="000D72C0">
- <w:tc>
- <w:tcPr>
<w:tcW w:w="6000" w:type="dxa"/>
<w:hideMark/>
</w:tcPr>
- <w:p w:rsidRDefault="00F82BF0" w:rsidR="000D72C0" w:rsidP="000D72C0" w:rsidRPr="000D72C0">
- <w:pPr>
<w:jc w:val="right"/>
- <w:rPr>
<w:rFonts w:cs="Times New Roman" w:hAnsi="Verdana" w:eastAsia="Times New Roman" w:ascii="Verdana"/>
<w:color w:val="000000"/>
<w:sz w:val="16"/>
<w:szCs w:val="16"/>
</w:rPr>
<w:pPr>
- <w:hyperlink w:history="1" r:id="rId17">
- <w:r w:rsidR="000D72C0" w:rsidRPr="000D72C0">
- <w:rPr>
<w:rFonts w:cs="Times New Roman" w:hAnsi="Verdana" w:eastAsia="Times New Roman" w:ascii="Verdana"/>
<w:color w:val="000000"/>
<w:sz w:val="16"/>
<w:szCs w:val="16"/>
</w:rPr>
<w:t>Inventory, net</w:t>
</w:r>
</w:hyperlink>
</w:p>
</w:tc>
- <w:tc>
- <w:tcPr>
```

Pretty ugly, huh? Try an experiment. Create a small Microsoft Word document and save it. Change the extension from “.docx” to “.zip”. Then, extract the contents of the ZIP file. What you will see is a bunch of XML files. Here is a screen shot of what the files look like:



XBRL-formatted information is pretty ugly also. But just like Microsoft Word and Excel documents; professional accountants will never need to work with the technical syntax of those documents. Professional accountants are concerned with the semantics of information conveyed by the XBRL-based format not with the XBRL technical syntax itself.

Someone I know told me of a conversation he had with a Big 4 audit partner. The audit partner made the statement, “I do not know how auditors could possibly audit the XBRL data.”

Auditors will not “audit the XBRL data”. Auditors audit the meaning of the information conveyed, the semantics; they do not audit the syntax. Correct syntax is easy to verify using automated processes.

How many times has an auditor concerned themselves with the XML files that make up the Microsoft Word document, PDF, or the HTML file that conveys the meaning of a financial report they are auditing? Never.

That is how often auditors need to be concerned with the XBRL technical syntax. Never.

Digital financial reports are less ambiguous than word processor documents

Formatting information within an XBRL document requires the creator to be more precise with regard to what they are saying. For example, consider the line item fact “Total inventories, net” below for 2016:

The screenshot displays an XBRL viewer interface. At the top, it shows the component information: Component: (Network and Table), Network: 5040 - Disclosure, Inventory Components, and Table: Inventory Components [Table]. Below this, the Reporting Entity [Axis] is 000000001 http://www.sec.gov/CIK, and the Legal Entity [Axis] is Consolidated Entity [Domain]. A dropdown menu for Period [Axis] is set to 2016-12-31. The main table, titled 'Inventory Components [Line Items]', has columns for 2016-12-31 and 2015-12-31. The 'Inventory, Net [Roll Up]' section includes rows for Finished Goods, Work in progress, Raw materials, and Other, all with values of 1,000,000. The 'Total inventories, net' row is highlighted in yellow and shows a value of 4,000,000 for 2016-12-31 and 4,000,000 for 2015-12-31. A 'Fact Characteristics and Properties' window is open, showing details for the selected fact. The 'Concept' is 'Inventories', and the 'Name' is 'us-gaap:InventoryNet'. The 'Balance Type' is 'Debit', and the 'Fact Value' is '4000000'. The 'Units' are 'iso4217:USD' and the 'Decimals (rounding)' is '-3'. Red circles highlight the 'us-gaap:InventoryNet', 'Debit', '4000000', and 'iso4217:USD' fields in the fact characteristics window.

Inventory Components [Line Items]	2016-12-31	2015-12-31
Inventory, Net [Roll Up]		
Finished Goods	1,000,000	1,000,000
Work in progress	1,000,000	1,000,000
Raw materials	1,000,000	1,000,000
Other	1,000,000	1,000,000
Total inventories, net	4,000,000	4,000,000

Properties	Occurrences	To Do
Reporting Entity	000000001 http://www.sec.gov/CIK	
Period	2016-12-31	
Legal Entity [Axis]	Consolidated Entity [Domain]	
Name	dei:LegalEntityAxis	
Prefix	dei	
Concept	Inventories	
Name	us-gaap:InventoryNet	
Prefix	us-gaap	
Balance Type	Debit	
Period Type	As Of (instant)	
Data Type	Monetary (xbrli:monetaryItemType)	
Fact Value	4000000	
Units	iso4217:USD	
Decimals (rounding)	-3	

Looking at that specific fact using an XBRL viewing tool, the reader of the financial report can understand more precisely that the reported fact is a specific concept from the US GAAP Financial Reporting XBRL Taxonomy, that the concept is a DEBIT, the rounding of the fact value, and other precise

details of the reported fact. Further, the reported fact is literally hooked to the documentation for the concept of the reported fact, the references to the Accounting Standards Codification, and other extremely useful information:

The screenshot shows the 'Report Element Properties' dialog box with the following information:

- Report Standard Label:** Inventories
- Base Standard Label:** Inventory, Net
- Documentation:** Amount after valuation and LIFO reserves of inventory expected to be sold, or consumed within one year or operating cycle, if longer.
- Class:** [Concept] Monetary
- Prefix:** us-gaap
- Name:** us-gaap:InventoryNet (circled in red)
- Balance Type:** Debit
- Period Type:** As Of (instant)
- Data Type:** Monetary (xbrli:monetaryItemType)
- ID:** us-gaap_InventoryNet

Useful functionality provided by good software helps you see the intersections between, say, the inventory components disclosure and the balance sheet which also reports that inventory fact:

The screenshot displays a financial report interface. At the top, it shows the component: **Component: (Network and Table)**. Below this, a table is shown with columns for 2016-12-31 and 2015-12-31. The table lists various assets, including **Inventories** (highlighted in yellow) with values of 4,000,000 for both periods. An overlaid 'Report Element Properties' dialog box is visible, showing the 'Occurrences' tab with a list of fragments containing the reported fact, such as '2001 - Statement - Balance Sheet' and '5040 - Disclosure - Inventory Components'.

Balance Sheet [Line Items]	2016-12-31	2015-12-31
Assets [Roll Up]		
Current assets [Roll Up]		
Cash, cash equivalents, and marketable securities		
Cash and cash equivalents	11,000,000	10,000,000
Marketable securities	9,000,000	10,000,000
Cash, cash equivalents, and marketable	20,000,000	20,000,000
Accounts receivable, net of allowance for doubtful accounts	29,000,000	29,000,000
Inventories	4,000,000	4,000,000
Prepaid expenses	3,000,000	3,000,000

Business rules that are provided with XBRL-based financial reports explicitly and precisely document mathematical relationships between reported facts. These business rules are machine readable and

therefore reliably and predictably prove that these mathematical relations are accurate, releasing external financial reporting managers and auditors from the drudgery of having to use their ten key to manual verify such relationships and the possibility of errors in financial reports. Literally every mathematical computation can be enforced and verified by software applications.

Label	Rendered Value	Op	Reported Value	Calculated Value	Balance	Result	Name
Inventory Components [Table]							abc:InventoryComponentsTable
Total inventories, net	4,000,000		4,000,000	4,000,000	Debit	Verified	us-gaap:InventoryNet
Finished Goods	1,000,000	+	1,000,000		Debit		us-gaap:InventoryFinishedGoods
Work in progress	1,000,000	+	1,000,000		Debit		us-gaap:InventoryWorkInProgress
Raw materials	1,000,000	+	1,000,000		Debit		us-gaap:InventoryRawMaterials
Other	1,000,000	+	1,000,000		Debit		us-gaap:OtherInventorySupplies

In fact, one could make a strong argument that it is easier to audit XBRL formatted information than it is to audit word processor formatted information.

Leverage software that understands financial reports

How much does Microsoft Word or any other word processor or Excel know about financial reports? Word processors and spreadsheets understand nothing about financial reports. They understand formatting syntax such as how to represent the rows, columns, and cells that make up a table.

The screenshot shows the XBRL Viewer application interface. The main window displays a table for 'Inventory Components' with columns for '2016-12-31' and '2015-12-31'. The table includes rows for 'Finished Goods', 'Work in progress', 'Raw materials', and 'Other', all with a value of 1,000,000. The 'Total inventories, net' row shows a value of 4,000,000 for both periods. The interface includes a menu bar, a toolbar, and a sidebar with a tree view of components.

Inventory Components [Line Items]	2016-12-31	2015-12-31
Inventory, Net [Roll Up]		
Finished Goods	1,000,000	1,000,000
Work in progress	1,000,000	1,000,000
Raw materials	1,000,000	1,000,000
Other	1,000,000	1,000,000
Total inventories, net	4,000,000	4,000,000

But because XBRL-based information represents the reported facts and information about those facts and relations between facts in a structured form that explains the meaning of those financial reports; software applications can leverage that meaning and help both external financial reporting managers create those reports and auditors audit the reports.

Auditing the information conveyed within an XBRL-based digital financial report will not be taking the information, exporting that information into Excel, and then manually reviewing the thousands and thousands of details of a report. First of all, that will never work and secondly that approach provides little leverage to auditors.

Humans augmented by machine capabilities, much like an electronic calculator enabling a human to do math quicker, will empower professional accountants and auditors who know how to leverage the use of those machines. Professional accountants and accounting practices, procedures, and processes will need to adapt⁴. Education and training of professional accountants also needs to adapt⁵.

The financial report creation tools of the future will be knowledge-based systems, expert systems, purpose built for creating financial reports⁶. The software for auditing those reports will likewise be knowledge-based systems. Auditors need to understand how that software works⁷.

Understanding how knowledge-based systems work

The typical business professional, including professional accountants and auditors, did not receive the training they need to correctly and appropriately understand digital financial reports and digital financial reporting in their business training in college. In order to understand how to audit the meaning conveyed by XBRL-based digital financial reports, professional auditors will need to learn a few new skills. None of these skills are particularly technical in nature. Very few of those skills relate to the XBRL technical syntax. These skills can generally be learned in about 40 hours.

Professional auditors need to understand the following basic aspects of knowledge-based systems⁸:

- Problem solving logic⁹

⁴ Georgios Petropoulos, *Do we understand the impact of artificial intelligence on employment?*,

<http://bruegel.org/2017/04/do-we-understand-the-impact-of-artificial-intelligence-on-employment/>

⁵ Shelley Palmer, *Stop Saying AI Can't Replace Humans*, <https://www.linkedin.com/pulse/stop-saying-ai-cant-replace-humans-shelly-palmer>

⁶ Charles Hoffman, *World's First Expert System for Creating Financial Reports*,

<http://xbri.squarespace.com/journal/2017/4/27/worlds-first-expert-system-for-creating-financial-reports.html>

⁷ Charles Hoffman, *Putting the Expertise into an XBRL-based Knowledge Based System for Creating Financial Reports*, <http://xbri.azurewebsites.net/2017/Library/PuttingTheExpertiseIntoKnowledgeBasedSystem.pdf>

⁸ Charles Hoffman, *Understanding Knowledge Based Systems*,

<http://xbri.azurewebsites.net/2017/Library/UnderstandingKnowledgeBasedSystems.pdf>

⁹ Charles Hoffman, *Comprehensive Introduction to Problem Solving Logic*,

http://xbri.azurewebsites.net/2017/IntelligentDigitalFinancialReporting/Part01_Chapter02.5_ComprehensiveIntroductionToProblemSolvingLogic.pdf

- Business rules¹⁰
- Knowledge engineering basics¹¹
- Expert systems or knowledge-based systems¹²

This brief description will help the reader see the connection between knowledge-based systems and the additional skills recommended above:

Simply put, a **knowledge based system** is a system that draws upon the knowledge of human experts that has been represented in machine-readable form and stored in a fact database and knowledge base. 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.

Again, computers are not taking over audits. That can never happen. Humans augmented by machine capabilities, much like an electronic calculator enabling a human to do math quicker, will empower knowledge workers who know how to leverage the use of those machines.

Professional accountants and auditors need to learn about those machines and not try and force those machines to fit into the paradigm that they currently understand. This is a paradigm shift.

In our opinion, the meaning conveyed via the XBRL format is consistent with...

Auditors will audit the meaning conveyed by structured XBRL formatted financial reports to assure that that meaning is consistent with the meaning conveyed by the HTML, PDF, word processor or other unstructured human readable representations of that same information.

Auditors will not concern themselves with the technical details of the XBRL technical specification. Software will bury XBRL deeply in the bowels of software, exposing the information representations in ways business professionals including professional accountants can work with on their terms.

¹⁰ Charles Hoffman, *Comprehensive Introduction to Business Rules*,
http://xbrl.azurewebsites.net/2017/IntelligentDigitalFinancialReporting/Part01_Chapter02.4_ComprehensiveIntroductionToBusinessRules.pdf

¹¹ Charles Hoffman, *Introduction to Knowledge Engineering for Professional Accountants*,
http://xbrl.azurewebsites.net/2017/IntelligentDigitalFinancialReporting/Part01_Chapter02.3_KnowledgeEngineeringBasicsForProfessionalAccountants.pdf

¹² Charles Hoffman, *Comprehensive Introduction to Expert Systems*,
http://xbrl.azurewebsites.net/2017/IntelligentDigitalFinancialReporting/Part01_Chapter02.6_ComprehensiveIntroductionToExpertSystems.pdf