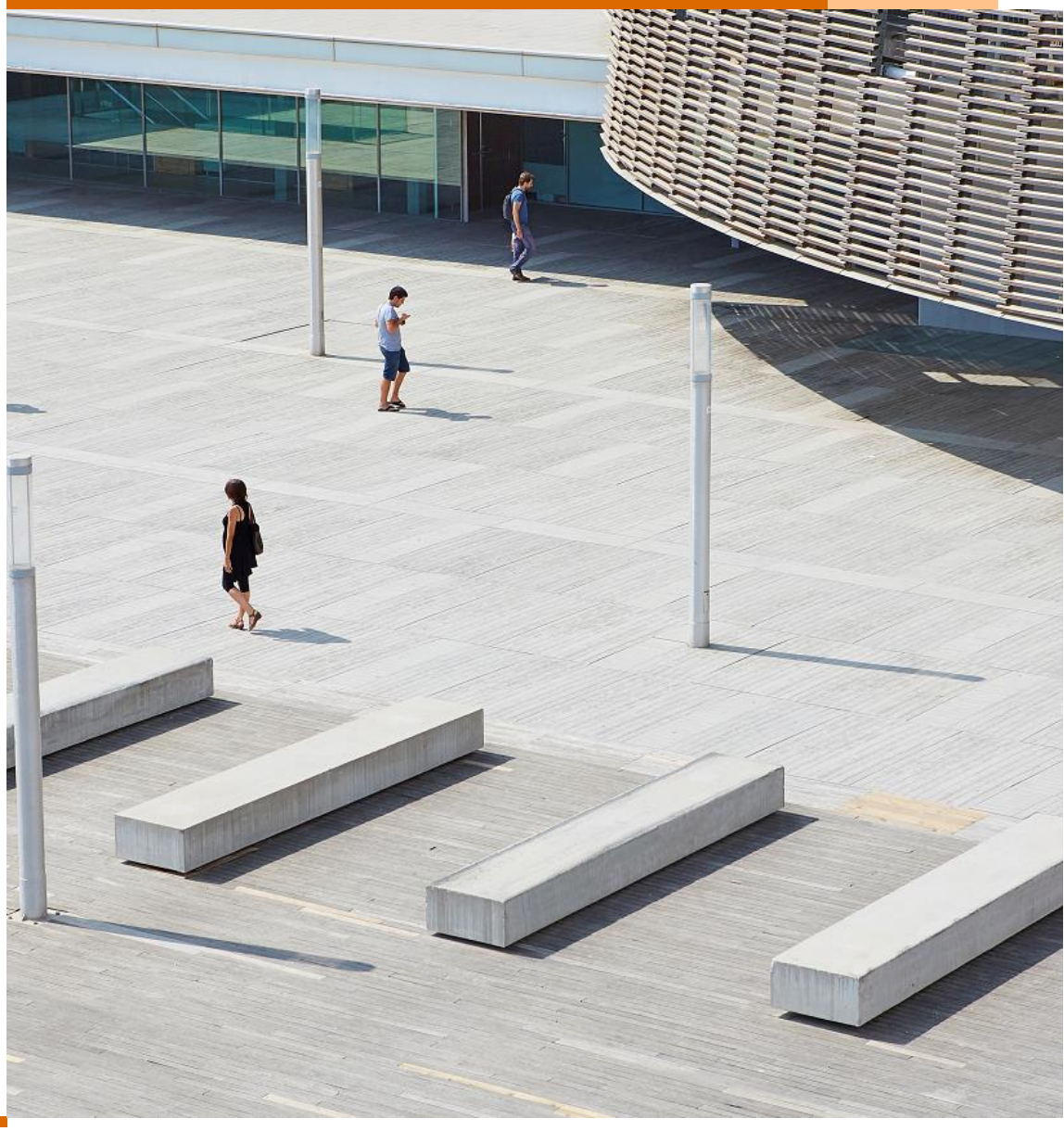
Building blocks: How financial services can create trust in blockchain

Blockchain can help financial institutions, but will Internal Audit accept it? Blockchain assurance may be the solution.



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The heart of the matter

Blockchain is an exciting emerging technology in the financial services industry. It could offer a more effective way to handle a wide range of financial transactions. That seems helpful, but can you rely on it? Can your Internal Audit team trust it? We say yes. It is possible to have sufficient assurance over blockchain, and it's time to turn those proof-of-concepts into a reality by gaining wider acceptance of blockchain at your financial institution.

Choose one:	• A group of banks • A government agency • A team of researchers • A trading network
proposed to put…	
Choose one:	• Transaction data • Ownership records • Payment history • Identity information
on a blockchain to…	
Choose one:	• Speed up settlement • Become more transparent • Improve accuracy • Lower processing costs

It seemed like the perfect application. After a successful proof-of-concept test, participants started thinking about a broader rollout. And then, without warning, they saw the email from their (Internal Audit)(legal)(compliance)(other risk management) team. "No, you can't do that."

This has probably happened dozens of times within the past year across many industries: financial, health, and more. Projects stall, or die, because internal control teams demand, appropriately, "how can we rely on it?" Testing and confirmation is Internal Audit's (IA's) job. It's a basic requirement of any modern business. And regardless of how revolutionary the technology is, there are other factors that shape success.

"Companies are smarter about technology than they used to be, but the challenges of integrating new technology into the enterprise have gotten more difficult," observes Chris Curran, chief technology officer in PwC's New Ventures business. "With blockchain, one of the most significant issues has nothing to do with functional capabilities. Rather, it's about helping business leaders, CIOs and CTOs, product designers, and innovation teams reassure stakeholders outside of IT—audit, legal, compliance, even regulators—in terms they can accept."

This balancing act isn't new. Every significant innovation over the past several decades has faced it. This time, though, it goes beyond a clash of cultures and priorities. There is a solution, and it offers insight into the future of assurance itself.

An in-depth discussion

Why we care: blockchain and the financial industry

There's no doubt the blockchain concept has attracted a lot of attention from financial institutions, governments, companies, and more. Let's start with a review of what blockchains actually are, why they're important, and how they might be used.

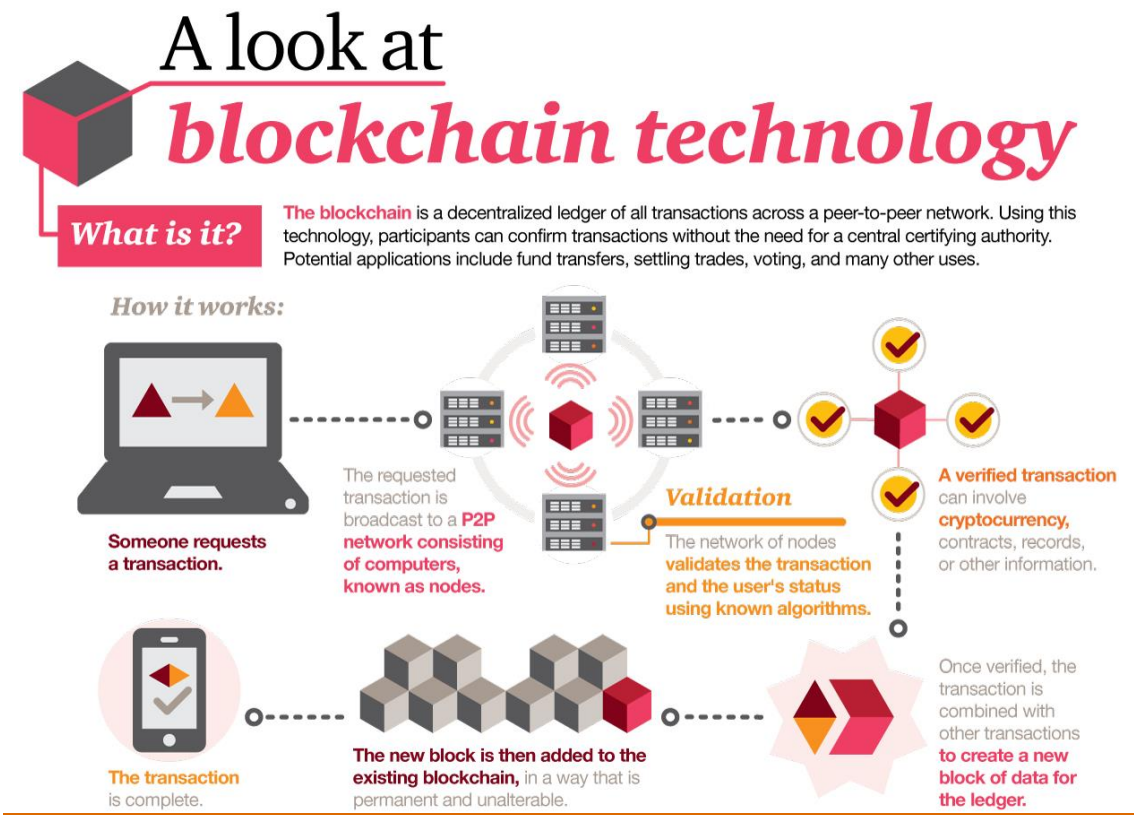
What blockchains are:

A blockchain is a decentralized ledger of transactions across a peer-to-peer network. Let's break this definition down. A transaction **ledger** is just a place where something can be recorded. We say blockchains are **decentralized** ledgers because everyone on the network has their own synchronized copy. They can all see and confirm that a transaction has occurred and has been recorded, all at the same time. This occurs on a **peer-to-peer** computer network. So, instead of connecting to a central authority through a hub-and-spoke model, every participant has a computer linked to other participants. See Figure 1 below.

What makes these ledgers so special?

It goes back to the technology, which is based on applied cryptography. Imagine a party that wants to add an item to the ledger, such as when ownership in an asset is transferred. This proposed transaction is encoded using known algorithms, and all members of the network are notified. Each blockchain has its own "consensus mechanism." Everyone uses the same, defined process to confirm that transactions

Figure 1: A blockchain lets multiple parties confirm transactions and record them on a decentralized, tamper-proof ledger.



are valid. Once they agree, the information is added to the permanent record. The new ledger entry has become one more block of data in a chain of related transactions. Because everyone is working from the same data, the transaction record can't be challenged, and it can't be changed.

Potential uses:

Financial services firms rely on accurate records of who owns a given asset. To make sure all parties agree on ownership rights, they typically look to a trusted intermediary, such as a government, a bank, a clearinghouse, or an exchange. There is an overlay of functions like custody, clearing, and corporate trust. There are also reconciliations, confirmations, identity management, and other steps to create a paper trail of what happened. All of this adds friction, in the form of time, money, etc. Blockchain could offer a more effective way to handle a whole range of financial transactions, with use cases in payments, derivatives, settlement, securities, syndicated lending, and trade finance.[1]

These broad applications explain why there have been so many proof-of-concept projects. At the same time, technologists keep running into a brick wall because none of the potential benefits address IA's concerns. Let's look at blockchain from their perspective.

The role of Internal Audit

Economies rely on capital flows from those who would invest and lend to those who borrow and build. Investors and lenders need a way to detect fraud and promote accountability. This is Internal Audit's role: offering independent assurance to a board or other external stakeholders that management is executing its role in accordance with established policies and risk appetite.

The process works like this: Management creates a set of processes and controls to provide comfort that the records are accurate. IA then tests to see if the systems work and that the data confirms what was recorded. Additionally, the auditors work with management to help improve processes and controls. Finally, the company undergoes an external audit. Once this is done, stakeholders have reasonable assurance that the reporting can be relied upon.

What keeps internal auditors up at night

There are a number of logical reasons why IA may have difficulty adapting to blockchain applications. By understanding and then addressing those concerns, the technology can gain wider acceptance. For example:

- Blockchain is relatively new. The first implementation is less than a decade old, and most applications are far younger than that. In contrast, the systems that management currently relies on have gone through testing for decades and have specific guidance and principles to allow IA teams to gain comfort with them. Audit teams may not yet have the expertise or guidance to be comfortable with a system that puts trust in cryptographic algorithms. Learning takes time.
- These controls are different. Because the technology is new, it requires a new way of thinking about controls. Auditors might welcome the change, but it's their job to ask the difficult questions: Who controls the blockchain? Who gets access? Where are the servers? What physical and digital controls exist? Who monitors activity?[2]

[1] In Making sense of bitcoin, cryptocurrency, and blockchain, we provide additional information on how the technology works and how it might be used.
[2] To illustrate the complexity of their concerns, auditors would want to understand if any of their company's internal control systems have been replaced by infrastructure controls from the blockchain network. If so, they might ask, which controls should be relied upon? How might this change the supervision process?

- Technical expertise is rare. In a recent survey, 86% of the financial services executives asked said that their organizations haven't yet developed necessary blockchain skills.[3] Few IT departments have the relevant experience, and even fewer companies have IA teams with enough expertise to provide any sort of assurance around the technology and the associated work. Most IA teams are always looking for technical expertise, but getting the resources can be tough.

- It got a rough start. While the first blockchain evolved with bitcoin, the two technologies have rapidly diverged. To those who haven't paid close attention, the whole topic may seem dicey, given some early issues with digital currency. But ledgers are just recording tools.[4] Some IA teams may understand that blockchains now have uses as mainstream as electronic voting, tracking intellectual property, and land registry, but that knowledge may not have spread to their controlling boards.

[3] PwC, "2017 Global Digital IQ Survey," Base: 322 FS business and IT execs, www.pwc.com/digitaliqsurvey.
[4] In PwC's 2016 paper Money is no object, we looked at the connection between blockchain and cryptocurrencies like bitcoin.

Our recommendations

Assuring a blockchain

If a technology is to gain wide acceptance in the business community, promoters should acknowledge and address the skeptics. Blockchain is new, but it has matured rapidly. The controls are different, but they can be designed and managed. Technical expertise is rare, but it can be found, especially in those organizations that have made a commitment to the technology. And, despite some bad press at the start, blockchain is now being firmly embraced by many of the most respected institutions in the world. A. Michael Smith, the PwC partner in charge of Internal Technology Audit Solutions for Financial Services, notes that all of these concerns can be addressed today: "What will get blockchain to gain broader acceptance is a clear way to show that IA's concerns have been addressed. I think we're now at that tipping point. There's a real, practical, cost-effective solution for blockchain assurance."

We expect that blockchain assurance will include the following steps:

- Evaluating the business use case and the needs of all stakeholders.
- Assessing the underlying cryptography, including how private keys are managed and how blockchain engine security is maintained. This would include reviewing the consensus mechanism being used to be clear about when a new record should be added.
- Examining *how* the *specific* network has been set up, how that system's reports are being generated, and the controls that guide *that* network's operation. Keep in mind that there is no such thing as a standard blockchain. There are many blockchain systems, and each implementation is unique.
- Performing ongoing reviews to assess the effects of any systemic changes.

Using the approach described here, defusing concerns about distributed ledgers is now within reach.

Case study: Internal Audit of a blockchain-based trading platform

To illustrate the point, let's look at a particular, real-life implementation of blockchain assurance in the capital markets industry.

One company, which we'll call a blockchain service provider (BSP), has been engaged in distributed ledger projects for several years. Two years ago, it launched a blockchain-based trading platform that enables companies to issue shares, transfer those shares to investors, and then support secondary market trading, all without direct intervention from an intermediary. This platform is now live, addressing a real business issue with commercialization potential.

Using a distributed ledger to record capitalization tables is a classic blockchain use case, but the assurance issue carries a twist. The BSP's Internal Audit team is fully on board, but it knows that it must also persuade would-be listers and *their* external auditors, *their* legal and compliance teams, as well as regulators. After all, if there is any doubt about who owns an asset at the moment when it is sold, the transaction may fail. The company operates exchanges for the electronic trading of stocks and options, and it also offers market infrastructure to exchanges, clearinghouses, central securities depositories, and regulators around the world. Given the broader reputational risk, transaction failure is not an option.

To address potential concerns, the BSP's internal auditors worked with an independent neutral third party—a blockchain assurance provider (BAP). The BAP was asked to assess if the exchange had set up its platform in a way that traders can rely upon the integrity and finality of each transaction. In the planning and risk assessment phases, the BAP took steps to confirm its independence and evaluated potential risks.

To do this, the BAP drew on its knowledge of the industry, the technology, client expectations, regulations, and so on. Then it helped design a testing approach and gathered data. The BAP evaluated the technology and examined how it had been connected to adjacent technology platforms. The BAP also looked at the controls environment: how data and access is secured, what protection exists against tampering, and so on. Finally, the BAP joined the network as an observing (non-transacting) member, allowing it to review and confirm the validity of transactions in real time. Reviewing what happens in real time, rather than testing selectively after the fact, is a dramatic departure from current audit techniques.

What this means for your business

The road ahead

The modern financial services industry has evolved to include a range of complex network of participants and processes. Technology shifts are now making it possible to rethink which relationships make sense, and whether they are still necessary.

Traditionally, firms on each side of a transaction depend on an overlay of controls to be sure that everything is done right. There is also selective, after-the-fact testing to be sure that controls have worked as intended. Blockchains could change all this by reducing the friction of the intermediate processes and by testing everything in real time rather than testing some things later.

"We're convinced that distributed ledger technology will bring an array of benefits to companies, intermediaries, regulators, and investors," said Grainne McNamara, a principal in PwC's Capital Markets Advisory practice. "But this will only happen once stakeholders can be assured that blockchains have been set up effectively with appropriate reviews and controls, just as with any other new technology. As such, it is in all of our interest to build blockchain systems with reliable governance protocols that can be evidenced and examined."

The BAP review of the exchange provider's platform, described above, offers a convincing example of how this can be done. We expect that acceptance of blockchain assurance by Internal Audit will play a key part in helping the technology transition from casual experimentation to broad acceptance. As for the "once upon a time" blockchain stories, perhaps they will soon end with "happily ever after."

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