

VININTELL

MARCH 2019 ISSUE 39



UNPACKING BLOCKCHAIN



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Welcome to this edition of VinIntell as a value-added service to members of the S A Wine Industry. The purpose is to provide you, the decision-maker, with meaningful insight into events, trends, opportunities and threats through the analysis of the ever-changing competitive environment. The analytical approach is a multifaceted, multidisciplinary combination of scientific and non-scientific processes.

We trust that this publication will become part of your strategic thinking, strategic planning and decision-making process. You are welcome to send comments and suggestions to the publisher.

INTRODUCTION

Distributed ledger technology (DLT), the technology that started the various cryptocurrencies in circulation today, has created quite a buzz in many areas in the last few years. Putting it simply, a DLT is a decentralized system for recording transactions with mechanisms for processing, validating and authorizing transactions that are then recorded on an immutable ledger.

Blockchain is one implementation of DLT. It is also referred to as an "Internet of value", meaning a secure way to store and transact value – anything from currency, stocks, contracts and even votes – from one entity to another. It is also the underlying technology powering cryptocurrencies such as Bitcoin and Ether.

Do the following words and phrases mean anything to you? HODL, to-the-moon, lambo, hash, FUD, no-coiner or flippingⁱ ... Welcome to the world of blockchain and cryptocurrency. These new words and expressions have joined about 850 other new words recently added to the Merriam-Webster Dictionary. This edition of VinIntell will focus on the blockchain technology that is changing business and industries and the workplace as we know it.

The origin of Blockchain can be traced to 2008.ⁱⁱ It was created by a group of people going by the pseudonym Satoshi Nakamoto who also developed bitcoin. As part of the implementation, Satoshi Nakamoto devised the first blockchain database and in the process, were the

first to solve the double-spending problem for digital currency using a peer-to-peer network.ⁱⁱⁱ Double-spending means spending the same money twice. With physical cash such as coins and notes, this is not possible and therefore not an issue but potentially it is a problem with blockchain. However blockchain prevents double-spending by timestamping groups of transactions and then broadcasting them to all of the nodes in the crypto network. As transactions are time-stamped on the blockchain and mathematically related to the previous ones (blocks), they are irreversible and impossible to tamper with. Blockchain technology underpins Bitcoin and other digital currencies like Litecoin and Ethereum.^{iv} However, its applications reach beyond cryptocurrency. Understanding cryptocurrency has its challenges but we will not go into that in this edition of VinIntell.

EXPLAINING BLOCKCHAIN IN SIMPLE TERMS

Blockchain, cryptocurrency and other new words like the ones mentioned earlier, have not yet become entrenched in business and socially. Until then the concept will remain obscure and even scary for some. We say we understand a smartphone but all we really understand is how to use the top level interface take photographs and check email, use QR codes and the like. The technology layers behind that are being ignored. As long as the device does what we want and

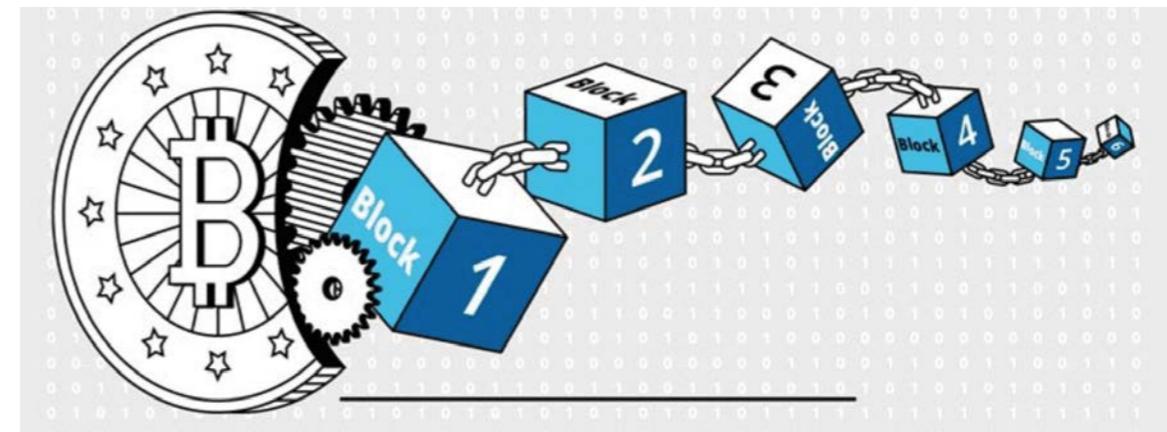


need it to do; the same with blockchain. Perhaps talking in simple language and taking a simple view might shed clarity on what blockchain is. In simple language blockchain is a technology that allows digital information to be distributed in a manner that prevents it being copied, altered or fiddled with.

Try viewing blockchain as separate from cryptocurrency and as a shared record book: A blockchain is really a shared database, otherwise known as a distributed ledger or a record book. The block is actually a line item in that shared record book. Each addition to the record book (distributed ledger) is a new line item (block). So blockchain is the really a modern version of this shared record book. There are thousands of copies of this record book, stored on computers all around the world, both home computers and business servers (hence the term decentralised). As you can imagine, this record book can be used to record many things.

If we now take the example of using blockchain to send and receive money: Carla wants to send money to Grant. A new line item (block) is created with details of that transaction. This line item (block) is sent to hundreds of other computers who have a copy of the record (ledger). Those computers confirm that this transaction is authorised, and ultimately they agree (or disagree) that everything about the transaction is legitimate before giving that line item (block) a tick of approval. It has to match up perfectly on every copy of the record. Transacting the virtual into reality language, it is as if Carla and Grant had a few hundred friends standing around them and watching Carla hand Grant the money in question, and they all agreed that she really did hand him the money. They also confirm other aspects of the transaction, such as it being the right amount. Note that in this shared record book (ledger) there was no bank or middle agent involvement. This shared record book is not owned by any one individual or organisation or bank. It is owned by everyone who has a copy. Importantly, this does not mean any one person who has a copy has control (more on this later).

Key to understanding blockchain is to note that this record book is irreversible (immutable/unalterable). Every line entry (block) made will exist in like that in the future "for as long as the internet exists". If Grant wanted to refund Carla's money, this would be a new line item (block) sending the money back and it will not change, wipe or neutralise the original transaction. Because of those technology design decisions, fiddling with line items in this shared record book is impossible. If someone who has one or more copies of the record book on their computers was to try to dishonestly change it, those changes would be rejected by the many computers used in the verification process. Note the important characteristics of blockchain: Immutable, transparent, secure, integrity of data, record keeping.



SOME IMPORTANT CONCEPTS

In Blockchain, information moves as a solid block in a digital format as it is distributed hence the name. This block is cast in stone as it were.

There are two elements: A block and a chain. As each transaction occurs it is put into a block (line item). Each block is connected or chained to the one before and after it. Transactions are blocked together and each block is added to the next in an irreversible chain. Information held on a blockchain exists as a shared and continually reconciled database.

At a very high level, it is just a chain of blocks inside computers. Say we have a number of blocks each representing a country. Each of them contains the capital city names of the respective country. Each of these blocks has something called a hash i.e. a set of characters (e.g. 1hi515AHA5H). Hash is derived from the information contained in the block. For example, the block of South Africa has cities Durban, Johannesburg, Cape Town, and Bloemfontein. So the hash could look like this: DJCTB. Every successive block will contain the previous block's hash. This is

what binds them together (the force). If someone tampers the first block to add the city Kimberley, the new hash becomes DJCTBK. However, the succeeding block of India has already stored the hash as DJCTB. This mismatch will break the chain. So the purpose of hash is to make sure no one tampers it. So files / line items move as blocks and are unalterable. Security, access and the role of intermediaries are also key concepts: Digital currency owners have the private password which is a highly complex key, to an address on the chain. It is there that their ownership is recorded. No oversight or middle man is required in the process and in terms of cryptocurrency, no bank is needed to verify the transfer of money and take money for that (transaction and bank costs or interest etc).^v

Each block of information or line item can also only have one owner. Unlike a bank that needs to update its own user account balances when there is a request to transfer money from one customer to another (coordination or records, synchronization, messaging and checking to ensure that each transaction happens exactly as it should) with blockchain, a single ledger of transaction entries that both parties have access to can simplify the coordination and validation efforts



because there is always a single version of records, not two disparate databases.^{vi} The information is constantly reconciled into the database, which is stored in multiple locations and updated instantly. That means the records are public and verifiable. It is safe because as there is no central location, it is harder to hack into since the info exists simultaneously in millions of places.^{vii}

REAL-LIFE APPLICATIONS

Although blockchain is primarily associated with cryptocurrencies and the financial industry, the true potential of blockchain technology is much broader. Think global supply chains, financial services,

Food's journey from farm to table relies on precise cooperation across participants (supply chain). Technology underpins this. In the world of blockchain, e.g. for IBM Blockchain's IBM Food Trust™, IBM has joined with Dole, Kroger, Nestlé, Tyson Foods, Unilever, Walmart, Carrefour, and others to make food safer, more efficient, and more sustainable. IBM has also launched TradeLens, a joint collaboration between Maersk and IBM that includes 90 organisations sharing important shipping data and capturing more than a million events around the world each day (digitising shipping). Furthermore IBM and MediaOcean, the foundational software provider of the advertising world bring together global leaders including Unilever, Kimberly-Clark and Kellogg's to address trust, control and arbitrage concerns in the online media supply chain with the aim of restoring billions lost to middlemen, counterfeit and fraud.

healthcare, government, the legal industry and others where people are exploring ways to use blockchain to transform traditional business models into effective, fast and safe business. The uses of blockchain are indeed much wider and ubiquitous than only money. Take the following examples that provide some indication on how blockchain technology could change life as we know it:

The decreasing role of intermediaries in the blockchained world along with the evolution of smart contracts, has led to speculation that there will be no need for costly and time consuming legal intervention in peer-to-peer transactions. It is almost inevitable that converging blockchain and law will, in some cases, mean that the role of lawyers as intermediaries will be reduced. However, there are also examples where lawyers themselves can make use of blockchain. One can only imagine how embracing blockchain can enhance legal services (faster, more efficient, true and secure): Take for example how Blockchain could make room for "smart contracts," where assets would be transferred automatically once certain conditions are met. A system like this could resolve disputes directly and efficiently, saving time and money. This also could mean the end of trust accounts where the law firm holds onto money and distributes funds once conditions have been met.

In healthcare when it comes to health insurance, potential penalties, fees, and fines abound, especially for healthcare providers. The blockchain's distributed ledger technology has prompted some insurers to investigate how it can assist in creating an interoperable record of changes in patient data in real time. This will allow insurers and healthcare providers to avoid fines that are often incurred by archaic recordkeeping and transmission systems. Blockchain can also prevent fraudulent billing, reduce counterfeit medicines, and protect and safely share patient data.^{viii} Also by allowing patient records to be shared securely between

healthcare providers, doctors can bring all that information together to improve their diagnoses and develop more holistic treatment plans for individual patients. With the wealth of patient data collated on the network, blockchain technology can also help to advance more sophisticated medical research, potentially curing diseases or providing insights for more effective treatments.

In retail and fast moving consumer goods (FMCG) blockchain has real value. At present, a lack of true supply chain visibility continues to cost customers' loyalty. Blockchain makes it possible for brands and companies to earn and keep customer loyalty because it allows them to prove that they have delivered on their promises. It takes trust to a higher level because quality, reliability, origin, authenticity and product safety can be better assured. Furthermore supply chain partners can know for certain where products are in seconds and a consistently up-to-date performance history would be the basis for everyone's reputation in the retail network. Blockchain assures the consumer that what they buy online and in shops is authentic and safe while producers and manufacturers can better ensure that they are trading in ethically-sourced goods to meet emerging consumer demands and enhance customer loyalty.

...AND IN THE WINE INDUSTRY?

Of course blockchain has numerous applications in the wine industry from production, marketing to sales and distribution. For example it is being punted as a long-awaited solution for wine buyers where tracking the origin of wine is most important for the high end investor. Most aspects of the winemaking practice are already digitised and the challenge now is how to "translate" data into a meaningful and relevant story to tell buyer through blockchain. The buyer must go as it were to the vineyard and the story with details about growing conditions, harvests and oak barrels is told in blockchain. Blockchain has an added important feature: a built-in fact-checker. With blockchain, buyers can verify that the story of their wine is cemented in truth.^{ix}

Besides the storytelling and verification features in blockchain it is true that fraud and counterfeit are significant problems especially in the premium wine segment where investors are buying expensive bottles and trading in wine futures without so much as a taste test. Altered wine and fake labels are a significant challenge in wine industry and this coupled with people wanting to know that what they are eating and drinking is what it claims to be, and that it comes from a reputable source adds to the producer's concern with loss of revenue and reputational damage. Blockchain



technology can be used for securing the authenticity and origin of fine wine and importantly, to track the origin of individual bottles of wine. We are looking at a future in which certification is layering physical bottle, technology, bottle data, images and origin documents about that bottle, in a blockchain ledger to create a truly useful solution which will empower consumers to make only information-based purchases.^x

BENEFITS

Blockchain's benefits are attractive: Enhanced transparency, enhanced security, improved traceability, increased efficiency and speed of transactions, and reduced costs. These benefits are obvious to the wine industry:

- Improved traceability: This is especially useful for companies dealing with products that are traded through a complex supply chain and then having to trace an item back to its origin. When exchanges of goods are recorded on a blockchain, an audit trail is created that shows where an asset came from and every stop it made on its journey. This historical transaction data can help to verify the authenticity of assets and prevent fraud. In wine this means that records last for the life of the bottle and all authenticity and origin data transfers to the new owner when a bottle is traded.
- Greater efficiency: The traditional way of sharing documents with collaboration is to send a Microsoft Word document to another recipient, and ask them to make revisions to it. You then wait to receive a return copy before you can see or make other changes because you are locked out of editing it until the other person is done with it. Two owners cannot work with the same record at once. With blockchain, since record-keeping is performed using a single digital ledger that is shared among participants, you do not have to

reconcile multiple ledgers. Everyone has access to the same information, and it becomes easier to trust each other without the need for numerous intermediaries. Clearing and settlement can occur faster.

- Greater transparency: Hosted by millions of computers simultaneously, its data is accessible to anyone on the internet. Unlike normal transactions, there is only one ledger doing the rounds; not each participant having his own ledger and increasing the possibility of human error or fraud. To change a single transaction record would require altering all subsequent records and the collusion of the entire network.
- Enhanced security: As the blockchain database is not stored in any single location, the records it keeps are public and verifiable. No centralised version of this information exists for a hacker to corrupt. In any industry where protecting sensitive data is crucial blockchain has an opportunity to really change how critical information is shared by helping to prevent fraud and unauthorised activity. Also identity theft could become a thing of the past with blockchain and biometrics. All personal identity information even a passport, educational records, and driving licence can be securely stored on the blockchain. Because personal data is linked to biometrics unique to a person and impossible to forge, the information is safe from fraud.



- Secure and accessible data storage: The idea of the immutable distributed ledger and its security levels is also attracting various government agencies to consider using it for storing data on such a system. This is due to the fact that it can hold large quantities of data which is then available from anywhere in the world at any time, while the system is mostly hack-proof. Estonia, for example, has already implemented blockchain technology that stores credentials of all citizens including land registry and tax compliance.
- Cost saving: With blockchain there is less or no need for many third parties to make guarantees because it does not matter if you can trust your trading partner. So there is a cost saving aspect. You just have to trust the data on the blockchain and not so much documentation needs to be reviewed to complete a trade because everyone will have permissioned access to a single, immutable or unalterable version.^{xi}
- Audit trail: Blockchain provides the best possible audit trail. Whereas it is possible to change the content of a block or line item the data of the blockchain does not lie in one computer but on the computer of every user in the network. If someone tampers his version, the network will consider what majority say is correct. In a

Blockchain network, not only data but the program is also replicated. Computers collectively execute the program. In case of blockchain, there is no central aspect: It relies on its user's computer to host its program.^{xii}

WHAT WE CAN EXPECT IN 2019 AND IMMEDIATELY BEYOND

Blockchain is expected to enhance its image, application potential and reputation after recently suffering problems for being closely associated with crypto currencies, and especially bitcoin. We might see distance forming between blockchain and crypto leading to wider adoption of blockchain. Indeed, blockchain technologies will move towards solving real-world problems yet it is not the answer to everything. It will exist alongside robotics and artificial intelligence etc in a changed future of work and business. So far although companies are experimenting with blockchain and running pilots it has not had any breakthroughs. Most blockchain projects announced are not yet released, while the ones that have kind of feel as premature and experimental as many of the world's first websites did. Areas in which blockchain will see higher levels of maturity are in supply chain, identity, transparency, and governance. Therefore 2019 should see blockchain adoption on a broader scale as



an increasing number are seeing that such technology will provide benefits for their companies as well. As more companies and industries are moving towards this technology, investments in this technology are expected to rise and mainstream adoption will take place.

Indeed, blockchain-based technologies are expected will underpin a good part of the internet that we use in the next 10 to 15 years. In the future no matter where you turn this technology will be everywhere. We are starting to get some insight into what will be happening

behind the curtain when this next kind of internet creeps into every aspect of our lives, dismantling centralised businesses as they exist today along the way.^{xiii} AI, Big Data, Internet of Things (IoT) and biometrics will increasingly converge with blockchain technology. Using blockchain in products connected to the IoT such as wearable devices and smart apps also means consumers will be using the technology without even realising it. This usability will be a key factor in encouraging the uptake of blockchain technology across industries.

Finally blockchain technology is likely to receive more attention from regulators and government lawmakers in the near future. The introduction of the General Data Protection Regulation (GDPR) in Europe^{xiv} in 2018 already had a widespread effect globally. In 2019, privacy and personal data protection trends will continue to grow in importance paving the way for wider blockchain technology adoption in the next three to five years.^{xv} Ultimately, a time will come when consumers will not be talking about how blockchain is being used; they will just care how good the use case of a product is. Much like we do not think about the underlying technology we are using when sending an email we are going to put something of value in and something of value will come out the other side and we will not care or think about what the underlying technology is. That is the point of success.^{xvi} On the soft issue side, perhaps the time is now ripe to rename the technology to something less hyped e.g. distributed ledger technology?



ENDNOTES

- i *Crypto glossary:* <https://blog.genesis.vision/riding-lambo-to-the-moon-a-crypto-glossary-6dee639dabad>
- ii <https://coinsutra.com/satoshi-nakamoto-facts/>
- iii *Double-spending refers to the incidence of an individual spending a balance of that cryptocurrency more than once, effectively creating a disparity between the spending record and the amount of that cryptocurrency available, as well as the way that it is distributed. The issue of double-spending is a problem that cash does not have; if you pay for a sandwich with a R20 bill, turning that bill over to the maker of the sandwich, you cannot turn around and spend that same R20 elsewhere. A transaction using a digital currency like bitcoin, however, occurs entirely digitally. This means that it is possible to copy the transaction details and rebroadcast it such that the same BTC could be spent multiple times by a single owner.*
- iv *Ethereum is an open-source, public, blockchain-based platform that runs smart contracts to carry out transactions. Smart contracts are self-operating computer codes or programs that automatically execute when specific conditions are met and hence do not require third-party involvement. The fact that such technology cuts out the need for third parties means that third-party risk and costs are cut out of transactions. It also means that no one organisation controls the data. Developers around the world can use Ethereum to build and deploy their own decentralised applications based on the Ethereum blockchain. Let all that sink in for a moment.*
- v <https://blockgeeks.com/guides/what-is-blockchain-technology/>
- vi *William Mougayar, author of The Business Blockchain*
- vii <https://medium.com/the-mission/a-simple-explanation-on-how-blockchain-works-e52f75da6e9a>
- viii www.disruptordaily.com/blockchain-use-cases-healthcare/
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- x www.ey.com/en_gl/global-review/2018/restoring-trust-in-the-wine-industry
- xi www.ibm.com/blogs/blockchain/2018/02/top-five-blockchain-benefits-transforming-your-industry/
- xii <https://blog.monetha.io/blckindustry/>
- xiii *Jamie Skellas is a polymath and technology designer, currently building businesses across blockchain, exports, and future food. He sits on the board of MiVote, and acts as advisor to start-ups and large corporates on emerging technology strategy. This post was republished from his LinkedIn profile with permission. This story first appeared in Business Insider.*
- xiv <https://eugdpr.org/> <https://eugdpr.org/>
- xv www.finextra.com/blogposting/16480/some-blockchain-predictions-for-2019
- xvi www.cnbc.com/2019/01/23/bitcoin-price-going-to-zero-davos-future-of-blockchain-tech-.html



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A SAWIS Publication.

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