

Roland Berger

Focus

September 2018

The blockchain bandwagon

Is it time for automotive companies to start investing seriously in blockchain?



Management summary

The automotive world is buzzing with excitement about blockchain. The word is on everyone's lips, and major players such as Ford, Daimler and Toyota are busy with pilot projects. But many in the industry are still confused as to what the technology is all about and what it might have to offer them.

In this paper we discuss what blockchain technology is and what it could mean for the automotive industry. We look at the maturity of the technology and consider whether it is time for the industry to start taking it seriously. We also investigate potential applications of blockchain technology in various parts of the automotive industry: the supply chain, communication, digital identities for vehicles, and so on. And we examine some of the challenges for implementation – challenges such as problems of scalability, the speed of technological advance, competition for internal budgets, and identifying and recruiting talent.

Finally, we turn to the question of whether companies should jump on the blockchain bandwagon now and start investing seriously in proprietary or collaborative solutions, or whether they would be better off waiting on the sidelines, monitoring ongoing developments. To help top management achieve clarity, we outline the key points for consideration before deciding whether to take the plunge now, later – or maybe not at all.

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Chapter 1:

New kid on the block

Is blockchain technology ready for the automotive industry?

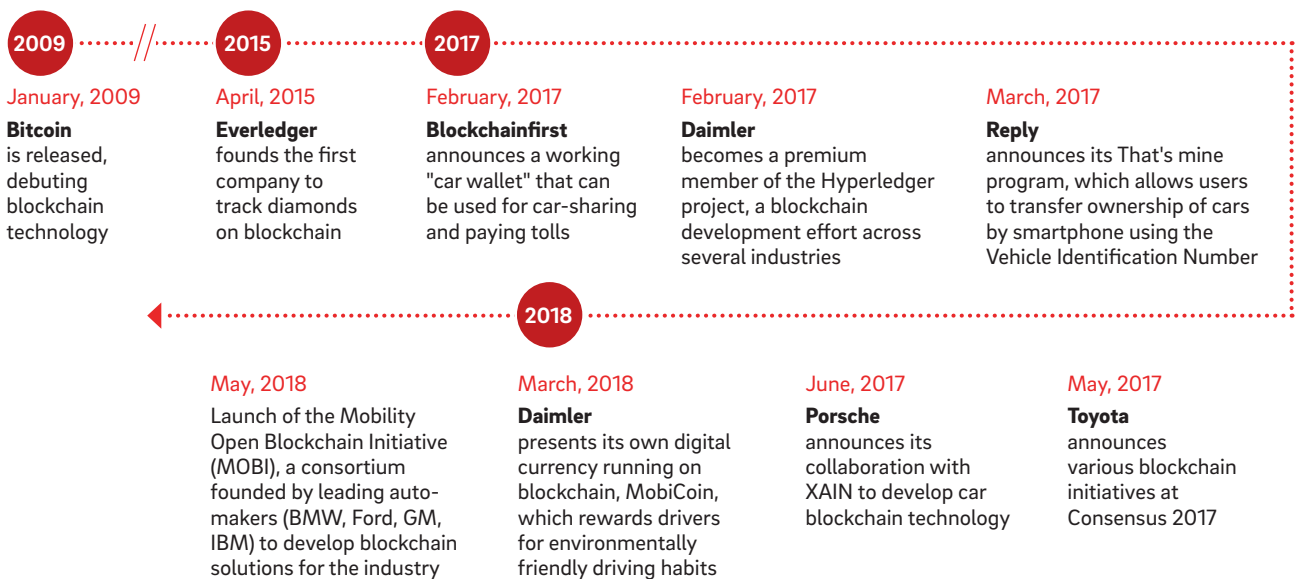
Blockchain is the latest buzzword in the automotive industry. Over the last couple of years, it has spread beyond its use in the world of cryptocurrencies, such as Bitcoin. It is now being widely touted as a potential solution to some of the biggest challenges facing the auto industry – in areas such as vehicle-to-vehicle communication, secure data transactions, component provenance and location tracking – and the gateway to new products and services. → **A**

In May 2018, a group of 30 major auto companies including GM, Renault, Ford and BMW launched the Mobility Open Blockchain Initiative (MOBI), a research group aimed at accelerating the adoption of blockchain

and the development of a digital mobility ecosystem. Yet many in the industry are still unclear as to what the technology actually is and how they can use it to their benefit. Research on blockchain and its application in the auto industry is still at an early stage. For many, blockchain is first and foremost associated with cryptocurrencies – an association that now appears too narrow. The public is unfamiliar with its potential benefits and hesitant to trust it, making implementation difficult. And the shortage of skilled blockchain developers and an unwillingness on the part of the industry to make significant investments in a technology that is still in its infancy create additional hurdles to adoption.

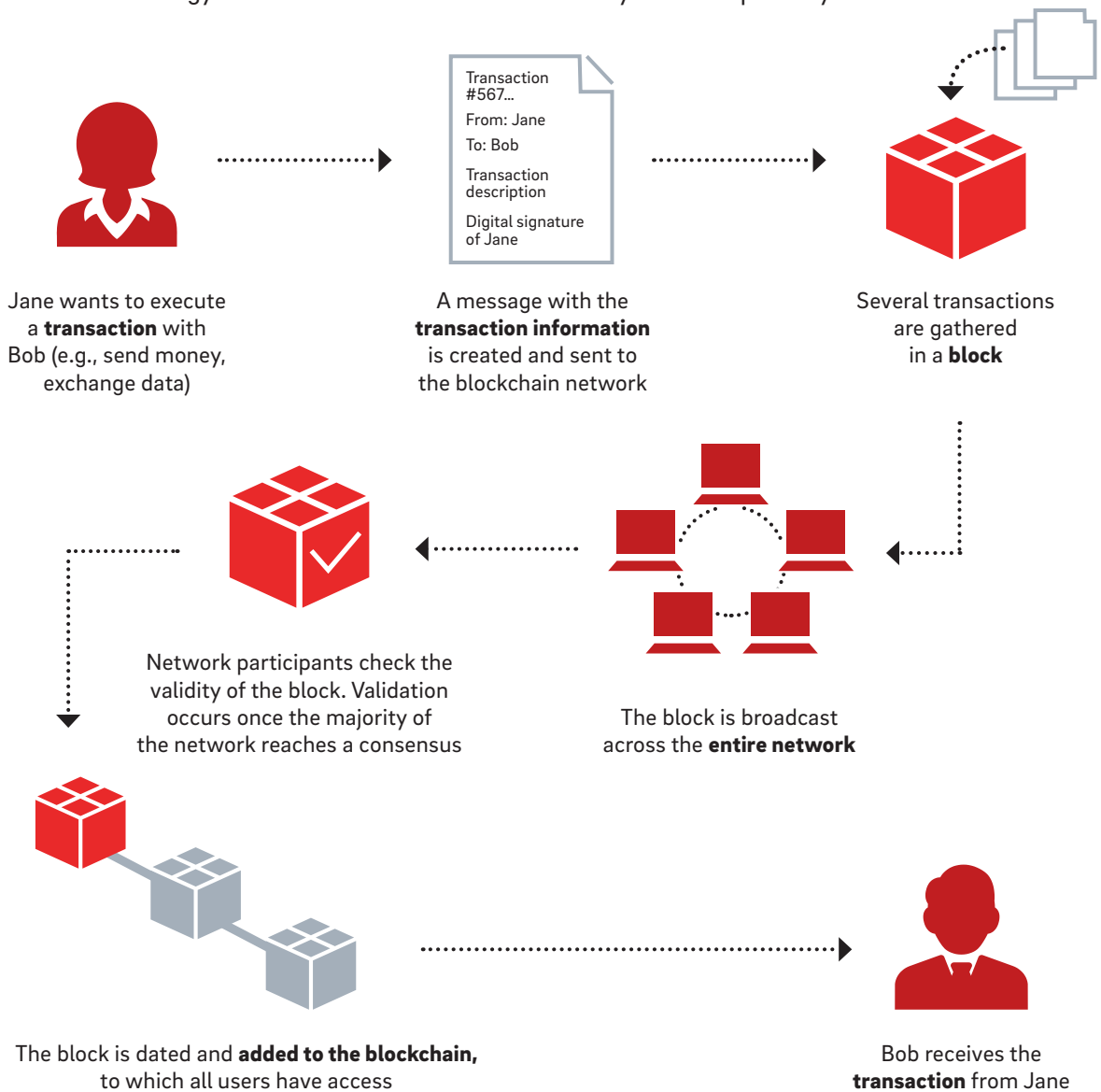
A: Slow off the blocks

It took eight years for the automotive industry to start researching blockchain



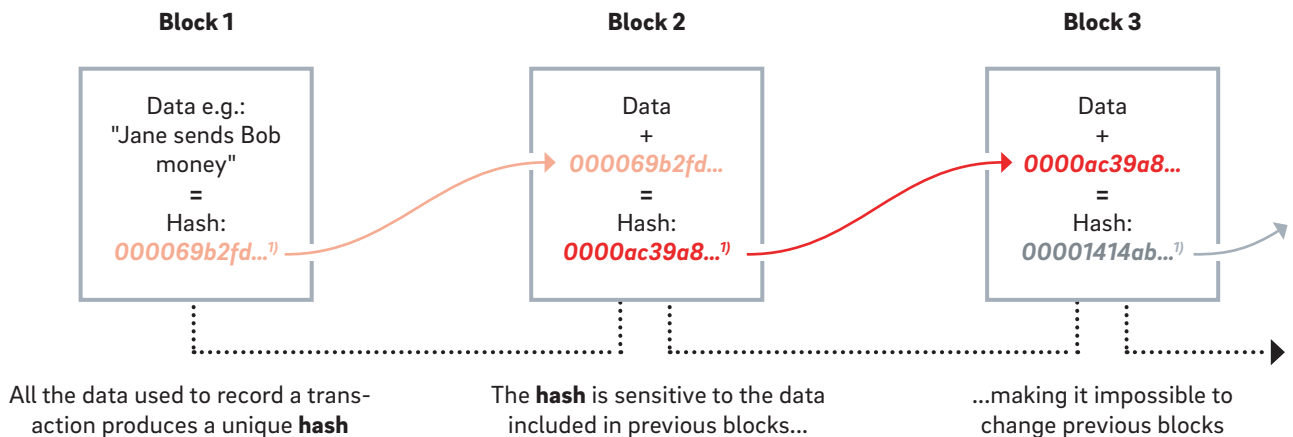
B: How does it work?

Block chain is a technology that enables transactions to be safely and transparently executed



C: A unique digital fingerprint

A hash is the unique digital fingerprint of the data which changes when an element recorded on the blockchain is altered



¹⁾ Hash number is usually 32 digits

Source: Roland Berger

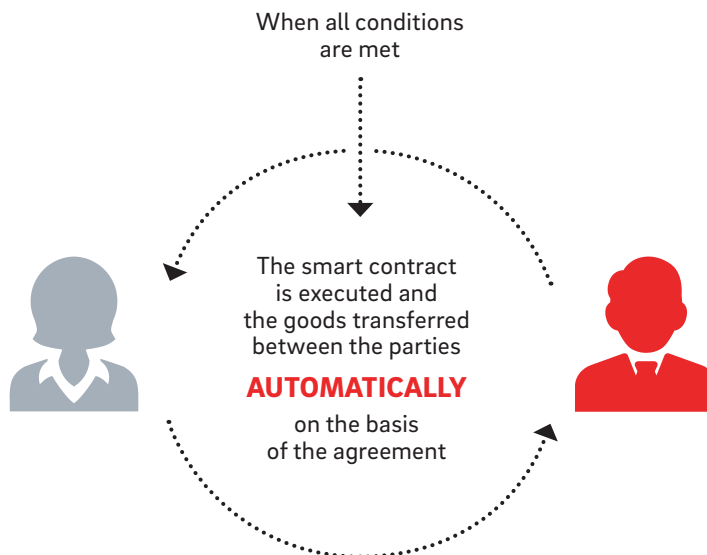
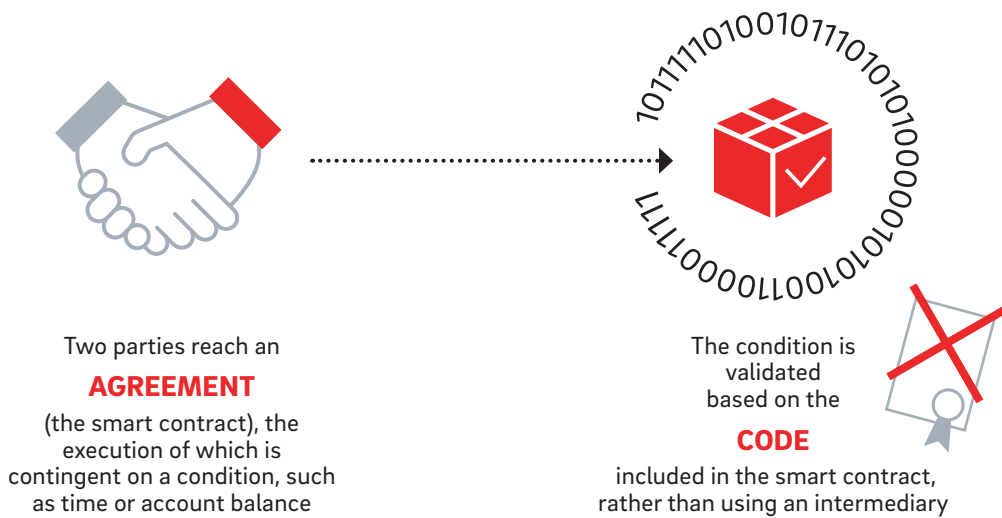
So, what is blockchain and should it be a priority for automotive companies? After all, the auto companies are already investing in developments such as autonomous driving, ridesharing and battery electric vehicle technology. Should they now really be redirecting a portion of their research budget toward a technology that is still at the beginning of the S-curve? We examine that question below. But before we go any further, we should take a closer look at what blockchain actually is. In a nutshell, it is a technology that enables secure decentralized transactions with few or no intermediaries. Blockchain is based on a decentralized database, transaction history, a consensus mechanism and an automated digital contract execution platform in which transactions between

participants take place and are recorded. Every transaction on the blockchain is recorded forever and any attempt to tamper with, steal or falsify it is immediately highlighted. The blockchains themselves do not store the information being transferred. Rather, they record the proof of the transaction, known as the transaction "hash". → **B/C**

It is this unmatched security that makes blockchain relevant for any industrial application that requires an audit trail. Blockchains are extremely hard to break into: To hack a blockchain one would need an as yet unrealistic amount of computational power. The technology therefore grants universal proof of anything that has occurred and been recorded on the blockchain.

D: Smart contracts

Blockchain enables contracts without the involvement of a third party



One of the first applications of blockchain was back in 2009, with the invention of the cryptocurrency Bitcoin. In fact, blockchain potentially has broad applications in financial services, as we discuss in our 2017 Think:Act publication "Enabling decentralized, digital and trusted applications: Why blockchain will transform the financial services industry". But the technology has now spread to other areas of life, too – areas such as "smart contracts", or trackable, irreversible transactions carried out directly between buyers and sellers without the involvement of a third party. Ethereum leads the market here. Countries such as Georgia, Sweden and Ghana already use the technology for some land-titling services, drawing on the data trail inherent to blockchain to record ownership of properties and how they have changed hands over time. Estonia, widely regarded as one of the most advanced digital societies in the world, started testing blockchain technology as early as 2008 and currently uses it to protect e-services, smart devices and national data in areas such as national health, legislative and judicial registries. → [D](#)

A number of companies have pioneered the application of blockchain in industry and new players work in decentralized autonomous organizations governed by smart contracts. In 2015 Everledger started using the technology for diamond supply chain management, creating individual IDs for diamonds and tracking them through to final sale. This gave them the transparency needed to avoid trade in "conflict diamonds". Maersk and IBM have formed a joint venture to use blockchain in cargo shipping documents and tracking, with the aim of digitalizing supply chains and improving global trade. AXA has launched an insurance product that uses blockchain to store and process payouts relating to delayed flights.

As these examples show – and there are many more – blockchain has moved beyond its original application in cryptocurrency and the financial services industry

Blockchain has now reached a level of maturity where the industry is starting to evaluate its potential application.

into a number of other industries. It has now reached a level of maturity where the automotive industry is starting to evaluate its potential application. What industry decision-makers need to know is where it can be applied, and how – and who should be driving its application. In the following section we discuss the potential use of blockchain in the automotive industry and examine five key areas where we believe the technology could soon be making a difference.

Chapter 2:

From theory to practice

Where can auto companies use blockchain technology?

Since early 2017, a growing number of car manufacturers have been developing proofs of concept for blockchain technology – companies with deep pockets and the ambition to become forerunners in the technology. The Mobility Open Blockchain Initiative (MOBI) launched in May 2018 aims to speed up the process of adoption. But where and how should other automakers and suppliers be getting involved in blockchain? We see five main areas of application emerging in the near future, which we discuss in turn.



FIVE AREAS OF APPLICATION

#1 SUPPLY CHAIN



#2 SECURE COMMUNICATION



#3 CAR E-WALLETS



#4 STREAMLINED CONTRACTUAL PROCESSES



#5 DIGITAL IDENTITIES FOR VEHICLES



#1 SUPPLY CHAIN

As we discussed above, blockchains are extremely secure. That makes them ideal for record-keeping between different parties. International trade and trade between raw material suppliers, automotive suppliers, OEMs, dealers, repair shops, online aftermarket retailers and so on often involves multiple parties that need to reach agreement. Rather than each party verifying, validating and reconciling transactions themselves, blockchain allows them to work with a single source of truth. The provenance and production history of components can be tracked on the blockchain by a barcode or RFID tracking. The tracking is instant, rids the process of much manual work and guarantees that the correct party gets the items that they ordered at the correct location, when they expect them. The blockchain guarantees transparency, traceability, authenticity and origination. In the aftermarket, for example, it eliminates the risk of fake parts being sold in repair shops – something that can easily damage brand reputation.

Full transparency over the supply chain is highly desirable for automotive companies. Daimler, for example, is working with Berlin-based startup XAIN to develop a supply chain blockchain that builds on the existing database management systems in the Mercedes Benz factory in Berlin. The purpose of the project is to develop a production auditing system that will automate audits, reduce overhead tracking and allow the use of smart contracts.

Other OEMs and suppliers are looking at using blockchain technology to help ensure that raw materials are ethically sourced. For example, one OEM is reported to be working with the startup Circular to ensure that the cobalt they use for their electric vehicles' batteries is ethically sourced. Around two-thirds of the world's supplies of cobalt come from the Democratic Republic of Congo, where an estimated 20 percent of the material stems from unregulated artisanal mines.

#2 SECURE COMMUNICATION

Blockchain technology has clear applications in the area of secure communication, both vehicle-to-vehicle and vehicle-to-object. In the future, autonomous vehicles will communicate with other vehicles, traffic lights and other unauthenticated devices. One obvious use of blockchain is to secure this communication and ensure that it occurs only between relevant entities, so it cannot be hacked into by unauthorized outsiders.

In Germany, XAIN and T-Systems are currently jointly developing blockchain technology for electric autonomous bus pools near Berlin. The project is in the implementation stage and could potentially solve traffic-flow problems while at the same time reducing consumption of electrical power. Porsche is also working with XAIN to develop blockchain technology that can remotely unlock vehicles using a mobile application without sending a request to a third-party server for validation. The process reportedly takes just 1.6 seconds, making it around six times faster than the previous technology. The system can also be used to provide other users with temporary access to the vehicle.

Porsche is also implementing blockchain technology in its new fully electric sports car, the Mission E. Thanks to the new technology, drivers can sign a roaming contract for recharging the vehicle's battery wirelessly, the application also taking care of the subsequent payment. Blockchain provides the necessary security to prevent sensitive data being hacked by cybercriminals during transmission.

#3 CAR E-WALLETS

Blockchain technology can be used to enable direct payments via what are known as car "e-wallets". E-wallets allow vehicle owners to automatically pay for repairs, parking spaces, tolls, car-sharing services and so on. The e-wallet can be independent from the driver or passengers, providing an added level of security for the car owner. In a car-sharing situation, for example, the payment can go straight to the car's e-wallet and automatically grant car access to the customer. Payments are instant and the lack of an intermediary reduces the cost of all types of transactions.

Information technology and service company Oaken Innovations has created a blockchain infrastructure for cars to pay for tolls using a toll-booth replacement device based on the Internet of Things (IoT). This greatly reduces the cost of operating a tollway, as payments are made automatically. New toll systems can eliminate the central server infrastructure, used for accounting, identity and payment processing, while potentially reducing the standard three percent transaction fee to a mere 0.01 percent.

Tier-1 automotive supplier ZF has announced that it will launch a mobility payment platform in its in-car payment system this year, enabling automatic payment for parking and electric charging. Initial service partners are the European parking management company APCOA Parking and electric vehicle charging station company ChargePoint. Similarly, Ford has patented a cryptocurrency-based vehicle-to-vehicle communication system that it calls Cooperatively Managed Merge and Pass (CMMP). The system hopes to reduce traffic congestion by giving users access to fast lanes on expressways in exchange for a cryptocurrency. If successful, this could become a new service model for the future mobility world.

#4 STREAMLINED CONTRACTUAL PROCESSES

Blockchain can dramatically simplify contractual processes. For instance, when a customer wants to finance a vehicle purchase, the dealer is generally required to run a credit check, validate the customer's employment status and examine their insurance history before providing the loan. This process takes time and in the past involved transmitting large amounts of sensitive data. Blockchain now makes it possible to carry out these validations without passing on personal or sensitive information.

Blockchain technology can also improve the customer journey when it comes to automotive insurance. Customers can instantly receive tailored policies, as the insurance companies can access driver history on a blockchain, including past accidents, risk profiles and records of fines. Policy proposals can incorporate the technical details of the new vehicle, its security ratings from external agencies and any other data that might be needed to make an offer. The customer can validate their identity on a touchscreen with their fingerprint, and a monthly direct debit can be set up from their bank account to the insurance company, triggered by a smart contract.

In the event of a breakdown, a smart sensor in the car's engine can prompt a damage notification, information that is sent to a blockchain. The repair service technician from the insurance company's partner network receives automatic notification and comes to pick up the vehicle. The insurance claim is submitted automatically where the insurance company approves or rejects it after performing a behind-the-scenes check to make sure the car is not insured with multiple carriers. This type of customer service could translate directly to more customers and reduced costs for insurance companies.

#5 DIGITAL IDENTITIES FOR VEHICLES

Auto companies can also use blockchain technology to create digital identities for vehicles. These are records that include the vehicle's ownership history, any accidents it has been involved in, its service history and so on. This increased transparency would be highly beneficial for buyers and sellers of used cars, generating greater trust, improving satisfaction and enabling more accurate pricing. Digital identities would also be invaluable for insurance companies, allowing them to adjust the prices of vehicle insurance products accordingly.

For OEMs and suppliers alike, blockchains can enable full transparency over prices, margins and discounts for spare parts along the distribution chain. This would create better steering and margin control for automotive companies. Digital identities can also support loyalty programs by tracking the many micro-transactions that take place. With all the services that are now being considered, there will be a need to monitor these transactions and reward loyal customers, thereby creating customer "stickiness".

Renault is also considering the idea of creating a digitalized car maintenance system. Vehicles would have a shared ledger using blockchain technology to log all car repairs and maintenance in one place. This would create a reliable "trust protocol" and enable the company to offer new services from dealers and insurers, for instance.

Chapter 3:

The road ahead

What are the challenges for implementation?

Implementing blockchain technology will not necessarily be a smooth ride for companies in the automotive industry. Adopters and latecomers alike will face a number of challenges.

The first of these challenges is scale. In a go-it-alone approach, the infrastructure and implementation costs are a limiting factor for companies. The response of many firms is to follow the pattern found in other industries and form broad alliances, such as the 30-company-strong MOBI mentioned earlier on. In this "ecosystem approach", groups of players pool their resources and so overcome the challenges of cost and scale. They also enjoy the critical mass needed to quickly set the standards themselves, creating and shaping the ecosystem.

A second set of challenges relates to the fact that the technology underlying blockchain is still evolving. With everyone still very much in experimental mode, there is a lack of established standards and legal framework. As we have seen with Bitcoin, once a country changes its legal stance on something, the dynamics can change very fast. The same could happen with data privacy and accessibility. In automotive there is debate over who owns the consumer's data. If it becomes available to everyone this would represent a substantial change to the ground rules.

The third significant challenge for the implementation of blockchain concerns the battle for internal budgets. The automotive industry – indeed the entire traditional transportation ecosystem – is currently experiencing disruption as a result of four major trends. Roland Berger uses the acronym MADE to describe them. The M is for mobility, with new mobility trends and behaviors developing around the world. A is for autonomous driving, in other words the development of self-driving vehicles. D is for digitalization, or the use of digital features that

impact both firms and consumers, including blockchain. And E is for electrification, in other words the development of electric powertrains.

The MADE trends compete for investment within firms in the automotive industry. Mobility, autonomous driving and electrification are product-centric areas, and many OEMs focus their budgets primarily on developing their core product offering. Unless it is core to the company's strategy, blockchain thus becomes yet another area clamoring for a slice of the pie.

The fourth and final major challenge for companies is to find and recruit the necessary talent. Building the competency required for blockchain internally is extremely difficult for firms, particularly given that blockchain is a long way away from what people do today. Not only that, firms are already dealing with a scarcity of developers. This has also been a problem for AI and machine learning, other areas where companies are hard pressed to hire the required talent.

Given these challenges, it is clear that the effective implementation of blockchain requires the full support of the C-suite, as the driving force behind change. For that support to be there, the board needs to be convinced that now is the right time for their company to invest in blockchain – as we discuss in the following section.

Chapter 4:

A path for the C-suite

What should you consider before deciding when to invest?

Although a number of larger players in the auto industry have started investing in blockchain, the technology remains far from mainstream. As with all developing areas, the questions on everyone's mind are when is the best time to invest and which are the right areas to focus on. Should we jump on the blockchain bandwagon now or would we be better off monitoring how the field develops and jumping in at a later stage? And how can we best use the new technology to strengthen our strategic position and enhance our core competencies? To help you determine the right answers for your company, we outline here some key points for the C-suite to consider.

FIRST: Learn about blockchain

The firm's leadership needs to understand how blockchain will disrupt its business. Blockchain creates efficiencies in the supply chain and savings on transaction and third-party costs. Is there a way to use it as a growth engine for the firm's current activities? More broadly, blockchain is a powerful enabler in many of the new mobility business models currently being considered in the light of MADE. It will likely become an important technology in ridesharing, car-sharing, rentals and used vehicles. What new business model opportunities does blockchain technology create for the firm?

The C-suite must keep a close eye on new developments and not let their competitors out of their sights for a moment. Simultaneously, they can begin experimenting with use cases, either on their own or as part of industry-wide initiatives. This will help them decide whether now is the right time for them to invest more substantially. The learning should go beyond blockchain to the different ecosystems and partnership options that exist. Going it alone will be very challenging, but it could serve as a great way to learn and build organizational competency. Alternatively, how can the firm use collaborations to de-risk some of the inherent challenges?

SECOND: Refine your corporate strategy

It is vital to properly align new technology projects with the firm's strategic objectives. The fundamental idea behind blockchain is that it enables companies to become future-proof, for example by using smart contracts to solve new mobility challenges. Early adopters will be able to shape the development of blockchain in line with their company's needs, whereas companies that adopt the technology later on, purchasing ready-made solutions, will be forced to follow. Firms operating in areas where blockchain will likely become the dominant technology would do well to embrace it early on, as those that do not are at risk of being replaced by those that do. For OEMs and suppliers, blockchain offers a chance to move beyond the role of simple product providers for other platforms and create and orchestrate ecosystems of their own.

THIRD: Focus your investment where you can enhance your core competencies

New technologies should strengthen and empower what you have decided to be, not distract you from your focus. Firms should only implement blockchain if it is clear that it can help enhance a core competency or enable them to differentiate themselves from their competitors. Companies must assess projects carefully, measuring the required investment and estimating the future potential before deciding at board level whether to proceed or not.

Is it time for your company to start investing seriously in blockchain? The question is for you to decide. Blockchain is not the solution for everything. Its disruptive power lies in its potential to massively speed up the trends already shaping the market. It will drive digitalization and the development of a more decentralized economy in which many participants, even small ones, can provide specific pieces of the value chain in areas where they excel. Our advice to the C-suite? Learn, refine, focus.

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WE WELCOME YOUR QUESTIONS, COMMENTS AND SUGGESTIONS

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