

# UNDERSTANDING THE BLOCKCHAIN UNIVERSE

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Blockchain is already affecting many different industries and professionals. From banking to cryptocurrencies, supply chain management and charities, blockchain is spreading an ever-growing net and converting the sceptics. *QW* speaks to five blockchain experts to find out what this new phenomenon means for the quality sector

**B**LOCKCHAIN has been regarded by some as a transparent and safe way to record and distribute data. But while mention of this technology has been making frequent appearances in newspaper columns over the past year, how many of us actually know what it is?

In a 2015 survey by the World Economic Forum, 58% of the experts and executives believed that 10% of the global gross domestic product will be stored on blockchain technology by 2025.

A year later in 2016, computer technology company IBM predicted that 65% of medium to large institutions will have blockchain projects in production by 2019.

Fast forward to 2018, while questions remain for some, the reality is that many companies today are utilising the technology. Between 6 February and 6 March 2018, there were more than 303 million transactions via public blockchain – triple the amount of transactions that took place in March 2016 (below 116 million), according to website blockchain.info. This increasing number of global blockchain transactions alone show the extent of its rising popularity.

### What is blockchain?

**Peter:** An analogy for blockchain is what we used to call a vertical filing system, where nothing ever gets taken out of it or is rearranged. It means that anything that comes in goes on the top of the stack, and that stack just gets taller and taller, and anyone in your organisation can have access to that stack of records.

But why is it called blockchain? You can understand the chain analogy because you can stack paper in a vertical structure, each document being a record, which is somehow connected to the records that come in earlier and later. That's where the chain part of the description comes from. If you imagine these documents bundled at intervals, that's the 'block' concept.

The computers (aka nodes) that process and validate the blockchain records are entirely independent and operate strictly on a peer basis. There is no management element to supervise or arbitrate, so there is no single point of failure or hacker vulnerability. It is conventionally assumed that in any system there must be a point of central control, where transactions are cross-checked, conflicts arbitrated, and management overrides are implemented. The idea of a management-less



**Peter Grossi, BSC, PhD, CEng, former Director at 2k Business Services Limited and now retired. Peter recently presented a lecture on blockchain to the CQI Wales Branch**



**Rebecca Liao, Vice President of Business Development at Skuchain, a US blockchain company**



**Emmanuel Lazaridis, Digital Strategist, Data Scientist, Big Data Engineer and Director at Data Cycle Limited**



**Gary Pogson, Lead Technical Specialist at Lloyd's Register, and author of Insight Report on Blockchain and Distributed Ledgers**



**Sainu Abideen, CEO of Blockchain Expert, a blockchain solutions provider**

system is something of a conceptual breakthrough and has been shown to be robust on a grand scale.

### Who will blockchain impact?

**Emmanuel:** Blockchain will impact all of us to some degree, but it may be many years before it has any serious impact on advanced market economies.

**Sainu:** As blockchain impacts areas like finance, supply chain and real estate, amongst others, it will impact almost everyone directly or indirectly. It started disrupting the global financial system and is now slowly penetrating other areas.

If bitcoin and other cryptocurrencies replace authorised currencies, they will wipe out millions of jobs, thousands of financial institutions and their supporting services. Financial institutions exist only because we needed a trusted third party between transactions and agreements. Blockchain uses consensus algorithms and cryptography, and smart contracts instead of agreements, so it enables the system to run without the trusted third party.

For instance, IBM and Walmart are working on a project to enable supply-chain traceability using blockchain. A walk-in customer in a retail shop would be able to scan and trace each and every ingredient used in a product.

The same method could be applied in the pharmaceutical industry to eliminate counterfeit medicines. A retail store would not be able to sell medicine which was not produced by the original company, as blockchain technology checks every node of the supply chain.

**Peter:** In principle, blockchain can impact several sectors, but you won't necessarily know it's happening. For example, when you go to see your doctor, he/she will look at the computer screen and look at your records, but you don't see those records. It will be the same with blockchain. They don't need to tell you [they are using blockchain technology].

### Why is blockchain important for supply chains?

**Rebecca:** In the same way that the internet gave birth to e-commerce, blockchain provides the foundation for collaborative commerce, in which enterprises are able to work together to unlock gains, while also expanding their control across the supply chain. The core value of enterprise blockchain is empowered collaboration, as blockchain technology unlocks information in the deep-tier, giving decision makers an unprecedented level of control across the supply chain, while ensuring the privacy of all sensitive information.

### Why should businesses consider it?

**Emmanuel:** Blockchain technologies address gaps in trust. Their use is likely to be limited to

situations where trust isn't well developed, and alternative mechanisms for allocating liabilities when trust is broken are more expensive than a blockchain approach.

If your business suffers from a trust gap in some element of its activities, blockchain may be a technology that you should consider. That may not sound like a ringing endorsement, and it isn't, not the least because the benefits of blockchain come at a price.

Quality assurance in international supply chains, that depend on suppliers in countries with weak regulatory systems or inadequate governance controls, is an example of an application where the costs of blockchain may be worthwhile.

Still, I can think of no case where a trusted ledger can't do everything that blockchain does, but cheaper. That's why blockchain is not a disruptive technology. In pure economic terms, it tends to make business activities more expensive because it prices in the bridging of a trust gap.

**Sainu:** It depends on what kind of business you are involved in. It is better to watch what is happening in the blockchain world related to your industry. This is very important because your competitors might be developing something which will disrupt your business. Even a start-up can have a new business model using blockchain that can make your business irrelevant.

A simple Google search with "applications of blockchain in <your industry name>" might give you some information about this. Or you can hire a blockchain consultant for your company, who will give you updates about the happenings.

**Peter:** Blockchain will not be relevant to companies that only have one central computer system on which all the records are maintained, and which can be conveniently accessed by outlying users. But companies, particularly multinationals, that have major computer systems established in different locations where data is maintained locally but shared nationally or globally, may want to keep a full copy of their company records in different locations, so the information is available and maintained locally, avoiding a single point of failure. In this case, blockchain would be worth considering, because it would provide them with a degree of robustness against failure and protection against corruption from internal or external sources.

### What are the main benefits for the quality sector?

**Emmanuel:** Quality nirvana is obtained by achieving three things: strong governance to define and translate an entity's aims into action, robust systems of assurance to make sure things stay on track, and a culture of improvement. Blockchain

technologies have something to offer in each of these areas, but are particularly relevant where systems of assurance are brittle.

Consider that, not so long ago, we were instructing scientists to never rip pages from their log books and to write in indelible ink. These two simple rules provided immutability and transparency where log books were available for inspection, so they were an inexpensive way to increase the robustness of assurance systems.

Then along came computers with all their volatile memory, and that kind of robustness became less easy to achieve and maintain. Immutability and transparency are therefore two features of blockchain technologies that are particularly relevant for the quality sector. That it is possible to automate processes over blockchain is also useful, but not compelling, because of the cost.

**Gary:** Blockchain enables transparent transactions, and this transparency in the organisation's operations can drive better behaviours [and] can help quality professionals drive quality behaviours in their organisation.

This technology can facilitate processes for industries with complex and distributed supply chains, which need more transparency in their processes. It's going to drive better behaviours throughout their supply chain, as every tier of that supply chain is open up to quality control. This is something that has been difficult to do in the past.

Blockchain can also help organisations comply with GDPR (General Data Protection Regulation), as it is a more transparent way to transfer data. It facilitates data tracking so that the organisation is able to know where that data is going and how it is being used.

### What challenges will it bring to quality professionals and auditors?

**Emmanuel:** The biggest challenges will be around overcoming the many barriers to incorporating blockchain technologies into the work of quality professionals. There are technical challenges: some hard, some harder. For example, the technologies have to become more accessible with better user experience (UX). Assurance systems will need to be redesigned. The governance models of blockchain technologies may need to be altered to mesh with the quality governance of organisations.

There are economic hurdles: the cost of transactions often exceeds the benefits that blockchain offers. And there are regulatory hurdles. Lots of them.

**Sainu:** Blockchain is still at its starting stage, so having the right tools, infrastructure and skilled manpower can be a challenge when you try to incorporate the technology into your business. You have to check the maturity of your tools, the ►

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availability of infrastructure and platforms, and if you have the right resources, before investing in blockchain technology.

**Peter:** Not many because blockchain is an invisible technical process. Quality professionals are not directly involved in how the data is managed within their computer centres. In this sense they would not be directly affected, but they could be equipped with something which is potentially more reliable and more robust.

**Gary:** These technologies will bring many challenges, particularly because they are difficult concepts for people to understand. In order to really work out if something is going to be useful for your organisation, first you need to analyse the challenges you have and ask if blockchain is the right technology to address the problem.

Blockchain can also be complex when there are large amounts of data to process, as it will require proof of work from a large network of people. This is one of the reasons that the number of bitcoin transactions is significantly lower than the amount the Visa [payments technology company] network achieves, for instance.

Organisations look at distributed ledger technologies [the underlying technology supporting blockchain] as the answer to their problems, but the truth is there might be another technology that can help solve the problem more efficiently. Blockchain is still in its infancy so it still needs to prove what it can do for you.

**Will organisations need to update their IT strategy?**

**Peter:** It depends on whether you have distributed copies of your database or one central monolithic database, and this is determined by the size of the organisation and how distributed it is.

Do you have a number of places around the country or around the world who all need to contribute with information and share it with all the others? How important is it for you to avoid the single point of failure, where someone might corrupt the records? If you adopt blockchain technology, your way of recording data will have to change.

**How can blockchain help fight corruption?**

**Sainu:** Blockchain can be used to fight corruption or to increase corruption, like most of the other technologies.

If it's used in the right way, it can fight corruption. Government agencies, for instance, can use it to increase transparency between departments and stakeholders.

Blockchain transactions are transparent, which reduces corruption, as it's very difficult to make hidden changes. The technology removes third parties and reduces human manipulations in the system.

**BLOCKCHAIN  
TIMELINE**

**October 2008:** Bitcoin is registered by Satoshi Nakamoto (*nom-de-plume* for the unknown person or people who designed bitcoin).

**March 2013:** Bitcoin market cap exceeds US\$1bn (£719m).

**December 2013:** Ethereum Project is launched to provide a platform for decentralised applications.

**September 2016:** Over 40 major financial services invested in blockchain or bitcoin start-ups since 2014.

**August 2017:** Cryptocurrency market cap reaches US\$150bn (£107bn).

**2018:** The World Economic Forum estimates that 80% of all banks will initiate projects on distributed ledger technology.

**Peter:** Blockchain is a way of keeping data in a distributed network that is incorruptible. That is the foundation of blockchain. The system is transparent and self-healing. If you want to crash into the system and corrupt the data (for example, putting in a false record) you would somehow have to simultaneously corrupt the records of a large number of computers, which is, for practical purposes, implausible.

Again, imagining blockchain as a vertical filing system. You add a piece of paper to your stack and mark it as safe. But if later on something is found to be wrong by correlation with earlier documents, blockchain can retrace it all, unwind as much as is necessary, and then rebuild it from confirmed information.

In the context of money laundering and tax evasion using cryptocurrencies, all blockchain records are visible indefinitely. So while 'dirty money' may not be immediately traceable to a real person, it can be trapped when they try to cash it in. An example is the WannaCry ransomware attack of 2017, where much of the extorted money was trapped when the criminals tried to cash it in. This traceability is not available for 'real' currencies.

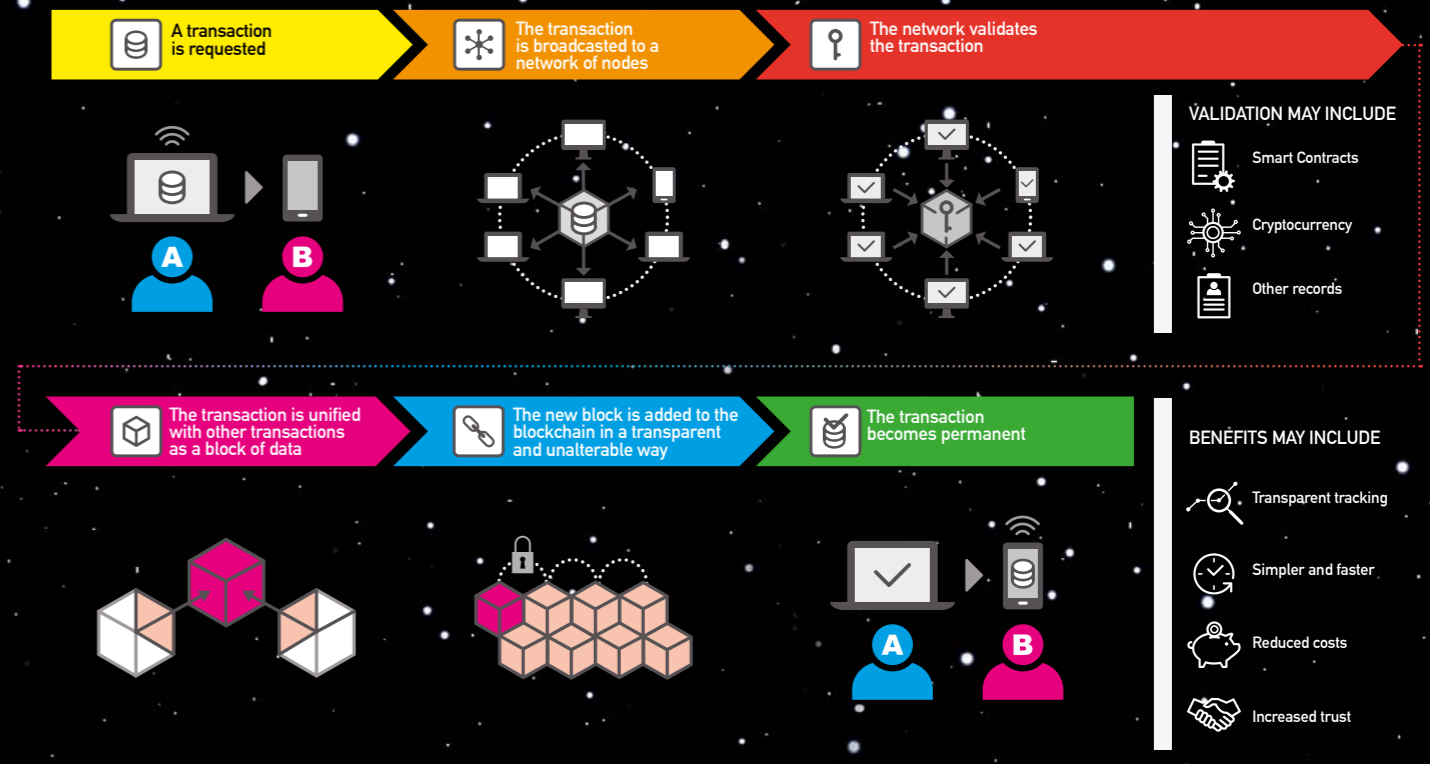
**Rebecca:** In addition to achieving real-time visibility into the origin and quality of goods, blockchain can also ensure transparency and security in payments. Smart contracts enable the continuous flow of transactions and data and, ultimately, fine-grained automation across a supply chain with precise control.

An enterprise will be able to digitise its points of sale, invoices, bills of lading, letters of credit or any documentation involved in a supply-chain transaction, and automate execution of those instruments based on secure triggers and data feeds, such as forecasts and bills of materials (BOMs), currently communicated through point-to-point electronic data interchange (EDI) messaging. Triggers on a smart contract can remain partially manual or come from an IoT (Internet of Things) signal or a set of workflow operations determined by the user. Without obtaining multiple signatures, these triggers cannot be changed. Corruption in the system will therefore be much easier to detect and prevent.

**How will it affect the quality professionals and auditors of the future?**

**Emmanuel:** Quality professionals of the future will need to have blockchain technologies somewhere in

**BLOCKCHAIN: HOW IT WORKS**



Implementing blockchain technology in an organisation can be a complex process. Companies can hire specialised service providers to help them through the process. Alternatively, companies can build their own blockchain using platforms available online. You can practise using blockchain over Ethereum, for example see: <http://bit.ly/2tMAqqm>, or check Hyperledger's vendor directory (<http://bit.ly/2DxpigF>).

their toolkit, and to know when they might be usefully drawn upon. I suspect that within a few years we will have seen some version of every major use case of blockchain in systems of assurance, but it may take longer for the benefits of blockchain technologies to seep into the governance and improvement areas of quality.

Once there are enough examples out there of applications of blockchain technologies to the quality world, [I predict] quality professionals will be turning to AI (artificial intelligence) for advice.

**Gary:** My question is: Will we even have to audit in the future?

At the moment, we rely on third party auditing to provide confidence on the organisation. They look at the company records and certify that the company is complying with the norms. Blockchain technologies can also do that. They can provide that capability themselves, especially if there are enough people on the network to provide that confidence.

Part of ISO 9001 requirements is making sure the services/products from an organisation meet

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the clients' expectations and continuously improve their customer delivery. For this they need customer feedback, and that feedback is provided through the organisation's channels. This means that the organisation provides the auditor with that feedback, and then the auditing body checks if the organisation is complying and if it has a proper system in place for clients to provide their feedback. Blockchain cuts out the middle man, enabling for a quick and reliable data check.

Paradigms will change, as there are certain services that an auditor or certification body currently provide that will be provided by blockchain technology in the future. ■

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