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New tech on the block

Planning for blockchain in the
Retail and Consumer Packaged
Goods industries

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1. Foreword

I am pleased to share with you this point of view on blockchain technology in the retail and consumer packaged goods industries and how to prioritise opportunities.

As with any new technology, there are a number of potential pitfalls associated with the deployment of blockchain. It is therefore important for businesses to have a carefully planned strategy in place before pursuing opportunities at scale.

To assist companies we have undertaken detailed analysis of over 50 potential blockchain use-cases in the retail and consumer packaged goods industry and have developed a means of scoring these based on the added-value they will create. This approach, which makes use of Deloitte's specialist insight into how businesses create value, is a useful starting point for any company looking to prioritise the investment of time, money and resources into a blockchain work programme.

Blockchain has the potential to transform the way that individuals and organisations interact, the way that businesses collaborate with one another, the transparency of processes and data, and, ultimately, the productivity and sustainability of our economy. It is in these applications of technology, not in the mining and trading of cryptocurrencies that Deloitte believes blockchain will thrive in the next ten years.

As the technology evolves and new use-cases emerge, the retail and consumer packaged goods industries are well placed to take advantage of the opportunities that blockchain affords.

The ability of blockchain to track, trace and authenticate products, record contracts, guarantee the movement of information and record transactions means it can be used across the entire value chain, benefitting businesses and consumers alike.

While we fully expect blockchain technology to achieve widespread, mainstream adoption in the retail and consumer packaged goods industries, we firmly believe that long-term, sustainable success is only possible through careful planning.

I hope you find this report insightful and thought-provoking, and welcome your feedback.

Steve Larke
Partner
Technology Consulting
Deloitte



2. Executive summary



Both the retail and consumer packaged goods (CPG) markets of the future will be starkly different from those of today. They will need to be more integrated and offer on-demand and personalised services that meet changing consumer demands.

They will need to continue to grow their digital capabilities and embrace new technology to improve the consumer experience. Deloitte believes that blockchain has the potential to play a major role in underpinning the industry transformation that is coming.

Blockchain is a digital, decentralised, distributed ledger that provides a way for information to be recorded, shared and maintained by a community (private and public). The technology relies on well-established cryptographic principles and operates as a repository for information which is recorded and shared through a peer-to-peer community.

Blockchain technology allows everyone to keep an eye on what is going on within a system, without giving any single person control over the information. There are numerous business applications for this technology, particularly in the retail and CPG sectors, and the potential impact is huge.

Our discussions with retail and CPG executives reveal that many businesses are keen to understand and introduce blockchain but are unsure where to start. Our analysis aims to help shape their understanding so that businesses can develop the most appropriate approach.

We have evaluated blockchain opportunities across the retail and CPG value chains, analysing characteristics that could be used to resolve a number of business issues. We have grouped our results into the following:

1. Trial projects

These opportunities have a lower immediate value relative to others as they are narrower in scope. However, they are attractive as they are less complex to implement. Blockchain opportunities in this segment relate to delivery, consumer protection, consumer payments, consumer participation, digital advertising and fraudulent transactions.

2. Explore

These are more attractive opportunities relative to trial projects in terms of value but similar in complexity (and cost), and offer greater value relative to investment in the short term. Blockchain opportunities in this segment relate to business to business payments, connected services, connected store (back office), know your supplier, and smart loyalty.

3. Wait and see

These opportunities currently offer a lower value relative to other blockchain opportunities and are more complex (and costly) to implement. Although they will provide value for businesses and have potential to generate further benefits, they may not be worth investing in heavily yet. Blockchain opportunities in this segment relate to the sharing economy, targeted recall, and locating stolen products.

4. Plan

These offer some of the most attractive opportunities in terms of potential value. However, they are heavily influenced by external factors and are considered the highest risk option based on the complexity of implementation and the resources required for success. Blockchain opportunities in this segment relate to connected supply-chain, and authenticity and provenance.

We expect a tipping point within the next five years, as businesses begin to appreciate blockchain's ability to track and trace products, record contracts and transactions and guarantee the movement of information. The result will be widespread adoption of blockchain following a period of trials and pilots.

Interest will grow over the next two to three years as more businesses develop detailed enterprise strategies and implement blockchain prototypes. The more advanced businesses will focus on how to scale-up the opportunities they have identified.

The rationale for and value of investing in blockchain will depend on a company's overarching strategic objectives as well as its capacity, capabilities and culture. However, those who do not consider the possibilities are at risk of falling behind. By contrast, early adopters of the technology will have the ability to gain first mover advantage in generating value for their business.

Organisations will need to assess which blockchain capabilities and opportunities are most suitable for them, as well as where, how to and how much to invest. For some, this will include a strategic assessment to explore opportunities. For others, it will be about enhancing existing blockchain capabilities, alongside other technologies, to achieve further value.

We envisage significant benefits arising from blockchain opportunities and are developing our own blockchain solutions to help address the challenges.



3. Retail & CPG disruption and the role of blockchain

This chapter outlines key characteristics of blockchain and its relevance to the retail and CPG markets, both now and in future.

What is blockchain?

Blockchain is a digital, decentralised, distributed ledger that provides a way for information to be recorded, shared and maintained by a community.

The key characteristics of blockchain as defined by Deloitte are listed in Figure 1.

Figure 1. Features of blockchain

Blockchain is:

- **near real-time** – enabling almost instant settlement of recorded transactions, removing friction and reducing risk
- **reliable and available** – as multiple participants share a blockchain, it has no single point of failure and is resilient in the face of outages or attacks
- **transparent** – transactions are visible to all participants, with identical copies maintained on multiple computer systems, increasing the ability to audit and trust the information held
- **irreversible** – it is possible to make transactions irrevocable, which can increase the accuracy of records and simplify back-office processes
- **immutable** – it is nearly impossible to make changes to a blockchain without detection, increasing confidence in the information it carries and reducing the opportunities for fraud
- **digital** – almost any document or asset can be expressed in code and referenced by a ledger entry, meaning that blockchain technology has very broad applications.

Broadly there are three levels of blockchain utilisation;¹

Storage of digital records: Blockchain can be used to store digital identities of individuals, organisations, assets, titles, voting rights, and essentially everything that can be represented digitally.

Exchange of digital assets: Blockchain can execute peer-to-peer transactions without trusted third-party intermediaries, reducing clearing and settlement times and costs.

Recording and executing smart contracts:

Blockchain can use digital codes to enable the automated execution of specified actions based on contractual conditions as validated by all parties. Smart contracts provide clarity and maintain trust between all parties. This approach reduces the chance of clerical errors and outright fraud.

Understanding of and interest in blockchain is variable

There is significant interest in blockchain at the C-suite level, with global investment exceeding US\$1.7 billion in the last three years. Market research firm Gartner estimates that blockchain's business value-add will grow to US\$176 billion by 2025 and exceed \$3.1 trillion by 2030.²

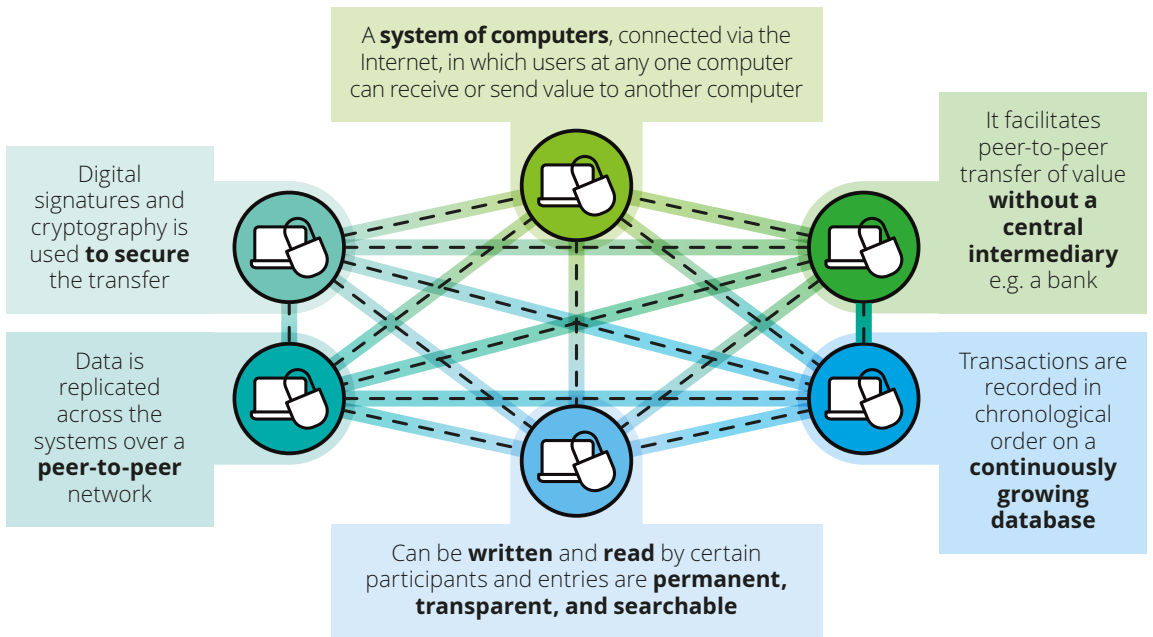
Blockchain has gained attention as the technology that underpins cryptocurrencies such as Bitcoin and Ethereum, among others. The interest in the potential of cryptocurrencies to disrupt existing currency norms, along with the security, record-keeping and trading capabilities of blockchain technology, means that the financial services industry has been an early adopter. As a result, financial services account for a significant amount of the current investment and activity in blockchain.

However, a survey by Deloitte revealed that other industries are becoming even more aggressive in pursuing blockchain strategies. The report highlights that concepts, prototypes and investments are emerging in every major industry.³

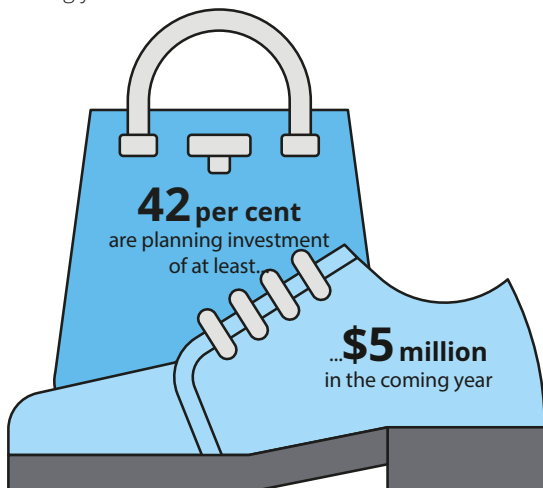
Source: Deloitte University Press, 2015

Figure 2 provides an overview of how blockchain works by utilising a peer-to-peer network to transfer and secure data. Further details on the underlying mechanics of blockchain can be found in previous reports by Deloitte.⁴

Figure 2. Overview of blockchain



In addition, a survey of executives in the consumer products and manufacturing industries expressed the most bullish blockchain outlook, with 42 per cent planning investment of at least \$5 million in the coming year.



Some organisations have already identified the potential use and benefits of blockchain technology to solve complex problems and generate new opportunities. Due to the complexity of implementation and limited in-house expertise, there are also a number of partnerships being formed to develop new use-cases across the industry.

However, despite the excitement about the technology, uptake of blockchain remains extremely varied. One of the main barriers to adoption remains a lack of in-depth knowledge at the C-Suite level. Discussions with businesses suggest the majority of executives are currently aware of the concept and benefits of blockchain on a broad level but lack specific and detailed understanding of potential applications. Nor do they know which applications are most relevant and valuable to their business.

The rationale for blockchain across the retail and CPG industries is strong

In an increasingly digitised world, emerging technologies such as blockchain afford retail and CPG businesses the opportunity to drive business value. One area key to blockchain adoption and use in the retail and CPG sectors is the application of this technology to issues throughout their supply networks.

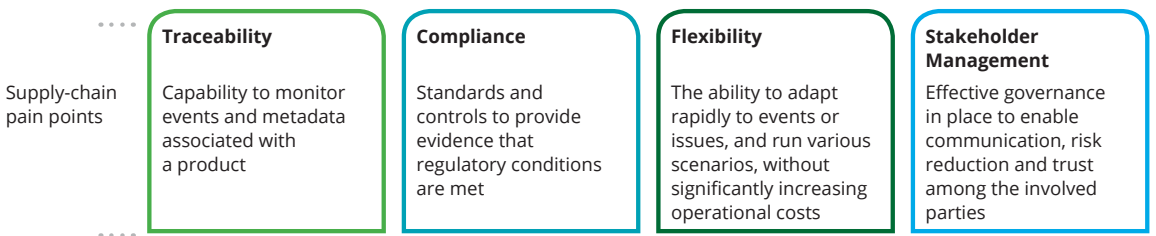
Retail and CPG supply-chains encompass the end-to-end flow of information, products and services, and money. The way these components are managed has a fundamental influence over an organisation's competitive positioning in areas such as product cost,

working capital requirements, speed-to-market, and service perception.

Despite digital supply network enhancements over recent years, paper-based processes are still common within the retail and CPG sectors, resulting in reduced transparency and collaboration across networks. Decision-making among supply-chain actors is further complicated by disparate legacy systems which provide limited visibility of other functions.

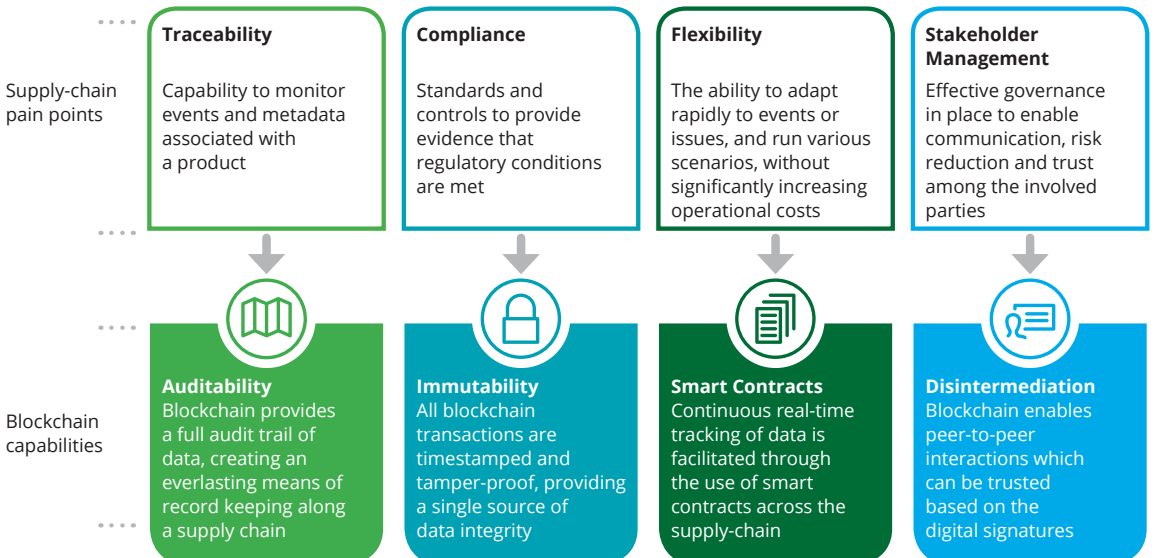
Deloitte supply-chain professionals have identified four key supply-chain pain points that retail and CPG businesses are experiencing across the globe, as shown in Figure 3.

Figure 3. Supply-chain pain points



Blockchain technology's immutability together with its ability to track and trace products, offer secure contracts and facilitate peer-to-peer interactions offers a potential solution to each of these pain points, as shown in Figure 4.

Figure 4. Blockchain capabilities as a solution to supply-chain issues



Among consumer enterprises, we believe that blockchain will (in the short term) have the largest impact on traceability across the supply-chain. In a supply-chain, a private or permissioned blockchain may be implemented, dictating a user's ability to read and write to that specific blockchain. The implementation of blockchain technology can be used to solve or reduce common issues such as traceability, compliance, flexibility and stakeholder management.

Blockchain's tracking capabilities (including timestamping) provide a full audit trail which can be used to protect consumers from counterfeit goods and also gives businesses increased confidence in the authenticity and quality of goods, impacting sourcing decisions. The distributed nature of the platform allows for greater oversight and control of products while real-time tracking via smart contracts gives supply-chain stakeholders the flexibility to make rapid decisions and update inventory levels on a continuous basis, thereby reducing working capital inactivity. Not only does this benefit companies from an operational point of view, it also has direct consumer applications.



Case study: Provenance – using blockchain to tell a product's story

Provenance is a Software as a Service (SaaS) platform that enables brands to track and display their supply-chain information using blockchain.⁶

Transparency regarding where products come from is something many companies stress and are quick to promote as part of their corporate social responsibility initiatives. A new network is using blockchain to help companies share information on their supply-chains.

Provenance is a data platform that enables brands to introduce greater transparency by showing the history of a product. Using blockchain, companies can easily tell their products' stories, verify their supply-chain and use this data to show their brand's transparency and authenticity. Businesses can create a free profile on the Provenance platform and input information about the materials, people and processes behind their products. For the £29 per month plan, companies can generate labels and unique product IDs to prove product authenticity, as well as add manufacturing stories to their e-receipts.

Beyond these supply-chain pain points, our broader industry research relating to digital transformation, changing consumer behaviour and key macro trends suggests there are a number of blockchain opportunities within the retail and CPG industries.⁵



Case study: Blockverify and Everledger – using blockchain to fight counterfeiting

In 2017, the global market in counterfeit goods was said to be valued at over £340 billion. In the EU alone, the clothing, footwear and accessories industry loses around £23.2 billion of revenue annually from counterfeit goods. In response to this issue, a number of companies offering blockchain-based solutions to counterfeiting have emerged over the last few years. Everledger and Blockverify are two of the most prominent.

In sectors such as diamonds, fine wine and art, Everledger works with experts to collect an asset's defining characteristics, history, and ownership to create a permanent, immutable record on blockchain that owners and potential buyers can use to prove the asset's authenticity. Since its inception in 2015, Everledger has authenticated over one million diamonds on the blockchain.

As well as operating in the diamond sector, Blockverify also uses 'track and trace' technology to authenticate pharmaceuticals, luxury goods and electronics. A UK company, founded in 2014, BlockVerify works with a product manufacturer at source to ensure the quality and authenticity of each item they produce. They are planning to expand the range of products that can be verified with the ultimate goal of making all products traceable via blockchain.

For example, blockchain has the potential to change the way we shop and pay for products. From a consumer perspective, one of blockchain's most obvious applications – though perhaps not the most compelling because of entrenched competition from cash and credit and debit cards – is as an alternative payment platform. Blockchain may also offer a superior means of powering loyalty-points programmes – including more advantageous accounting treatment of the liabilities created by the accrual of points, real-time updating of points balances, and better management of points across franchised operations – because its shared distributed ledger can simplify the settlement process.

The potential to disrupt – the need to respond

Across the consumer industry, blockchain will become a standard tool for solving certain strategic challenges. But it will also facilitate innovation and offer solutions to problems we did not know existed. Ultimately, blockchain could provide the foundations for a completely new way of doing business.

Despite offering opportunities for businesses to find efficiencies, improve product quality and heighten the overall consumer experience, the growth of blockchain also presents a number of challenges to retailers and CPG businesses that will need to be met head on. For example, in our analysis of how blockchain can be used as a means of easing supply-chain pressures, we looked at the power of blockchain to create disintermediation by enabling peer-to-peer interactions which can be trusted based on secure digital signatures. The potential long-term impact of this in the retail and CPG industry is a reduction in the need for intermediaries between producers and consumers. This has the potential to disrupt the long-established retailer-consumer relationship which could fundamentally change the structure of both industries. Blockchain's power to create disintermediation firmly shifts the power in the relationship away from retailers and towards the consumer. CPG businesses should be poised to take advantage of this by exploring how blockchain can facilitate direct to consumer (D2C) opportunities. Retailers, meanwhile, must guard against the negative impacts by using new technology to offer a better, more complete service to their customers. In the same way that many traditional bricks and mortar retailers have gone online in order to guard against the competition from online retailers, retailers in the current landscape can make use of the advantages of blockchain in order to guard against new threats to their business models.



Case study: INS creating a decentralised grocery shopping platform so consumers can buy directly from manufacturers

INS is a company that provides a glimpse of what the future of retail could look like. It plans to build a blockchain-based platform that will allow consumers to order their favourite branded goods direct from the manufacturers. The enterprise believes this could offer consumers a considerable discount on the prices they currently pay in supermarkets. As the brands will be free to set their own prices, without the need to negotiate with supermarkets and invest in trade promotions, they could conceivably improve their product margins while also saving the consumer money. INS claims that the potential savings for consumers could be as much as 30 per cent.

INS was set up by the founders of grocery delivery service Instamart and a group of blockchain experts. They have completed their first round of funding, raising \$42 million, and have already signed memoranda of understanding with a number of leading consumer product manufacturers such as Unilever, P&G and Mars.⁷ INS will also allow global and national brands to sell alongside local and independent producers who would otherwise fail to achieve listings in supermarkets so that the consumer can decide which products most interest them.

The platform, which is currently in development, proposes to use blockchain for order payment and fulfilment. Consumers will be able to pay in three different ways: FIAT currency, cryptocurrencies such as bitcoin or Ethereum, or via INS tokens which will be created to facilitate trading and rewards on the platform.

While the focus of this paper is the potential use-cases available to retail and CPG businesses, potential disruption of the industry could come from elsewhere. For example, blockchain could be used to champion consumer rights, guaranteeing protection against inferior, faulty or unsafe products. One such application could be legislation that provides instant verified refunds to consumers in the event of breach of contract. A consumer application in this mould would place a significant onus on retailers and CPG businesses to provide better service as any consumer rights issue would be dealt with instantly, incurring costs that businesses might previously have managed to avoid.



Maximising the potential impact

Blockchain has been likened to the second generation of the internet. This interpretation could be exaggerated, but at the very least blockchain has the ability to transform an organisation's processes.⁸

Blockchain can be applied in different ways in the business operating model. It can be used to make existing processes more efficient, support the move into adjacent services and markets, and/or assist the development of new transformative services.

In response to this, many business leaders are asking questions about which technology to invest in, what the benefits are, when to invest and how to get started. The aim of this paper is to help companies in the retail and CPG sectors gain a better understanding of blockchain and prompt consideration of how it can be incorporated into a business strategy.

Blockchain is not a tactical response to a standard technology problem.¹⁰ While it can facilitate transformation, a clear strategy must be developed based on proof of concepts for opportunities. Complexity and value will inherently differ between organisations as will business objectives and strategies on how to achieve them.

While blockchain can be used in isolation, it is likely to have a bigger impact when combined with other technologies such as big data, the Internet of Things (IoT) and Artificial Intelligence (AI).

As a result, we will see more successful blockchain applications in industries that have experience in these areas. In fact, by 2020, according to Gartner research, 40 per cent of the world's blockchain business value-add will be derived from the manufacturing sector.⁹



4. Practical applications of blockchain within retail and CPG



As previously outlined, there are a number of use-cases in the retail and CPG sectors.

The analysis in this report is based on a selection of 16 use-case groups.

The use-case groups were developed from an initial analysis of over 50 use-cases which were shortlisted and combined to cover the breadth of the retail and CPG markets and potential blockchain applications. Each use-case group may cover a range of individual use-cases.

The use-case groups have also been categorised by purpose to distinguish between the over-arching reasons for the blockchain application:



Consumer – improving and protecting the consumer experience



Supply-chain – improving process efficiencies across the supply-chain



Payments and contracts – improving transaction processes and ensuring the validity and implementation of contracts.

Figures 5 to 7 provide descriptions of each of the 16 use-case groups assessed in this report.

Please note, storage of digital records, exchange of digital assets and the use of smart contracts are not considered for analysis on their own but are viewed as tools to achieve specific use-cases.

Consumer

Across the value chain there are a number of blockchain use-cases aimed at improving and protecting the consumer experience.

The six use-case groups within 'Consumer' are described in Figure 5 below.

Figure 5. Consumer – retail and CPG use-case groups

Use-case group	Description – a blockchain-based solution that...
 <p>Smart loyalty programmes</p>	... captures, stores and verifies customer/consumer details and behaviour for more personalised targeting. A smart loyalty programme will also make use of the technology to incentivise behaviour and reward loyalty through the use of smart contract logic.
 <p>Consumer participation</p>	... allows consumer surveys, research and competitions to be carried out securely. In contexts that require a high level of transparency and security, such as voting in public ballots (e.g. to express a preference in a survey), blockchain technology guarantees both the legal certainty of the vote and the transparency of the process.
 <p>Locate stolen products</p>	... can be used to tag products, so that whenever a consumer makes a purchase, they are able to verify its authenticity and activate it within the system. As such, should a product be stolen or go missing, it is possible to trace any subsequent transaction, instantly notifying the legitimate owner of its whereabouts, and helping to prevent both sale and possession of stolen goods.
 <p>Connected services</p>	... allows businesses to provide guaranteed after-care service and warranties. After-care services can be based on predefined contracts and agreements stored and executed on blockchain.
 <p>Targeted recall</p>	... enables manufacturers and retailers to identify products that are unsafe or contain defective parts, and therefore issue specific recalls or service bulletins for these products. This can reduce disruption to customers as well as the recall costs for the process. This application will also track the status of the recall, which can be used for regulatory reporting to government.
 <p>Sharing economy</p>	... presents an environment for safely and quickly allowing monetary transactions, verifying and changing ownership references, and recording usage behaviour. This can be utilised to underpin a new kind of sharing economy – meaning, among other things, the cooperative purchase and maintenance of large or expensive consumer goods.

Supply-chain

Across the value chain there are a number of blockchain use-cases aimed at improving process efficiencies across the supply-chain.

The six use-case groups within 'Supply-chain' are described in Figure 6 below.

Figure 6. Supply-chain – retail and CPG use-case groups





Use-case group	Description – a blockchain-based solution that...
 <p data-bbox="126 919 271 975">Connected supply-chain</p>	<p>... provides an end-to-end supply-chain solution to enable manufacturers to order or sell, trace and pay for goods once they arrive at their destination seamlessly. Documentation would be created, updated, viewed or verified by parties on blockchain who could confirm receipt of goods once received (e.g. by port authorities), enabling manufacturers to track their shipment. Payments could also be initiated seamlessly between parties throughout the process, based upon agreements (e.g. between seller and customs authorities, seller and shipping company and between seller and buyer). As an extension, connected IoT sensors and smart devices could measure the condition of containers and other information that can be recorded on blockchain and inform final settlements (e.g. if goods have been damaged).</p>
 <p data-bbox="102 1172 297 1228">Authenticity and provenance</p>	<p>... verifies the provenance of products. Blockchain makes it possible for every legitimate touchpoint in a supply-chain – from a supplier to a manufacturer to a shipper – to add a verifiable record to an item's pedigree. This can be used to prove the authenticity of products, eliminating the risk of counterfeiting and ensuring confidence in resale markets.</p>
 <p data-bbox="150 1359 247 1390">Delivery</p>	<p>... tracks manufacturing and consumer deliveries to named locations. The growing trend towards home delivery requires increased levels of trust and security that can be offered by blockchain tracking technology. The use of autonomous vehicles and unmanned drones across the supply-chain requires immutable tracking systems in order to guarantee public safety.</p>
 <p data-bbox="139 1516 257 1572">Know your supplier</p>	<p>... captures, stores and verifies supplier details using external information prior to the supplier providing services. Once verified, supplier contracts could be stored on blockchain and payments executed when a service or product has been fulfilled. Once established, data can also be provided "off-chain" to support supplier performance reporting and inform future contractual agreements.</p>
 <p data-bbox="107 1703 289 1759">Connected store (back office)</p>	<p>... stores and analyses all relevant product and supply-chain-related data, making it possible for retailers to improve their fulfilment capabilities – managing inventory in real time and avoiding stock shortages, among other things.</p>
 <p data-bbox="126 1889 271 1945">Fraudulent transactions</p>	<p>... creates an escrow system, protecting both buyer and seller by not releasing any funds until both parties have confirmed they are satisfied. By running this process on blockchain, transactions can be confirmed by smart contracts, eliminating the need for third-party moderation.</p>

Payments and contracts

Across the value chain there are a number of blockchain use-cases aimed at improving transaction processes and ensuring the validity and implementation of contracts.

Four use-case groups within '**Payments and contracts**' are described in Figure 7 below.

Figure 7. Payments and contracts – retail and CPG use-case groups

Use-case group	Description – a blockchain-based solution that...
 <p data-bbox="142 866 257 919">Consumer payments</p>	<p data-bbox="319 747 1148 841">... allows consumers to save time and money on payments, either through the use of cryptocurrencies, or by facilitating cheaper, faster validation of credit payments, eliminating the costs currently incurred by banks.</p>
 <p data-bbox="142 1087 257 1141">B2B payments</p>	<p data-bbox="319 969 1214 1125">... uses smart contracts to replace traditional letters of credit. When used to facilitate business-to-business (B2B) payments, blockchain can simplify the transaction process between financial institutions, speeding up the process, and reducing intermediary costs and risk. Blockchain also facilitates cross-border payments and can be used to guarantee payment of duties and other taxes.</p>
 <p data-bbox="135 1309 265 1363">Digital advertising</p>	<p data-bbox="319 1191 1205 1315">... improves transparency around real-time bidding for digital advertising space by providing a full audit trail of data. This will allow ad buyers and sellers to verify campaign execution and engagement targets accurately and claim rebates based on failed implementation.</p>
 <p data-bbox="139 1531 261 1585">Consumer protection</p>	<p data-bbox="319 1413 1194 1537">... creates digital records of consumer's purchases, moving product warranties from paper onto the cloud via blockchain – keeping them up-to-date and easily transferable. Consumers are able to maintain a virtual warranty wallet, saving retailers and manufacturers administrative work.</p>



5. Assessing blockchain opportunities

Our analysis is aimed at identifying where blockchain could have the greatest impact in the retail and consumer packaged goods industries.

Blockchain's value – based on business benefits

The criteria used to assess the value to business of blockchain opportunities are based on the Deloitte Enterprise Value Map. This is a tool which identifies factors stimulating business growth. The criteria we have used to measure use-case group value includes factors that support organisational growth through:

- **strong revenue growth** – including factors that support volume and price
- **better operating margins** – including factors that support the selling and administrative side as well as cost of goods sold
- **improved asset efficiency** – including the effectiveness of property, plant and equipment as well as inventory
- **expectations** – including factors that affect company strengths and perceptions.

Within the Deloitte Enterprise Value Map there are over 1,000 strategic and tactical elements that can influence these criteria and thus affect business growth. Examples of the more granular elements include improvement of incentives in relation to procurement efficiency and developing a stronger brand.

For each strategic and tactical element, a score was assigned based on whether the use-case would be relevant and whether it would help solve a problem inherent in the industry or organisation. Consideration was also given to whether or not the blockchain use-case would be the most appropriate solution.¹¹

The resultant range of values for the blockchain use-cases is shown in Figure 8. A higher position represents a higher value.

Assessing blockchain's complexity

The complexity criteria are based on the level of business change required, unique participants and active participants (volume), the number of services and whether the use-case has been tested before.

The potential range for complexity or ease of implementation of the blockchain use-cases is also shown in Figure 8. A position further to the right represents a more complex implementation and adoption process.

Strategic choices will affect the attractiveness of use-cases

Our analysis has not considered use-cases of 'low value'. Therefore, depending on the strategic objectives of the business, there are four segments of impact:

1. Trial projects

These opportunities are attractive as they are less complex to implement than other opportunities. However, the immediate value is lower relative to others as the blockchain application has a narrower focus. Businesses that are exploring blockchain opportunities could consider these as a starting point if relevant to their organisation, and expand them in future to obtain more value.

2. Explore

These opportunities are more attractive relative to the trial projects in terms of value yet have similar levels of complexity, offering greater value relative to investment in the short term. As with trial projects, businesses that are exploring blockchain opportunities should consider these as a starting point, if relevant to their organisation.

3. Wait and see

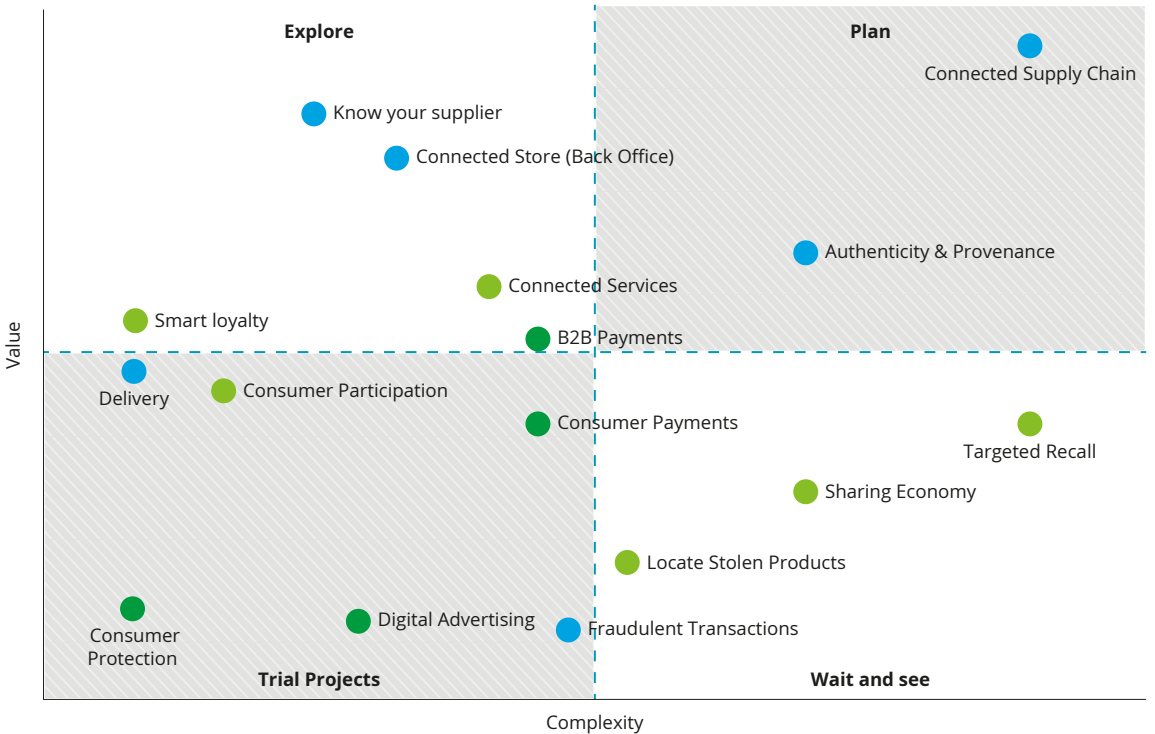
These opportunities currently offer a lower value relative to other high-value blockchain opportunities and are more complex to implement at present. Although they will provide value for businesses and have potential to generate further benefit, at the most basic level they may not be worth investing in heavily yet. Businesses where these opportunities may be relevant should keep a close eye on how these evolve in future and consider combining them with other opportunities.

4. Plan

These opportunities are attractive in terms of the value they offer. However, they are heavily influenced by external factors and are also considered the highest risk option. To be able to deliver on these projects it may be necessary to belong to a consortium and businesses that pursue these opportunities are likely to be part of one.

Understandably, the use-cases that offer the highest value are also often the most complex (and most costly) to implement. The potential impact of blockchain opportunities by primary reason (use-case purpose) varies by value and complexity, demonstrating the breadth of applications across the sector's value chain.

Figure 8. Value and complexity of blockchain use-case groups



Key (Use-case purpose)
 ● Consumer ● Supply-chain ● Payments and contracts

Source: Deloitte analysis



6. Responding to blockchain

It is important for businesses to understand how much blockchain can generate additional commercial value and how it aligns with the overall business strategy.

Exploring opportunities is the minimum required in the short term

The analysis in this report can be used to help review the potential value for businesses. Those who are new to blockchain could experiment with one or two opportunities in the 'explore' quadrant while keeping an eye on opportunities in the 'plan' quadrant.

Uncertainty about the future value of nascent applications of blockchain means that at this stage many organisations may prefer to explore and test uses rather than commit to full enterprise adoption. However, the rapid pace of improvements in blockchain technology means that within one to two years blockchain could replace processes and provide a solution to many of the challenges faced by the industry today. For example, blockchain work programmes that last more than two years may be inherently outdated before they are even implemented.

Deloitte predicts that blockchain technology will reach a tipping point in the next five years, moving from a fringe technology associated with dubious cryptocurrency investments and get rich quick stories to a standard operational technology across the financial, manufacturing and consumer industries. Along the way, blockchain will face significant challenges, but if these can be overcome and the technology continues to develop as expected, there could be widespread adoption among enterprises.⁴

Maximising opportunities

We expect the biggest opportunities to come from multiple blockchains, seamlessly integrated and working together across a value chain. For instance, the 'Know your supplier' use-case group offers significant value but this might be even greater if it were combined with other blockchain applications to utilise financial and operational data and understand the end-consumer.

However, organisations must consider how to implement this technology effectively, integrating multiple blockchains, legacy systems and databases for on-chain/off-chain solutions and constructing the appropriate architecture.

The most valuable and possibly the most complex blockchain solutions will require both on-chain and off-chain data, local storage, and integration capabilities to realise a seamless solution.

Reviewing the potential impact – responding to the opportunity and disruptive trends

The potential impact of individual blockchain opportunities may vary within each use-case group. The potential value and complexity are also likely to vary as the industry landscape changes due to factors such as new competition, new technology, Brexit and other disruptive factors.

For instance, in future, the "last mile" of delivery to the consumer will be revolutionised by the rise of vehicle autonomy – in the form of drones and driverless technology. This will place more emphasis on businesses to invest in and support this technology, and, in turn, related blockchain use-cases will generate more value than offered today.

Don't deviate from your core values and strategy

As with any new technology, the temptation to invest is not always directly correlated to the need for it in your business. Using blockchain as a tool to achieve your strategic goals is key to seeing a tangible value-add from the technology. With this in mind, it is worth remembering that while blockchain provides huge operational upsides, businesses will not be the only beneficiaries of this transformational technology.

The ultimate beneficiary will be the consumer. If blockchain can create efficiencies and save costs throughout the supply-chain, these benefits can be passed on to the consumer in the form of lower prices. If blockchain provides more transparency across the supply-chain, these benefits can also be passed on to the consumer in the form of safer products and higher quality.

And if blockchain is used to provide comprehensive product tracking and tracing throughout the manufacturing process, then consumer trust around the provenance of products will grow. Taking all this into account, any consumer-focused businesses that have the resources and capabilities should be considering how they can harness the power of blockchain to achieve their strategy.

Next steps

Ultimately we expect to see more organisations turn initial use-cases and proofs of concept (PoCs) into fully deployed production solutions. Though the tactics they use to achieve this goal may differ by sector and unique need, many organisations are likely to embrace three approaches:

- focus blockchain development resources on use-cases with a clear path to commercialisation
- push for standardisation in technology, business processes and talent skill sets
- work to integrate and coordinate multiple blockchains within a value chain.

In order to realise the potential benefits, organisations need to assess which blockchain capabilities are most suitable for them, as well as where and how to invest.

Key questions leadership should be asking before embarking on their blockchain journey include:

- How can blockchain technology drive value in my business?
- Are there new products, services or business models enabled by blockchain that we want to explore?
- How are our competitors utilising blockchain technology?
- How are other industries applying blockchain technology?
- Are there any projects that could be replaced or enhanced by blockchain technology?

At the very least, this will include an evaluation of strategic objectives and assessment of use-cases most relevant to each organisation.

Those further ahead with their plans will be exploring the development of a blockchain solution that considers the technology architecture, costs and benefits in more detail.

Trailblazers will be looking at enhancing existing blockchain capabilities to scale up and realise the full value of blockchain, alongside other technologies.

We believe the key for all businesses is to ensure their blockchain plans address critical business issues and support new growth opportunities. Businesses should also consider their organisation's readiness to adopt blockchain, understand what technology is needed and develop their blockchain strategy to scale up on this basis.

Given the early stages of the technology, and the limited expertise in the area, a return on investment and the full value of implementing a blockchain strategy may not be felt for a number of years.

Investment in blockchain may be expensive and resource heavy and implementing a blockchain strategy may require a culture change within a business. Businesses that do not consider how blockchain may affect their operations are at risk of falling behind and losing out on potential growth opportunities. If done correctly, however, the investment could be transformational.

7. Contacts



Steve Larke
Partner, Technology Consulting, Deloitte
slarke@deloitte.co.uk
+44 20 7007 2165



Craig Turnbull
EMEA Analytics Leader, Deloitte
crtturnbull@deloitte.co.uk
+44 20 7007 8497



Mike Manby
Partner, Performance Analytics, Deloitte
mmanby@deloitte.co.uk
+44 20 7303 6226



Jacob Boersma
Manager, Risk Advisory, Deloitte
jboersma@deloitte.nl
+31 88 288 2069

Authors



Dr Bryn Walton
Insight Manager, Retail and Consumer Packaged Goods, Deloitte
bcwalton@deloitte.co.uk
+44 20 7007 2352



Ben Perkins
Director, Consumer & Industrial Products, Deloitte
bep Perkins@deloitte.co.uk
+44 20 7007 2207

Contributors

Jeremy Rossell
Director, Consulting, Deloitte
jrossell@deloitte.co.uk
+44 20 7303 7577

Thiago Sartorio
Manager, Consulting, Deloitte
tsartorio@deloitte.co.uk
+44 20 7007 2883

Rodd Penney
Senior Manager, Risk Advisory, Deloitte
rpenney@deloitte.co.uk
+44 20 7007 0474

Chik Soon
Manager, Risk Analytics Solutions, Deloitte
chsoon@deloitte.co.uk
+44 20 7007 0170



8. Endnotes

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Notes



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