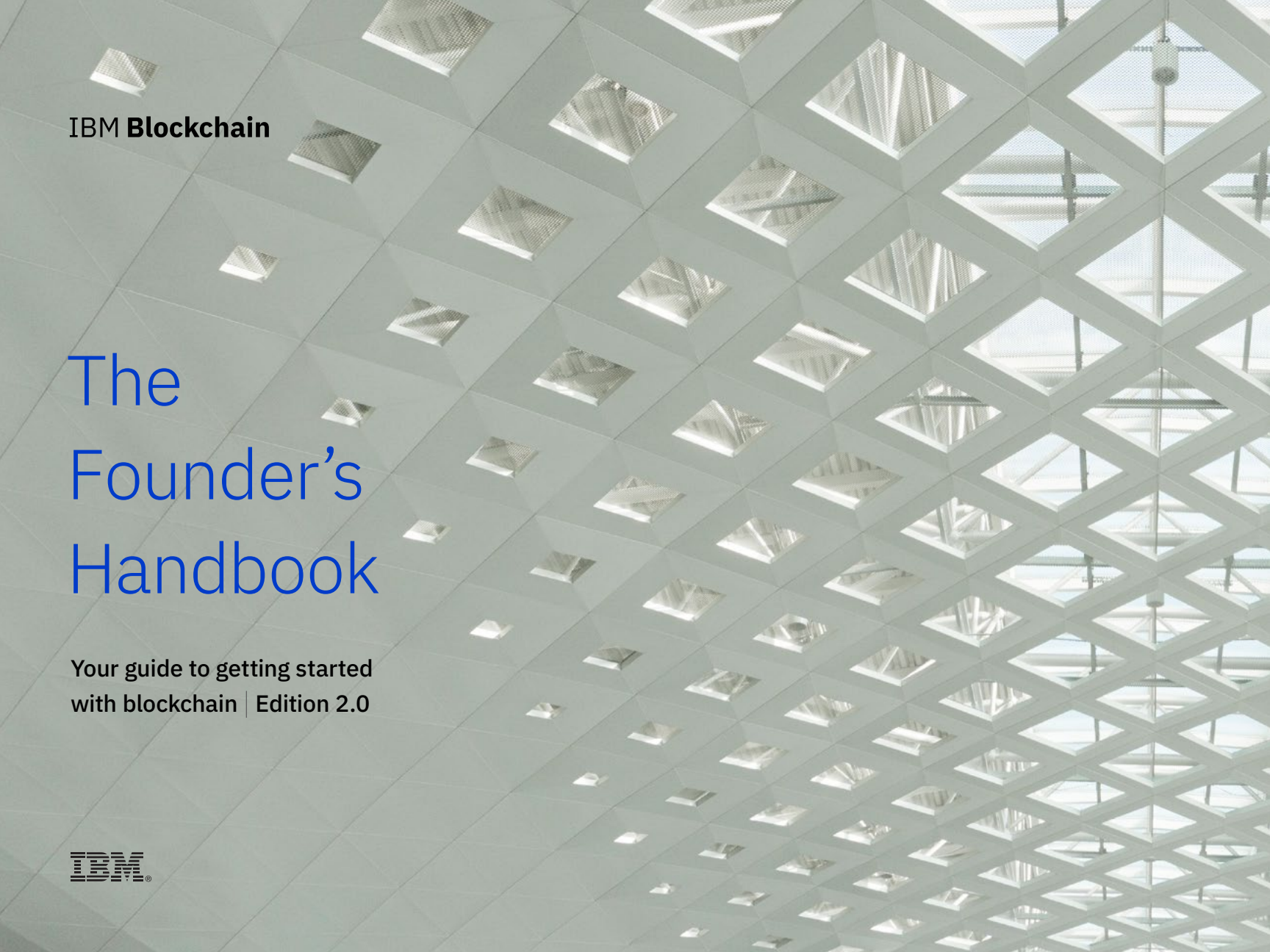
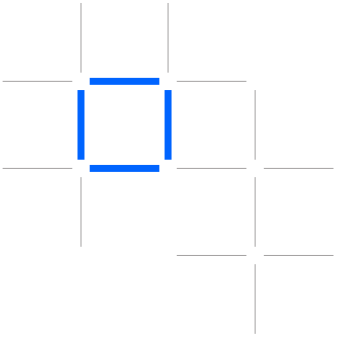
IBM **Blockchain**

The Founder's Handbook

Your guide to getting started with blockchain | Edition 2.0



The Founder's Handbook

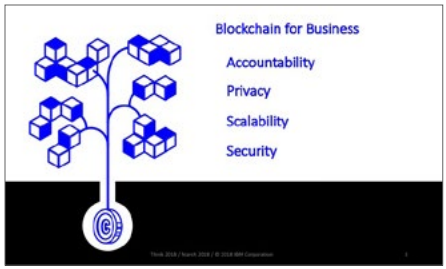


Welcome and congratulations. The fact that you're reading this means you're ready to think about applying one of the most transformative technologies available for business today... blockchain.

With so many new and exciting advances in blockchain, there has never been a better time to leverage this emerging technology. This second edition of *The Founder's Handbook* is meant to provide you with insights and best practices on all of the topics you'll need to address when founding a network, including brand new content on smart contracts, tokens, and legal considerations.

While Bitcoin has unleashed interest in using distributed technology, the real long-term potential of blockchain lies in its ability to help organizations exploit the immutability and provenance of shared data, transact broadly with one another, and retain privacy and security for their data. As authors, we're assuming you understand the basics of blockchain technology and know that a permissioned blockchain for business network is far different than bitcoin. Throughout this handbook, when we talk about "blockchain" we are referring exclusively to "permissioned blockchain" unless stated otherwise. And if you're brand new to blockchain, don't worry. There are excellent resources to help bring you up to speed here.

Blockchain for business is poised to transform many of the world's most fundamental



Enterprise blockchain emerged from the legacy of cryptocurrency

business processes, opening the door to new styles of digital interactions that vastly reduce the cost and complexity of getting things done. At IBM, we've worked with the Linux Foundation's open-source Hyperledger Organization to reimagine blockchain from the ground up — to create a new breed of blockchain suitable for business use across industries and the regulatory environments they operate in. From engagements with over 400 clients around the world and over 40 networks that have graduated to active states, we've helped our clients learn what it takes to go from a good idea on paper to a value-producing blockchain network.

We've chronicled some of these initial best practices in *The Founder's Handbook* to make your journey in joining the blockchain revolution easier. The world has only seen the tip of the iceberg when it comes to blockchain for business; there's untold opportunity for more value and more use cases that could change the face of every industry, including yours. We'll continue to bring you new learnings from these emerging networks in future versions of this handbook.

Before we begin, there's one thought that should guide everything you do moving forward: **blockchain for business is a team sport**. Each individual organization can reap its benefits only by engaging across an ecosystem of multiple parties — all of whom derive some benefit. So if blockchain for business is really about more than one party, the first question you may be asking is this: why call this *The Founder's Handbook*? The answer is simple. Somebody has to get the group started — namely, its founders.

A founder is the organization and person (or people within that organization) driving the creation and ongoing maintenance of a blockchain network. While all members derive value from the network, the founder has the unique opportunity to lead the definition of how that value is provided and how all participants receive their share. If that sounds like something you're interested in, then this handbook is for you.

☐ **Founder's Tip > There are three fundamental pieces of advice from our blockchain experience to consider as you go forward**:

1. *Dream big — and act incrementally.*
   Know what "North Star" will guide you as you leverage the transformative power of blockchain, but start with the minimum viable product (MVP) and minimum viable ecosystem (MVE) that will serve as your first steps along the way.

2. *Motivation drives momentum.*
   Specifically understand how to incentivize members of the network so that they're willing to balance their obligations and rewards.

3. *The total of blockchain participation is greater than the sum of its parts.*
   Some of the best founders have the ability to bring together the group. Remember... blockchain for business is a team sport.

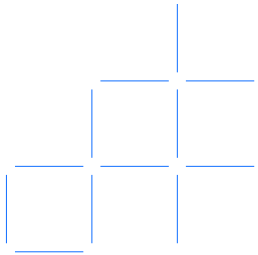
The next chapters of *The Founder's Handbook* will help you identify your blockchain use case in response to a business problem, how to build your ecosystem and how to navigate the group governance surrounding it. We've also added new content on smart contracts and tokenization, as well as including a new chapter on important legal considerations that you and other members should address as you build your ecosystem.

Taken together, they're just the first of many insights IBM is excited to share with you. After you've finished reading the handbook, we'd love to hear your feedback through this short survey.

We've built the IBM Blockchain Platform to serve as the catalyst for creating your blockchain solution. We've also brought together IBM Blockchain and IBM Cloud experts to help you apply best practices as you design, develop and deploy a blockchain solution. And our worldwide IBM Blockchain Services team has specific blockchain skills to assist you in driving transformative business outcomes by applying the right expertise and proven methodologies wherever you are on your blockchain journey.

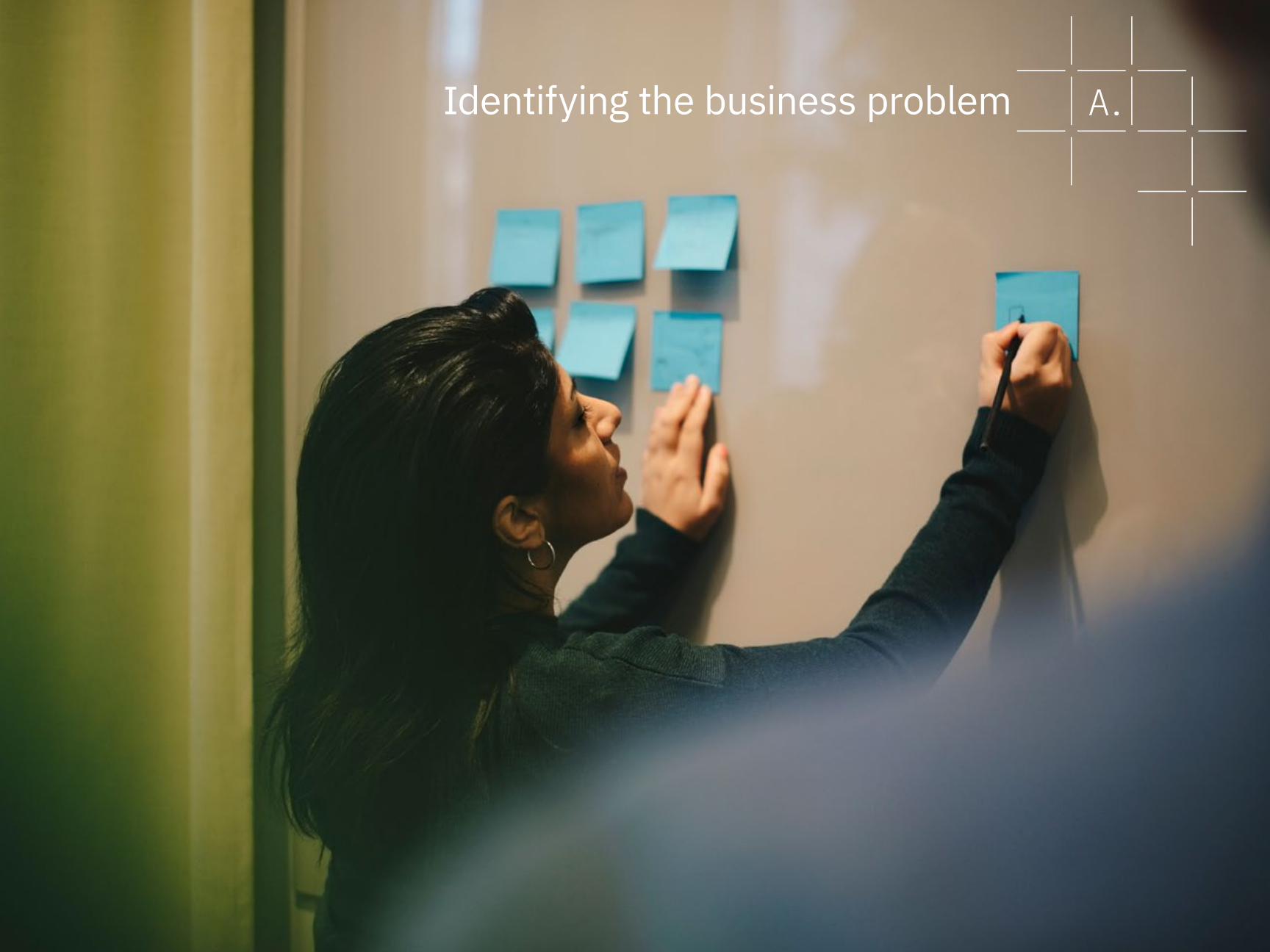
Quite simply, we believe that blockchain will do for business what the internet did for communication.

What will we solve together? Let's find out.



Identifying the business problem

A.



Identifying the business problem A.

If a business problem is yours — and yours alone — blockchain may not be the remedy you're looking for. Blockchain is best applied where there's friction across multiple parties, and those parties can each benefit from addressing it.

The business problem may reside as part of a private ecosystem you lead — your own supply chain, for instance. It could also extend across your industry, or even span multiple industries. The business problem may cause friction from inefficiencies that increase the time and/or cost it takes to transact between parties. Or there may be lack of trust in the accuracy and availability of information needed to verify data authenticity, resolve disputes and more. If you've found a process with these types of friction or others, then you have the beginnings of a blockchain use case.

Identifying the right problem to solve is the first step in achieving blockchain success. So how do you identify potential business problems, prioritize which one or ones to solve, and calculate the benefits of solving them?

☐ **Founder's Tip > Make sure you start with deep industry or subject matter expertise.** Once you've defined the problem you're trying to solve, assemble the right set of subject matter and industry experts to lend their intricate knowledge of the industry, users, the regulatory environment and existing technology landscape.

Given the current maturity of the blockchain space, it's easy to fixate on the technical components of a solution. While technology is

Scenario mapping

"We found a use-case that was a real problem. It wasn't a 'hey I could use blockchain for this' — it was a real problem that had to get solved — where the best technology for the problem was blockchain."

– Greg Wolfond, Founder, CEO & Chairman, SecureKey Technologies

important, only industry expertise will help as you try to understand pain points, business drivers and motivations of different parties in your ecosystem.

☐ **Founder's Tip > What, who, why?** Three simple questions — asked repeatedly as you go deeper into the potential problem space — can surface how pervasive or limited the business problem is throughout a company, industry and/or ecosystem; how expensive it is to fix, and whether it requires regulatory review and compliance:

1. *What is the problem with the way we do things today?*
2. *Who is this a problem for?*
3. *Why is this a problem?*

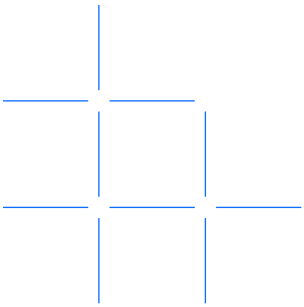
Identifying pain points

Based on your professional experience within your industry, can you identify a specific process currently creating friction among multiple parties? If so, we recommend conducting interviews with key stakeholders to understand their pain points and needs through a technique we call scenario mapping.

Scenario mapping is an IBM Design Thinking tool that consists of mapping out the current process of a specified stakeholder to understand where improvements can be made. An As-Is Scenario Map is done from the perspective of one user, mapping a timeline of actions, feelings and thoughts as that user moves through a process. It identifies specific phases of interest and helps articulate areas where users feel pain most.

Let's say you want to scenario map an insurance remittance application. As a founder, you could choose to interview an accounts receivable representative who routinely experiences friction in reconciling payment data. Or perhaps you want to better understand pain points in a cross-border supply chain application; you may wish to interview customs officials and bankers to better understand their experiences.

We recommend focusing on a use case with the greatest amount of friction. Doing so can ensure you'll have a reasonably-scoped initial solution and increase the likelihood of solving real pain points. This then allows you to define areas of interest and focus moving forward.



A distributed ledger is a type of database that's shared, replicated and synchronized among the members of a decentralized network. It records transactions, such as the exchange of assets or data, among participants in the network.

Creating a value proposition and solution is an iterative process

☐ **Founder's Tip > Determine blockchain fit.**
There are four key questions in evaluating the need for blockchain; they can uncover how closely your use case aligns with the purpose and value proposition of blockchain itself.

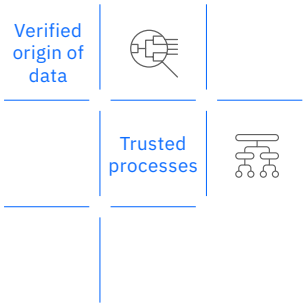
1. *Does the solution require trusted data to be shared across multiple parties without a central authority?*
   The fundamental value of blockchain lies in its shared ledger, an append-only distributed system of record across a business network. If a use case doesn't require a shared ledger and a network of participants, blockchain technology probably shouldn't be used. Think of it like the Apple app store. You need both the technology platform (app store) as well as the applications to make it truly work.

2. *Are assets being transferred between parties?*
   At its core, a blockchain solution should manage the transfer of anything with tangible or intangible value. Assets can be physical ones like a piece of fruit; digital like an electronic file or data, or intangible like a letter of credit or contract. Blockchain is used to record the transaction of these assets between multiple parties in a business ecosystem; without asset transactions, you're likely better served by a traditional database.

3. *Is there a need for privacy among participants in the current business network?*
   One thing that separates permissioned blockchain from traditional distributed databases and some cryptocurrency-based blockchains, such as Bitcoin, is its ability to permission the data. Participants can transact privately across the network to ensure that confidential information is not broadcast. Their identities won't be linked to the transaction either, further ensuring their confidentiality.

4. *Is there the need for greater trust inside the current business network?*
   Heavy regulation and frequent audits are typically a strong indicator of distrust within an industry. Because blockchain assets have a verifiable audit trail and cannot be modified, inserted or deleted, the network's shared ledger becomes the trusted source of information for all parties. Transactions are also electronically endorsed on a case-by-case basis by mutually-selected members of the business network, fortifying trust even further.

Blockchain characteristics



Blockchain characteristics

Much has been written about blockchain's ability to increase privacy, enhance trust and remove friction within a business network. But blockchain's core value proposition rests on two key elements:

- Verified origin of data: While Blockchain does NOT guarantee data veracity, it does make it clear who put what data onto the ledger and when.

- Trusted processes (or workflows): Blockchain creates the ability to track each step in a workflow, so that permissioned parties can understand and track how data flows through the process.

Blockchain's value proposition also hinges on the fact that it delivers consensus, provenance, immutability and finality to participants in a business network. A good blockchain use case will deliver one or more of these benefits.

1. *Consensus:* Frequently within a business network, it's advantageous for a set of organizations to have the same view of a set of data that may be updated or changed by individual parties. For example, any use case or industry that relies on shared reference data — such as bank routing codes, employment records, title insurance and others — will benefit from this property of blockchain.

2. *Provenance:* All transactions on a blockchain are tied to one another through an append-only process called hash chaining. Each transaction is tied to ones that came before it, resulting in a tamper-proof audit trail that allows participants to know where an asset was first logged on the blockchain and how its ownership has changed throughout its lifecycle. Industries like manufacturing, transportation and supply chain that need to track how often and through how many parties an asset changes hands, as well as ones that incur significant costs due to recalls, can benefit from blockchain's provenance capability.

3. *Immutability:* As described above, each block is linked to the previous one. This means that no participant can credibly claim that an earlier transaction changed or did not occur. Any industry with audits and regulatory compliance will derive its principal benefit from blockchain's immutability since it creates an indelible record of all transactions, including seek and find access for auditors and regulators.

4. *Finality:* Transactions and asset ownership on a blockchain are executed immediately upon the fulfillment of specified contractual conditions. In the global trade industry, for example, banks and corporations benefit from blockchain's finality to make transactions nearly instantaneous, compared to the time and the cost associated with physically signing documents, currency fluctuations and more. Organizations can also leverage IoT devices in this scenario to help sellers draw down a buyer's letter of credit at specified points during shipment. If an erroneous transaction is sent, reversing it would require an equal transaction in the opposite direction, with both transactions being visible. When assessing the need for finality, consider whether parties would benefit from the ability to create instantaneous and tamper-proof transactions.

Key phases and next steps

Assuming your use case aligns with the value proposition of blockchain, you can now consider the scope of your first project. **Our recommendation is to start small but to keep your future vision in mind as you design your first project.**

There are two phases that are critical to shaping your solution. First, you need to prove the **technology fit** to ensure that blockchain can provide the benefit you envision. For this first phase, we suggest starting with a small number of assets and a select group of participants — for instance, a ledger with real-time view of compliance, audit and risk data for auditors and regulators.

Once you've proven the technology fit for blockchain, you'll want to do a broader pilot to prove out the **business case** and the **business model** for the solution. During this second phase, it's important to begin with the end state in mind — think through what types of participants will likely join your future network, as well as what geographies and other characteristics you must design for. While you should also start with a smaller subset of participants, understanding what it will take for the whole network to benefit from the solution will be critical in designing one that can scale to the opportunity you envision.

Building your ecosystem

B.

By design, Blockchain makes it easy for diverse parties to transact with one another without requiring a central authority — especially when there are varying levels of trust between them. That's why it's vital to create a vibrant ecosystem where participants work together to solve the same business problem.

In this section, we'll share our thoughts on what it takes to build the right ecosystem, how to grow it and some special considerations on getting started.

When forming a blockchain network, one of the first questions that comes up is "who should participate?" Depending on your use case, the easiest place to begin is with participants from your existing business networks. Generally, you have existing relationships with them and there are already processes in place for coordination. While this can be a great starting point, it's important to thoroughly scope the potential for your solution and evaluate the new blockchain ecosystem. Some of the most disruptive use cases may cross traditional industry lines, and there are likely other players that should also be included. It's also critical to keep in mind key geographies, regulatory environments and more in order to ensure future scalability.

Therefore, a more appropriate question to ask at this stage is, **"what types of participants would best fit into the ecosystem in order for it to succeed?"** That is, do you need one (or more) anchor organizations to provide capabilities like industry credibility, financial resources, human

Founders need to bring organizations together that will make their blockchain network work.

resources, physical resources, intellectual resources or others?

Anchor participants can be an important springboard to encourage participation by other key ecosystem members. An example of this is IBM Food Trust™. In its earliest stages, Walmart was the initial anchor to prove the technology, adding invaluable industry-specific knowledge, applying resources and thought leadership to help build the solution and providing an active supply chain for testing. Our initial joint success led to participation from key industry players including Dole, Driscoll's, Golden State Foods, Kroger, McCormick and Company, McLane Company, Nestlé, Tyson Foods and Unilever in proving the second half of the requirement: that the ecosystem could work with direct competitors and collaborators sharing information on a single trusted system.

Founders need to bring organizations together that will make their blockchain network work. Certainly, there are many different forums and approaches for doing this; it may be easiest to start in the context of an industry association or working group. We've seen the strongest results when doing this within the framework of a Design Thinking Workshop.

☐ **Founder's Tip > Design Thinking Workshops help MVE collaboration.** Sharing inspiration and collecting feedback are the hallmarks of an IBM Design Thinking Workshop. Here's how one could work for you in building your blockchain ecosystem:

- *Get key stakeholders in the same room.* For some prospective ecosystem partners, the allure of going to a design thinking session to learn about blockchain's potential for their business and industry is enough of a carrot to bring them to the table. However, the real value comes through bringing divergent points of view together, talking through expectations and requirements, and setting up processes for how parties will coordinate over time. An early face-to-face meeting often helps establish credibility and trust across participants.

- *Create As-Is and To-Be business models.* The second key activity for the ecosystem is to envision the future business model. Many networks are choosing to opt-out of rehashing As-Is Business models as they don't want to saddle the group with old-school thinking, jumping directly into the To-Be Model instead. Therefore, it's crucial to address which network members

have access to which data sources, providing important new value not available before. In order to get to the To-Be Model, first review the four key blockchain benefits discussed in Section A: **consensus, provenance, immutability** and **finality.** Then consider how those benefits will impact the business network while identifying areas of tangible cost savings or process improvement for each ecosystem member.

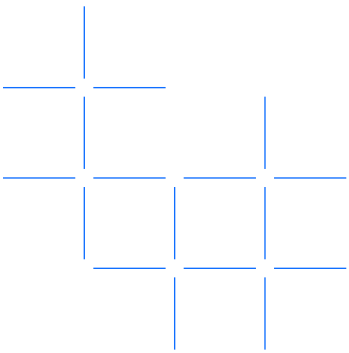
- *Determine incentives and shared value.* When building a blockchain solution, success hinges on the ability to create value that resonates with all ecosystem participants. While the exact value will likely differ for each, there are five key incentives for organizations to join an ecosystem:

    1. *Cost reduction from increased operational efficiency*
    2. *Improved customer experience*
    3. *New revenue opportunities to help reach new customers*
    4. *Avoiding potential costs through operational risk reduction*
    5. *Increased industry influence/thought leadership*

These incentives are crucial as you begin crafting the value proposition for each participant. And while it's essential to create an incentive model early on, keep in mind that incentives are likely to change over time, meaning incentive structures should be built dynamically. Let's also not forget one of the most important sources of input: the opinions of your ecosystem participants. What they hope to get out of the experience might be the most insightful input of all. We'll talk about this in more detail in the next section on creating your business model.

☐ **Founder's Tip > Establishing your minimum viable ecosystem (MVE).** Once you've determined that blockchain technology is a good fit for your use case, the next question we're often asked is "*how many organizations should participate in a pilot network?*" The answer can fluctuate depending on the use case, industry, production stage and level of trust.

Our recommendation is to determine the key segments that will make up the ecosystem in production. A segment refers to the role that an organization provides in the network. In IBM Food Trust, sample segments include retailers, farmers, truckers and others.



To prove that competitors can work together in your initial ecosystem pilot — and eventually, your ecosystem — it's vital to have multiple participants of a given segment in the initial pilot.

Some additional advice on establishing your MVE:

- The exact number of participants in the MVE is actually less important than ensuring that a few represent the most critical segments of the network. With IBM Food Trust, nine participant segments were identified; however, to minimize complexity, we did the initial pilot with just three segments: retailers, suppliers and trucking companies. This allowed a smaller group that understood the core concerns across the solution space to move quickly.

- One challenge to blockchain is that direct competitors are often involved in the same network. This is a new and challenging reality for most organizations. To prove that competitors can work together in your initial ecosystem pilot — and eventually, in your ecosystem — it's vital to have multiple participants of a given segment in the initial pilot. IBM Food Trust has multiple retailers in the first stages, creating credibility for other competitors to join the ecosystem.

As you progress from first project to pilot, you'll be testing assumptions around the technology and the ecosystem. As you extend into production, your MVE size and number of anchor clients may start to grow.

In the first phase — as you're trying to understand the value of blockchain for your business in your first project — it's possible to begin with just two participants, the simplest configuration. This will help you evaluate the use case and technology fit. During the formative stages of your network, our rule of thumb is to have at least three participants (including key segments as we did in IBM Food Trust). Less than three participants beyond your first project is not enough to get much-needed input and feedback to build a solution with shared value. You should also be wary of a low, even number of participants; this can result in split votes when making decisions, leaving your ecosystem in gridlock.

Three to five participants will ensure significant feedback when building the solution and can encourage others to join. Once you build out a solution with operational stability among this core group of participants, you may want to open the ecosystem to the next set of participants.

Growing the ecosystem

As the network moves from pilot to production, recruiting participants should accelerate. Onboarding should be fully digital, contracts should be a click-through standardized legal

How you pitch the future direction of the solution will likely sway adoption of it.

document and all billing systems should be automated. If you've successfully developed the solution and business model, each additional participant should yield additional value; network growth should be a top priority. In most instances, organizations will care less about the technology being used as long as it solves their business problem in a secure, efficient and cost-effective manner.

☐ **Founder's Tip > Five keys to drive additional network adoption.** IBM has identified five key areas that can drive additional network adoption: *value proposition, enterprise-class, standards, usability* and *future vision*:

1. *Value proposition* — In order to reach maximum adoption, the value proposition must resonate with all members of each segment that founders want to attract. Companies will only join the network and participate if they see a tangible return on their investment of time and resources.

2. *Enterprise-class* — Organizations must feel like they can trust the solution with their business-critical systems. These organizations will place special emphasis on data security, auditability, resilience, reliability and scalability.

3. *Standards* — It's critical that a founder leverage existing standards and ensure long-term interoperability. This avoids reinventing existing capabilities and bespoke technology that can be difficult to maintain in the long term. It's also important to plan for interoperability to ensure that other solutions in this domain can operate with your network. This will help accelerate the pace of innovation for your solution.

4. *Usability* — The solution needs to be user-friendly for the IT department of a Fortune 50 company, a small business owner with only a smartphone and everyone in-between. It's critical to have a variety of tools and access points so that the solution works for all groups.

5. *Future vision* — How you pitch the future direction of the solution will likely sway adoption of it. When we talk about extended value, we are very concrete: once you have data and transaction partners on a single, distributed system, consider how to use that data and connectivity to unlock more value for participants. Examples include extending geographic reach, functionality (e.g., new analytic tools), participants and others.

"It [blockchain] allows you to iteratively work toward a partnership. Using blockchain to establish an ecosystem allows you to ease into that without having to predefine the nature of the relationship before you even experiment or begin to add business value."

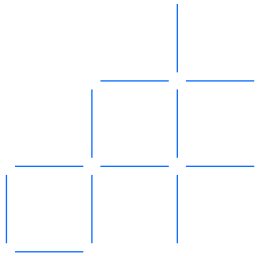
– Jesse Lund, Vice President, Head of IBM Solutions, Financial Services

☐ **Founder's Tip > Incentivize early MVE participants.** One of the unique characteristics of blockchain is the iterative work environment that participants can enjoy. It's an advantage that can greatly benefit many organizations, including startups, due to the legal complexity inherent in traditional commercial partnerships. Using blockchain to establish an ecosystem allows participants to ease into relationships instead, iterating on ways to add value without having to predefine the exact nature of the engagement.

In the earliest stages, the objective is not limited to monetizing the solution; rather, it's about experimenting and testing the solution and business model hypotheses on potential participants. Getting it right in this environment means that success is more likely to follow.

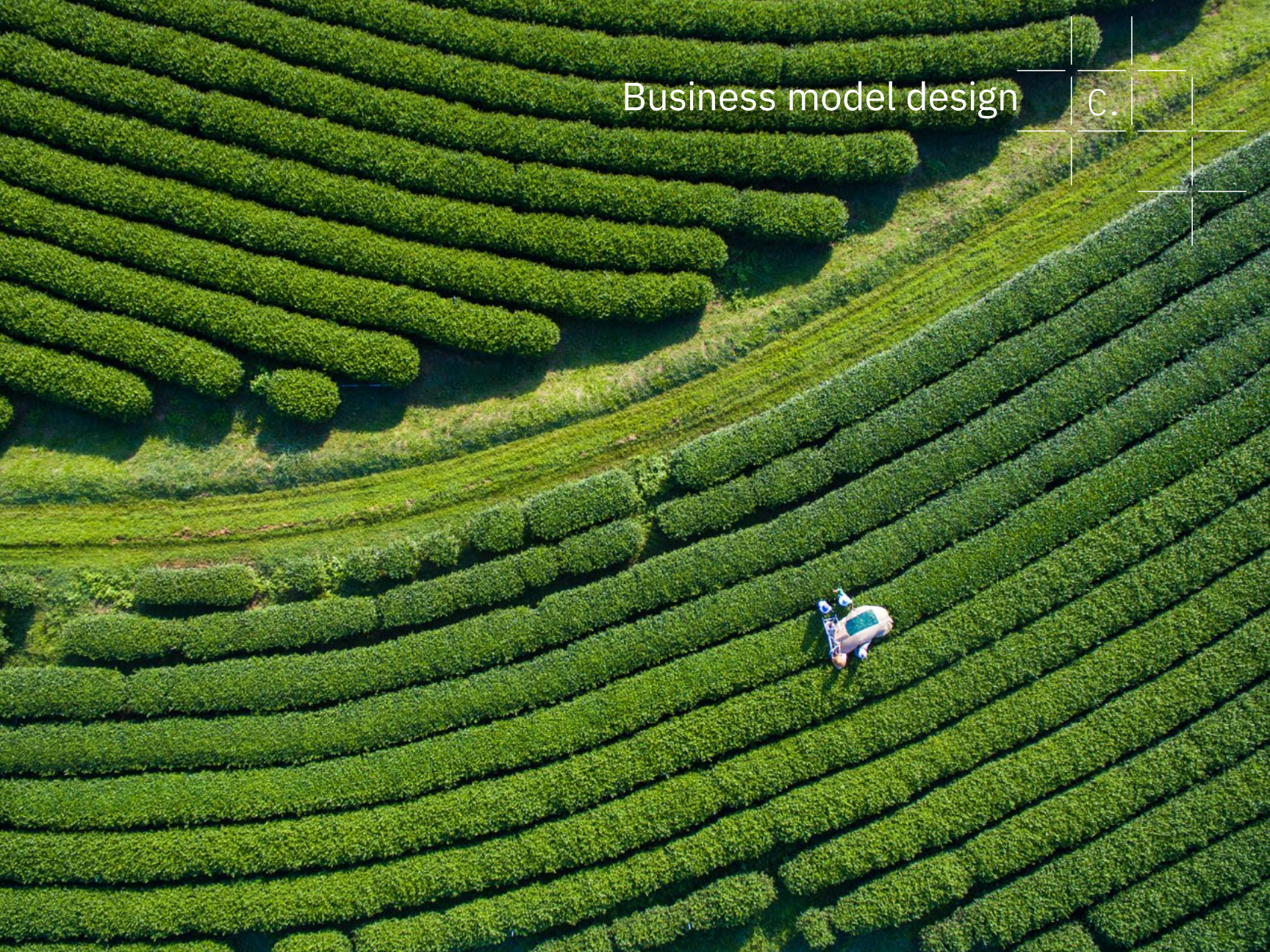
Next steps

The creation of shared value and participation by ecosystem members is arguably the most important factor when building a blockchain solution. As such, devoting time and energy into understanding what motivates and drives each network participant is crucial. In the team sport of blockchain for business, the value of a solution can only be fully realized through participation by all in the ecosystem; creating a compelling incentive model is the key to success.



Business model design

C.



Now that you've brought your minimal viable ecosystem together, you're ready to design the business model for your solution. While you may be comfortable building the investment case to justify costs and demonstrate benefits to your company, you're not doing this alone — you're now working with others in your ecosystem.

What will the economic model be that supports value not just for the founder(s), but also for anyone else who joins? Designing that business model is your next area of focus, and it comes with a number of questions to answer:

- *Is there a membership fee?*
- *If so, how often do participants pay?*
- *Is there a fee for each transaction?*
- *Do select members get more or less of the value created?*

In this section, we'll provide insights on these questions and others as you design the business model for your network based on the type of ecosystem you've decided to form.

☐ **Founder's Tip > Evaluate the level of permissioning needed for your ecosystem.** Use cases and the ecosystems that accompany them have certain characteristics that lend themselves to particular business models, incentivizing founders and additional participants as the network grows. In the broader blockchain market, people often describe a dichotomy in how blockchain networks are permissioned as either public

(fully open and anonymized) or private (completely closed and private). Unfortunately, this characterization is misleading; a spectrum of permissions — from fully open to tightly controlled — characterizes most blockchains.

To better understand this range, let's think about analogies from life:

- *Public park*: anyone can walk into a public park, but behavior matters — good is rewarded, bad can have you kicked out. The park may not require ID to gain entrance, but adherence to the rules is expected.
- *Nightclub*: Who hasn't been carded at a nightclub? Showing valid ID means you can stay — your identity is valid and known by the owners, and others in the bar can trust that they're among peers who have a legal permission to be there.
- *Members-only club*: This ultimate velvet rope of admittance means that only people approved for admission by the club's owners or group of owners will be admitted. Membership can also come with a series of privileges, including anonymity and the ability to connect with other members privately.

These three examples (which we'll refer to later in this section) equate to the key levels of permissioning possible in your network. And as you'll read, they'll help you determine how to answer the key questions asked at the beginning of this section.

Smart contracts

Smart contracts are the bread and butter of blockchain technology. Essentially, smart contracts are the digitized business logic used to help you exchange any asset of value (money, real estate, retail products, etc) without the need for third-party services. In practice, smart contracts are coded onto the blockchain as "if-then" statements that automatically execute transactions and record information onto the ledger. Because the conditions of smart contracts are mutually agreed upon by all (or a subset of) members and because they're executed automatically without intervention, smart contracts are one of the key components responsible for establishing trust and efficiency within your network.

Smart contracts can be as simple as a data update or as complex as a self-executing contract with conditions attached. For example, a smart contract can update a bank account

balance and ensure that enough money is in an account before executing a debit. A similar but more complex example might include an international shipment where the smart contract verifies that a buyer possesses the required funds before releasing a shipment, and then automatically releases the shipment, transferring funds to the seller at incremental points along the delivery.

Founder's Tip > Identifying opportunities for smart contracts. When working on your business model design, identifying opportunities for smart contracts often happens naturally. As you decide whether to implement a smart contract for a specific business rule, it can be helpful to think of it from the context of:

1. *Does the business rule need to be agreed upon by multiple members?*
2. *Does each transaction need to be signed by either all, or a subset of, members?*
3. *Will a smart contract help establish trust and transparency among members?*

If the answer is yes to one or more of these questions, it may make sense to implement a smart contract for the business rule. Once you've identified some initial opportunities, work with your MVE to hash out the details around how the smart contracts function and how they're implemented.

The value of tokens

One asset type to consider utilizing within your smart contracts is tokens. Tokens are digital representations of ownership of currency, equity, and other tangible or intangible assets. Some benefits of tokenizing assets include increased speed of transaction settlement, increased liquidity of assets and mitigation of investment risk. Moving to a Token-Driven Economy, an IBM Institute for Business Value report, provides a great overview of how tokenization works and the value it provides.

How it works: Tokenization can be explained by comparing it to securitization, a process used in the financial services sector through which receivables — like mortgages, car loans and student loans — are pooled and their cash flows are sold in standard units to investors who then receive both the principal and interest payments. Tokenization creates similar segmented units, or tokens, but goes a step further than simply restructuring cash flows by monetizing the "right to use" the asset. Tokenization and digitization work hand-in-hand, as blockchain technology allows tokens to be traded on a digital platform.

Tokens can be utilized in several ways including digital currency for payments, a representation of equity, or a claim to tangible or intangible assets. Digital currencies such as Bitcoin or state-sponsored currencies are one example of tokenization. Initial coin offerings (ICOs) represent another use of tokenization and involve the creation and sale of tokens to crowdfund projects. These tokens represent a stake in the project or company. Tokens can also represent ownership rights to assets like real estate or tradeable permits.

For example, Veridium is a company working with IBM to tokenize carbon credits — tradable permits that allow the holders to emit a specified amount of carbon dioxide or other greenhouse gases. With a public, permissioned blockchain network, permit holders can more easily monetize their unused carbon credits, incentivizing the move toward environmentally conscious practices.[1]

Why do it: When deciding how to best transact on a blockchain and whether digital tokens present an opportunity, start by considering the problems that currently exist with how assets are exchanged. If your solution stands to gain from a faster transaction settlement, reduced counterparty risk or increased liquidity of the assets, tokens may be a viable option.

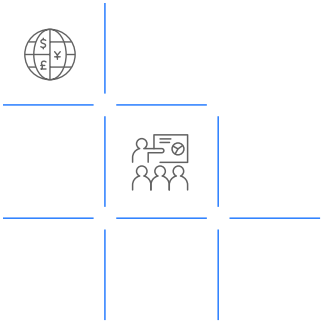
Tokens, unlike currency, can be digitally traded directly without needing to go through a third party, leading to a faster transaction settlement. Additionally, tokenization permits assets like stocks or mortgages — traditionally complicated and time-consuming to purchase due to added steps of waiting for documents or settlement in order to transfer ownership — to be traded in real-time.

Tokenization allows for fractional ownership of assets; if an asset is too large of an investment for one investor or offers too much risk, then the cost and risk can be distributed among multiple token holders. Large-scale, illiquid assets are much more liquid when broken up into smaller units than when they are whole.

Any asset that's currently securitized — mortgages, auto loans or credit card obligations — is ripe for tokenization. Tokenizing these assets on public networks opens investment opportunities to more than just the private, accredited investors with current access.

One current downside of token usage is that tokens are transacted on a public permission-less network, potentially exposing an organization's proprietary business logic, transaction history and customer information.

As a founder, there are now two key economic decisions to make: your investment case and the business model for the network.



The key to mitigating this risk is the interoperability of ledgers, allowing participants to exchange tokens across protocols and create public permissioned networks. When creating your project, consider what information you can place on a public ledger and how it might be tokenized, with the goal of maximizing the value of decentralization while minimizing your risk of exposure. Tokenization is still in its early stages and we expect to see many exciting advancements in this space as the technology matures and adoption increases.

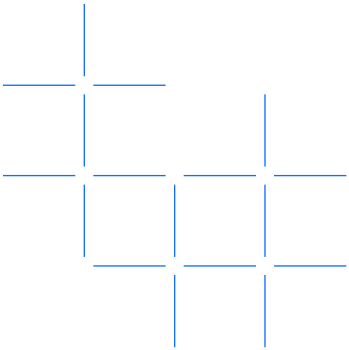
☐ **Founder's Tip > Link the investment case and business model.** You may have a sense of the type of network you're forming — at least to start. As a founder, there are now two key economic decisions to make: your investment case and the business model for the network. While these exercises are linked, they're separate activities. Let's examine each.

Investment case

As a founder, you need to determine if the investment it takes to create and launch the network will yield the return you're looking for — an exercise tied to your individual goals, financial assumptions and appetite for risk. For networks where value is predominantly derived by one or a few participants providing a differentiated service, the founder or founders should think about whether they can bear all upfront costs. If the network is successful, these costs are later recouped through business revenue or from new process efficiencies. If the upfront cost is too large for a single founder, it may be necessary to reach out to close partners upstream or downstream to help build the solution; those partners would then share in value generated by the network. Token issuance may be an option for some businesses but should be approached with caution and the appropriate legal counsel due to the current regulatory risk.

For networks where value is predominantly derived from the network effect of increased membership and participation, it's important to think about what MVP attributes will attract early entrants — and how they can then attract others. In addition, founders will need to determine whether it's necessary to charge a small fee to kick-start the network, and whether that fee is reimbursed to early entrants once the network reaches a certain size.

In some use cases, founders may create a solution that significantly increases the overall value of each transaction. In this case, a one-time membership fee, annual membership fee or per-transaction fee may be options.



Ensure that each member of the business has a positive return on investment (ROI), so they have an incentive to join and transact on the network.

In addition to top-line considerations, distribution of profits is also important. One option includes distributing profits based on the number of referrals to the network. For example, if company A refers X members, they receive Y% back (which may cover part of their own membership fee). Another option may include reinvesting profits back into the network to build further capabilities, maintain the solution or lower the price-per-transaction.

Business model

Once you have justified the investment within your own organization, you are ready to begin crafting the business model. This includes creating the **plan for shared value**, deciding how **value is going to be returned** to founders and members of the network and devising a **plan for sustaining and maintaining** the network.

☐ **Founder's Tip > Calculate value together early.** Elicit input from stakeholders as early as possible — these individuals and the organizations they represent will become your blockchain network participants, and their collective input helps ensure the value proposition resonates with each and every member. Without this collaborative approach, it's unlikely participants will be adequately incentivized to drive value in your solution.

Crafting the value proposition

Crafting the value proposition should be a quantitative exercise done for each type or segment of participants who will contribute data to the network. We've seen that founders often need to demonstrate the value of the solution to their potential partners to entice them to join. Calculate how much value is being spent given the current process, then how much value can be transferred back to participants. Identify specific metrics such as dispute resolution time or transaction costs and attempt to calculate the solution's value for each type of participant; a business value assessment is a useful tool for discovering and documenting these values.

☐ **Founder's Tip > Make sure everyone has a positive return on investment.** Keep in mind that the value proposition will not be the same for everyone in your network. At the very least, it's likely that different segments of participants will have different value propositions. Even within a segment, differentiators like size, current level of technology, geography and more will lead to different value propositions for individual participants. The most important thing, however, is to ensure that each member of the business has a positive return on investment (ROI) so they have an incentive to join and transact on the network.

Ultimately, the business model will be unique to the specific use case you're pursuing. However, here are a few recommendations based on core business models and types of permissioning we've seen:

- Many business networks will realize economies of scale through the use of blockchain. If the network is like that of the public park we referenced earlier, the value of the network will grow as the size of the network and collective participation increases. New entrants will likely lower the overall cost for others in the network. Sustaining the network through maintenance, fixes and new functionality also then becomes a shared effort.

- The same can be true for the ecosystem similar to our nightclub reference; there are barriers to entry and possible capacity limits may result in a higher floor for transaction costs versus a completely open and public network.

- In networks where a few core members dominate, a "members only" fee may be useful for participants who establish the network and are keen to profit from the activity on it. Transaction fees then may be the best way to attract masses of members that use the service or want to join. Combining these different mechanisms of monetization allows for the greatest value potential while mitigating downside network risk.

The value of the solution may also ultimately dictate the business model. If the value is relatively fixed on a per-transaction basis, you'll likely be able to recoup a portion of the cost, and some of that may also go towards network maintenance. If the value is variable instead, it may be wise to have rules around variable transaction fees to account for seasonality or peak usage — like when a nightclub charges a cover fee at peak hours to exclude certain customers or lowers their prices at happy hour to attract others.

Finally, don't forget to consider the potential new revenue opportunities and cost savings that may be possible once this level of shared data is available. There are likely to be other parties in adjacent industries that will express interest in the data which may create new opportunities to monetize the network and the data within it.

☐ **Founder's Tip > Remember the intangibles.** As stated throughout, founders must offer sufficient benefit to ensure positive ROI, convince others to convene a network and bring

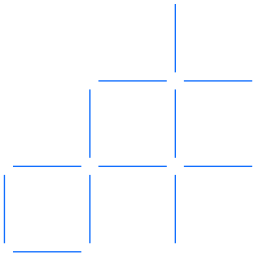
the ecosystem along — but intangible benefits also provide a tremendous opportunity to motivate participants.

One example is the intersection of local energy providers, consumers and retailers. Allowing consumers to pay for products and services at retailers with energy tokens may actually drive additional local shopping that wouldn't have existed otherwise. Over time, this behavior may even influence additional members and/or retailers to join.

Intangible benefits like these may drive up the network's overall value proposition, helping it collect even greater revenues. At the same time, this revenue may be distributed to groups outside the direct network as a means to uphold its overall value proposition.

Next steps

The true value of a solution can only be fully realized through the participation of all players in the ecosystem. Creating a compelling incentive model that includes key cost reductions as well as greater value for all involved is crucial to success and will accelerate the time to scale your solution. Lastly, your network has the potential to scale over time by connecting with other networks, leveraging other solutions and providing additional benefits which haven't yet been considered. As with any offering, it's important to always be reinventing as new technologies emerge and new opportunities present themselves.



Governance D.

Blockchain introduces foundational capabilities with entirely new ways for organizations to interact. Decentralized by nature, it incents multiple parties to have a stake in how a solution is built, run and operated. Governance is one of the key elements that distinguishes one network from another, making it essential that the governance model reflects the ongoing needs of participants.

Governance models are still evolving in blockchain. In this section, we'll cover some key considerations and components that both blockchain founders and users should review when evaluating the design, development and implementation of a governance model.

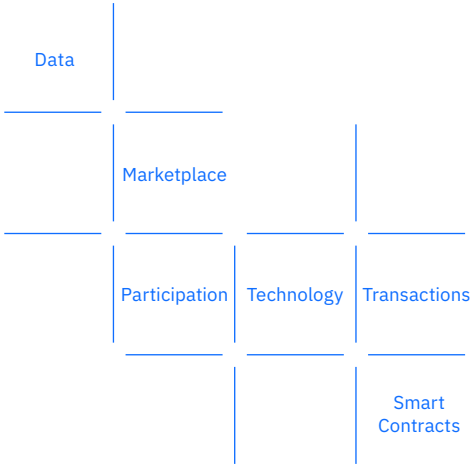
Governance overview

There are two critical components that shape a governance model, incentives and a mechanism for coordination[2]:

1. *Incentives*: Each participant must have an incentive to participate in a blockchain solution; individual incentives are not necessarily the same or even aligned to those of others, but there should be some level of common incentive across participants.

2. *Mechanism for coordination*: When participant incentives do not align, there must be a process to come to a resolution around common incentives.

Six key solution governance considerations



In the pre-blockchain economy, companies that wanted to collaborate on a large scale would come together to form market utilities like SWIFT or CLS. This central authority would then set the direction and execution standards for participants to follow. In many of these examples, each member held an ownership stake and final decisions were made by the utility ensuring fairness in the system.

Blockchain, however, introduces both incentives and mechanisms for coordination into the technology itself. Therefore, two critical areas of governance must be considered when building a blockchain solution (although there are others that may also be important depending on your use case):

1. *Solution Governance* refers to the set of rules that determine how different organizations using a solution interact with each other.

2. *Blockchain Governance* refers to the structure and process determining how blockchain technology itself is maintained and evolves over time.

☐ **Founder's Tip > Six key considerations for solution governance.** As you consider the type of governance model you want for your network and the path to achieve it, we've identified six solution governance considerations to review: *Data, Marketplace, Participation, Technology, Transactions and Smart Contracts*.

1. *Data* refers to data ownership and data security. Some initial questions to be addressed include: who owns the data submitted to the network? Who owns the insights made from that data? What are the data security needs of the network? Clearly-defined ownership and security strategies are necessary before inviting participants to join the network.

2. *Marketplace* refers to rules around bringing the solution to market. If you're building a revenue-generating solution, what's the model and how will revenue be shared? Will participants be incentivized to bring others into the network? Are they allowed to build revenue-generating applications on top of it? Much of the marketplace factor hinges on the future state of the network, so developing a decision-making process on this subject is warranted as opposed to defining specific rules from the outset.

3. *Participation* refers to topics around network access and onboarding, the types of roles there are and network participant

revocation. Is manual or digital onboarding appropriate for your network? What's the actual process? What types of roles will participants play? What's the process of revocation if a participant wants to leave the network? How will that participant's data be treated once they've left?

4. *Technology* refers to the technology stack utilized, ownership of IP and infrastructure costs. What level of privacy is required for the blockchain? Will the network contribute to the underlying open source protocol? Will it require a blockchain-as-a-service platform? Are participants entitled to the solution's source-code ownership? How is the cost of technology shared? Many of these discussions will be resolved early on, but you should have a strategy for evolving the solution as it grows, as well as the underlying technology.

5. *Transactions* refers to the exchange of value on the blockchain network, with a number of questions to be addressed. What types of assets can be transacted? What types of participants can submit a transaction, and which participants can validate them? How many are required to do so? Do different types of transactions have different requirements? These questions are typically answered with MVE participants as they evaluate solutions to be run on the network.

6. *Smart Contracts* refers to how the business logic for transactions is approved, coded and maintained. Smart contracts help to establish trust within the network through the rules that govern them; therefore you should seek to include your MVE in these conversations. Additionally, during the process of writing smart contracts, you'll need to work closely with your engineering team to ensure the business logic is accurately captured and that your ecosystem members have a way of understanding the business logic and verifying its accuracy within the smart contract. Key questions to consider include: which members are responsible for reviewing and approving the smart contracts? Do other members trust these parties? How can ecosystem members verify that the code accurately represents agreed-upon conditions? What's the approval process for implementing changes and new smart contracts?

☐ **Founder's Tip > Addressing blockchain governance.** The governance considerations just outlined all deal with your solution's business model. It's critical to nail these down to ensure your governance model will be

appealing to new organizations looking to join the network; yet designing them in a flexible way also means that governance can evolve over time as the network grows and matures. Additionally, you should consider the possibility of system failures. Having a plan and governance rules in place to address potential issues will be beneficial when unexpected issues arise.

Selecting blockchain technology that makes sense for your business case and addressing blockchain governance now follows. If you're new to this space, we've published a blog as a helpful resource to help you choose your blockchain platform. Your choice of technology is critical to the governance model because the majority of available blockchain protocols are owned and maintained by a distributed group of developers. They may (or may not) belong to the same organization, have similar incentives or even objectives for creating and updating the technology.

Because blockchain creates a system of record that tracks all critical data, it's essential that mechanisms are in place to protect against problems in the technology itself, as well as allowing for technology to evolve as new innovations become available.

☐ **Founder's Tip > Pick blockchain technology with an open, established set of governance mechanisms.** Given the nascent stage of blockchain, governance must assure that the right mechanisms are in place so that innovations can evolve to meet market dynamics. This is particularly critical in open source projects where there is no single owner of the technology.

Bitcoin, Ethereum and other public blockchain networks rely on informal governance led by a core group of developers. This creates significant challenges around how governance will scale as those platforms evolve.

In contrast, Hyperledger provides an open governance framework, along with the Linux Foundation's 20-year track record of managing open source projects. For more detail, you can read about Hyperledger's Governance model here.

The project is governed by an Executive Committee and a Technical Steering Committee. Only an Open Source, collaborative software development approach can ensure the transparency, longevity, interoperability and support required to bring blockchain technologies forward to mainstream commercial adoption by communities of software developers building blockchain frameworks and platforms.

Next steps

Governance is a crucial factor in the success of your solution, your ecosystem and your business model. Once you have had time to think through the key concerns and drivers for your governance model, it can be beneficial for founders to seek the advice of legal counsel. Legal considerations can have a significant impact on the business decisions you make. And in the spirit of blockchain for business as a team sport, it's always important to seek frequent input on governance from your network participants as well; they will likely have different regulatory requirements depending on their industries, geographies and roles. Keep in mind that best practices in governance for blockchain will continue to evolve, so this will be an ongoing effort.

Legal Considerations

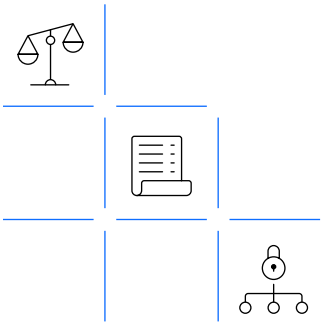
E.

Throughout the course of building your blockchain solution, you will encounter a number of unique legal matters due to its distributed nature. Local and international law, industry-specific regulations, data sharing regulations, intellectual property, liability and general commercial agreements — such as service level and performance assurances — are just a few areas that can create complexity and require a careful approach.

While the material in this section is intended to provide readers with issues for consideration, it is in no way meant to replace the assistance of a qualified lawyer. As soon as you and other founders begin working on a blockchain application, it's imperative to seek proper legal counsel to address these and any other issues specific to your use case.

Jurisdiction

A blockchain network may span numerous jurisdictional boundaries, making determining legal jurisdiction tricky. In a typical commercial contract, the parties choose which jurisdiction will govern, assuming they have a reasonable nexus with that jurisdiction. When making this decision, you will need to consider where the work is being done, where the resources are



located and where the companies are based. A full evaluation of the jurisdiction of all parties involved should be performed to identify the location which most benefits all parties.

Data protection and privacy

Due to several unique characteristics of blockchain technology, data on a blockchain is inherently more secure than data stored on a traditional database. Some of the features which contribute to this added security include the use of cryptography to secure records and the use of private keys, functioning as digital signatures, associated with each transaction.

Furthermore, because blockchains are decentralized and distributed across peer-to-peer networks, it's extremely difficult for a "bad actor" to access and then alter the data across the network. Even with these protections, however, it's incumbent that you manage who has the ability to generate encryption keys; the frequency with which they're replaced; how they're accessed, and how keys are turned off when an employee leaves a company. Limiting the number of entities that can generate encryption keys, limiting access to those keys and setting up an audit process are all security measures you can adopt to better protect the data on your blockchain.

From a legal perspective, it's important for you to consider the node locations and the type of data stored on the blockchain as these factors can trigger additional laws and regulations that must be followed including HIPAA, FERPA and GDPR. From both a compliance and performance perspective, you should seek to understand what data is necessary to store on-chain and what data can be stored off-chain. Questions you should ask yourself when making this decision include: is the data necessary to the use case; do network participants require access to the data; is there a need for consensus and endorsement of that data, and can I store a hash of larger data on-chain while storing the actual data off-chain.

Antitrust law

Antitrust law is another legal consideration that may impact your network's blockchain solution. Antitrust law, also known as competition law, seeks to promote competition and protect consumers from anticompetitive business practices such as price-fixing. Generally speaking, any action that can potentially limit competition can be considered a violation. Anytime two or more entities in the same industry begin sharing information, a variety of competition laws can be triggered, depending on jurisdiction, and special care needs to be

taken to establish measures to avoid creating the potential for a violation. In some situations, even something as simple as preventing network access to certain entities can be a violation of antitrust laws.

As a means of simplifying disparate antitrust laws and decreasing the risk of noncompliance, some network founders have opted to include an antitrust policy within their governance model. This policy is developed by legal experts and serves as a set of rules which all ecosystem participants must abide by in order to participate in the network as well as related discussions or meetings. Regardless of strategy, it's important to discuss potential anticompetitive considerations with legal counsel.

Ownership of intellectual property

One major area of discussion for corporations working on a joint blockchain solution is the ownership of intellectual property (IP). Under United States common law, the inventor maintains the sole right of ownership; if there are multiple inventors, all inventors have joint rights of ownership. If a third-party is contracted to build the blockchain solution, the outcome is typically open to negotiation. It's also common for other parties — including the technology provider — to receive some type of rights to use the copyright via an explicit license with ecosystem participants who don't have explicit ownership rights being granted use rights. While it's not always cut and dry, these guidelines can be used as a basis to start addressing IP.

Liability

Anytime multiple entities collaborate on a project of any kind, the question of liability is bound to arise; this is the same with blockchains. While it's not possible to completely remove all risk associated with liability, it is possible to mitigate risk. Typically, the two keys to mitigating risk are:

1. *waivers or limitations of liability and*
2. *agreements to indemnify other parties for certain claims.*

A waiver of liability is commonly used to eliminate the likelihood that another party will file a lawsuit against a company. The contract states that the parties understand that they participate at their own risk and agree that neither party has any liability to the other. Alternatively, a limitation of liability provision is often included in contracts to provide a cap on

the potential financial exposure for the parties, specifying which damages are subject to the limitation and which damages are excluded and therefore waived in totality.

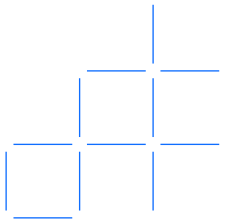
An indemnification provision is another way to secure protection against certain third-party claims. To be clear, these are not intended to cover claims between the parties to the agreement. Typically, the scope of covered claims are set forth, such as claims of copyright infringement, and a process for notification and resolution of claims.

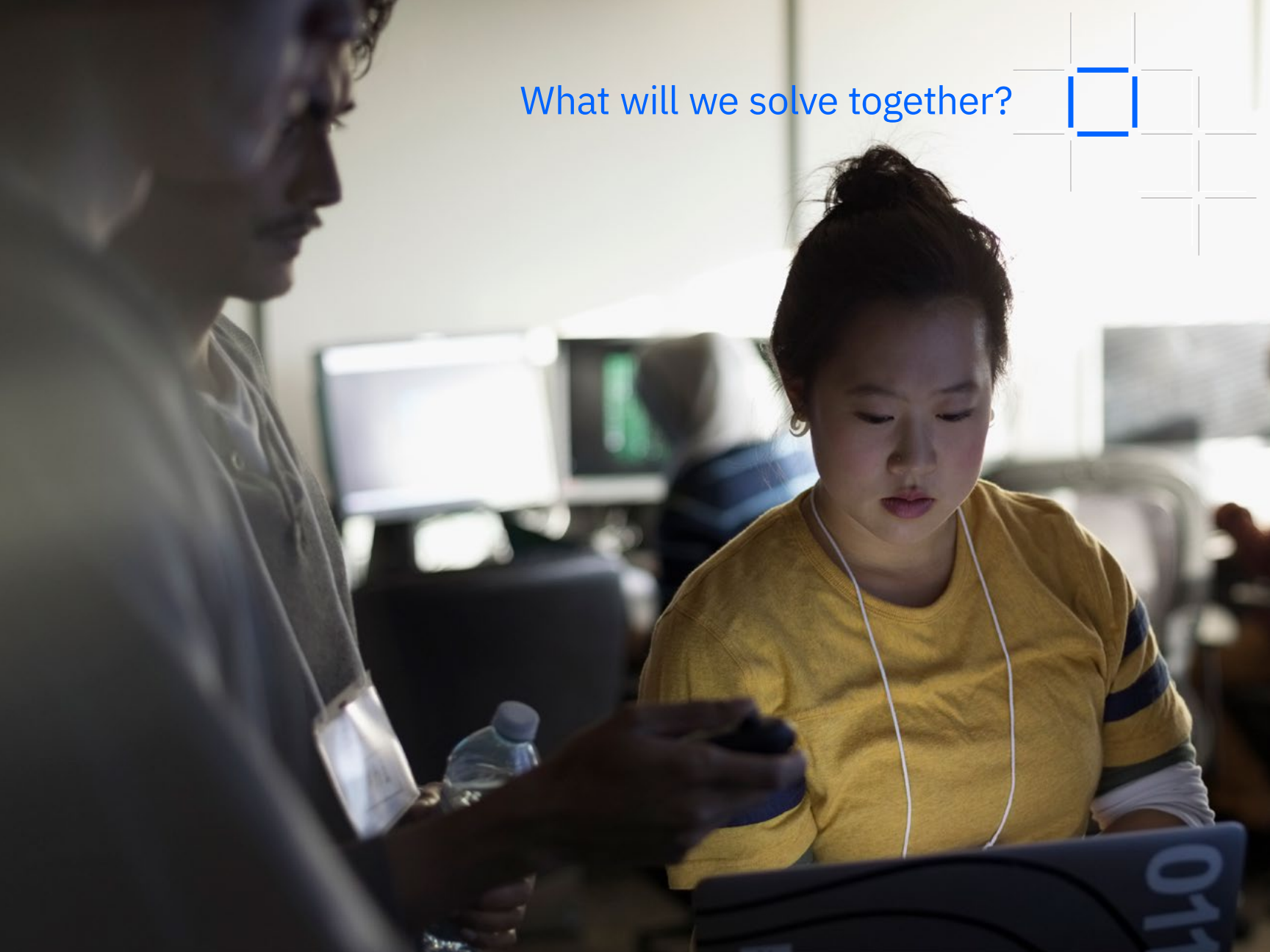
Smart contracts

A smart contract is a self-executing computer protocol intended to facilitate an agreement between ecosystem participants. Smart contracts are governed by a set of agreed-upon rules (as with a typical contract), then executed automatically on behalf of ecosystem participants using electronic signatures. The legal enforceability of smart contracts depends entirely upon a jurisdiction's recognition and acceptance of electronic and digital signatures. Again, this is an area where legal counsel is critical for determining whether a smart contract will be deemed valid and binding.

Next steps

It's never too early to seek legal counsel. This becomes increasingly more important as you begin interacting with network co-founders and anchor clients, especially when creating the network governance model. When searching for counsel with blockchain expertise, be sure to investigate what blockchain work they've done. Do they primarily work on initial coin offerings? Or do they specialize in permissioned, private blockchain networks for enterprise use? The laws governing each of these are vastly different from each other, therefore it's important to understand their true areas of expertise.




What will we solve together?

A few parting thoughts

We've interviewed dozens of startup founders, corporate innovation leads, blockchain solution pioneers — as well as our own who have already delivered over 400 blockchain engagements around the world.

Each has had their own series of wins and recommendations — along with pitfalls and cautions. Our goal has been to bring their common experiences and best practices together to help accelerate the blockchain journey for others.

The bottom line is this: in order to make blockchain real for business, it's necessary to bring together your ecosystem and find the shared value for participants in your network.

Throughout *The Founder's Handbook*, we've started answering some big questions, but there remain many more that founders are still figuring out. We've grouped these big issues into a few categories to make it easier to digest in the context of this handbook. In reality, most founders are tasked with answering all of them, all at the same time.

At IBM, we believe passionately in the transformative potential of blockchain, and we're here to broaden your understanding of how to get started in building a blockchain solution. But this is really only the beginning.

Like any good innovation, this is just the second release of *The Founder's Handbook*. We invite you to join future iterations by sharing your stories and lessons learned as you become not just a blockchain network founder, but also an author of the next great chapter in business innovation.

What will we solve together? Let's find out.

Start building your own network:
console.bluemix.net/catalog/services/blockchain

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Provide feedback on The Founder's Handbook:
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