BLOCKCHAIN: THE FUTURE OF THE SUPPLY CHAIN

How tech will revolutionise transparency throughout retail

RetailWeek CONNECT

In association with **IBM**
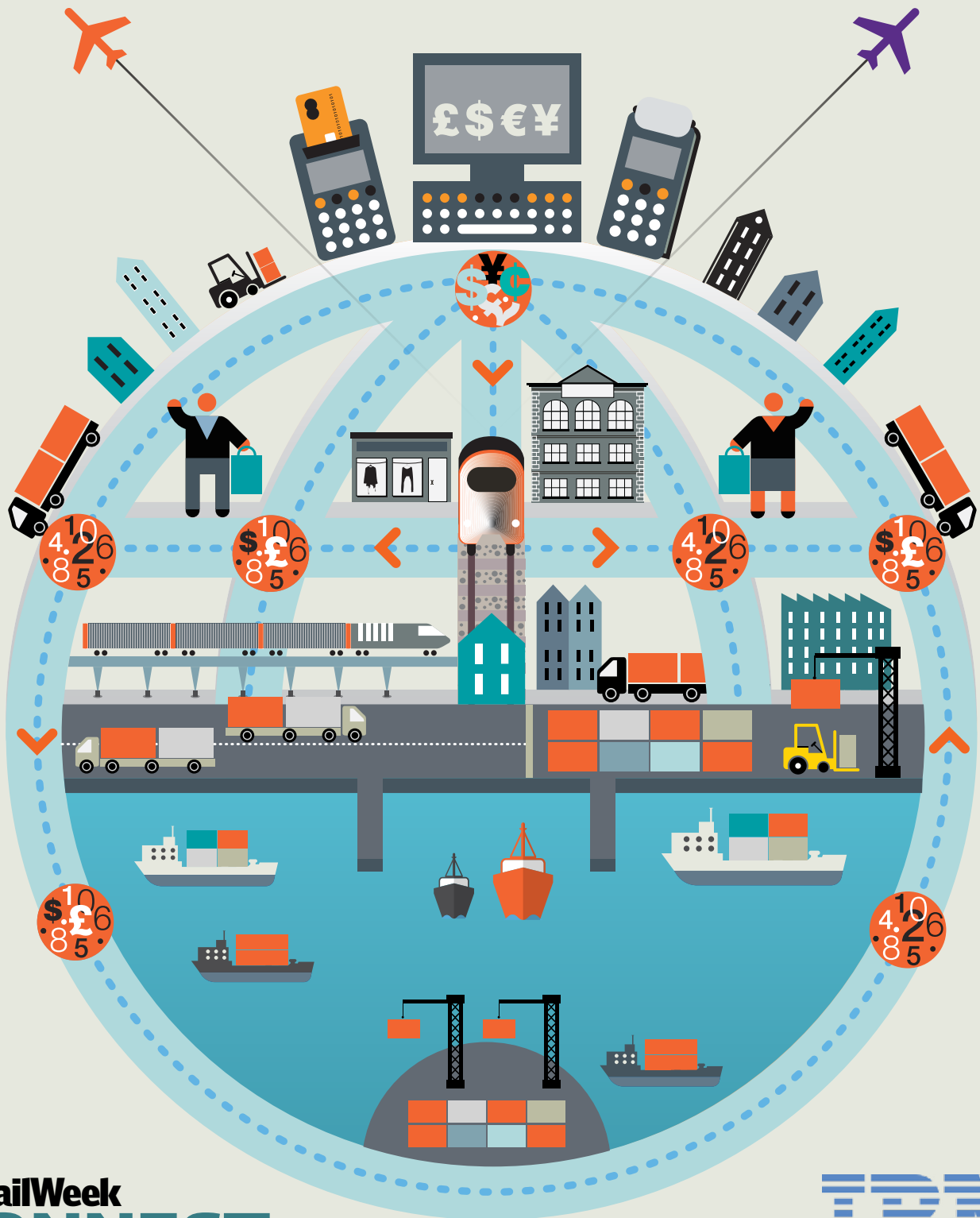
CREATING A SEAMLESS END-TO-END SUPPLY CHAIN

CHAPTER 1: TRANSFORMATIVE TECHNOLOGY

The rapid growth and proliferation of technology over the past few years has transformed how retailers operate – from how customers find and buy products, to the role of bricks-and-mortar stores.

However, one element of retail that has had a comparatively slow pace of change has been the supply chain, which is often still paper-based and can be prone to errors.

The lack of transparency within some supply chains has presented retailers with a host of challenges, from being accused of unacceptable warehouse working practices, high cost and delays in transportation, through to contamination, damage, loss and wastage of products, and scandals about the provenance and authenticity of everything from designer watches to mincemeat. This has led to an erosion of consumer trust in retailers' operations.

This is where blockchain comes in – a technology that has the potential to

SIMPLIFIED SHIPPING

The shipping industry has traditionally been hampered by inconsistent information across organisational boundaries, as well as manual, time-consuming, paper-based processes and blind spots throughout the supply chain. A huge 80% of goods consumed daily are carried by the ocean shipping industry, but the supply chain has been slowed by the complexity of point-to-point communication at each stage. A joint venture between IBM and logistics firm Maersk has created a blockchain accessible by the whole supply chain and is designed to improve the visibility and cost of transportation by exchanging data and handle document workflows, allowing millions of shipments to be tracked end to end and integrated with customs authorities on certain trade lanes.

transform the retail supply chain over the next few years. Blockchain was created in 2008 as the foundation upon which to trade cryptocurrency – digital currency, such as bitcoin – which can be traded peer to peer without the need for a third party, such as a bank, to validate the exchange. But blockchain has far wider implications for retail and beyond. It is a digital ledger that tracks transactions between – and can be shared across – multiple users and organisations.

It is also decentralised, which means more than one party has ownership of it, and is able to see it and add to it. It is said that blockchain will revolutionise transactions in the same way that the internet did for information – it creates transparency in proving how goods are sold and transported, and allows this information to be accessible to all.

And, much like the internet, it is set to transform how retailers operate.

Permanent record

Current transaction records, held within legacy systems, have different participants who each believe their version to be true rather than one 'shared ledger' of transactions, but blockchain is visible to every party that participates. From the farmer who grows the tomato, to the transport company that delivers it to the distribution centre, right through to the shopfloor worker who puts it on the shelf.

The nature of blockchain as a shared ledger also means it is immutable, which means no entry can be changed once it has been entered.

Blockchain enables transactions between many parties to be recorded and confirmed. It affords everyone using it total transparency. For example, a failed inspection on a product at any point in the supply chain will be automatically traced to the origin of the problem.

Bitcoin was the first application of **blockchain technology**

"Blockchain is visible to every party that participates. From the farmer who grows the tomato, to the transport company that delivers it to the distribution centre, right through to the shop worker who puts it on the shelf"

CHAPTER 2: FROM THE IOT TO PAYMENTS

One of the areas where blockchain could have the most dramatic impact on retail is in the grocery supply chain. The World Health Organisation estimates that almost 1 in 10 people worldwide become ill every year from eating contaminated food. Recalling food products that are potentially contaminated is a costly and labour-intensive process.

As IBM Global Consumer blockchain leader Stephen Leng explains: "In today's siloed supply chain, there are any number of ways you can't trust the data you have on where a product has been or who has handled it.

"This means that with a food recall it can take you weeks to figure out where the problem occurred, and you could have destroyed all the product in question before you discover that the problem was not with any of your suppliers.

"Having all the data on the blockchain from source to shelf would eliminate this problem, effectively shining light into the dark places of your supply chain where you've never been able to shine a light before.

"As all the data is shared and confirmed as soon as it's captured, the retailer can identify exactly where the fault lies and respond to it far more quickly."

One way that blockchain ensures this transparency and authenticity is through smart contracts, which are unique pieces of computer code linked to each part of a product's journey from its original source to the customer's hands.

"A smart contract enshrines a business rule, such as whether a food product needs to be stored at a certain temperature, and then translates it into a line of code which is added to the blockchain automatically and then cannot be changed," explains Leng.

Removing risk

Combining Internet of Things (IoT) technology with blockchain technology will remove risk from the supply chain, be it on verifying a product's origin, authenticity or age.

For example, an IoT device could be used to record that a food product was being stored at precisely the right temperature, which could then be validated and entered onto the blockchain.

This would mean that if the product arrived in less-than-stellar condition the supermarket selling it could confirm quickly that the fault did not lie with the warehouse that had stored the product at the correct temperature.

It's therefore no surprise that some of the retailers looking at how blockchain can be incorporated into their supply chains are grocers and luxury retailers, the latter of which are aiming to eradicate counterfeit versions of their products by having unimpeachable records of their own supply's authenticity.

Blockchain also has the potential to provide more secure and transparent payment options.

Retail consultancy Retail Reflections founder and chief executive Andrew Busby says: "The reason you as a shopper pay for an item through your bank rather than going directly to a retailer or supplier

is because there's no real trust or security in just transferring money to a third party via the internet yet. But that also means you are limited by your bank's opening hours and transaction fees.

"So the security and transparency of blockchain could eradicate the need for an intermediary party."

The same is true for retailers currently paying suppliers through a maze of paper trails, accounts payable and receivable departments and purchase orders.

By using blockchain for financial transactions, both parties involved can see from the same ledger that a payment has been sent and received immediately through lines of code that cannot be tampered with.

THE UTILITY SETTLEMENT COIN PROJECT

Swiss bank UBS is leading a project designed to create a digital cash system to process inter-bank transactions via blockchain technology. It is suggested that the first live collateralised token exchange using the USC platform could occur towards the end of this year.

Ten of the world's biggest banks are involved in the project, including: UBS, BNY Mellon, Deutsche Bank, Santander, Barclays, HSBC, State Street, Credit Suisse, MUFG and the Canadian Imperial Bank of Commerce.

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1 in 10 people worldwide fall ill every year from contaminated food


BANKING BRAVERY

It is the banking sector that has really surged ahead in the blockchain adoption race. In September 2016, Barclays conducted the world's first live trade transaction using blockchain technology. Launched in November 2017, Visa's B2B Connect platform leverages blockchain technology to simplify cross-border business-to-business transactions. A first pilot for bank-to-bank transactions, phase two – scheduled for some time in the middle of 2018 – will involve the project moving towards a commercial launch.

BLOCKCHAIN: A TIMELINE
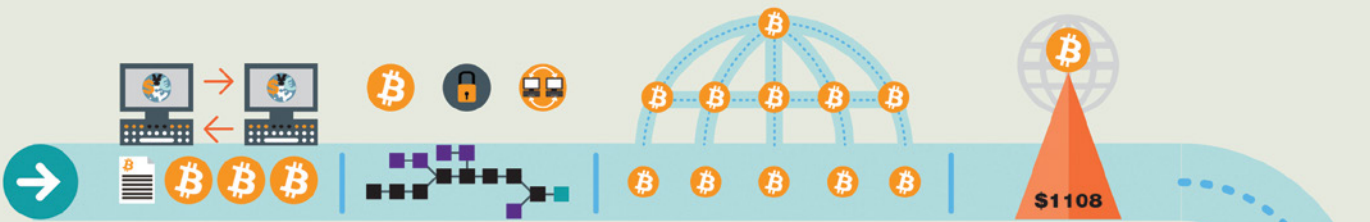
October 31, 2008
The first blockchain is conceptualised in a white paper titled *Bitcoin: A Peer-to-Peer Electronic Cash System.*

January 3, 2009
Blockchain is implemented as a core component of the cryptocurrency bitcoin, where it serves as the decentralised, public ledger for all transactions on the network.

February 2009
Bitcoin mining (a process by which transactions are verified and added to the blockchain) becomes a worldwide hobby. Anyone with internet access and suitable hardware can participate.

November 2013
Bitcoin value spikes at an all-time high of $1,108 per bitcoin and breaks into public consciousness as a digital currency. Blockchain is identified as having the potential to reshape the global financial system.

July 2016
The bitcoin blockchain file size grows to 100GB, the term 'blockchain' is popularised and IBM opens a blockchain innovation research centre in Singapore.

March 2016
The world's largest shipping company, Maersk, teams up with IBM to trial blockchain technology to track cargo across the globe.

February 2016
Linux Foundation announces Hyperledger project to advance blockchain as a technology for business transactions.

June 2015
Blockchain 2.0 launches with technology that can be used to build a set of programmed instructions, known as smart contracts. This enables blockchain to support business transactions.
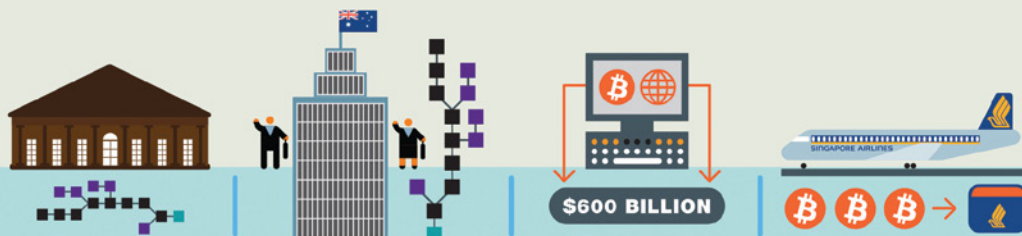
August 2017
Walmart announces the development of a blockchain solution for food safety.

November 2017
Australia's main stock exchange announces its intention to become the first global market to use blockchain to manage trades.

December 2017
Almost a decade on from the conception of blockchain, the total digital currency market capitalisation rises above $600bn for the first time.

January 2018
Singapore Airlines announces a blockchain-based loyalty wallet for members of its frequent flyer programme.

CHAPTER 3: ADOPTING BLOCKCHAIN

The biggest barrier preventing retailers from overhauling their operations has traditionally been the cost of implementing new technology. It is possible that the costs associated with blockchain could hamper its take-up.

However, IBM UK enterprise retail leader Jonathan Glencross says: "Of all industries, banking has taken the lead on blockchain at the moment but retail is second."

Although start-up costs need to be considered, due to the cloud-based nature of blockchain the maintenance costs are relatively low once it is up and running.

"The technology is the easy bit," says Leng. "The main challenge to rolling out blockchain is to establish the network and get the right governance in place.

"Getting consensus with your trading partners, what problem you are trying to solve, and what data is needed to

achieve the outcomes you are looking for. The prize is, the more participants you get on to the network the bigger the benefits for using it become.

"Get as many in your ecosystem on board as possible, because the more businesses using it the more effective it is."

Consumer demand

However, Planet Retail research analyst Jesse Collins says that adoption of blockchain technology would be driven by customer demand, which will likely temper uptake across retail and beyond.

"Using technology life-cycle and shopper expectations as a key indicator of necessity, deploying blockchain technology is not a requirement right now," he says.

"Since it is still in its infancy and no retailers really have blockchain-certified sourcing yet – or at least

consumers aren't aware of it – it is not table-stakes technology because consumers do not expect it and are not basing purchase decisions on it."

Collins adds that, despite the benefits blockchain offers to supply chain visibility, there are barriers that could prohibit adoption.

"There are high costs of implementation due to infrastructure requirements, integration with existing processes and staff training. In addition, it requires new processes for all parties involved in every level of the supply chain, compounding the previously mentioned barriers," he says.

There are sectors, such as grocery, fashion or luxury retail, where the value of blockchain is obvious, but the return on investment for businesses without a global supply chain or high-value products is less immediately clear.

And, while there are likely to be some suppliers that adopt blockchain to stand out from their competitors, the majority are unlikely to invest in it without sufficient demand from their retail partners, which in turn are likely to hold out for consumer appetite.

Retail consultancy Elixirr partner Brian Kalms says that "certain suppliers or brands that have more clout may only operate with sellers that can authenticate products and record exchanges in ledgers".

"It might not need to be a priority for most retailers, but larger companies with the cash to experiment may find it to be a sound investment," he adds.

Investing in future tech

One retailer that has led the way in this regard is Walmart, which has collaborated with IBM in developing a food safety and traceability solution (Food Trust) powered by blockchain.

The initiative is intended to foster greater transparency in the food supply chain and will span across growers, suppliers, processors, distributors, retailers, regulators and consumers.

A number of leading US retailers and suppliers have already joined the network and are exchanging data, and the plan is to add many more before the end of the year.

At the time of the launch, Walmart's vice-president for food safety Frank Yiannas said: "Blockchain technology enables a new era of end-to-end transparency in the global food system – equivalent to shining a light

BLOCKCHAIN AND THE INTERNET OF THINGS

Research published in 2017 by Zebra, a technology tracking company, showed that by 2021 70% of retailers are planning to invest in IoT technology. While many IoT devices are being labelled as revolutionary for all aspects of our lives, they are without the authentication standards needed to keep user data safe. Blockchain's transparency and tracking capabilities are considered to be an answer to the security questions posed by IoT technology.

on food ecosystem participants that will further promote responsible actions and behaviours."

However, Kalms points out that for a company of Walmart's scale, which works with a greater number of suppliers, Blockchain will be more of an investment priority. However, for smaller companies this may well become a key investment area particularly, Kalms emphasises, to mitigate supply chain risks.

The technology may be in its infancy in terms of retailer adoption, but for many businesses it would undoubtedly increase transparency and save money on costly errors in their supply chain.

"Forecasts of the value of blockchain are huge, so we'll see early adopters now and the businesses that will lead on it and benefit first as a result, but we predict that by the mid 2020s there will be mass adoption," says Glencross.

It's undeniable that for any retail chief

technology officer there is no shortage of potential innovative business solutions to invest in. But as they weigh risk versus reward and the potential to improve transparency and consumer trust, it is hard to think of a technology that could be as rapidly transformative to retail as blockchain.

Blockchain will redefine how retailers share information
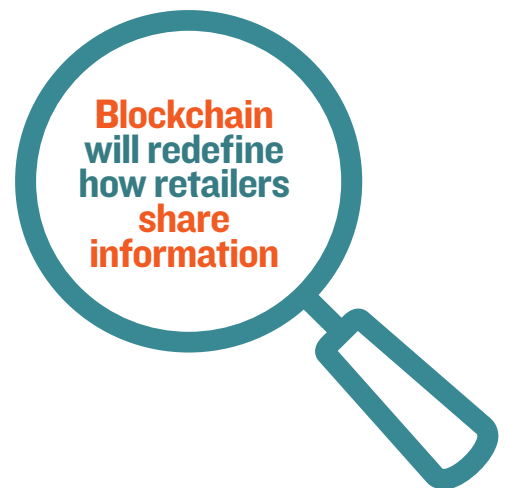
Walmart and IBM are developing a food safety and traceability solution powered by blockchain

Alamy

FIVE KEY TAKEAWAYS FOR RETAILERS

1 Increased transparency
As a cloud-based, decentralised ledger, blockchain enables every person who is involved in a product's journey to the customer's hands to see where it has been and ensure the process to get it there has met industry standards.

2 Find errors faster
Because every transaction on Blockchain is not only secure but immutable and final, meaning it cannot be changed by any participant, and is entered by the owner of the transaction, it will become far easier to identify where a problem or error occurred in a product's journey.

3 Safeguarding authenticity
The ability to demonstrate to shoppers exactly where a product has come from could make it a vital resource for fashion retailers looking to combat speculation around working conditions in warehouses.
And for retailers selling big-ticket or luxury items, the technology can be used to combat counterfeiting.

4 Safety in numbers
The main battle for retailers that want to deploy blockchain lies in convincing partners across their supply chain to get on board with the technology. The more aspects of the retail supply chain that use it, the more effective it will be.

5 Retailers are already using it
Although blockchain is a relative newcomer to the retail technology market, it is already being used by some retailers to ensure product quality in their supply chain.

PARTNER COMMENT

As technology becomes embedded into our everyday lives, the impact on retail has been undeniable. Operating models are becoming more agile in response to changing consumer expectations, and brand loyalty is dwindling as consumers are inundated with choice of varying convenience, price and variety.

With the growth of international trade, we have entered into an ethically conscious age, where product traceability is higher on consumer agendas and the Modern Slavery Act demands tougher standards and accountability on supplier engagement.

Traditionally, the retail nirvana has remained at the front end, with the goal of deciphering the most engaging experience across channels. However, the supply chain is now taking the spotlight and that's where we're really seeing blockchain change the way retailers can operate. Across a number of examples, from safety and standards (food or otherwise) to international trade, to programmatic advertising, risks associated with the consumer in such events as product recalls are minimised by rapid identification and communication.

We are seeing how organisations can not only deliver a more valuable promise to their consumers but also maintain transparency and accountability across the retail value chain. It's an exciting time for the industry as increasing numbers of use cases and benefits come to light, and brands are being held to account.

Whether identifying and preventing the rise of counterfeit goods, demonstrating product authenticity or lowering supply chain prices through reduced information asymmetry, transforming the supply chain from a traditionally paper-based and error-prone connection to a more transparent and digitised system is a game changer.

The supply chain is at the root of retail operations and customer experience, and building blockchain into the equation will change how goods are sold and transported with universally accessible information.

As retailers and partners across the supply chain begin to adopt this new way of thinking and operating, we will start to see a new era of engagement and visibility that will provide consumers and brands alike with the opportunity to transfer value and develop a deeper understanding of their retail experiences.

**Jonathan Glencross,
enterprise retail leader, IBM**

KEY POINTS

- The potential for blockchain is clear and it will change our society and how we do business. I am sure the debate over the speed of adoption will continue, but we will see significant steps in the next two years.
- Blockchain is a global shared infrastructure for business and can help protect us from fraud, cyber security breaches and monopoly disruptors that play online.
- Eventually society will see blockchain as part of our digital lives and it will change everyday tasks and challenges, such as banking, buying property, and even those in the political landscape such as voting. The challenge is that we do not know where the boundaries will be in 15 years' time.
- In 24 months' time the question will be 'why aren't we moving to blockchain?', not 'how should we use it?'.

ABOUT IBM

IBM helps retail companies deliver relevant, differentiated and compelling products, services and experiences to its consumers. We help you better leverage data to discover new insights and provide greater visibility across the supply chain using our cognitive capabilities, powered with Watson to understand, reason and learn over time – automatically and at scale. With our world-class digital agency, you can quickly implement new digital capabilities, and explore new business models and ecosystem partners to innovate and drive profitable growth.

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