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Capturing the Value of Blockchain

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AT A GLANCE

This report describes how companies can unlock business value from blockchain by adopting a two-step approach.

Blockchain Is the Next Big Thing for a Reason

Blockchain's potential to create new business models, boost operational efficiencies, mitigate risks, and deliver social impact is driving investor interest, especially as these benefits become better understood.

Organizations Can Grow Value in Two Main Ways

Depending on their ambition, resources, and ability to build critical mass, businesses can use blockchain technology to pursue incremental wins based on linear value growth or go for disruptive plays that leverage network effects.

Blockchain Can Yield Wide-Ranging Benefits Under the Right Conditions

Examples from across industries suggest that both incremental wins and disruptive plays can deliver significant value if organizations take a long-term view, focus on critical pain points, and establish the right strategic and operational supports to drive broader adoption.

Few doubt the disruptive potential of blockchain—certainly not investors, who continue to pour record-breaking sums into the space. In 2018, blockchain-related venture capital funding soared to $3 billion, up from nearly $1 billion in 2017. However, the much-publicized turbulence in bitcoin and other cryptocurrencies led to a softening of some blockchain investment classes, as evidenced by the decrease in market value in pure-play blockchain companies, private investments, and newly founded blockchain ventures.

Companies and investors are wrestling with the challenge of how to unlock the technology's value. Just as it took a while for organizations to figure out how to turn the power of the internet into productive avenues for growth, it is taking time for today's businesses to understand how to marshal blockchain's capabilities into tangible and sustainable sources of value. Despite growing interest in the technology, business leaders remain unsure of how to identify the building blocks needed to implement a new standard and ensure meaningful returns from their investment.

With the aim of providing more clarity, we examine how blockchain can create value and explain the different growth trajectories that value can take over time.

Blockchain refers to a database infrastructure that is distributed and shared among network participants.

Understanding the Disruptive Potential of Blockchain

Blockchain refers to a database infrastructure that is distributed and shared among network participants. Blocks of data entries and transactions are chained together and stored in an immutable form, allowing participants who are authorized to access the network to view and add information but prohibiting alterations to existing records. Sophisticated cryptography and key management ensure data integrity and authenticate participants.

What makes this technology special? Traditional data-centric business models often depend on one central authority vested with decision-making power and control over all data stored in a given database. As a result, other parties must simply accept, without tangible proof, that the information shared is complete, credible, and accurate, and that the central authority has not used their data for its own benefit. While variations exist, most blockchain engines allow transactions to be executed and ownership to be shared in a peer-to-peer relationship, with multiple identical copies of the data stored in separate nodes of the network, and with the owners of the data and digital assets strictly controlling permissions for who can access what. The technology's consensus mechanism ensures that these copies cannot be retroactively altered and authenticates the digital assets underlying each transaction. In

this way, blockchain does away with a central authority and serves as a single source of truth, enabling parties to read and write to a common database that all participants can trust.

Blockchain technology has the potential to displace intermediaries, such as banks, brokers, and notaries.

The disruptive implications of these features are far-reaching. Blockchain technology has the potential to displace intermediaries, such as banks, brokers, and notaries, whose business models are predicated largely on providing independent third-party verification. By enabling greater transparency across the network, blockchain could also disintermediate market arbitragers, price-reporting agencies, benchmark providers, and others whose businesses create value by capitalizing on information asymmetry. Blockchain's structure and capabilities support end-to-end automation and easy data sharing across companies, and greatly reduce manual reconciliation efforts. In addition, anywhere, anytime access to complete transaction histories can significantly improve regulatory and audit compliance, decreasing the associated costs and boosting response times. Finally, blockchain technology enables "smart" contracts, with which contractual obligations can be enforced through predefined software code that requires no human interaction.

The four primary sources of value that blockchain use cases can deliver, and which businesses can mix and match in different ways, include:

- **New Business Models.** Blockchain-supported innovation can help businesses create new revenue streams. In the energy sector, for instance, blockchain platforms can help individuals and entities trade excess energy stores autonomously and in near real time over the grid. Blockchain innovation can also allow product companies to move up the technology stack and expand their portfolios with higher-value service offerings, such as track and trace or analytics services based on data captured by blockchain.

- **Operational Efficiency.** Blockchain enables process automation and the removal of unnecessary intermediaries to help organizations improve productivity and performance. It also supports audit and regulatory compliance, generating significant time and cost savings. The use of smart contracts, for instance, can automate routine business functions, such as invoice generation and reconciliation, customs clearance, and property title transfer. According to the *Economist*, Santander Bank, for example, believes that financial institutions could generate $20 billion in savings by applying blockchain to streamline and automate many back-office activities.

- **Risk Mitigation.** Companies can use blockchain-related applications to improve tracing and authentication across the supply chain. Better provenance and transparency throughout the supply and distribution chain, for example, could reduce counterfeiting and associated health and safety issues from fraudulent parts, thus mitigating financial and reputational damage. (BCG will address this topic in a forthcoming article.)

- **Social Impact.** Blockchain platforms can be used to support a wide variety of initiatives, including voting and election management and ethical sourcing. The Democratic Republic of Congo, for instance, is using blockchain capabilities to

build a new e-government platform that will help the country manage its natural resources and social welfare programs. Estonia is pioneering the use of blockchain for securing citizen information and is planning to adopt the technology to support other public welfare initiatives, such as those relating to personal ID and health records.

Determining Which Growth Model to Pursue

Not all blockchain solutions deliver value in the same way. Understanding the two primary growth models for value creation—linear and network effects—is crucial to designing, implementing, and funding successful commercial applications. The models have different timing and growth dimensions.

Linear. Consider the sale of a pen. For a customer, the value of a recently purchased pen lies in gaining the ability to write something on a sheet of paper. Note that the user derives value immediately, and that the value doesn't change—regardless of how many other people start to buy pens. In this growth model, the intrinsic value of an item stays the same even as the customer base grows. Every incremental participant or transaction adds value in a linear way.

Network Effects. The value of other items, such as telephones, takes a very different course as the user base grows. The overall value for the first users of the telephone, for instance, was limited: people could call only the few other users who also had a phone. As the installed base grew and more people acquired telephones, however, the intrinsic value of the telephone rose sharply—and continued to rise with every additional unit sold. Other examples are trading exchanges and social media platforms. In each of these examples, value rises exponentially as the participant base grows.

Deciding Between Going for an Incremental Win or Becoming a True Disruptor

The absolute value potential in linear value-growth models is usually limited to a company's production or sales capacities. But that's not the case in network effects models, where growth is unbundled from production and sales. Given the enormous value that network effects can create, blockchain use cases that deliver such effects have the potential to be true disruptors. In an ideal world, that's where companies should be focusing their attention.

Blockchain use cases that deliver network effects have the potential to be true disruptors.

But implementing true-disruptor use cases is not for the faint of heart. It requires significant financial and technical resources, a high tolerance for risk, the ability to convince a critical mass to join a nascent platform, and an established proof of concept. Businesses must also ensure that anchor participants agree to common data and governance standards. Getting participants to embrace these new standards takes considerable effort—and usually requires the leadership of a large incumbent or industry consortium, or, alternatively, a strong regulatory push.

Companies that cannot meet these criteria are not without recourse, however. They can instead pursue incremental-win use cases, either as a stepping stone or as an end in itself. Incremental wins focus on linear growth opportunities, which are of-

ten easier to manage, carry less financial and implementation risk, and can provide a faster path to growth. Incremental wins can also help organizations demonstrate proof of concept to attract partners, secure venture capital funding, or validate their participation in a blockchain-enabled solution initiated by others.

In evaluating whether to pursue a true-disruptor model or go for an incremental win, companies need to take switching costs—both real and perceived—into account. Most companies have some type of existing data infrastructure that uses a combination of relational databases, software interfaces, and human engagement. And although blockchain systems have the potential to streamline and automate this infrastructure, they still require approaches, standards, and models to validate and share data across various IT systems. The use of open interfaces and shared data models can significantly aid deployment, a matter that business and IT teams should consider in their planning.

Learning from Early Adopters

To explore what it takes to implement a blockchain program successfully and illustrate the type of impact it can have, we examined two pioneering initiatives. One focuses on driving efficiency and social impact; the other focuses on improving risk management and creating a new business model for the diamond industry.

Blockchain helped the United Nations' World Food Programme (WFP) transform its cash transfers, aiding thousands of Syrian refugees. In May 2017, the WFP piloted a blockchain innovation called Building Blocks to provide Syrian refugees residing in the Azraq camp in Jordan with a more secure and efficient way to receive electronic cash transfers. Through the blockchain platform, WFP was then able to authenticate a beneficiary's identity and record the entire transaction history in-house rather than share it with third parties. Using biometric data taken from an eye scanner at the point of purchase, the blockchain platform verified the individual and debited their electronic account for the amount of the sale. Not only did the blockchain platform automatically record the transaction, it stored all associated reconciliation and payment details in a transparent, tamper-proof, and easy-to-audit fashion. That made it easier for WFP program managers to oversee the cash transfers, manage funding, and assess future needs.

Companies must take switching costs into account when deciding whether to pursue a true-disruptor model or go for an incremental win.

Since its launch, Building Blocks has improved the handling of millions of cash transfers, ensuring needy populations receive stable supplies of nutrition. The initiative took a process that used to require people to wait in long lines, paperwork, and manual due diligence into one that took just seconds—providing immediate, linear value growth. In addition, by automating the cash transfer system and eliminating the need for intermediaries, WFP was able to cut transaction fees by a staggering 98%, freeing up funds that the organization could then redirect back into humanitarian relief. The success of the Building Blocks program in the Azraq refugee camp prompted WFP to expand the initiative in early 2018, supporting more than 100,000 refugees residing in camps across Jordan.

In addition, with BCG's help, WFP is now applying blockchain technology to provide new ways of cash assistance to Syrian refugees in Jordan as part of a novel model called New Choice, which could have true-disruptor potential. Unlike the

current cash transfers, in which food and other allocations are predetermined by the WFP, through New Choice, refugees will receive the cash value of those entitlements and more options to redeem them. New Choice relies on blockchain technology, which links different cash-out options, and will allow refugees to keep one account using the Building Blocks platform. Refugees can then gain access to much-needed financial services, such as mobile money and cash back. By collaborating with financial institutions or retailers, New Choice would open financial opportunities and empower vulnerable, unbanked populations to make their own decisions about how best to use their entitlements. If it succeeds in building enough critical mass to create a multiservice financial ecosystem, New Choice could transform humanitarian assistance models (creating network effects) and provide a pathway out of poverty for scores of individuals worldwide.

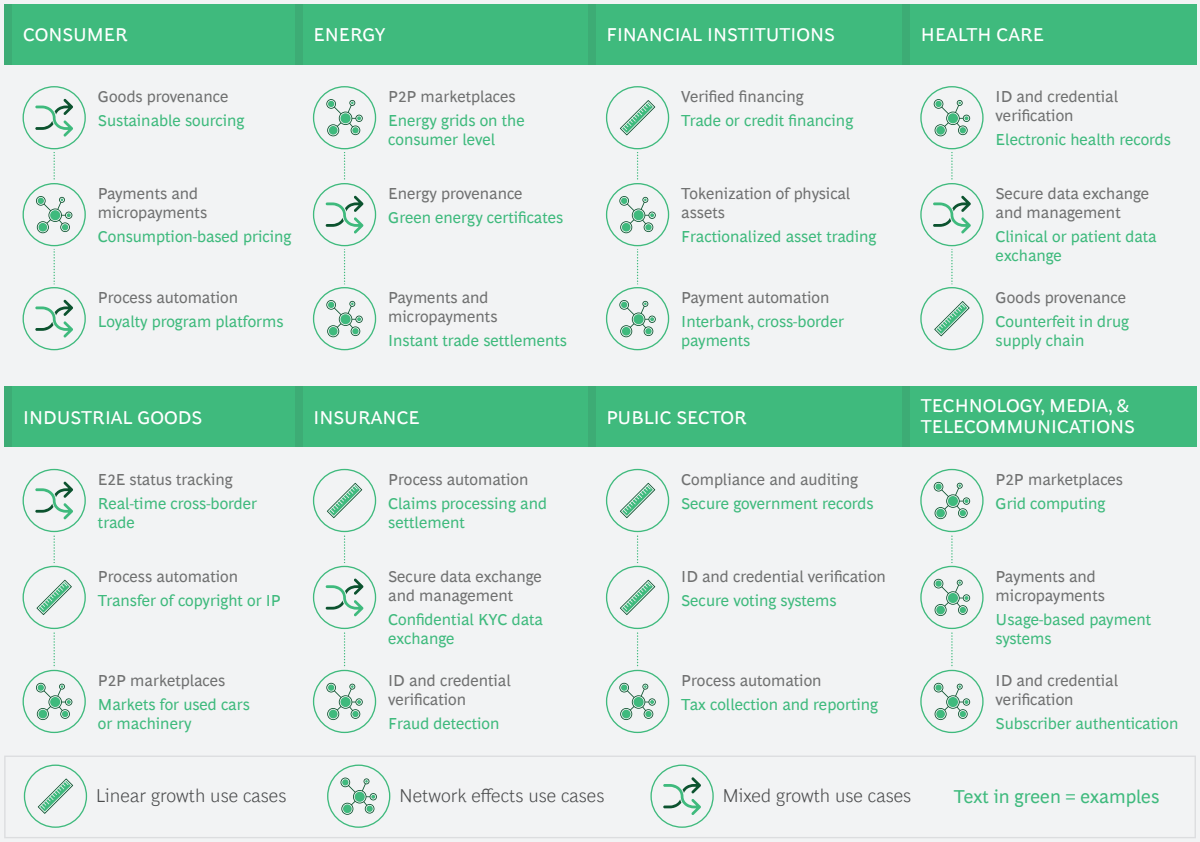
The blockchain platform Tracr provides end-to-end diamond tracing from the mine to the point of sale.

Blockchain-enabled track and trace helps the diamond trade achieve industry-wide benefits. Initiated by De Beers Group, the blockchain platform Tracr provides end-to-end diamond tracing from the mine to the point of sale. It was created to address long-standing issues and provide benefits within the diamond industry—authenticating a diamond's natural creation, provenance, and ethical sourcing. Through blockchain technology, Tracr creates trust among the various industry actors and confidence in the end-to-end traceability of a diamond. De Beers, which provides roughly one-third of the global supply of diamonds by value, was a natural leader for this type of initiative because it had the market position, financial ability, and industry relationships to attract industry players from across the supply chain in developing a solution for the entire diamond industry.

One of the first tasks for the Tracr team was to create a unique digital "fingerprint" for each diamond and then use that information to track and trace the diamond's journey. Working with data analytics experts, the team developed specialized algorithms capable of crunching through reams of sourcing and measurement data to generate identifying signatures that could be attached to each diamond recorded on the blockchain. The team also needed to establish a standardized way for platform participants up and down the supply chain to input relevant data—such as when a diamond left the mine or arrived at a distributor—in order for the platform to serve as a single source of truth. Working in partnership with key stakeholders, the team is creating a comprehensive data ontology that spans the value chain. To spur adoption, the Tracr team is building application programming interface extensions that will allow industry participants to integrate the platform into their corporate enterprise resource planning systems.

Since Tracr's launch, the platform has attracted a broader base of producers, manufacturers, and retailers to pilot and cooperate on developing refinements. Initial results suggest that Tracr's tracking and authentication capabilities hold significant promise. The cross-industry collaboration has proven helpful in building momentum and buy-in. If that momentum continues, Tracr could emerge as an industry platform with the potential to deliver significant value for the industry. Knowing that a diamond is legitimate carries immediate emotional value for the consumer, and the network effects from industry-wide participation in the platform could transform fraud detection, leading to greater trust and improved cost and revenue performance across the diamond trade.

EXHIBIT 1 | The Top Three Blockchain Use Cases by Industry



Source: BCG analysis.
Note: The use cases are listed in order of rank, with the highest-ranked use case on the top and the lowest-ranked use case on the bottom. The ranking is a general assessment only; the value of each use case is subject to individual context. E2E = exchange to exchange; IP = intellectual property; KYC = know your customer; P2P = peer to peer.

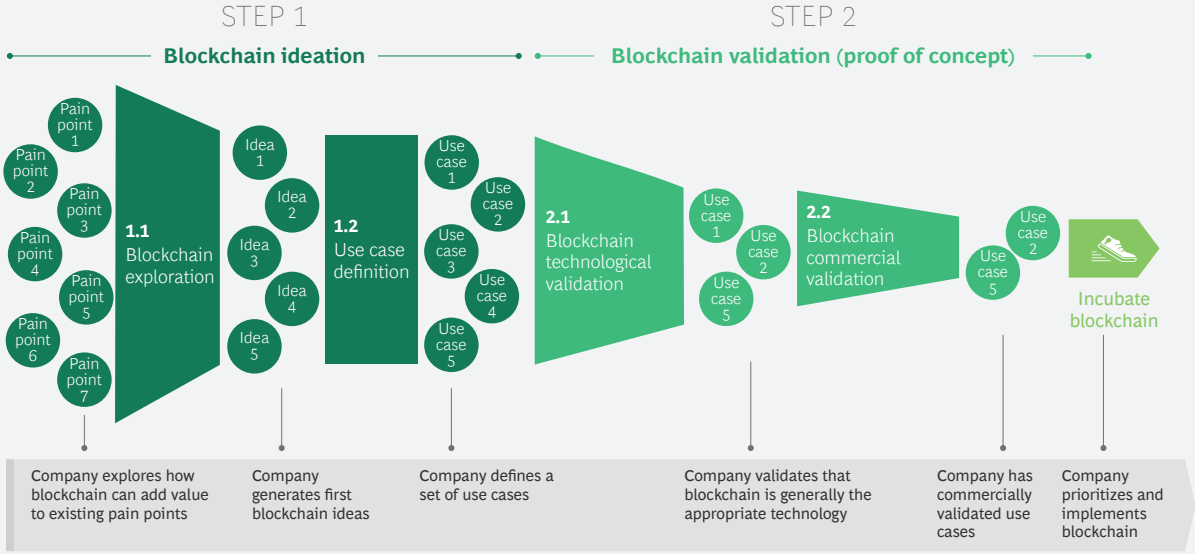
In addition to these two cases, BCG analyzed major trends and pain points affecting key sectors to see where blockchain-related applications could have the greatest benefit. From that work, we identified three of the most promising use cases for each of the selected industries. (See Exhibit 1.)

Getting Started

Blockchain technologies are still new; the list of possible avenues to take are wide; and the operational and partnership requirements to deliver on any of them are often extensive.

We recommend that organizations follow a two-step approach to get around these complexities. (See Exhibit 2.) Step one is ideation. Businesses need to invest time in mapping out current pain points across the whole industry value chain. As part of that process, they should identify ways in which technology and blockchain-specific capabilities could create meaningful value, and then ask themselves what a poten-

EXHIBIT 2 | A Two-Step Approach to Blockchain Success



Source: BCG analysis.

tial use case would look like. To get the biggest payback from blockchain, businesses should target major pain points and prioritize areas that either have high strategic relevance or are costly and inefficient.

The second step is validation. With a set of possible use cases in hand, organizations need to assess whether blockchain is the right technology for the purpose or whether an alternative database solution would be a better choice. As part of that exercise, businesses need to run the numbers and consider what it will take to implement a given blockchain use case and whether doing so would be commercially attractive. Once steps one and two are complete, the validated blockchain use cases are finally ready for incubation.

Companies need to keep in mind that taking a long-term view is crucial to success. Although a business can create a prototype relatively quickly, it takes time to set standards for data and governance, lay the technical foundation, and assemble enough participants to generate real and scalable value. Fully delivering on the ambition of creating an industry-wide platform is a multiyear endeavor. Success also requires close, often intense, collaboration within the company. Strategy, planning, and investment should be coordinated in conjunction with key stakeholders, such as IT.

External collaboration is also critical. For true-disruptor use cases, the company often needs to act as an ecosystem integrator, bringing together diverse players from along the value chain or across industries to coordinate efforts and align interests.

Finally, organizations need to assemble the right people and skills. Bringing a blockchain solution to life requires deep technical expertise in architecture design, data

analytics, cryptography, and other areas. In-depth commercial and industry know-how are also important to identify and prioritize use cases that have significant monetization potential. Guiding the business through the planning and rollout of any blockchain initiative also requires strong leadership to navigate inevitable tradeoffs, communicate value, and coordinate development.

BLOCKCHAIN'S ABILITY TO create trust and transparency, automate transactions, and validate and document items as varied as a person's identity and the provenance of a product is likely to herald a sea change in how businesses operate. As with previous technological shifts, early movers will have a significant advantage in forging partnerships, defining standards, and growing adoption—attributes that are especially important given the limited window to create a leading industry platform. Businesses that invest time in exploring high-value use cases, anticipate what's required to support the likely growth trajectory, and capitalize on the opportunity to disrupt incumbents will reap the greatest rewards from blockchain.

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