

Will Blockchain Make Auditors Obsolete?

By Eric E. Cohen

“Auditors,” some say, “will be out of work very soon, thanks to The Blockchain – the trustworthy, global, immutable audit trail of commerce which lets anyone automatically check the results of any



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organization without the need of intermediaries. Who needs the auditors?,” they continue, “as The Blockchain is inherently self-auditing.”¹

Is there any truth to these warnings? Do accountants and auditors have anything to fear or are there essential changes (other than ongoing education) they need to be making now?

A trustworthy, accessible, timely and consumable audit trail is the *beginning* of the audit, not the *end* of it. This is not to demean blockchain, cryptocurrencies or their objective supporters, nor to stifle open, honest and objective discussion on how the audit profession might adapt and enhance their capabilities with blockchain, artificial intelligence (AI) or any other emerging technology. Many of the challenges and opportunities of automated audit processes need to be evaluated to facilitate real-time assurance on real-time reporting, where trade-offs and compromises may be necessary to meet a new need.

Where Did It All Start?

As the cryptocurrency Bitcoin began its climb into the mainstream – from the earliest days when it took 10,000 Bitcoins to purchase a couple of pizzas,² through Bitcoin-to-dollar conversions of hundreds, thousands and tens of thousands of dollars (at this time of writing,³ approximately \$5,000 CAD = \$3,800 USD = 1 Bitcoin) – it led to the claim that the technology underlying blockchain and cryptocurrencies (cryptographically-supported, append-only chains of blocks creating a decentralized, seamless, trustworthy, complete and public audit trail that anyone can query automatically for balances at any time) would make auditors obsolete.

“There are claims that – despite the audit profession’s claims to the contrary – the market has decided that financial statements and the related financial audit are obsolete.”

It should be noted that there are many related claims, including the opinion that coins and currency as we know them (often referred to as *fiat currency*, such as the Canadian or US dollar) are inherently evil, will be obsolete within five years and everyone will be using some form of cryptocurrency instead.⁴ For what it’s worth, I’m not ready to give up my loonies and toonies yet. Also there are claims that – despite

the audit profession's claims to the contrary⁵ – the market has decided that financial statements and the related financial audit are obsolete, with the proof that investors have been throwing billions of dollars at new blockchain-related companies based solely on a fancy web site, a convincing team of contributors and a complex white paper, leading the US Securities and Exchange Commission to set up a web site⁶ to counter that trend.

Does The Blockchain Make Auditors Obsolete?

Does “The Blockchain” (as the technology or the Bitcoin blockchain are sometimes referred to) make auditors (and accountants) obsolete? What aspects of blockchain and distributed ledger technologies (B/DLT) can contribute to higher quality audits or alternatives to today's periodic audit, and what other technologies/methodologies must be in place? Under what conditions does B/DLT have the potential to facilitate, rather than exacerbate, the audit process?

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The profession has gone on record to say that blockchain may bring many changes to the profession. CPA Canada and the AICPA (American Institute of CPAs), for example, note:⁷

“Blockchain technology has the potential to impact all recordkeeping processes, including the way transactions are initiated, processed, authorized, recorded and reported.

“Both the role and skill sets of CPA auditors may change as new blockchain-based techniques and procedures emerge.

“While traditional audit and assurance services will remain important, a CPA auditor's approach may change.

“[B]lockchain technology may also have a significant impact on the way auditors execute their engagements.”

But the profession has not (yet) accepted that blockchain will be the end of the audit profession as we know it. To understand the claim, we need to begin the discussion with some background. A wide variety of philosophical and political goals, technical advances and circumstance have led us to where we are today.

Impact of an Events Approach to Reporting – 1960s

During the 1960s, Professor George H. Sorter proposed the idea that business reporting could be improved by reporting disaggregated business events rather than having management summarize business position and activities by value.⁸ At the time, the means of facilitating a

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process where users, rather than the accountants, can receive sufficiently detailed information for them to aggregate, assign their own weights and values and then use them in their own forecasts and utility functions seemed far off. With today's Internet, however, data standardization, mobile platforms and emerging B/DLT are removing most of the technical barriers to Sorter's events-based reporting. B/DLT may be a key to the appropriate exposure of the detailed events.

The availability of detailed events data on a blockchain (whether the right kind of evidence is available or not) is part of the claim that blockchain may be the conduit to easily summarizable events data.

Need For Privacy-enabled Electronic Payment Method – 1980s – 1990s

The need for electronic communications and payments that preserve the privacy of the parties



involved can be traced back to the 1980s, if not before, more than 20 years before Satoshi Nakamoto's Bitcoin whitepaper.⁹ Back in 1985, for example, David Chaum wrote about "a personal 'card computer' to handle all your payments and other transactions. It can protect your security and privacy in new ways, while benefitting organizations and society at large."¹⁰

Activists, such as the Cypherpunks, also wrote and promoted anonymous payment systems, "defending our privacy with cryptography, with anonymous mail forwarding systems, with digital signatures, and with electronic money."¹¹

Foundation For Blockchain – 1991 - 1995

"What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party."

Not for supporting private payments, but to prove the integrity and timing of digital documents, Stuart Haber and Scott Stornetta developed an electronic time-stamping methodology, which was put into practical use in what is arguably the first practical blockchain, from Surety.com. Since January 1995, every Sunday the *New York Times* classifieds have published a series of cryptographic hashes representing new blocks of data being added to their existing chain of blocks.

The research and work of Messrs Haber and Stornetta is recognized in the Bitcoin whitepaper itself, where three of the eight references provided by the author are references to their work.

The Surety.com chain of blocks has technically much in common with the Bitcoin blockchain from a cryptographic point of view. That early chain did not, however, include cryptocurrency

or other digital assets, it was not decentralized, and there was no need for mining or consensus mechanisms or incentives for third parties to verify the transactions. Yet the publication of the hashes publicly removed the ability of a centralized service provider to change the underlying records without others knowing about it.

The Concept of “Triple Entry Accounting” – 2000s

In 2005, a financial cryptographer published a paper on Triple Entry Accounting.¹² To be distinguished from Ijiri’s different effort using a similar name,¹³ Grigg’s Triple Entry Accounting focused on cryptographically-supported business activities, integrated payments, pseudonymity, and largely mirrored entries.

This idea lent itself naturally to the Bitcoin, and, later, other blockchains, where each transaction represented the exchange of Bitcoin from one party to another – more accurately, from one Bitcoin address to another, where the party behind the address is not itself part of the ecosystem. It appeared that triple entry accounting promised that all business trade activity will automatically result in reliable accounting, as all major revenue and costs of sales activity will be a natural by-product of B/DLT activity. Enthusiasts call on that promise to support the notion that all reporting will be a natural by-product of the related transactional activity. I believe there are environments where triple entry accounting can be a very powerful tool; I do not believe it is a panacea.

Bitcoin (and Beyond) Blockchains – 2008 and On

As mentioned previously, the 2008 Bitcoin paper¹⁴ brought together work in time-stamped, cryptographically supported chains of blocks and digital currency. The focus was on a new peer-to-peer environment for exchanging payments without the need to rely on a financial institution. There was a strong focus on the “double-spending” problem, minimizing the risks that someone would try to spend the same value in two or more places. As noted in the paper:

“What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party. Transactions that are computationally impractical to reverse would protect sellers from fraud, and routine escrow mechanisms could easily be implemented to protect buyers. In this paper, we propose a solution to the double-spending problem

using a peer-to-peer distributed timestamp server to generate computational proof of the chronological order of transactions.”

“I have found that few of the people who say that blockchain will make auditors obsolete understand the role that external auditors play in the first place.”

Another blockchain, the Ethereum blockchain,¹⁵ added the ability to engage autonomous programs, known as smart contracts, to act on

the users' behalf. Many people felt that this self-running programmable environment would take the blockchain one step closer to removing accountants from the operational process and – as users could now examine the smart contracts as “easily” as they can examine the detailed transactions – not needing auditors.

Looking at a Bitcoin record in a blockchain explorer,¹⁶ it is clear that very little “business” information is captured. There is no documentation on the identities of the exchange partners, the reason for the exchange or if any goods or services were exchanged along with the Bitcoin. Other blockchains and distributed ledgers soon joined Bitcoin in the market, but few were designed to capture all of the information that might be found in an enterprise resource planning (ERP) system for a particular transaction. While verification might take place to ensure that there was sufficient Bitcoin for the exchange, that the signatures were appropriate to authorize the exchange and a few other requirements, the lack of context beyond “party A has authorized the exchange to party B” means that many of the audit's requirements are not captured. And there is no way to verify that transactions are arms-length, to deal with collusion or other challenges.

So, to start on our exploration:

1. There is no “The Blockchain.” There are many blockchains, among them the Bitcoin blockchain and the Ethereum blockchain. The Bitcoin blockchain has spawned many others, such as Bitcoin Cash, Bitcoin SV and Bitcoin Gold. Many of the other 2,000 plus¹⁷ coins run on their own blockchains. There are “blockchains” with no digital assets, which are restricted in use and perhaps not decentralized or public. When someone asks if “blockchain” makes auditors obsolete, it is important to know what that person means by saying “blockchain.”
2. Blockchain – especially the Bitcoin blockchain – is focused on privacy and pseudonymity. There are no mechanisms to ensure a user can find all of the Bitcoin addresses for a person or organization, and therefore identify all activities for that identity. A blockchain environment can be developed that will make it easy to find the identity of the users and to help aggregate all of the holdings, but that isn't common today, and there is no cross-chain ability either.
3. Some of the currencies are tied to some physical, logical or fiat currency asset, often to provide some stability. Tether, which is on the Ethereum blockchain, is “100% backed by Tether's reserves.”¹⁸ With no automated means of proving that, for every electronic Tether, there is an equal and opposite dollar in reserves, the market recognizes the need of an independent confirmer (auditor) to provide comfort that Tether is living up to its promise.
4. Part of the promise of automation deals with smart contracts. While many environments expose the smart contract code publicly, most of the investing public must rely on some third party to understand if the code is appropriate and well designed.

5. Whether it is a cryptocurrency exchange or any other intermediary, the market wants trusted parties to evaluate the controls and operations.
6. I have found that few of the people who say that blockchain will make auditors obsolete understand the role that external auditors play in the first place. One critic said that “The main work of the auditor is to verify and justify the audit trail.”¹⁹ The *Wall Street Journal* recently published an article²⁰ stating that emerging technologies help management to choose to bifurcate the external audit so that external audits analyze only the data that management has had another party provide for them. Even a rudimentary reading of *ISA 500 Audit Evidence*²¹ makes it clear that auditors do a lot more than show that the numbers in reports are agreed to the detail.
7. I have also found that few people who say that blockchain will make accountants, auditors and management obsolete understand accrual accounting, the difference between cash, accrual, encumbrance or other methods even between two trading partners (journal entries are not always mirrored) and the impact on mirrored activities. Nor do they have a clear understanding of the role of estimates, valuation or judgment in accounting and reporting. Blockchain accounting does not cover most internal activities (e.g., depreciation), nor does it cover commitments and contingencies (the need for legal representations doesn’t immediately go away).
8. I have found that few people who say blockchain will make auditors obsolete understand that subsequent activities, such as payments of an invoice, may bring new information about that invoice, or why auditors perform three-way matches to look for issues.

So, for every claim that blockchain means the end of audits, there are multiple cries for an experienced, knowledgeable, accounting and controls savvy party to take an expanded role.

Higher Quality Audits Or Alternatives

What aspects of blockchain and distributed ledger technologies (B/DLT) can contribute to higher quality audits or alternatives to today’s periodic audit, and what other technologies/methodologies must be in place?

Although I have also done my own analysis, ACCA Global presented²² a useful evaluation of how B/DLT fares related to providing evidence for different management assertions. I use the mnemonic “Velociraptor” to remember those assertions:

- **V**aluation
- **E**xistence
- **A**llocation
- **O**ccurrence
- **C**ompleteness
- **C**lassification
- **U**nderstandability

- Accuracy
- Presentation
- CuToff
- Obligations
- Rights

The ACCA evaluation largely agrees with mine, and makes it clear that B/DLT alone does not inherently provide a direct benefit to most of these assertions. I will have solid evidence that something happened (occurrence). But, without help, the rest begins to fall apart. There is a difference between possession and ownership; there is a difference between a record of a physical asset and that physical asset; there is a difference between reporting of an activity and the accounting period relevance of that activity.

“Events accounting – where events are reported and aggregation is left as an exercise to the stakeholder – turns today’s reporting and assurance model upside down.”

Nevertheless, these are not reasons to ignore the potential benefits of a global, public, transparent, standardized, seamless, cryptographically supported audit trail. If I have seemed negative so far about B/DLT, that has not been my intention – I only want to push back on the wrong expectations about it. In fact, I have been calling for such a solution for more than 15 years, and much of my work has been to support collaboration in the

areas of data standardization (in particular, XBRL GL, but also other audit data standards representations), digital signatures and encryption, continuous auditing, and other “legs” to the “stool.” In the 2005 paper “The Need for and Issues Surrounding the Seamless Audit Trail,”²³ I wrote about the necessity for a new seamless audit trail repository, with standardized transactions being hashed and added to a write-only medium. Blockchain has the potential to be that medium. But it is not blockchain alone. It also needs, amongst other things:

1. Data standardization, open data and other interoperability tools

Thousands of different blockchains mean thousands of different ways to represent the same type of data. If the world doesn’t converge onto one “The Blockchain,” finding and using any detailed information will be challenging, even for the most technically adept. Encouraging the use of standards such as XBRL GL²⁴ will facilitate the design of audit-ready blockchains, the design, review and upkeep of smart contracts, and the use of automated advanced audit data analytics tools. Other aspects of interoperability are being studied by groups such as ISO/TC 307.²⁵

As auditors are not limited to a client’s books and records, data from internal sources (logs for process mining, non-financial information) and exogenous data sources are also very important.

It is also important to remember that much of the detail you'd find in an ERP system is not meant to be on a blockchain. Making that additional detail as trustworthy, accessible and reusable as the posting to the blockchain is vital to this process.

2. Standardized and approved rules (including smart contract), collaboration and certification

Smart contracts, as the cynics note, are neither “smart” nor “contracts.” They are programs that can run autonomously on a chain, and programs are written by people who are fallible and cannot predict every possible error condition or edge case. Where smart contracts are executing accounting tasks, there has to be confidence in those smart contracts. One way to gain that confidence is for those smart contracts to be developed publicly and collaboratively and for them to receive some certification.

3. Artificial intelligence (AI)

AI has the potential to monitor transactions, identify patterns, fill in gaps, and provide feedback where human interaction is necessary. AI solutions in bookkeeping²⁶ and audit²⁷ are already becoming mainstream.



4. Tokenization

Although blockchain is heavily associated with cryptocurrency or even cryptocollectibles,²⁸ tokens can be used to represent inventory, physical assets, voting rights, securities and many other tangible and intangible items. The use of tokens as proxies for real-world assets and services, for rights (e.g., rental agreements) and anything else that can be tracked can be

incredibly useful for reconciliation and tracking purposes.

5. Continuous (data, controls) audit and advanced audit data analytical techniques and guidance

The AICPA illustrates the potential power of audit data standards and automated data analytical techniques with an “Audit Data Analytics to Traditional Processes Mapping Document.”²⁹ The tool illustrates how, leveraging a knowledge of assertions, industry practices and standardized data references and the processes of performing analytics and testing – currently highly manual – can be automated.

6. Internet of Things (IoT)

Minimizing the need for human “feet on the ground,” the Internet of Things can be used for monitoring, recording and acting on behalf of the auditor. The Internet of Things, or IoT, is a system of interrelated computing devices, mechanical and digital machines that have unique identifiers and the ability to transfer data over a network without requiring human-to-human or

human-to-computer interaction. IoT devices can be used for automating the collection of information necessary for record-keeping and decision making, with the additional potential benefit of facilitating the capture of increased amounts of information (more detail, more often). At the same time, they can reduce manual errors, as well as reduce the time lapse between an event and its recording, permitting more timely decision making and facilitating assessment of process-driven activities. IoT can be both a facilitator of human involvement (drones, virtual/augmented reality, virtual presence, wearable tech) and a facilitator of automated processes to maximize human involvement (RF ID, advanced analytics, use of exogenous data, AI, Tokenization, autonomous vehicles).

7. A complete change of mindset

The seemingly simple act of “confirming” that the value of a single Bitcoin address should contribute to a company’s balance sheet is completely non-trivial.

Events accounting – where events are reported and aggregation is left as an exercise to the stakeholder – turns today’s reporting and assurance model upside down. Regulators have previously bristled against providing more information for the market to work through, likening it to drinking through a fire hose, with the concern that additional information makes it easier

to hide problems in plain sight.

Under what conditions does B/DLT have the potential to facilitate, rather than exacerbate, the audit process?

Many auditors are concerned about the impact of blockchain on the audit. It was designed to promote pseudonymity, and financial and tax auditors alike are frustrated by not always understanding who possesses what and who owes what. Company management may say that they have \$10 million dollars’ worth of cryptocurrency and provide the addresses representing cryptocurrency and currency translation values. Proving that the company is actually the owner of the digital assets at that address and that the values should contribute to a company’s balance sheet is not, however, as simple as sending a bank confirmation today. The seemingly simple act of “confirming” that the value of a single Bitcoin address should contribute to a company’s balance sheet is completely non-trivial.

Further, in the electronic environment, the accounting profession has bemoaned the loss of the traditional paper audit trail. A 2012 survey conducted by the AICPA Auditing Standards Board confirmed this by noting that, “the second greatest source of emerging audit or attestation risk identified by respondents was auditing in an electronic environment where all the entity’s transactions are electronic and there is no paper trail.”

Properly designed, B/DLT has the potential to be the tool to overcome that loss and bring audit trails into the 2020s. But, until someone can show me how blockchain could have prevented frauds from A to Z (AIG to ZZZZ Best) and everything in between (including my home town

fraud, Stirling-Homex Corporation) from occurring, I will not believe that blockchain inherently solves anything.

It's Not The End

Blockchain and distributed ledger technologies are an instant success that have actually been around for more than 25 years. Many groups with conflicting goals and philosophies have brought blockchain to where it is today, and the hype and confusion around it is magnified as people became instant millionaires and billionaires thanks to cryptocurrencies. Self-proclaimed spokespeople have promised the moon and some have predicted the end of the audit profession. Few of these acolytes, however, understand the role of the external auditor, how financial statements come together or, indeed, what blockchain does or doesn't do.



While some say that blockchain is a solution looking for a problem, I have – for more than 15 years – spoken about the potential role that a public, transparent, cryptographically-supported, standardized audit trail could play in accounting, reporting and auditing. A reliable and usable audit trail is, however, only the beginning of the audit, and not

the end. In an environment requiring judgment, actuarial estimates, valuations and fair value assessments, recognition of unrealized gains/losses, percentage of completion activities, accruals and prepaids, impacts of regulatory, market or customer/vendor issues, the processes involved will not become completely automated, mirrored or anticipated, and the blockchain only report will come up short.

Endnotes:

¹ A collection of claims from personal experience, Twitter, and other online resources. For example, “If immutable distributed ledgers become a reality, their audit and accounting divisions will eventually become obsolete, with a huge human impact.” <https://www.marketwatch.com/story/blockchain-will-make-todays-accountants-and-many-wall-street-jobs-obsolete-2018-02-28>.

² https://en.bitcoin.it/wiki/Laszlo_Hanyecz.

³ <https://coinmarketcap.com/>, accessed February 25, 2019.

⁴ See, for example, <https://www.ccn.com/bitcoin-price-moves-towards-9000-with-strong-momentum-bull-market/>.

⁵ <https://www.thecaq.org/promise-our-profession>, accessed February 25, 2019, which notes that “it is one of many reasons surveys consistently show that U.S. investors have high degrees of confidence in U.S. capital markets, public companies, and audited financial information.”

⁶ <https://www.howeycoins.com/index.html>, accessed February 25, 2019.

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- ¹⁵ <https://ethereum.org/>.
- ¹⁶ Such as <https://www.blockchain.com/explorer>.
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- ¹⁹ <https://www.aatcomment.org.uk/how-new-technology-and-legislation-threatens-the-auditing-sector/>.
- ²⁰ <https://www.wsj.com/articles/parsing-of-audit-work-creates-opening-for-technology-firms-11549881000>.
- ²¹ <http://www.ifac.org/system/files/downloads/a022-2010-iaasb-handbook-isa-500.pdf>.
- ²² <https://www.accaglobal.com/in/en/technical-activities/technical-resources-search/2017/april/divided-we-fall-distributed-we-stand.html>.
- ²³ https://www.oasis-open.org/committees/download.php/16709/Tax%20XML%20AuditTrail_60215.
- ²⁴ <https://specifications.xbrl.org/spec-group-index-xbrl-gl.html>.
- ²⁵ <https://www.iso.org/committee/6266604.html>.
- ²⁶ For example, <https://www.botkeeper.com/>.
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