



Building your blockchain advantage

Fresh insights on how to create value, scale fast and open new markets

IBM Institute for Business Value

Executive Report

Blockchain



In this report

Case study analysis shows that organizations that focus on designing a minimum viable ecosystem (MVE) with shared value rather than a minimum viable product (MVP) are more likely to be successful with blockchain.

Organizations can benefit by collaborating with industry partners to leverage network effects. A prime example: The TradeLens blockchain-enabled shipping network.

Tokens are a powerful tool for creating new market models—as in the case of Plastic Bank, a blockchain-based solution that unlocks value from wasted plastic.

How IBM can help

As one of the world's leading research organizations, and one of the world's top contributors to open source projects, IBM is committed to fostering the collaborative effort required to transform how people, governments and businesses transact and interact. IBM provides clients the blockchain technology fabric, consulting and systems integration capabilities to design and rapidly adopt distributed ledgers, digital identity, blockchain solutions and consortia. IBM helps clients leverage the global scale, business domain expertise and deep cloud integration experience required for the application of these technologies. Learn more at www.ibm.com/blockchain.

Building a robust business case

As blockchain adoption continues to gather momentum, organizations must approach their blockchain strategies with the same rigor and commitment as any other new and transformative strategies. They can't just fall back on prototypes alone. They need to build a robust business case for blockchain that includes a fair incentive model to attract all the partners required for the success of their networks. New governance models can help scale the network quickly. Monetization strategies will be crucial to generate and recoup investment for the build out of the technology platform and other infrastructure.

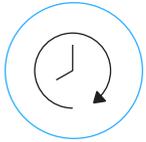
Introduction

From the start, the value of blockchain as a single source of truth was so apparent that forward-thinking organizations didn't hesitate to explore its application.

Blockchain pioneers began to anticipate entirely new paths to value and even new business models that could countermand an era of depleting trust. As organizations tested this capacity for establishing trust, new applications emerged in quick succession.

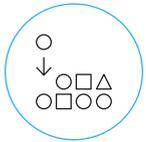
In many ways, blockchain proved its value so readily that the pace of adoption shouldn't surprise. And yet, that momentum is significant. An IBM Institute for Business Value survey of over 1,600 executives across eight industries reveals that more than 60 percent of early adopter organizations surveyed expect to have a blockchain network in production by 2020.¹

Solutions being developed continue to prove blockchain as both a trusted platform for business and a source of economic growth. For example, over half of surveyed C-suite respondents expect the sharing economy, which can only succeed if new means are available to establish the reputation of all parties, to reshape their business models.² Just about one-third of organizations are reallocating massive amounts of capital – an estimated USD 1.2 trillion – to launch new platform business models.³ These new platforms for growth and innovation require a sophisticated and granular orchestration of activities among multiple parties. Here, too, blockchain creates a foundation for trust and a means to scale with less friction.



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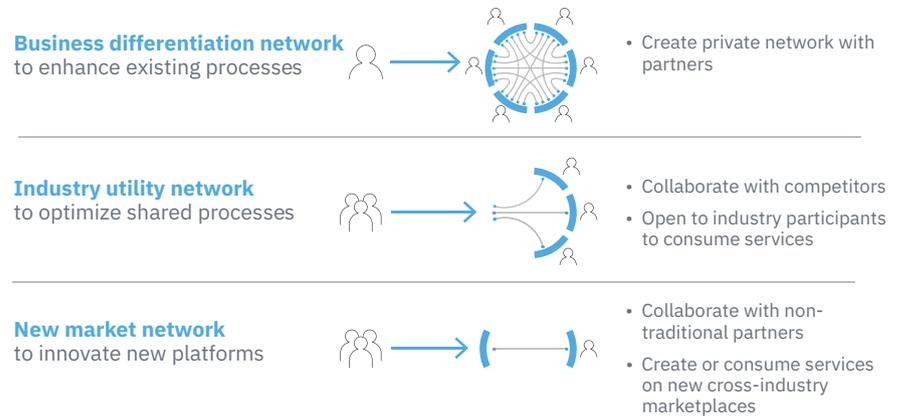
About one-third

of organizations are reallocating massive amounts of capital – an estimated USD 1.2 trillion – to launch new platform business models.

The challenge for enterprises today is to determine early on whether to create enhanced – and likely differentiating – processes on blockchain with their established business partners or pursue another route. Other options include collaborating with others to architect entirely new business models on the blockchain or consuming a service in a network built by others. As we've worked with clients and surveyed the state of play, we've observed three distinct types of networks emerging with different sources of value, with some networks possibly evolving from one type to another (see Figure 1).

Figure 1

The combination of different types of blockchain networks and roles organizations can play opens up a variety of opportunities to create value



Source: IBM Institute for Business Value analysis.

Business differentiation: An enterprise and its business partners establish a blockchain platform to enhance processes.

Industry utility: Competitors in an industry collaborate to resolve issues endemic to the industry, constraining growth and innovation for some time. They do so by optimizing shared processes.

New market: An individual enterprise and its business partners or a new consortium of companies – sometimes spanning multiple industries – create a new business model to tap into underserved or entirely new markets.

This report draws on insights from case study analysis of over 25 blockchain networks in various stages of production across multiple industries and geographies. Detailed analysis of each business case, including its incentive models, governance structure, monetization strategy and market approach, was followed by selected interviews to validate the findings. Here, we reveal lessons learned in three areas:

1. *In search of value:* The importance of designing a minimum viable ecosystem (MVE) and equitably incentivizing all network members.
2. *Getting to scale:* How competitors collaborate to create new value and govern their growth.
3. *Designing for new markets:* New opportunities to change relationships with customers and how to monetize the build out of blockchain infrastructure.

In search of value

Sometimes an abundance of choice isn't necessarily a good thing. Blockchain-based business models are a case in point. While most rules of business model design still hold, there are some unique considerations to designing a successful blockchain network. Because the unit of competition is the network – and no longer a single enterprise – the business case for the network and how it will grow matters as much as, if not more, than the product or service itself.

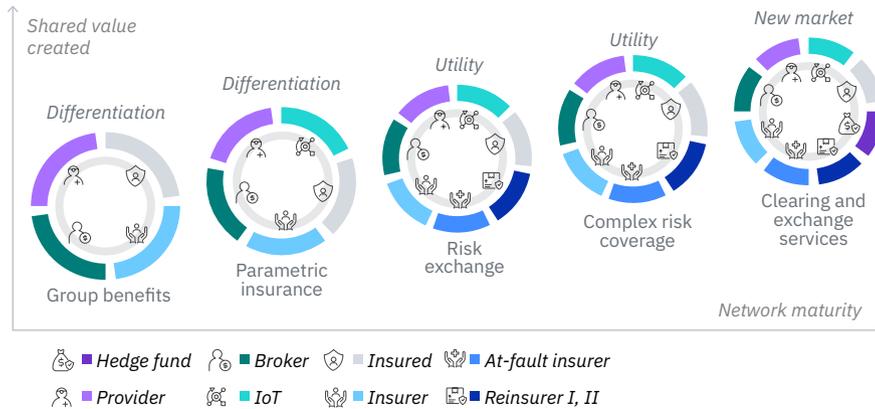
A planned evolution

We've observed that organizations that launch their journeys by first designing and testing minimally viable ecosystems (MVE), rather than minimum viable products (MVP), have a greater chance to be successful. Not all use cases are equal, and organizations may gravitate to use cases that demonstrate the highest value or quickest return on investment. Certainly, early value is one consideration. But it may not be the most important one. Two considerations are more fundamental: use cases that are aligned with how an organization ultimately wants to grow its network and whether an organization can bring all the necessary partners along.

The effects of blockchain network design are both deep and far-reaching. An organization's strategy to grow the network will still be iterative, but its evolution must be carefully planned. If the ultimate objective, for example, is a network for the insurance industry, a family of use cases could include a range of services and offerings, each involving interaction among multiple parties (see Figure 2).

Figure 2

An illustrative roadmap for a blockchain network in the insurance industry



Source: IBM Institute for Business Value analysis.

Because competition is based on a network of partners, not a single organization, founding members of successful networks cast as wide a net as possible to identify use cases that help incentivize members appropriately to join – and remain in – the network. Value must be commensurately shared among members from the outset and as the network evolves. As organizations identify benefits for all members, they may frequently need to rethink the design of the use cases themselves.

Sharing the pie

Traditional benefits can be grouped into three categories: cost reduction, revenue growth and reducing working capital. As in any digital transformation, identifying areas to take out cost may be the easiest exercise, which could be why most early blockchain efforts have focused on stripping out cost.⁴

But even if reducing cost is the primary goal, organizations should look for other types of benefits for members in the network. These benefits should always be correlated with their effort, risks involved and their roles. Other benefits could include brand uplift from reputedly tracking goods on a blockchain, improved reliability – even in industries ripe with fraud – and reducing environmental damage to the communities they serve.⁵

It's not uncommon for organizations to complete their analysis and conclude there's no benefit for some members. More likely, the incentives are simply not apparent, especially if the member itself is not an active participant in the assessment. Most founding members find that it makes most sense to bring potential ecosystem members in early, including them in the identification of benefits and the selection of use cases.

Sometimes, however, the benefits just don't add up equitably. If a member can't quickly achieve an appropriate level of economic benefit, networks look to other types of incentives. There are many ways to reduce costs to bring benefits in line – the network could waive joining fees for some members, absorb the onboarding costs, or provide future discounts or rebates on transaction fees.

This is especially applicable for members essential to the existence of the network as a source of data or because of their “gravitational pull” in the ecosystem. For example, for ports and customs in a trade network, it may be worthwhile to explore other incentive-based systems, such as tokens, which are digital representations of assets, to join the network.

In the Interac distributed energy network, electric retailers and consumers are incentivized to join and sell excess energy to the grid using tokens. In addition to lowering the overall cost of energy for retailers by selling excess capacity on the spot market or reselling to customers at a lower cost, this model helps retailers transition to new platform-based services that facilitate prosumer engagement. By demonstrating a commitment to sustainability, they also enhance their brand reputations.⁶

“Blockchain is like a network technology that does a variety of things. First, it can create a large business network that ties people and entities together; second, it has the core ability to digitize and trade assets; and the third value proposition is that it provides one single shared ledger in a decentralized state so it can cross markets and sectors.”

Oscar Roque, AVP, Mobile Product and Platform Development, Interac

“We firmly believe that the formation of TradeLens as envisioned will result in a much-needed, open, neutral and consistent standards-based solution for our industry. We’re excited to be part of the process.”

Charles Wellins, President and COO, FlexiVan

Getting to scale

Everybody, it seems, is in hot pursuit of network effects. Blockchain-based industry utilities have a fair chance of achieving them. They may also have the shortest runway. By definition, industry utilities are designed to dominate their categories or segments – often by bringing their competitors along. Typically, a utility network creates value by optimizing a shared business-to-business process.

For example, we.trade is a joint venture owned by 12 European banks that developed and licensed the first blockchain trade platform for commercial clients and their banks. The platform provides a secure environment for the banks’ commercial clients to execute import or export transactions in a user-friendly and efficient way.⁷

One danger is that industry utilities, because they often involve collaborating with competitors, may assume they won’t face competition and, consequently, can take their time to scale. In reality, in the fight for utility status, network-to-network competition could be fierce. How network-to-network competition will play out in the future can’t be precisely known. However, picking an industry segment and getting to scale first may be the best way to defend against a competing network from outside the industry or segment.

Starting with strength

For industry utilities, more than any other type of blockchain network, starting with strength is a strategic imperative. Organizations with sizeable shares of their industries from the outset have considerable advantage in achieving the kind of scale that leads to network effects. The social strength of founding members may matter as much as size, and organizations that can more easily attract other members – that have influence in their categories – scale with comparative ease. For example, retail giant Walmart is requiring more than 100 leafy green vegetables suppliers to track their produce on its blockchain by 2019.⁸

Getting to scale before others is a function of the strength of the ecosystem. It depends as well on how the network scopes its use cases. Organizations are learning to start with use cases large enough to drive network effects, but small enough that they aren't too complex to govern.

Network effects are best measured by transaction volume. Once an industry utility has garnered about 50 percent of the transactions on the network, it has likely reached a tipping point. When this occurs, a consortium of banks on a trade finance network might find that, by continuing to build its portfolio of use cases and bringing in insurers, for example, it can quickly scale the number of exporters and importers on its network. Moreover, the sooner an ecosystem begins onboarding subsequent use cases, the quicker it can try to monetize and subsidize its costs.

Governing for the long haul

The biggest challenge for industry utilities may be collaboration with other industry players. Most large organizations are more accustomed to dictating terms to their supply chain partners and others in their ecosystem than collaborating with them. Even though competitors in an industry utility aren't giving away what differentiates them, they often fear that they might do so. This mindset, and the likelihood that few organizations have ever cooperated with their competitors before, makes strong governance a make-it-or-break-it attribute of industry utilities.

Governance covers the business, legal and technical challenges of coordinating activities and growing the network. A well-governed network determines and enforces network policies based on the mutual interests of the community. The governing entity creates rules that determine, among other things, membership, management and regulation of the network (see Figure 3).

For competitors coming together in a utility network, policies defining intellectual property (IP) can be particularly challenging. As a general rule, many networks decide that ownership of IP should be determined by the members that paid for its creation. Policies about licensing the IP outside the network are established at the outset. Because most organizations consider data their most differentiating asset, policies that explicitly guide the sharing of data – who can see it and under what conditions – is as vital as policies that cover IP innovation.

Figure 3

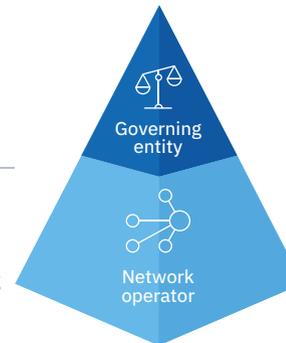
The governing entity manages and grows the network, as well as creates, defines and enforces network policies

Manage working group membership

- Define and enforce the rules of the network
- Set and collect network fees

Run and operate the network, security, performance and capacity management

- Perform technical onboarding and maintain apps
- Provide operational support and helpdesk



Expand the working group by seeking new global members

- Expand network reach by working with other foreign jurisdiction prospects

Build future feature updates into the solution on behalf of members

- Prioritize solution functionality for future releases by working with network members
- Deploy updated solution by working with network members

Source: IBM Institute for Business Value analysis.

Strength in numbers

The TradeLens blockchain-enabled shipping network that recently scaled to more than 100 ecosystem partners promotes more efficient and secure global trade, supports information sharing and transparency, and spurs industry-wide innovation.

Global trade has grown at amazing scale, but suffers from huge inefficiencies and complexities. Whether these include data trapped in silos, contrasting views on transactions or inefficient paper-based processes – the industry and the supply chain partners that support it need transformational change. The TradeLens network is at the heart of making this transformation a reality.

TradeLens is backed by a collaboration agreement between Maersk and IBM and lays the foundation for digital supply chains by empowering multiple trading partners to collaborate – publishing and subscribing to events data – establishing a single shared view of a transaction without compromising details, privacy or confidentiality. TradeLens enables digital collaboration among the multiple parties involved in international trade. Shippers, ocean carriers, freight forwarders, port and terminal operators, inland transportation, customs authorities and others can interact more efficiently through real-time access to shipping data and shipping documents, including IoT and sensor data.

TradeLens is setting up an Industry Advisory Board comprised of ecosystem participants to help govern the growing network, shape the platform and promote open standards. The network is working with bodies such as United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) and industry groups such as OpenShipping.org to help ensure interoperability. At a future stage, third parties can build and deploy applications to a TradeLens marketplace – unlocking new value for network members.

Figure 4

TradeLens sees strength in numbers

Ports, terminal and operators  48	Inland providers  3
Shipping lines  4	Shippers and others  41
Government authorities  8	Shipping events tracked (YTD)  200M

Source: IBM Institute for Business Value analysis as of October 18, 2018.

Figure 5

The key to monetization of blockchain networks is to find the right unit of measure



Pay for apps

Pay for access to a blockchain-based service available via an app. (for example, a monthly subscription fee)



Pay for basis points

Pay by volume and value of transactions on the blockchain network (for example, 0.01% of a transaction on a global payment platform)



Pay for insights

Pay by degree of insight available from the blockchain solution (for example, a fee for status of product, lower fee for port-to-port status versus door-to-door status)

Source: IBM Institute for Business Value analysis.

Designing for new markets

New market business models should be audacious. When designing the network's path to value, organizations should consider how they can radically shift more power to the consumer or capture the long tail. Founders of new market networks may seek opportunities to exploit underutilized assets by bringing them into the sharing economy or create new partnerships.

One of the most consequential developments for new market models on a blockchain is the token. Tokens are units of value exchange – not always monetary – that can create incentives where they don't currently exist. Consumers can earn tokens, such as loyalty points, and exchange them for discount or rewards. But they are far more flexible than traditional loyalty cards as units of exchange. Consumers may earn tokens when they do something of value to the business – write a review, for example, share personal data or recycle a printer cartridge. Because they exist on a blockchain, tokens can easily be granted and accepted by more than one organization, typically increasing their value.

Loyyal, for example, is reinventing how loyalty is created, rewarded and managed, and offers brands an innovative way to unlock billions of dollars held captive in legacy loyalty programs. A cross-brand blockchain platform, Loyyal aims to remove barriers in loyalty relationships via a sophisticated custom token-based incentivization process. Loyyal's blockchain-based platform handles employee reward and recognition as tokenized currencies that support flexible rules for earning, redemption and peer-to-peer sharing.⁹

Show me the money

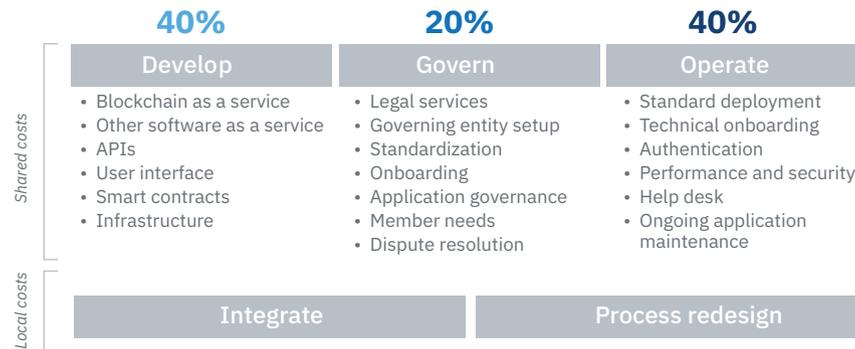
Like any new venture, how an organization monetizes its investment determines its viability. However, on a blockchain, many more ways – and methods – exist to pursue that goal of monetizing value. The trick is finding the right unit of measure (see Figure 5).

Monetization strategies tend to fall into three types: charges to participating members by access to apps, charging by basis points, such as volume or value of transactions on the network, or by degree of insight based on how much data on the blockchain a member wants to access. For example, on a trade network, insight into the movement of a container from door-to-door would cost more than its port-to-port status.

Founding members could also monetize the platform itself – through licensing fees in other geographies, or the right to create apps on its platforms. Moreover, data on the blockchain can be monetized in new ways: sold with assurance of privacy or with permission by consumers to members outside the network. Monetization is also influenced by the cost to develop, operate and govern the network (see Figure 6).

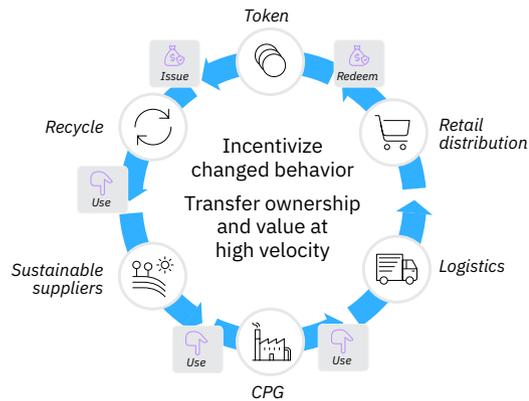
Figure 6

An illustrative three-year cost model to create and scale a new blockchain network from MVE to production



Source: IBM Institute for Business Value analysis.

Figure 7
A tokenized circular economy



Source: IBM Institute for Business Value analysis.

New market networks, of course, also need to generate revenue. For example, event ticketing is a USD-40-billion-a-year business, with almost 1 billion tickets sold annually on the primary and secondary markets.¹⁰ Today, speculators and industrial scalpers use computer algorithms and “bots” to buy up tickets, resulting in lost revenue for artists and performers and a disconnected – if not disenfranchised – fan base. True Tickets entered this market with a blockchain-enabled application to track the life-cycle of tickets from the point of issuance to event entry. True Tickets provides artists, venues and promoters with the ability to manage and monetize the resale of tickets while maintaining visibility into transactions to enable data analytics.

As new market networks become the center of gravity for robust ecosystems, decentralized platforms that host multiple blockchain solutions are beginning to emerge: LedgerConnect is a decentralized app (Dapp) store that connects fintechs, software companies and banks with apps for buy-side and sell-side trading. LedgerConnect combines an app store with managed network services and secure infrastructure, connecting providers and consumers of apps in a seamless way on a single network, so organizations can focus on using blockchain for their business objectives rather than application development.¹¹

As new blockchain networks continue to pop up, leaders in government and business are starting to recognize that significant structural changes to the economy are possible. Top of mind for many is something called the circular economy, a boon for how we sustainably manage our society and the environment going forward (see Figure 7).

Toward a circular economy

The concept of a circular economy – one in which waste is eliminated, everything is recycled and repurposed to its fullest extent, and environmental harm is significantly reduced – has been around for decades. Some call it the regenerative economy, and in the global consumer products industry alone, the savings from the circular economy is estimated at more than USD 700 billion annually.¹²

The design of a circular economy has always been possible. Blockchain makes it eminently feasible, thanks to the combination of blockchain's track and trace capabilities, as well as tokens that incentivize the behavior of individuals. Corporations could incentivize consumer recycling by granting tokens and trace whether items were disposed in a responsible manner.

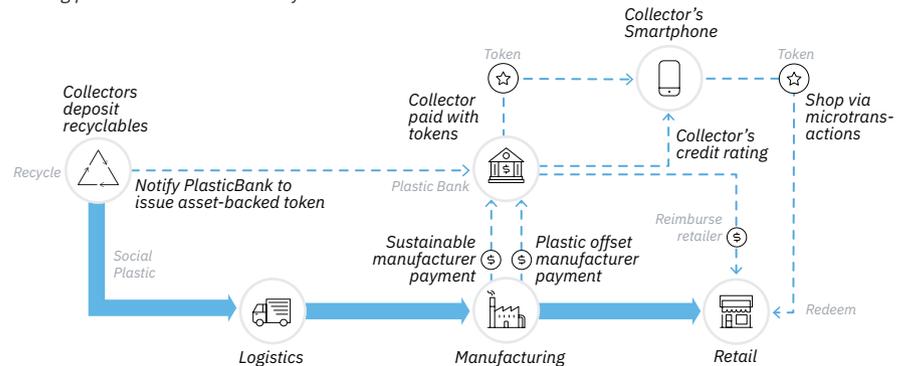
Plastic Bank encourages recycling entrepreneurs to collect plastic bottle waste on beaches and take them to Plastic Bank collection points. Plastic Bank incentivizes collectors to gather the trash and bring it in for recycling. Plastic Bank recycles the material into "social plastic," which it then resells at a premium to environmentally aware-partner businesses like Henkel and Norton Point Sunglasses, which in turn craft it into recycled consumer goods or 3D printed bricks for building houses or for use in packaging via consumer product companies, each branded with the "social plastic" message.¹³ Most importantly, it keeps plastic out of the ocean.

One of the challenges of rewarding waste collection is the potential for fraud and theft. There's no incentive for collectors to spend all day gathering bottles if their cash payments could be stolen, and there's no incentive for sponsor companies to pay extra for recycled plastic if those funds could end up in the pockets of organized criminals.

Instead of cash, collectors receive a blockchain-based digital token on their smartphone. This is handy as many collectors tend to be unbanked. It's often a dangerous environment to hold cash but most do have a smartphone. Collectors can shop for groceries, pay for school tuition, acquire medical insurance, or even buy basic utilities via microtransactions. Funds are not likely to be stolen, and manufacturing partners can verify that their contributions are being used as intended.

With Plastic Bank, collectors get a savings account and can even earn a credit rating based on the consistency of their interactions. Credit ratings provide better access to financial inclusion for loans and mortgages. This new economic opportunity is made possible by tokens on blockchain.

Figure 8
Turning plastic waste into currency



Source: IBM Institute for Business Value analysis.

The path to value

As organizations define their blockchain strategies, we recommend they pursue these five steps:

1. *Scan for opportunities:* Take the time to consider all the possibilities on the horizon. Don't settle for considering just one use case – even if it's a great one. By assessing the full range of possibilities, you're not just expanding your options, you're likely to find ways for one use case to evolve into another.
2. *Measure ecosystem viability:* For each use case, identify the network members required to establish the solutions on the blockchain. Consider the benefits each could achieve and make sure those benefits can be equitably distributed across members. Be sure to perform an initial market sizing to determine at what point potential members may accrue expected benefits.
3. *Calculate the network equation:* The costs for developing and operating a blockchain platform, as well as governing it and onboarding new members, should be core to your monetization strategy. This could include the network raising fees and royalties from its members, charging for access to data or by the volume of transactions.
4. *Future proof your network:* Organizations should consider the tipping point to realize network effects of its first objective. Only then is it likely to contain any competition and help ensure its own success. To scale, consider what new products or services could be included, what new members could be added to attract others to the network and what adjacent market plays exist.
5. *Keep your options open:* Ultimately, every organization will need to determine if it's best to create a blockchain network on its own, collaborate with others to establish a new network or participate in somebody else's blockchain platform. It's likely that most organizations will someday do all three, conducting some activities on a network they didn't establish while also transacting on a network they govern.

For more information

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Are you ready to tap into the blockchain advantage?

What problems slow down your supply chain or plague your industry?

How could you differentiate your organization with enhanced processes or a superior brand proposition?

What initial market size needs to be achieved in order for members of your ecosystem to accrue expected benefits from blockchain?

What further scaling options exist for your blockchain solution? Could the solution scale or be licensed to other geographies?

How will your blockchain network as a whole monetize its initial investment?

How could tokens incentivize new behaviors or facilitate new peer-to-peer and prosumer markets on blockchain?

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Related reports

Forward Together: Three ways blockchain Explorers chart a new direction. <https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=GBE03835USEN>

First on the block: Learn from early blockchain business networks. https://public.dhe.ibm.com/common/ssi/ecm/gb/en/gbe03903usen/first-on-the-block_GBE03903USEN.pdf

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