Case for Semantic Oriented Accounting and Audit Working Papers

Understanding the advantages of modern, semantic oriented, machine-understandable accounting and audit working papers for compilations, reviews, and audits

By Charles Hoffman, CPA (March 3, 2024) (Work in Progress)

"I skate to where the puck is going to be, not where it has been." Wayne Gretzky, Canadian hockey star

The very factors causing accountants and auditors to be overwhelmed – increasing volume, complexity, and pace of information – also hold the key to solving this problem. While presentation-oriented electronic spreadsheets serve a purpose, their capabilities have limitations. A new, modern spreadsheet tool designed with semantic orientation and machine comprehension could unlock new functionality for accounting working papers and audit schedules.

In 1982 after graduating from Pacific Lutheran University with a business degree focused on accounting, I started work as an auditor for Price Waterhouse. Back then we used paper audit working papers. I was quite impressed with the trifold 18 column ledger paper. I was even issued a special tool for punching holes in the upper left-hand corner of each paper spreadsheet that had to be added to the bundle of paper audit working papers.

The day I started at Price Waterhouse they gave a group of us a tour of the office. During that tour we stopped by a room which had two shiny new IBM PCs sitting on a desk. During that tour the tour guide instructed us new staff accountants, "Make those IBM PCs do something."

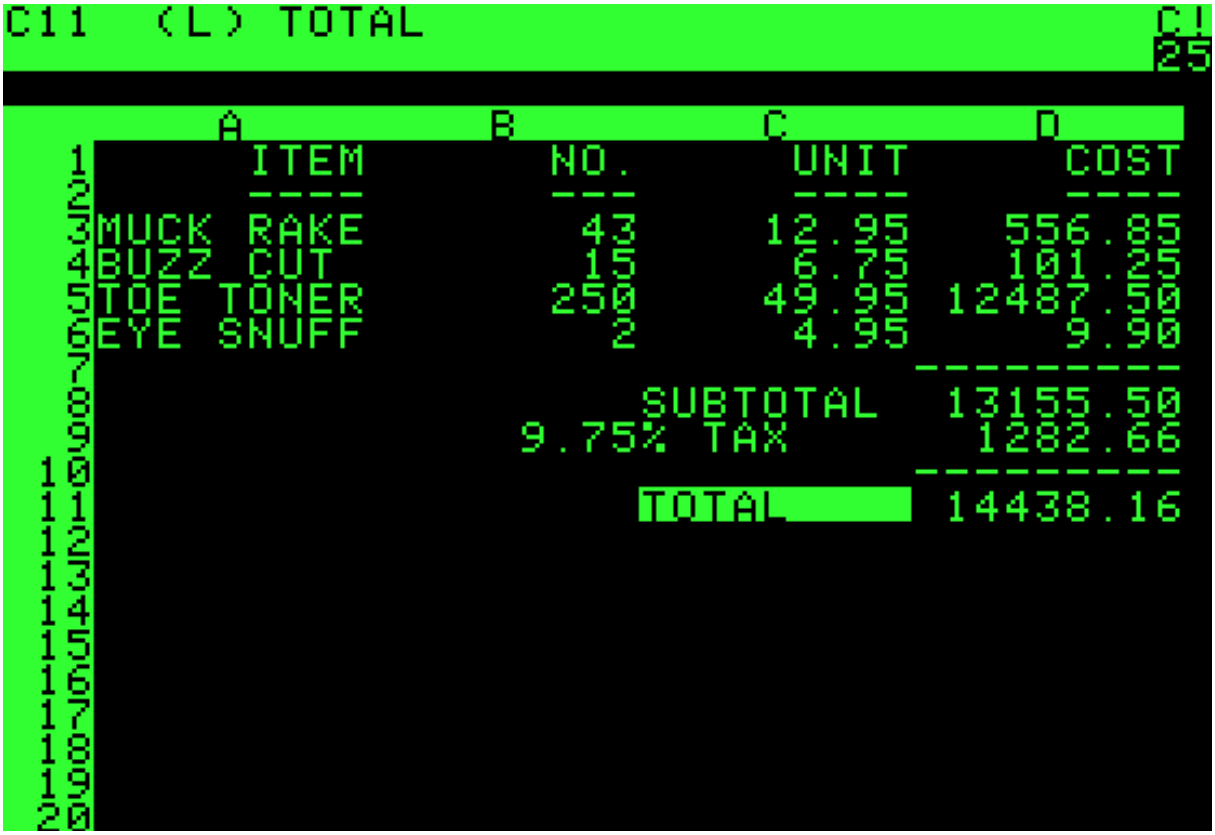
Audit working paper bundles of the typical audit would be about four or five inches thick. Some audits required multiple working paper bundles. Those working papers were stored in the depths of the office, in a back room that was used to store the bundles of working papers for hundreds of audit engagements that Price Waterhouse staff, seniors, managers, senior managers, and partners worked on.

Something else that was stored in that same room were dusty mechanical calculators[1] that looked like they weighed 50 pounds. It was the 1980s and the large, heavy mechanical calculators had been phased out; replaced by electronic calculators that were much smaller and faster. Texas Instruments and Hewlett Packard electronic calculators with paper tapes that were used by new staff accountants to "foot" and "cross foot" all those paper working papers to make sure there were no mathematical errors in those working papers.

[1] Wikipedia, *Mechanical Calculator*, https://en.wikipedia.org/wiki/Mechanical_calculator#Mechanical_calculators_reach_their_zenith

Shortly after starting work at Price Waterhouse, I took a class in VisiCalc[2] which was installed on those new IBM PCs. During college I had taken a class in programming FORTRAN, learning to do a bubble sort to put a set of numbers in order.

VisiCalc left a lot to be desired, but it did help me understand that those paper spreadsheets and calculators could be combined into one tool. And electronic spreadsheets offered interesting capabilities above and beyond what the paper spreadsheets offered.



In an audit you get accounting working papers from clients, these were called “PBCs” (prepared by client). One schedule that we always had for an audit was the trial balance of accounts as of the ending period of the audit which provided the balance in each account in a chart of accounts of a company being audited and the value of that account; each account listed in rows and totaling to zero when each of the accounts was added up because the sum of the debit accounts had to equal the sum of the credit accounts; a fundamental rule of financial accounting.

The client’s trial balance would be recast into what was called the adjusted working trial balance which showed each of the client accounts and had two columns for adjustments that may have been required as part of the audit and then a final adjusted balance column. Of course, the final column of that adjusted working trial balance also had to foot to zero. This is how accounting works; there are many checks along the path of the numbers to make sure no mistakes were made.

The adjusted working trial balance was cross referenced to what is referred to as a number of “lead schedules”. Lead schedules generally represent a line item of the financial report. Lead schedules were

[2] Wikipedia, VisiCalc, https://en.wikipedia.org/wiki/VisiCalc

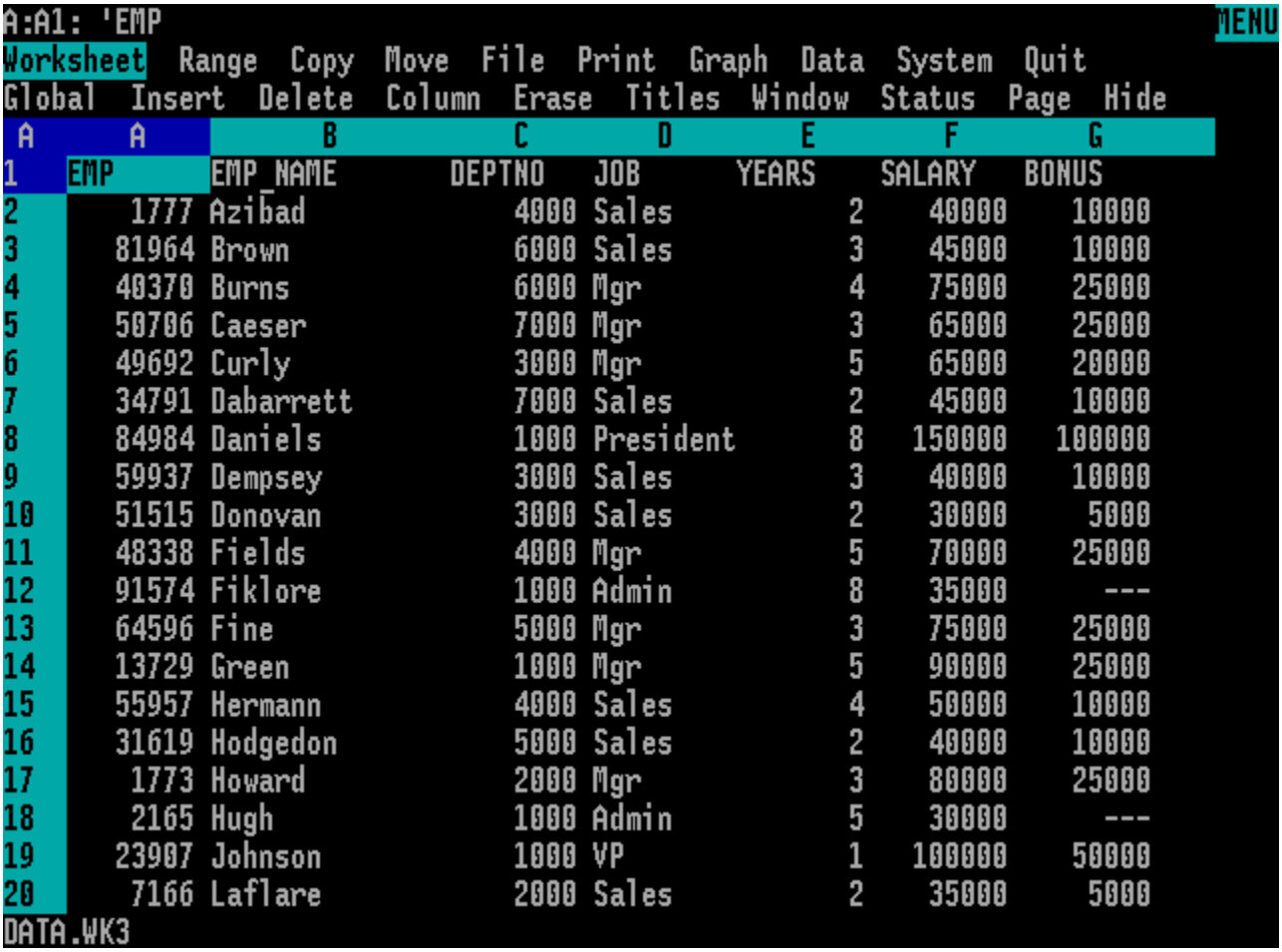
referenced to detailed schedules in the set of audit working papers. Detailed schedules were generally where the majority of audit work was performed.

The point is that all these schedules were numerically connected. Back in the day auditors were issued different colored pencils. Staff accountants had red pencils. Managers and partners had blue pencils.

And this was how financial audits were performed. Lots of paper working papers, lots of "ticking" and "tying"; footing and cross casting numbers to make sure no mistakes were made.

VisiCalc was a very limited tool. It was the first electronic spreadsheet application and it only had one "sheet" that you could key numbers into.

Fairly shortly after learning VisiCalc, Lotus 1-2-3[3] was introduced. Lotus 1-2-3, which was released January 26, 1983, tripled the power of VisiCalc. It had three electronic sheets! Lotus 1-2-3 became the industry standard for the electronic spreadsheet in the early 1980s.



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1	EMP	EMP_NAME	DEPTNO	JOB	YEARS	SALARY	BONUS
2	1777	Azibad	4000	Sales	2	40000	10000
3	81964	Brown	6000	Sales	3	45000	10000
4	40370	Burns	6000	Mgr	4	75000	25000
5	50706	Caeser	7000	Mgr	3	65000	25000
6	49692	Curly	3000	Mgr	5	65000	20000
7	34791	Dabarrett	7000	Sales	2	45000	10000
8	84984	Daniels	1000	President	8	150000	100000
9	59937	Dempsey	3000	Sales	3	40000	10000
10	51515	Donovan	3000	Sales	2	30000	5000
11	48338	Fields	4000	Mgr	5	70000	25000
12	91574	Fiklore	1000	Admin	8	35000	---
13	64596	Fine	5000	Mgr	3	75000	25000
14	13729	Green	1000	Mgr	5	90000	25000
15	55957	Hermann	4000	Sales	4	50000	10000
16	31619	Hodgedon	5000	Sales	2	40000	10000
17	1773	Howard	2000	Mgr	3	80000	25000
18	2165	Hugh	1000	Admin	5	30000	---
19	23907	Johnson	1000	VP	1	100000	50000
20	7166	Laflare	2000	Sales	2	35000	5000

DATA.WK3

And then of course we got Microsoft Excel which had a graphical user interface (GUI) and ultimately dominated the market. *VisiCalc, Excel, and The Rise of The Spreadsheet*[4] provides a good summary the evolution of the electronic spreadsheet.

[3] Wikipedia, *Lotus 1-2-3*, https://en.wikipedia.org/wiki/Lotus_1-2-3

[4] The History of Computing Podcast, *VisiCalc, Excel, and The Rise of The Spreadsheet*, https://thehistoryofcomputing.net/visicalc-excel-and-the-rise-of-the-spreadsheet

The electronic spreadsheet[5] has been commercially available for more than 40 years now and is an appropriate solution for many tasks commonly performed by financial accountants, auditors, and analysts. First introduced by VisiCalc[6], enhanced by Lotus 1-2-3[7], perfected by Microsoft Excel[8], and tuned for the internet by Google Sheets[9]; electronic spreadsheets are a "Swiss Army Knife" type of tool.

Conventional or "traditional" electronic spreadsheets have their advantages; but they also have their disadvantages.

A general lack of spreadsheet creation methodologies leads to non-uniform spreadsheets as a result. The video, *Strata Conference in London 2013: Felienne Hermans*[10], provides an excellent summary of the typical problems caused by electronic spreadsheets.

This general lack of "best practices" then leads to spreadsheets that are notoriously plagued by errors. One source points out that 80% of spreadsheets contain some kind of materially significant error[11]. While it may be easy to document what might be considered best practices in spreadsheet creation, because of the flexible nature of spreadsheets, enforcing those rules to create repeatable processes with traditional spreadsheets is very challenging or even impossible.

Auditing spreadsheets tends to be very difficult, and understanding the underlying spreadsheet business models represented within a spreadsheet can be difficult. The more complex the spreadsheet modeling becomes, the harder it is to understand.

The Wired article, *How Many Spreadsheets Does It Take to Run a Fortune 500 Company?*[12], highlights how big a problem this has become. Financial regulations, such as Sarbanes-Oxley requirements, have tried to address the symptoms of this problem by requiring organizations to properly document what people sometimes refer to as "spreadsheet hell"; but those regulations really do nothing to solve the problem. Lack of controls and even an ability to create controls and repeatable processes increase risk.

Gartner estimates that the average Fortune 1000 company uses 800 spreadsheets to prepare its financial statements for regulatory reporting[13]. Recall as we have stated above, 80% of spreadsheets contain some kind of material error. A Forbes article says 90% of spreadsheets have errors[14]. It is hard to pinpoint the actual number of errors, but the range seems to be somewhere between 10% and 90%[15].

All of these characteristics lead to spreadsheet maintenance nightmares. Most of us that have tried to understand and use a spreadsheet created by someone else understands that daunting task. These

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[5] Wikipedia, *Spreadsheet*, https://en.wikipedia.org/wiki/Spreadsheet
[6] Wikipedia, *VisiCalc*, https://en.wikipedia.org/wiki/VisiCalc
[7] Wikipedia, *Lotus 1-2-3*, https://en.wikipedia.org/wiki/Lotus_1-2-3
[8] Wikipedia, *Excel*, https://en.wikipedia.org/wiki/Microsoft_Excel
[9] Wikipedia, *Google Sheets*, https://en.wikipedia.org/wiki/Google_Sheets
[10] YouTube, *Strata Conference in London 2013: Felienne Hermans*, https://youtu.be/wbiVK6HKHHg
[11] CIO, *Eight of the Worst Spreadsheet Blunders*, https://www.cio.com/article/274673/enterprise-software-eight-of-the-worst-spreadsheet-blunders.html
[12] Wired, *How Many Spreadsheets Does It Take to Run a Fortune 500 Company*?, https://www.wired.com/insights/2014/03/many-spreadsheets-take-run-fortune-500-company/
[13] Gartner, *XBRL Will Enhance Corporate Disclosure and Corporate Performance Management*, https://unstats.un.org/unsd/nationalaccount/workshops/2008/newyork/IG22.PDF
[14] Forbes, *Sorry, Your Spreadsheet Has Errors (Almost 90% Do),* https://www.forbes.com/sites/salesforce/2014/09/13/sorry-spreadsheet-errors/?sh=5ea0cc7156ab
[15] Quora, *What are the percentages of spreadsheet errors for financial, academic, and average end-user errors?,* https://www.quora.com/What-are-the-percentages-of-spreadsheet-errors-for-financial-academic-and-average-end-user-errors

disadvantages are amplified as the complexity of what is represented by the spreadsheet increases. Extracting information for analysis across multiple spreadsheets can be very challenging, if not impossible.

Spreadsheets are a fundamental piece in the compilation, review, and audit of financial reports; many accounting working papers and audit schedules now are comprised of these traditional electronic spreadsheets. If between 10% and 90% of those spreadsheets contain errors, what exactly is the impact on those accounting and auditing working papers and schedules represented using traditional electronic spreadsheets.

Is there a better way? Is there a need for a professional spreadsheet type tool? Could this new spreadsheet type tool supplement what professional accountants can bring to the table to solve some of the problems of traditional spreadsheets. What if you could effectively reduce the error rate? What if you could effectively get automated machine-based processes to help accountants? What if you could separate the rules from the spreadsheet and apply machine-readable rules across many spreadsheets?

The notion of a logical spreadsheet is not new. The first logical spreadsheet was created by Frank Kriwazek at Imperial College in the early 1980s and was called LogiCalc[16]. What a logical spreadsheet is and how it is implemented can vary but generally their purpose is to extend or improve upon the functionality of conventional or "traditional" spreadsheets.

A logical spreadsheet[17] is a spreadsheet in which the traditional spreadsheet formulas take the form of logical statements. Think knowledge graph. Another term used to describe this is the deductive spreadsheet[18]. Imagine a specialized knowledge graph with a DATALOG query/logic engine attached.

In the document, *Understanding and Leveraging the "Semantic Glue" of XBRL-based Financial Reports*[19], I explained how logic is used to "glue" XBRL-based financial reports together. In another document, *Understanding Logical Objects of XBRL-based Digital Financial Reports*[20], I pointed out the high-level logical objects of financial reports. I have created a bunch of working prototypes using a framework that I have created to test these ideas[21]. This includes representing a chart of accounts, trial balance of accounts, adjusted working trial balance, lead schedules, detailed working paper schedules, and detailed test of internal controls.

Further, while these ideas which were perfected for financial reporting and then applied to accounting and audit working papers; these same ideas and the same framework can be used for other things.

These same ideas that I have applied to financial reporting can be used more generally to create what amounts to "logical digital twins[22]" of business "organisms" or "assemblies" or "infons" or "blocks" of information. Useful units of information logically glued together by business logic. Think Legos.

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[16] Stanford University, Michael Kassoff ana Andre Valente, *An introduction to logical spreadsheets*, http://logic.stanford.edu/publications/kassoff/introtologicalspreadsheets.pdf

[17] Wikipedia, *Logical Spreadsheet*, https://en.wikipedia.org/wiki/Logical_spreadsheet

[18] Carnagie Mellon University, *The Deductive Spreadsheet*, https://www.cs.cmu.edu/~iliano/slides/cmu06.pdf

[19] Charles Hoffman, CPA, *Understanding and Leveraging the "Semantic Glue" of XBRL-based Financial Reports*, http://xbrlsite.com/2024/Library/UnderstandingAndLeveragingSemanticGlue.pdf

[20] Charles Hoffman, CPA, *Understanding Logical Objects of XBRL-based Digital Financial Reports*, http://xbrlsite.com/2024/Library/UnderstandingLogicalObjects.pdf

[21] *PLATINUM Business Use Cases, Test Cases, Conformance Suite*, https://digitalfinancialreporting.blogspot.com/2023/07/platinum-business-use-cases-test-cases.html

[22] *Logical Digital Twin of Financial Reports*, http://www.xbrlsite.com/mastering/Part02_Chapter05.A0_LogicalDigitalTwin.pdf

What if:

- Rather than being presentation-oriented “workbooks”, “sheets”, “rows”, “columns”, and “cells”; the spreadsheets where logical-oriented models.
- Rather than rules always being combined within a spreadsheet; rules can be separated from the actual spreadsheet to enforce and control the information provided within the spreadsheet. Imagine a set of spreadsheets all using exactly the same rules.
- Rather than using position-oriented linking of cells which tends to be brittle; what if a robust, trustworthy linking mechanism were used, think “linked data” and the semantic web.
- Rather than being documentation and maintenance nightmares; what if spreadsheets were self-documenting.
- Rather than being uncontrollable; what if boundaries, guardrails, and bumpers could control the wild behavior of those creating spreadsheets.
- Rather than being a global standard spreadsheet format like Open Office XML[23]; what if global standard audit engagement objects from a global standard semantic model was used.
- Rather than being a “sheet” or “workbook”; what if the spreadsheet can be worked with as a machine-readable knowledge graph.
- Rather than being a “sheet”; what if the spreadsheet were really a multidimensional pivot table that uses a global standard multidimensional model. Not OLAP, but does support OLAP and not restricted by the limitations of OLAP. Not a three dimensional “cube” but rather an “n-dimensional” hypercube[24]. Also, rather than being read only like OLAP, the model would be read/write.
- Rather than being readable by humans; what if a spreadsheet was readable by machines and from that machine readable representation an understandable human readable representation could be generated.
- Rather than being limited to tabular data; what if that table-oriented limitation went away.
- Rather than being individual presentation-oriented tables; what if the logic-oriented representations fit together like “Lego blocks”.
- Rather than focusing on information presentation which can be arbitrary; what if presentation issues and logical representation issues were separated and dealt with separately. You could still get your arbitrary presentations, but you also got to work directly with the logic and use global standard presentations in order to reduce work.
- Rather than only local content addressability; what if you had global content addressability?

Of course, teams will be able to collaborate in real time using these semantic spreadsheets using cloud-based software applications with information being stored safely on a centralized server as most audit engagement systems work today. It is just that the payload of these sorts of systems, the “audit engagement objects” would be logic oriented rather than presentation oriented artifacts.

Also, rather than each staff accountant reinventing the wheel when it comes to these audit engagement objects, standard canonical[25] “templates” or “archetype” or “patterns” will be used. The canonical version is somewhat of a prototype of the best practices or good practices “authoritative” or “official” or “standard” way to represent an audit disclosure that can then be adjusted to meet the needs of a specific audit engagement in a “controlled” or “guided” or “conscious” way. This is as contrast to a

[23] Wikipedia, *Open Office XML*, https://en.wikipedia.org/wiki/Office_Open_XML
[24] Wikipedia, *Hypercube*, https://en.wikipedia.org/wiki/Hypercube
[25] Wikipedia, *Canonical*, https://en.wikipedia.org/wiki/Canonical

haphazard, unconscious approach to creating audit schedules that is not standardized and as a result leads to more work than would have otherwise been necessary.

What problem does this notion of a logical spreadsheet solve? Here are a couple of specific examples.

When I began work with Price Waterhouse, obviously, I started at the bottom, a staff accountant doing audit work on multiple audit jobs. My superpower is that I am really good at systems thinking[26]. One thing that I noticed on these audit engagements is that the exact same task was done, unnecessarily, in different ways on different audit engagements. Another thing that I learned over time is that known best practices were not always used to perform certain specific rudimentary tasks.

What I mean is this. Take a basic audit task which used a basic audit schedule that can be easily standardized. Say a proof of cash. What I noticed was that there were certain audit engagements that had excellent proof of cash schedules and others that were not as good.

When I was promoted to senior accountant and then I began running audit jobs and supervising audit staff this non-standard approach across different audit jobs became problematic and made my job harder. So, what I did was to understand the best practices and standardize those best practices for certain specific tasks and processes as best as I could for basic audit sections across these different jobs.

I would take the time to create standard audit schedule templates for specific audit sections and used the same best practices-based template across all audit jobs that I supervised. This was a lot more work to begin with, but it made my supervision of staff accountants significantly easier in the long run.

These same ideas can be used for a financial report creation project (closing book) or full audit project. How much can be standardized? Is it closer to 20% or is it closer to 80% or maybe even 100%? Well, here is the deal. If there is any improvement it makes the audit project better. But I figure that 10% of tasks and processes can be cherry picked and easily automated, the next 10% to 20% will take a little work, and then significant effort will be necessary to reach the 80% level but that is probably very doable.

Another thing I standardized was the use of electronic spreadsheets to connect adjusted working trial balances, lead schedules, and some detailed accounting schedules. Naively, I tried to get the managers and partners to want to standardize all of our audit engagements to use electronic spreadsheets to construct this rather basic "shell" that was used in every audit engagement in our Price Waterhouse office. I was informed that PW had an office somewhere that did that sort of thing and it was not our place to come up with these sorts of innovations.

So, I standardized all of my audit engagements that I was personally responsible for on this standardized electronic spreadsheet use to create adjusted trial balances, lead schedules, and a handful of other more detailed working papers.

A couple of years later I left Price Waterhouse for completely unrelated reasons, I wanted to pursue Ironman Triathlons. I went to work at a local CPA firm that was all ex-Ernst & Young employees. I took the time to standardize all of our audit and review engagement working papers and converted all the paper-based accounting and audit schedules to electronic spreadsheets.

[26] *Systems Thinking*, https://digitalfinancialreporting.blogspot.com/2023/09/systems-thinking.html

During that time, I also pursued, very slowly because of the triathlon thing, my Masters of Business Administration (MBA) with a concentration in what was then called *World Class Manufacturing Techniques*. Today that is referred to as *Lean Six Sigma*[27].

Today, there seems to be an opportunity to combined the quality control techniques and principles of Lean Six Sigma, structured information offered by global standards such as XBRL and RDF, deductive reasoning powered by DATALOG, the ideas of the traditional electronic spreadsheet, knowledge graphs, the ideas of the semantic web, and the needs of accountants and auditors into a new type of logic oriented "spreadsheet" type of tool.

To get an idea of what a tool for working with semantic accounting and audit working papers, have a look at these screen shots of working prototypes[28] and watch this video playlist[29].

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A kludge (or kluge) is an engineering/computer science term that defines what is best described as a workaround or quick-and-dirty solution that is typically clumsy, inelegant, inefficient, difficult to extend and hard to maintain; but it gets the job done. By contrast, elegance is beauty that shows unusual effectiveness and simplicity. Accounting and audit working papers have become a kludge. That needs to be fixed. Creeping normality makes the systems we have today seem right, but they are actually a hairball[30].

Using a machine-understandable logical digital twin represented using a global standard technical syntax such as XBRL or RDF; it is possible to describe well understood and agreed upon quantitative and qualitative associations between financial facts or sets/assemblies of financial facts within a report, such as a financial report, more granular information in accounting working papers or audit schedules, or even non-financial information. Such associations can have any degree of complexity or granularity.

This information can then be reasoned on using a logic engine such as DATALOG which is an implementation of nearly a complete set of first order logic (i.e. some risky capabilities were removed in order to guarantee that catastrophic logical failures caused by logical paradoxes do not occur and therefore the processing is certain and reliable).

After all, much of the financial information begins in a structured form as financial transactions within a relational database that underlays every accounting system. Accounting systems simply provide reports or queries that aggregate those transactions to different levels of granularity. Rather than putting information into this meaningful structured format, printing a report or running a query, then putting that information into a presentation-oriented spreadsheet to then perform work on that information makes little sense. Rather than trying to parse the presentation-oriented information to then make use of that information it makes much more sense to retain the meaning of the information provided by the structure and work with it in that manner.

Computers are far better at taking pieces of information and putting those pieces together than they are at disaggregating larger chunks of information and then trying to figure out the meaning of that unstructured information. We already key individual pieces of information into forms to capture that information within a relational database.

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[27] *Lean Six Sigma*, http://www.xbrlsite.com/mastering/Part01_Chapter02.K_LeanSixSigma.pdf

[28] Accounting and audit working paper prototypes, https://photos.app.goo.gl/Rr9Q6coP2NhpR2Pg7

[29] World's First Expert System for Creating Financial Reports, https://www.youtube.com/playlist?list=PL80qjzvfqwtNuTekdlRy0rhaHEDIXkOh3

[30] Creeping Normality, Integration Hairball, and Why Most Organizations are Not Ready for AI, https://digitalfinancialreporting.blogspot.com/2024/03/creeping-normality-integration-hairball.html

This new approach to creating accounting working papers and audit schedules enables the quality control focus to be flipped from correcting copy/paste or rekeying errors made by humans, to one of fixing systems and processes to making it possible to avoid errors. Because errors do not need fixing, resulting process quality is improved, and brings reduced costs. By investing a relatively small amount in building better processing systems, the cost of fixing mistakes is reduced and the cost of failure from the impact of mistakes is reduced. This is known as the "1-10-100 Rule" of *Lean Six Sigma*[31]. Defect rates move from about 6.7% (sigma level 3) to about 0.00034% (sigma level 6).

This is achievable because computers do the tasks which they do best (tedious, repeatable, monotonous tasks) and humans do what the computer cannot do. Humans and computers working as a team, augmenting each other's skills.

Accountants change their current role that is effectively that of a "data janitor" in a world with very poor semantic hygiene to one of adding value by being able to spend more of their time performing financial analysis.

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There are plenty of opportunities for process standardization and task automation if you simply look. Rather than cleaning up mistakes, it is better to fix processes to avoid mistakes. Conventional spreadsheets have their limits and the volume, pace, and complexity of information is pushing on those limits. Accountants and auditors have become overdependent on spreadsheets. Accounting and auditing are wrought with tedious chore of repeatedly producing the same spreadsheets over and over again.

It is a well understood fact that the tedious, mundane manual task of data cleaning is where most accountants spend most of their time. All that copying, pasting, and renaming doesn't just take a tremendous amount of time, it is also an invitation to make mistakes. Unintentionally altering information or a brief mental laps can lead to spreadsheet disasters. Instead of a tedious, time consuming, mind-numbing tasks using conventional spreadsheets; what if there was a better tool? After all, this is the twenty first century; By creating accounting working papers or audit schedules using smart software applications you can reduce errors and risk.

The following is additional helpful information that can help a reader that wants to get their head around these ideas. The documents are arranged in no particular order.

- *Modernizing the Global Audit Machine for the Future*[32]
- *Semantic Accounting and Auditing Working Papers*[33]
- *Saving the World from Spreadsheet Disaster*[34]
- *Meet the Excel warriors saving the world from spreadsheet disaster*[35]: Relooks at some fundamental and foundational idea about accounting and reporting from the perspective of "digital".

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[31] *Don't Let Costs Spiral: Why the 1-10-100 Rule is Your Quality Control Ally*, https://www.linkedin.com/pulse/dont-let-costs-spiral-why-1-10-100-rule-your-quality-control-harale-qix2f/

[32] *Modernizing the Global Audit Machine for the Future*, https://digitalfinancialreporting.blogspot.com/2024/02/modernizing-global-audit-machine-for.html

[33] *Semantic Accounting and Auditing Working Papers*, https://digitalfinancialreporting.blogspot.com/2023/05/semantic-accounting-and-auditing.html

[34] *Saving the World from Spreadsheet Disaster*, http://xbrl.squarespace.com/journal/2020/10/15/saving-the-world-from-spreadsheet-disaster.html

[35] Meet the Excel warriors saving the world from spreadsheet disaster, https://www.wired.co.uk/article/spreadsheet-excel-errors

- *Using Difference Between CAD/CAM and BIM to Understand How to Create Financial Reporting Expert Systems*[36]
- *Fool Proof Accounting = Good, Useful Reporting*[37]

[36] *Using Difference Between CAD/CAM and BIM to Understand How to Create Financial Reporting Expert Systems*, https://digitalfinancialreporting.blogspot.com/2023/03/using-difference-between-cadcam-and-bim.html

[37] *Fool Proof Accounting = Good, Useful Reporting*, https://digitalfinancialreporting.blogspot.com/2024/02/fool-proof-accounting-good-useful.html