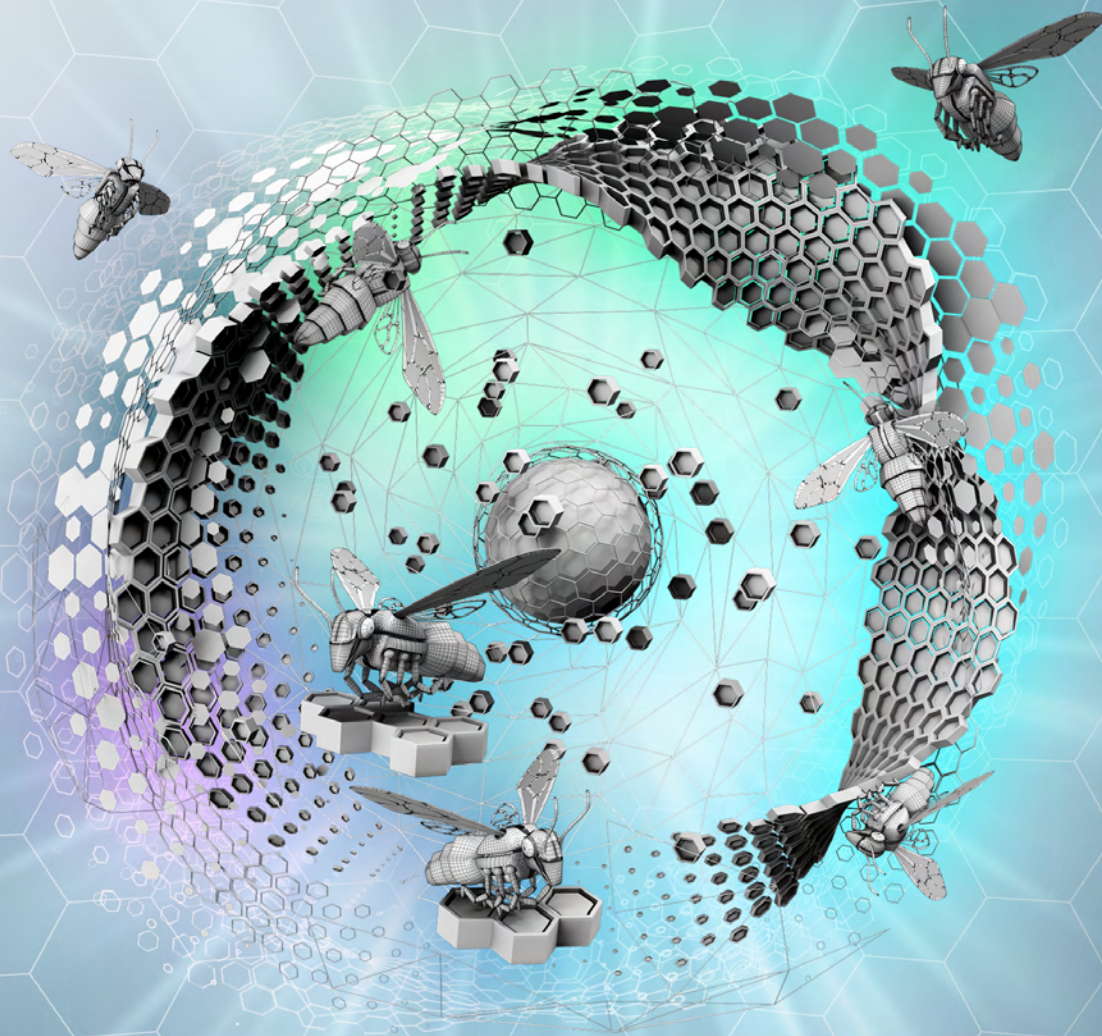


Tech Trends 2022





Blockchain: Ready for business



BLOCKCHAIN
AT SCALE

Maturing technologies, standards, and delivery models are driving enterprise adoption.

USE CASES BEYOND
WALL STREET

As businesses experiment with blockchain, creative use cases are cropping up in multiple industries.

LEAD WITH
NEED

Incumbents and startups alike must lead with genuine needs to realize business benefits with blockchain.

TREND 3

Blockchain: Ready for business

Distributed ledger technologies are changing the nature of doing business and helping companies reimagine how they manage tangible and digital assets

Trendy cryptocurrencies and nonfungible tokens (NFTs) capture media headlines and the public imagination, but these and other blockchain and distributed ledger technologies (DLTs) are also making waves in the enterprise. Much like the TCP/IP protocols that provide underlying support to enterprise network communications, shared ledgers could eventually become an integral, if invisible, foundation of business operations, allowing established industry leaders to expand their portfolios and create new value streams and enabling startups to dream up exciting new business models.

Blockchain and DLT platforms have crossed the disillusionment trough of the hype cycle and are well on their way to driving real productivity. They are fundamentally changing the nature of doing business across organizational boundaries and helping companies reimagine how they make and manage identity, data, brand, provenance, professional certifications, copyrights, and other tangible and digital assets. In fact, while companies canceled purely speculative blockchain projects during the pandemic, they doubled down on those delivering proven benefits.¹

When [Tech Trends last discussed blockchain](#), we explored the need for standardized

technology, processes, and skill sets to clear the path for adoption and commercialization.² Today, technical advancements and regulatory standards, especially in nonpublic networks and platforms, are helping drive adoption by organizations beyond financial services. Maturing technology and platforms are helping advance progress by supporting interoperability, scalability, and security. As enterprises get comfortable with blockchain and DLT platforms, creative use cases are cropping up in many industries, fundamentally transforming the nature of doing business across organizational boundaries.

Blockchain at scale: Evolving technologies and standards

First-generation blockchain and DLTs have proven the feasibility of such applications as cryptocurrency trading, clearing, and settlement—but they have also proven to be slow, energy-hungry, and impractical to scale.

At first, the market teemed with numerous platforms and protocols. However, it lacked technical or process standards and, without interoperability, enterprises could not interact across multiple platforms. Early use cases were constrained to the simple transfer of value from one party to another. Users couldn't create conditional transactions or contingencies that would allow parties to agree on terms.

In addition, adoption was limited by unique challenges associated with transaction verification. For example, cryptocurrencies and

other use cases verified transactions using the proof-of-work consensus mechanism, a complex and lengthy computational process that consumes high amounts of energy and has high per-transaction fees and slow transaction times—10 minutes or more for each transaction.³

Such challenges are typical of the early stages of adoption of most technologies, and entrepreneurs, enterprises, and academic institutions set out to industrialize blockchain and other DLT platforms. Today, maturing technologies, evolving standards, and new delivery models are boosting enterprise adoption. For example:

Nonpublic and permissioned networks.

Many early DLT platforms are low-trust public networks in which anyone can participate. As a result, these networks often include fraudulent members and lack complete privacy and anonymity.

Today, risk-averse enterprises have more trusted, secure options: nonpublic (i.e., private) networks, which only allow select, verified members to participate; and permissioned networks, which anyone with a verified identity can join, with member activities controlled via permission-based roles.

Technology improvements. A growing emphasis on usability and speed permits practical use cases not supported by first-generation applications, including the ability to set up self-executing contracts and contingencies. New types of cryptographic processes for verifying transactions consume far less energy than the proof-of-work process and have eliminated bottlenecks, enabling speedier transactions and lower per-transaction fees and energy consumption. For example, the proof-of-authority consensus mechanism is used to verify transactions in many of the private and permissioned networks favored by enterprises.

Improved interoperability. Many DLT platforms suitable for enterprise use have emerged. Polkadot, Cosmos, Wanchain, and many other new protocols and platforms enable enterprises to connect multiple blockchains and seamlessly interact, collaborate, share, and make transactions with multiple entities across numerous platforms. This allows organizations to develop foundational infrastructures that support multiple use cases and customized applications. Architecture, consensus mechanism, token type, and other characteristics vary among platforms, and organizations may need to explore more than one, depending on objectives and use case.

Technology and innovation ecosystems.

With the increase in the number of DLT platforms, innovation has grown in tandem, and an extensive, vibrant ecosystem has emerged. Its participants are developing decentralized apps that provide such specialized functions as identity management and supply chain management.

Today, maturing technologies, evolving standards, and new delivery models are boosting enterprise adoption.

Blockchain beyond Wall Street

Enticed by the promise of safer, more efficient transactions, the financial services industry has been leading the way in leveraging blockchain and other DLT platforms.⁴ But the benefits extend far beyond Wall Street, especially in uses cases in which multiple organizations access and share the same data and need visibility into transaction history. Typically, this is an expensive, inefficient

process lacking trust and security. As the potential emerges for blockchain and other DLTs to bolster the efficiency of business operations and create new ways of delivering value, many forward-thinking companies in other industries are implementing and integrating these technologies into existing infrastructures and road maps.

In fact, the vast majority of participants in [Deloitte's 2021 Global Blockchain Survey](#) (80%) say their industries will see new revenue streams from blockchain, digital assets, and/or cryptocurrency solutions.⁵ And global spending is soaring, with one research firm predicting that it should increase from US\$5.3 billion in 2021 to US\$34 billion in 2026.⁶ According to another analysis, banking leads in blockchain adoption, followed by telecommunications, media, and entertainment; manufacturing; health care and life sciences; retail and consumer goods; and government. Retail and consumer goods

are projected to see the fastest growth in blockchain spending between now and 2024.⁷

Use cases gaining traction include:

Self-sovereign data and digital personal identity.

Leveraging blockchain and other DLT platforms for secure storage and management, users can establish ownership over their personal data and create and control their own tamper-proof digital identities. This can enhance the security of personally identifiable information and prevent the creation of counterfeit or stolen identities. Applications include contact-tracing, electronic health records and credentials, and electronic voting.

Trusted data-sharing among third parties.

As discussed in [Data-sharing made easy](#), data access and sharing among third parties are typically restricted due to technology silos and privacy concerns. Private

and permissioned DLT platforms enable organizations to securely interact with and exchange data, ensuring that verified, trusted third parties have only the specific levels of data access needed. Without sacrificing data integrity or privacy, organizations can share data across company and industry boundaries and enhance collaboration and trust among ecosystem partners. For instance, secure data-sharing among health care providers could improve the exchange of patient health information; in the intelligence community, it could facilitate the exchange of threat intel and other actionable information across agency and international boundaries.

Grant funding. For both funding agencies and grantees, blockchain and other DLT platforms can help reduce the administrative burden associated with monitoring and reporting financial and performance results. One study of federal agency initiatives found that using blockchain to

make, track, and monitor grant payments enhanced the quality and transparency of grant reporting and improved the efficiency of payments and reporting.⁸

Intercompany accounting. Intercompany clearance and settlement—especially for large global organizations or those with numerous legal entities—often involve multiple enterprise resource planning systems, spreadsheets, and manual processes; reconciliation frequently is delayed for many weeks after the transaction is complete. Blockchain and other DLT platforms can improve traceability, transparency, and auditability of intercompany transfers accounting, especially in mergers and acquisitions, by validating and creating a shared, immutable record of transfers.

Supply chain transparency. In today's global supply chain, blockchain and other DLT platforms can improve product-tracking and

traceability to reduce counterfeit products and illegal or inferior ingredients and components; ensure the provenance of items such as turkeys, diamonds, and wine; and help governments enforce tariffs and trade policies. It can also help track assets and shipments, allowing for more transparency throughout the procurement process, from purchase orders and logistics to invoicing and payments.

Customer and fan engagement. Selling NFTs as collectibles enables people and organizations to build digital communities, engage fans and customers, and build their brands. When COVID-19 restricted live sports and entertainment events, NFTs helped entertainers and sports personalities, teams, and leagues diversify revenue and stay in touch with their fans and customers.⁹ And when used for event ticketing, blockchain and NFTs have the potential to eliminate ticket fraud and scalping.

Creator monetization. Artists, writers, inventors, and other creators often struggle to prove ownership of and monetize intellectual property (IP) through licensing, patents, and copyrights. With blockchain and other DLT platforms, content creators can embed their IP with a smart contract that's executed every time the IP is downloaded. The contract can trigger an automatic payment and flex based on user identity; for example, a large enterprise would pay more than an individual consumer.

Lead with business and customer need

It's possible to draw an analogy between today's DLT platforms and the internet of the mid-1990s—and to the change that the internet brought to business processes across industries and ecosystems.

Consider that in its infancy, the internet was slow, ugly, and misunderstood. Some legacy companies ignored it—after all, they reasoned, there's no market for online shopping or movie streaming. Many startups, on the other hand, enthusiastically joined the party, adding the “.com” suffix to their business names and spending lavishly on business and product launches.

Both of these fairy tales ended badly. However, for every market leader that ignored the internet and fell by the wayside, another savvy incumbent eventually became an online giant. And while internet startups with unsustainable or flawed business models didn't survive the long haul, those with solid business strategies and execution became wildly successful. When the dust of the dot-com era settled, the companies left standing were the ones that built—or rebuilt—their business models around tangible business and customer need.

The current state of blockchain and other DLT platforms is not unlike that of internet in 1997: clunky, with an inadequate user interface, but with lots of possibility for enterprise applications. Like the internet, they're helping businesses and organizations streamline business processes and operations and drive value through the creation of new digital business models. Their ability to build trust outside of organizational boundaries without the use of traditional intermediaries profoundly changes the way value can be created and delivered—and, like the internet, they're transforming how business is conducted across industries and ecosystems. Within a single organization, change can be challenging; across multiple organizations and industries, it likely will be several orders of magnitude more difficult. As barriers to using DLTs fall, both incumbents and new entrants that are *leading with business and customer need* are able to navigate this transformation more smoothly.

Many entrepreneurs and startups are working to identify new customer use cases and develop and gain investors for new business models based on blockchain and other DLTs. For example, startups have created shared ledger-based authorship, and ownership platforms can solve challenges around copyrights, attribution, rights management, and royalty payments that artists, writers, and musicians face.¹⁰ But established market leaders aren't sitting idly while these technologies disrupt their industries. Instead, they're embracing DLT-driven business models and leveraging their reputations as trusted providers. For instance, Microsoft leans on blockchain to provide a record of royalty agreements and payments for its gaming partners.¹¹

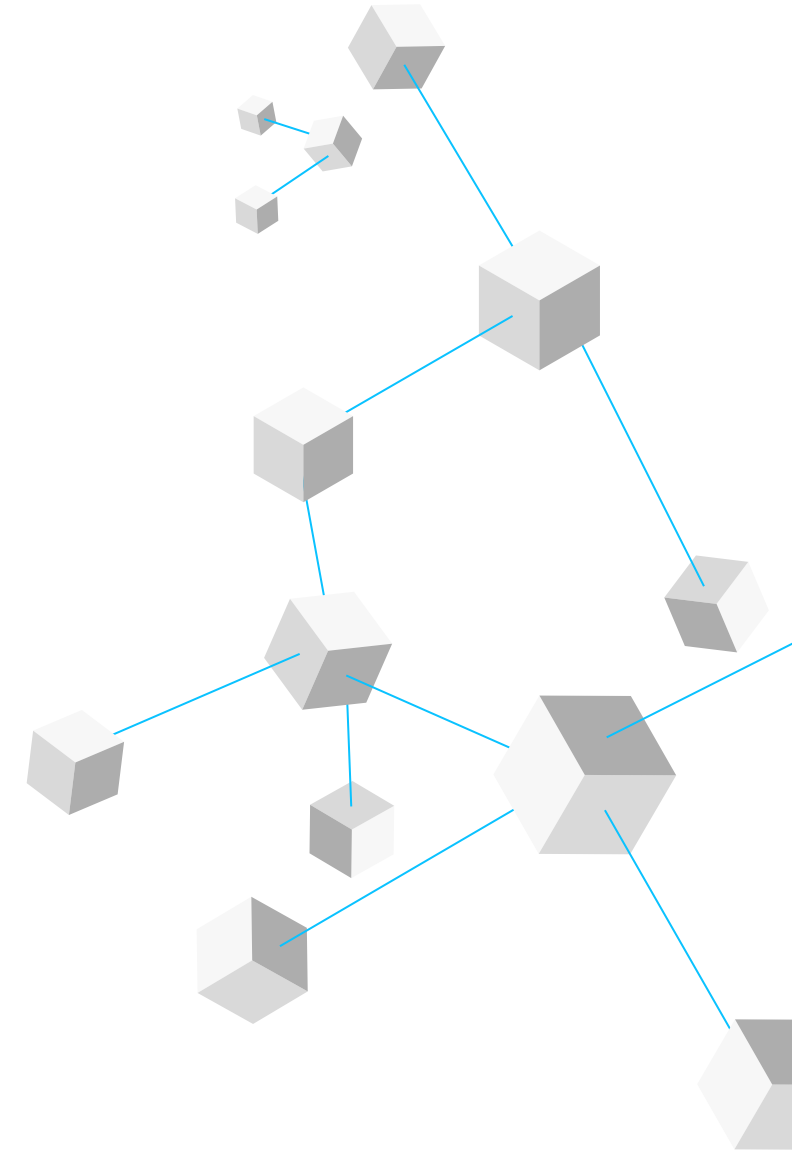
The way forward

Today, maturing technologies, evolving standards, and new delivery models are

boosting enterprise adoption of blockchain and other DLT platforms. A plethora of enterprise use cases continues to emerge, providing organizations across industries the ability to develop new business models that transform value creation of all manner of physical and digital assets and streamline business processes across organizational boundaries. As confidence in the shared ledger grows, could the collective on-chain record one day be viewed as a more credible assertion of truth than an off-chain record?

Innovative business models can help startups break new ground and enable legacy enterprises to evolve or supplement existing business strategies to maintain their reputations as trusted brokers within the "trustless" shared-ledger ecosystem. To be successful, newcomers and old timers alike will likely need to first identify legitimate customer or business needs.

As organizations leverage blockchain and other DLT platforms to drive new business value, they likely will need to understand which platforms and protocols are the most relevant for their industries and use cases, and future-proof existing enterprise architectures to operate in multiple platforms. Finally, to support the cross-organizational and industry transformation that these technologies and platforms will bring, organizations can cultivate a sense of urgency in improving or changing business processes and bolster change management capabilities.



LESSONS FROM THE FRONT LINES

Caisse des Dépôts scales up blockchain programs in French finance

Caisse des Dépôts et Consignations, a public financial institution in France, has established several mature blockchain initiatives. While many companies are still trying to figure out what blockchain is and how it might be useful, the 205-year-old organization is using blockchain to unlock both new opportunities and new ways of operating.

But getting there didn't happen overnight. When Nadia Filali, head of the blockchain and cryptoassets program at Caisse des Dépôts, first heard about Bitcoin and the security protocol that underpins the cryptocurrency in 2015, she recognized the opportunity but knew it would take a team with diverse expertise along with a broad ecosystem of partners. "You can't work on blockchain alone," Filali says. "You have to collaborate."¹²

After talking to several other financial institutions and blockchain startups, Caisse des Dépôts partnered with 10 other organizations to launch LaBChain, a consortium dedicated to exploring opportunities using distributed ledger technologies for the financial services sector. Once all members had a common understanding of the technology through trainings and experiments, LaBChain enabled them to develop proof-of-concept projects on use cases such as collateral management, shared know your customer (KYC), and Euro tokenization. Now with more than 35 members, including regulators and researchers, LaBChain has become a gateway into the French blockchain ecosystem. "The point was to create a *do* tank, not only a *think* tank," Filali says.

If one mission of the blockchain and cryptoassets program is to support the adoption of the technology, another is to explore potential applications for its business units and clients. Filali assembled an internal team who understood blockchain and its potential impact, including people from the legal, IT, and finance units, and began implementing solutions. Her team and their extended network are now able to develop in-house blockchain products, consult with regulators, and guide other public institutions in

adopting blockchain. Their work has led to partnering with the EU Blockchain Observatory and Forum, and Filali chairing the board of INATBA, the International Association for Trusted Blockchain Applications, since April 2021.

Filali's team is also working on a broader project related to digital identity. Along with the French postal service and two energy companies, Caisse des Dépôts founded a startup called Archipels, which provides document certification services. Energy providers can submit the hash (proof of existence) of their certified bills in Archipels' blockchain. This allows banks or administrators to verify the documents provided by their clients and reduce fraud. Archipels currently holds more than 20 million document hashes, creating and updating entries in its ledger. Filali expects this first service to lead to a larger array of identity verification services, such as digital wallets.

Each of these initiatives required heavy coordination between Caisse des Dépôts and French government ministries, business associations, and banks. Filali says any large-scale blockchain project is likely to interact with such institutions, and building an eager coalition of partners is critical. "Sponsorship by our top management was really important for us to grow," she notes.

Building such partnerships may be getting easier as blockchain continues to mature. In 2019 and 2021, the French parliament passed a series of cryptocurrency regulations. These require crypto-services companies to register with financial regulators and comply with anti-money laundering and KYC rules, among other obligations. In a way, Filali says, this has given crypto and blockchain greater legitimacy. Now, institutions that were previously skeptical are looking for ways to engage with these digital assets and exploring concrete use cases in tokenization and self-sovereign identity.

"It's like the planets aligned," Filali says. "We have the energy. We have the competencies. And people understand that if you don't act now, you may miss your opportunity."

The blockchain is forever for one jeweler

Chow Tai Fook, a Hong Kong-based jeweler, is one of the largest diamond sellers in the world. By definition, the company buys and sells physical assets—but that doesn't mean it can't take advantage of emerging digital tools. It currently operates digital sales and marketing platforms, utilizes customer data analytics, and automates much of its production lines. Now it's adding blockchain to its digital portfolio.

One of the main value propositions of Chow Tai Fook's products is the fact that it sells diamonds that are certified by the

Gemological Institute of America (GIA) and that meet the requirements of the United Nations' Kimberly Process, which establishes guidelines for ethically sourcing diamonds. The problem is that less scrupulous sellers regularly skirt these standards, allowing them to sell diamonds for lower prices, and consumers have trouble telling the difference.

This is what led Chow Tai Fook to establish a blockchain that digitizes all of its diamonds' certification information. After cutting and polishing each diamond, the jeweler laser engraves it with a serial number that references a specific entry in a two-party blockchain ledger maintained by Chow Tai Fook and GIA. This preserves an immutable digital record of the diamond's most important information, including provenance and grade. Customers can bring the diamond into a jeweler to have them look up the serial number and associated record, and then access this record through a dedicated mobile application.

"That's how we protect our customers," says Jade Tin Hei Lee, general manager of business analytics and technology applications at Chow Tai Fook Jewellery Group. "With blockchain, they have full transparency into the journey and the quality of their diamond."¹³

Putting this information on the blockchain also helps Chow Tai Fook with its own internal processes. The company has over 5,000 individual jewelry stores, around 65% of which are owned and operated by franchisees. Together, these stores process around half a million diamonds each year, with most diamonds of 0.3 carats or above coming with their own certifications. Matching every diamond that passed through each of these stores to their certifications used to be a more difficult process. Now it's as simple as matching a serial number on a diamond to a blockchain ledger entry.

The company is looking to extend its use of blockchain to ease financial transactions.

Franchisees sometimes require bank financing to cover the cost of inventory purchases, and banks need to see information about a store's sales, revenue, and other performance factors before giving that financing. Chow Tai Fook is currently looking into how it can put a franchisee's data into a blockchain ledger to speed up the process and help stores acquire the inventory they need when they need it.

"We aim to use blockchain to store that performance information so the banks can easily verify it," Lee says. "We hope this can help franchises operate more efficiently."¹⁴

Diamonds are a highly illiquid asset. They have substantial value but can be harder to buy, sell, and trade than assets such as cash or stocks. But Lee says creating a digital record of their value helps decrease some of the challenges. It also helps attract a younger generation of buyers, who are more likely to trust digital certifications. Meeting the expectations of

this younger, more digitally savvy customer base is a key priority for the company.

“Even though Chow Tai Fook is a 92-year-old company operating in an industry that’s even older, it’s important to leverage technologies like blockchain to take advantage of emerging opportunities,” says Lee. “We’re an old company, but we keep innovating over the decades.”

How blockchain went from mystery to mainstream at the US Treasury

The US federal government is committed to tracking every dollar it spends, more so than most typical enterprises. Transparency and accountability are paramount when dealing with taxpayer money. For that

reason, the Treasury Department is investigating how blockchain may enable a new generation of more automated record keeping.

Each year, various federal agencies send out billions of dollars in grants. Recipients of these grants often use the money to make their own grants to smaller subgrantees. Every penny must be tracked as it passes through each organization. Historically, this has meant a large amount of reporting and paperwork for grant recipients.

To alleviate some of this burden, the US Department of Treasury’s Bureau of Fiscal Services is working to develop a blockchain solution to make the process of distributing grants and tracking the flow of money simpler. The project essentially turns grant payments into digital tokens that represent actual money. Recipients can either redeem the token with government agencies for cash or divide it up and distribute to subgrantees, who also would be able to turn their token into

actual money. Along the way, each token transaction updates a blockchain ledger with information about how much money was transferred and for what purpose.

Most of this information is automatically generated, which means the process stands to replace much of the reporting that grantees and subgrantees must do when receiving government funding. Some estimates suggest that research institutions spend upwards of 44% of their time on administrative tasks such as reporting. Using blockchain to track payments could eliminate much of this.

“We’re able to attach the funding element with all that grant information,” says Craig Fischer, innovation program manager at the Department of the Treasury.¹⁵ “We know who it’s from, what it’s for, [and] the intent of the funding. It has that entire history baked in. With blockchain, recording is reporting.”

The project is still at the proof-of-concept (POC) stage. Right now, the application can tokenize grants and record grants and subgrants in a blockchain ledger. It needs the final piece: an all-purpose API connecting the blockchain ledger to legacy downstream payment systems.

The grant payment project builds on other blockchain POCs Fischer and his team have already run. The first was a project to use blockchain to track phones used by employees. The second managed software licenses to track which employees were still actively using a license and which licenses could be restocked.

Fischer says each of these initiatives has been geared toward raising the profile of blockchain within the department and demonstrating that it has use cases beyond cryptocurrency. There are several challenges to using blockchain in a government agency.

For one thing, Fischer says he's not aware of any other mature blockchain payment projects in the federal government, so his team must design and develop supporting processes like access control and security standards.

But Fischer is confident that their POCs are building real traction for the use of blockchain across the federal government. Initially, the hardest thing was educating people on what blockchain is. Now people are starting to get it and he can focus on demonstrating value.

"It used to be important to say, 'I'm using blockchain to solve this problem.' Now it's just 'I'm solving this problem,'" says Fischer.

MY TAKE

Andre Luckow

PhD, head of emerging technologies, BMW Group IT



Two decades of working and studying emerging technologies have taught me to recognize the difference between hype and hope—between the technologies that are truly transformative and those that are not.

In 2018, I was asked to consider potential use cases for blockchain, when it was at the peak of its hype cycle. Naturally, I approached the topic with a dose of healthy skepticism. But as our organization narrowed down the possibilities, we found the right use case for transformation.

I see business problems through the lens of data, and one part of the BMW Group's operations that needed better data was our complex supply chain. We produce approximately 10,000 vehicles a day in 31 plants across 15 countries, leveraging a complex global supplier network. Not so long ago, we still relied on spreadsheets and email. Fraud, limited visibility into second-tier suppliers, and

mismatch of supply and demand were common issues that had the potential to cause production disruption and quality issues. My team started with a proof of concept that allowed the BMW Group and a handful of suppliers to share supply chain data more easily over a blockchain. Real-time visibility, shared among all supply chain members, prevented overstocking and shortages. The transparency not only benefited us with more information about part origins but also enabled our suppliers to uncover improvement opportunities.

After displaying our prototype to our leadership and supplier partners, the BMW Group saw the clear business opportunity and invested in scaling up our blockchain work to more suppliers. The initiative, formally known as PartChain, has enabled nearly seamless transparency and impacted broader data-sharing initiatives such as the [Catena-X](#), Automotive Network e.V.

Catena-X creates a collaborative data ecosystem along the automotive value chain, enabling businesses such as OEMs, small and medium enterprises, and recycling companies to take full advantages of a secure data-based economy. By all accounts, the technology has proven fruitful in inspiring initiatives that accelerate data visibility across our value chain.

We are also exploring use cases for blockchain that begin to improve the driver experience. Despite our advances in manufacturing and supply chain, selling or renting cars to consumers is still a fraught, paper-laden process. We recently partnered with the German government to use blockchain as a means of federating driver's licenses and simplifying the purchase process. Self-sovereign identity allows German citizens to verify their licenses frequently with ride-sharing or insurance companies with minimal friction and maximal

security, while providing sellers an easy way to reduce identity fraud. In the not-so-distant future, we expect buying a car could be as easy as scanning a QR code.

Looking back on the hype around blockchain in 2018 and the progress the BMW Group has made since, two things are clear. One, blockchain is transformative, and one day we will be using blockchain-based technologies without even realizing it because of the potential they have to build better business processes and customer experiences. Two, the transformation may take longer than anyone anticipated. Businesses need to adopt broader thinking as to which new markets or ecosystems can be supported and simplified through blockchain; they need to ask the right data-driven questions to find their appropriate use cases. If we push the technology forward from all sides, we're bound to see even more great ideas surface.

EXECUTIVE PERSPECTIVES



STRATEGY

CEOs have the unique opportunity to work with their IT leaders to understand the art of the possible when it comes to blockchain technologies. Today's advances in blockchain technology are akin to the adoption of TCP/IP protocols for the internet 30 years ago. Though broad understanding of blockchain technology is still limited, the possibilities for impacting business models are vast. Just as databases enabled business process reengineering within organizations, DLTs enable streamlined processes between organizations. CEOs need to decide how early they want to be on the adoption curve.



FINANCE

Although many CFOs have acknowledged the theoretical utility of blockchain and other digital ledger technologies, they have been hesitant when it comes to full-scale adoption. CFOs can use agile techniques to test DLT use cases to become more confident in their efficacy and safety. They can work closely with IT leaders to identify test cases, deploy experiments, and monitor results. Once use cases are successful, organizations can review the regulatory and financial risks before scaling to enterprise and inter-party adoption.



RISK

Enterprise adoption of blockchain is not yet widespread, and an understanding of the technology's risks is still nascent. Chief risk officers should collaborate with IT to improve their organization's readiness for emerging tech. They can build road maps for adoption and identify use cases for blockchain, as well as proactively reduce risks. New applications of cryptography, for example, can vastly improve the efficiency and reliability of transaction verification, while blockchain-based digital identity solutions can enhance the security of sensitive transactions. Moreover, the blueprints used for blockchain readiness can be applied to further adoption of emerging tech, such as quantum computing.

ARE YOU READY?

3

KEY QUESTIONS

1

What new delivery models, revenue streams, or business process improvements could be unlocked by maturing blockchain and DLT platforms and standards?

2

How could decentralization improve the way you communicate, collaborate, and exchange data with other organizations or ecosystem partners?

3

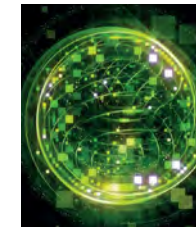
Can you identify opportunities to build or increase customer trust by using blockchain to ensure the transparency and traceability of product or service development, creation, and distribution?

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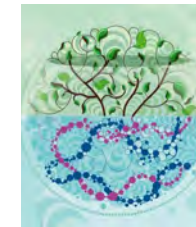
2021 Global Blockchain Survey

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The rise of using cryptocurrency

[Consider](#) the benefits of crypto and other digital assets for investment, operational, and transactional purposes.



Blockchain to blockchains

[See](#) how coordination and integration of multiple blockchains can work together across the value chain.

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