1. Introduction

“The difficulty lies not so much in developing new ideas as in escaping from old ones.” (John Maynard Keynes)

Technology enables change. Today, technology is impacting society at a pace never experienced before which results in rapid change. The institution of accountancy must adapt to remain relevant.

Artificial intelligence, structured information such as XBRL, digital distributed ledgers, machine-readable workflow model standards, machine-readable business decision model standards, and Lean Six Sigma philosophies are a match made in heaven and will have a significant impact on accounting, reporting, auditing, and analysis experienced in a digital environment that will prevail during the Fourth Industrial Revolution.

The Fourth Industrial Revolution is not something that will soon be here, we are here now. Accountants are notoriously resistant to change. Not embracing change has risks and consequences. Both overstating and understanding the impact of change can have detrimental effects. Understanding the moving pieces of this puzzle can help professional accountants strike the appropriate balance between optimism and pessimism.

This resource helps you understand the moving pieces and strike the right balance.

There are three specific technology trends that can be leveraged to significantly improve accounting, reporting, auditing and analysis. Those technologies will transition into the mainstream, modernizing accounting and auditing over the coming years. Those three technologies are:

- XBRL-based structured digital financial reports
- Knowledge-based systems and other application of artificial intelligence
- Blockchain-based digital distributed ledgers

In this resource we cover XBRL-based structured digital financial reports and artificial intelligence and other applications of knowledge-based systems which will enable new approaches to creating financial reports. We leave blockchain-based distributed ledgers for others to explore.

The future of financial reporting is digital financial reporting.

The general-purpose financial statement (or financial report) has existed for over two millennium. Formats for general purpose financial statements have included clay, paper, word processor documents such as Microsoft Word, PDF, and HTML. The common thread that all these reports have is that a machine cannot read these reports because the reports are unstructured.

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An alternative to paper or e-paper financial reports is needed. The institution of accountancy needs to create a digital, or structured, version of the general purpose financial statement which is readable by both humans but is also machine-readable.

The general purpose financial report is getting a face lift, being updated for the 21st century. It is hard to say exactly when this process began. In the early 1900’s financial disclosures became more standardized with the creation of what became US GAAP. In the 1970’s efforts began to create a set of international financial reporting standards, IFRS. In the last part of the 20th century the XBRL technical specification was created, establishing a global standard technical syntax usable for business and financial reporting. In the early 21st century the US Securities and Exchange Commission funded the creation of the US GAAP XBRL Taxonomy and mandated that public companies report to the SEC using the XBRL technical syntax.

But public companies who report to the SEC amount to only about 10,000 entities that are regulated by the SEC. There are still approximately:

- 18,500 private companies with 500 employees or more employees in the US
- 27.5 million private companies in the US
- 800,000 employee benefit plans that create financial reports in the US
- 90,000 state and local governmental entities in the US
- 360,000 not-for-profit entities in the US

Similar numbers of state and local governmental entities, not-for-profits, and private companies likewise exist in other parts of the world.

All these companies could benefit from the digital financial report. What exactly are the benefits of a digital financial report as contrast to current paper-based or e-paper electronic financial reports?

Think about something. Today, how much does the tool that you are using to create your financial reports understand those reports that you are creating? Generally, those software applications know nothing about what a financial report is. Two primary tools are used to create most financial reports: Microsoft Excel and Word. What do those applications understand about financial reports or the process of financial reporting? They understand nothing. But what if software did understand the financial reports with which they are interacting?

You can understand what I mean about a software application understanding the information that it is working with if you think about another type of document that has already made the transition from human-readable only unstructured documents to human-readable and machine-readable structured digital information.

Think of the blueprint.

1.1. Understanding digital by looking at the blueprint

Digital financial reporting can be understood by contrasting that process to the process of creating blueprints using Computer-aided Design/Computer-aided Manufacturing (CAD/CAM) software. Just as CAD/CAM software is knowledgeable of blueprints; properly created digital financial reporting software is knowledgeable of

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financial reports. CAD/CAM software understands what a door is, what a window is, what a wall is, and that a window goes into a wall.

Similarly, digital financial reporting software understands what a balance sheet is, what an income statement is, what a disclosure is, that assets goes into the balance sheet and that assets equals liabilities and equity, per the accounting equation\(^7\).

CAD/CAM software is used to increase the productivity of the designer, improve the quality of design, improve communications through documentation, and to create a database for manufacturing. CAD/CAM output is often in the form of machine-readable information which can be printed; provide instructions for machining directly to a numerically controlled machine, or used in other ways for other manufacturing operations.

Similarly, a digital financial report will travel through the entire supply chain which is connected via the Internet and information never needs to be rekeyed and different business systems will have the same understanding of the reported financial facts and the associations between the reported facts.

This resource will give you all the information that you need to understand XBRL-based digital financial reports. Basically, a digital financial report creation tool is an expert system for creating financial reports. It uses artificial intelligence technology such as machine-readable rules, a rules engine, and intelligent software agents to help the professional accountant using the software to create the financial report.

1.2. Impact on professional accountants

To remain relevant, CPAs and other professional accountants need to adjust their thinking about how to appropriately modify financial reporting to keep up with the digital revolution. These and other business professionals need to figure out the best ways to employ this new digital medium, where, and they must understand the ramifications of any change.

Even with good tools, a tool in the hands of someone with inadequate knowledge can produce substandard results. Poor tools can make this situation even worse. But give a knowledgeable, skilled craftsman the right tools and they can produce high-quality and even beautiful and elegant results.

This resource is for professionals who choose to be masters at their craft. It will help CPAs, external financial reporting managers, internal and external auditors, other accountants, financial analysts, regulators, and other business professionals understand the moving pieces of the new digital financial reporting paradigm and create high-quality digital financial reports.

1.3. About this document

It takes hard work to create a framework, master a model, or create a theory. A creator of a theory or model is attempting to discover the seemingly invisible principles that hide behind appearances. Theories don't simplify. Theories describe the principles by which the world operates. A theory or model is characterized by its intent: the discovery of essence.

\(^7\) Accounting equation, [https://en.wikipedia.org/wiki/Accounting_equation](https://en.wikipedia.org/wiki/Accounting_equation)
Frameworks, theories, principles, and models make things easier to understand. Frameworks, theories, principles, and models articulate rules that anyone can then follow.

Rene van Egmond and I have been collaborating, trying to figure out how to properly employ XBRL for financial reporting since the very first XBRL International meeting in 1999. Rene has a strong technical background; I have a strong financial reporting background. We both know people all around the world who know bits and pieces about XBRL. We have both looked at this information attentively. We have both looked at it closely. We have both looked at it over, and over, and over. I was funded by UBmatrix to do nothing else but understand XBRL for over 12 years and took full advantage of that opportunity. I worked with world class professional accountants on creating both the IFRS and US GAAP XBRL taxonomies. I was very lucky to have that opportunity.

The U.S. Securities and Exchange Commission (SEC) mandated XBRL-based digital financial reporting beginning in about 2009. I participated in the team to create the initial US GAAP XBRL Taxonomy. Since that time thousands and thousands of XBRL-based digital financial reports have been publically available. Poking and prodding those XBRL-based digital financial reports helps one understand digital financial reporting. I have published most of my analysis on my blog.

Rene and I have taken what we have learned and condensed, organized and synthesized it into this resource. As Henry David Thoreau says: “Simplify, Simplify”.

This resource helps accounting professionals and other business professionals cut through all the noise and misunderstandings which surrounds this new technology, XBRL. This resource allows business to focus on what is truly important and not be distracted by the underlying technology which there is no need for business professionals to ever deal with.

This resource also helps information technology professionals and software developers to understand what business professionals truly need from software applications in support of XBRL-based digital financial reporting.

While this resource uses XBRL to explain digital financial reporting, XBRL is really only one of many technical tools which will be employed for digital financial reporting. While XBRL is a widely employed technical tool, it is not the only tool and there is more to digital financial reporting than the XBRL technical tools. XBRL is simply one of many enabling technologies.

Information in this document was accumulated over a period of about fifteen years. It represents, arguably, the best resource available today to understanding XBRL-based digital financial reporting. The information and knowledge has been accumulated, synthesized, organized, and explained as best as possible given the current point in time of the evolution of XBRL, digital financial reporting, artificial intelligence, software available to business professionals, etc.

1.4. Assumptions about reader

We make the following assumptions about the reader of this resource:

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• We assume that you are not the average professional accountant or business professional but rather motivated and somewhat of an early adopter or someone who will be helping the average accounting professional understand digital financial reports. As software improves, the complexity of digital financial reports will be absorbed by software. However, at this stage of the evolution of digital financial reports we have not reached the ease of use required for the average accountant to make use of digital financial reports.

• We assume that you understand the basics of the XBRL technical syntax. If this is not the case we would encourage the reader to become familiar with the XBRL technical syntax to get the most from this document. A good resource for the general understanding of the XBRL technical syntax which the reader needs is chapter 4 An XBRL Primer in the book XBRL for Dummies10. We also provide an XBRL primer that is helpful in understanding XBRL. For a more complete understand we would suggest The XBRL Book: Simple, Technical Precise11.

• We assume that you understand financial reporting and will not explain fundamental financial reporting concepts and terminology.

• We assume that you will dig into the details of examples provided using good software. This will help you grasp important details. This is not a resource for understanding how to use any specific software application for the purpose of digital financial reporting.

• We assume that you are a hard worker. While we have accumulated a great deal of information, this resource is not perfect. Understanding digital financial reporting will take work. This resource will improve over time but we recognize that it is not where it really needs to be for the average professional accountant. Please bear with us.

• We are not saying that we have all of the answers. We do have a lot of very good questions, we have many interesting and enlightening observations, and we have figured many things out. We are working toward a world-class global standard solution for XBRL-based digital financial reporting.

Figuring out how to leverage technologies such as artificial intelligence, structured machine-readable information such as XBRL, other machine-readable standards, and digital distributed ledgers will be a journey, a process.

1.5. Organization of this document

We have organized this resource into parts and sections. Each part and section serves a specific purpose and fulfills a specific need for any business professional or information technology professional endeavoring to understand XBRL-based digital financial reporting.

As part of this introduction we provide an overview of the changes into which digital financial reporting fits. Accounting, Reporting, Auditing, and Analysis in a Digital Environment provides a conceptual overview and explains the over-arching paradigm into which XBRL-based digital financial reporting will fit and the three primary enabling technologies that are driving paradigm change, we state the

10 XBRL for Dummies, http://xbrl.squarespace.com/xbrl-for-dummies/
obvious when we point out that professional accountants need to adapt, and we provide an overview of what you need to do in order to adapt. Computer Empathy provides you with important background knowledge that you need to understand the true puzzle and the new paradigm. Essentially, this section provides you with a new map. We provide an optional Basic Level XBRL Technical Primer or a more advanced Intermediate Level XBRL Technical Primer introduction to the more technical aspects of XBRL.

In order to understand XBRL-based digital financial reporting appropriately, we need to fill a few gaps in your current training most likely.

We do that in PART 1: Foundation for Understanding, Framework, Theory, Principles which provides business professionals with important background and foundational information that they did not get in their accounting information systems or other computer science classes that they may have taken in college.

This sets the foundation to be able to effectively build upon in the next sections. We start off with a Conceptual Overview of Structured, XBRL-based Digital Financial Reporting. Next, we take the information in this resource and condense it down to 15 principles, Digital Financial Reporting General Principles. Those 15 general principles frame the big picture.

The next sections Business Rules, Problem Solving Logic, Expert Systems, Intelligent Software Agents, Digital Distributed Ledgers, Lean Six Sigma, and Digitizing Financial Reports fills in additional missing background information. We finish up with a little more background knowledge you need for this journey.

Digitizing Financial Reports provides an overview of how we get from paper-based financial reports to digital financial reports. It also provides necessary background for understanding the differences between paper-based or electronic financial reports and digital financial reports. Understanding these differences is important because how you interact with digital financial reports will be different. The bottom line is that the workflow of professional accountants will change.

Overview of Professional Accountant’s Interests, Perspective, Position, and Risks helps bring into focus things accountants should be thinking about as they endeavor to understand digital financial reporting. This section helps you understand the interests, perspective, position, and risks of professional accountants.

We finish off the first part with Understanding Other Moving Parts of Digital which summarizes other odds and ends you should be aware of.

In PART 2: Conceptual Model, we outline the conceptual model of XBRL-based digital financial reports. In the first section, Introduction to the Conceptual Model of an XBRL-based Digital Financial Report, we provide a high-level overview of the conceptual model. We provide specific section then on Hypercubes, Fact Sets, Understanding Mechanics of an SEC-type XBRL-based Digital Financial Report drills into the specifics of public company financial reports which are submitted to the SEC. Then, Reference of Financial Report Conceptual Model Elements, we provide details of the conceptual model. Reference for Financial Report Conceptual Model Domain Semantics focuses on accounting and reporting aspects of the model. Digging into Slots, Blocks and the Mechanics of a Business Report focuses on the deals of slots and blocks. Understanding Fundamental Accounting Concepts and Report Styles focuses on key

In PART 3: Working with Digital Financial Reports, we help you get your hands dirty and introduce you to digital financial reports. We start off this section with Viewing XBRL-based Digital Financial Reports which provides a good hands-on introduction to digital financial reports. After viewing, Validating the Model Structure and Fundamental Accounting Concept Relations shows you some basics of validating a digital financial report so that you know it is created correctly. One highly desirable result of expressing financial reports digitally is so the information can be more easily used by analysts. The section Query and Analysis of Digital Financial Reports covers important aspects of using digital financial reports. Creation of Digital Financial Reports will put you in the driver’s seat and helps you create your own intelligent digital financial reports. We finish of the hands on part with Summary of Common Sense Digital Financial Report Creation Principles summarizes information that will help you become a digital financial report master craftsman.

In PART 4: Examples and Samples, we give you lots of examples and samples to play with, explore, and learn from. We start with a Hello World basic example, then cover Concept Arrangement Pattern Examples, Member Arrangement Pattern Examples, Business Use Case Examples, Comprehensive Example, Financial Disclosure Template Examples, and Reference Implementation of an XBRL-based SEC Financial Filing sections provide a rich set of detailed examples you can use to further your understand this material. (Note that an IFRS reference implementation will eventually be provided).

In PART 5: Important Technical and Other Details, we provide information that is probably not useful to most professional accountants, but it is very useful to software developers building software for business professionals. Special or Specific Modeling Considerations dives into a little more specific examples related to digital financial reports. Reconciliation of Models reconciles various models to each other which is helpful to software developers. Financial Report Semantic Object Properties summarizes information needed to implement the conceptual model in software applications. Report Element Properties provides additional implementation details. Analysis of 6,751 XBRL-based Public Company 10-Ks Submitted to SEC helps you see how the conceptual model was reverse-engineered from the empirical evidence of XBRL-based public company financial reports submitted to the SEC. Top XBRL Technical Syntax Related Modeling Tips provides information that did not really fit anywhere else, but is important. Notion of Profiles, General Application Profile, and NOLAP explains those ideas.

1.6. Additional resources

Throughout this document sample files, examples, and other information is referenced. Each section will refer you to this additional information which is useful. All of this information is also summarized in one location which you can find here:

We will also provide additional information, updated information, and otherwise provide additional resources you might need at this blog.

The following is other resources which you will likely find helpful:

- **XBRL for Dummies** ([http://xbrl.squarespace.com/xbrl-for-dummies](http://xbrl.squarespace.com/xbrl-for-dummies)) by Charles Hoffman and Liv Watson helps understand what XBRL is, what it is not, and provides good chapter, An XBRL Primer, which helps you understand the XBRL technical syntax should you want to delve into that. It also helps you understand how others are making use of XBRL and helps business readers understand the notion of a supply chain.

- **Arelle** ([http://arelle.org](http://arelle.org)) is a high quality, free, open source XBRL processor. For those who are more technical, this is a great resource. Business professionals, don’t bother. Trying to make use of this will drive you nuts.

1.7. **Where next**

Digital financial reporting is just getting started. Many new opportunities will be created for professional accountants who learn to harness these new tools. Older tools will become less relevant.

1.8. **Acknowledgements**

While I did physically create the information in this resource, I could have not done so without the gracious help of a number of people, directly and indirectly, over the years. I see myself as merely a custodian of this important information, nurturing it along for the benefit of all, condensing countless discussions into something hopefully useful for the common good.

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There are others which I probably left off and for this I apologize. I acknowledge and appreciate the thinking others contributed to this endeavor.

1.9. **Feedback**

Please send any feedback to Charles.Hoffman@me.com. We will use feedback to improve this resource.