



## MODULE

# Ecosystem

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### Overview

#### Focus Areas

1. Proving the ecosystem value
2. The need for ecosystem collaboration with blockchain
3. Potential blockchain collaboration models
4. Typical roles in a blockchain ecosystem
5. Ecosystem governance
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# Overview

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Blockchain is most effective when used to automate cross-enterprise workflows, thereby enabling business processes and the sharing of data across enterprise boundaries. However, doing so effectively requires an ecosystem with an agreed-upon governance structure defining the roles and behaviours of participants, how and what information will be shared amongst participants, data ownership, entrance and exit criteria and funding.

A distributed ledger carries some notable advantages, including decentralisation, greater flexibility, greater transparency, audit trail, independence, and more. But, like any new technology deployed in an organisation's day-to-day operation, blockchain carries additional considerations as well, such as managing what information is appropriate to put on the network and who gets to write that information to the shared chain. Thinking through such issues early on, and planning accordingly to manage them, is vital to a project's success.

# 1. Proving the ecosystem value

*How does an organisation adapt its planning and development practices to suit the unique characteristics of this emerging technology?*

Distributed ledger technology enables cross-enterprise collaboration and is the ultimate in networked technology, designed from the ground up to be decentralised. This opens exciting new possibilities in terms of delivering functionality to customers and employees, but for most organisations, it also means adopting new workflows and ways of thinking through development projects from the earliest planning stage.

The first crucial step is to identify an appropriate use case for blockchain – something that it can do better than an existing solution to improve an organisation’s operation. For some use cases – for instance, a database that is infrequently updated and only used by one or two staffers in their work – it may make sense to stick with a traditional solution. But for other cases – for instance, data shared among dozens of stakeholders who could benefit from real-time information sharing – a blockchain might work better.

Following identification of a viable use case, it is vital to prove the business value that will be realised from a new project for **all stakeholders**, including both in-house employees and external partners.

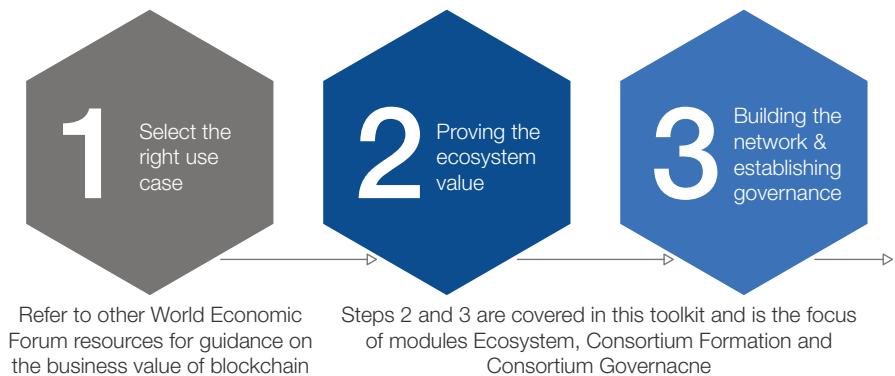


Figure 2.1 – This module focuses on steps 2 and 3

Blockchain applications are premised on peer-to-peer engagement using shared ledgers that enable exchange of information and management of business processes across an ecosystem. Blockchain technology supports collaboration while maintaining independence. Using blockchain, one can automate a business process and select what information can be made available to specific participants in an ecosystem. For example, an organisation may not wish for a customer to see improvements made in safety stock levels or cycle time as that would give them negotiating leverage and reduce the ability to reprioritise work based on demand. While blockchain can provide that visibility, an organisation decides what information to share and with whom.

Because of these characteristics, the deployment of blockchain solutions requires a shift to thinking in terms of the ecosystem of these stakeholders, some within an organisation and some without, in order to take advantage of blockchain’s trust and transparency features.

In order to deploy responsibly, it is necessary to analyse the ecosystem and clearly understand incentives and dynamics.

**Recommended References** from World Economic Forum before your start with the toolkit:

- [Blockchain Beyond the Hype<sup>28</sup>](#)
- [Building Value with Blockchain Technology: How to Evaluate Blockchain's Benefits<sup>29</sup>](#)
- [These 11 questions will help you decide if blockchain is right for your business<sup>30</sup>](#)

**Example**

Finboot<sup>31</sup> technologies delivered a solution involving airport logistics group, in which an ecosystem of airlines, fuellers and in-to-planes (logistics operators) participated. This implementation optimised the reconciliation of refuelling services. However, the solution focused on selective disclosure of the data registered on blockchain to make sure efficiencies gained don't compromise competing interests.

## 2. The need for ecosystem collaboration with blockchain

*Why is an ecosystem both an essential component for a blockchain solution and the reason most solutions fail to scale?*

An organisation has selected the right use case and proved through a rigorous business value assessment that a blockchain solution will provide unique and sustainable business value. Now it is time to scale that solution across multiple supply-chain partners.

As blockchain projects almost always involve cross-enterprise workflows, collaboration is a critical success factor that needs to be considered at proof-of-value (PoV) time. Since information in a blockchain project will usually be shared across multiple supply-chain participants, it is important to consider how the ecosystem will operate and be governed.

Conversely, a lack of ecosystem thinking, and up-front planning have already hampered several blockchain projects in the supply-chain space. This is why there have been many PoVs for blockchain solutions in the space, but few deployed into production.

Ecosystems enable integration across enterprise boundaries, allowing organisations to deliver products or services that they would otherwise not have the technological capabilities to deliver on their own, nor the end-customer understanding to imagine. An ecosystem mindset allows organisations to move beyond what's traditionally possible for them within the confines of their own vertically integrated operations, as well as the dynamic limitations of a particular supply-chain network.

It is worth noting that ecosystems exist for a variety of reasons. Typically, there are a couple primary drivers emerging. The first is a closed ecosystem where all participants are involved in the production of a good or service. For example, a prominent apparel manufacturing company, invited all its suppliers (from Tier 1 to Tier 3) onto a blockchain system for tracking the lifecycle of a t-shirt from yarn to consumer. At the other end of the spectrum are industry-wide consortia to for example drive better visibility to provenance of fair-trade items such as coffee or palm-oil might. These ecosystems have very different requirements and governance. Services are ever more valuable as additional buyers and sellers participate in the ecosystem.

Most successful ecosystems start out small and expand. Starting big has proven difficult and produced few successes. The most effective model seems to be one in which a leader establishes the workflow and governance to produce quick benefits while enabling the future buildout of the ecosystem. As the network matures, network governance and operations adapt to the evolving needs of participants, often including new entrants.

Notably, technology providers have begun to document different generalised models for managing an ecosystem, including the concept of a minimum viable ecosystem (MVE) and the prime tenant model. While it will be interesting to keep an eye on the development of these models over the next few years, the important thing for now is that these models all seem to share the premise of starting out small with an ecosystem an organisation can control, then build from there.

At the early stages, this might entail starting with a supply chain for just one product line that expands as the organisation gains experience and can clearly



*Ecosystems require managers to think about business challenges in a new way. The traditional focus on maximising profits within the boundaries of the company may be the very thing that keeps companies from engaging and succeeding with participation in an ecosystem.*

**Jesper Mathias Nielsen**, Manager,  
Deloitte



### Example

SAP's Blockchain powered industry alliance, SUSTAIN,<sup>32</sup> brings together palm growers, palm oil processors, consumer goods manufacturers, non-profit organisations, and other relevant stakeholders.

### Example

OneAgrix,<sup>33</sup> a Singapore-based online marketplace for halal products, has implemented a blockchain system powered by Origin Trail that enables consumers to check the provenance of any products, including its halal certifications.

### Example

Repsol,<sup>34</sup> the Spanish oil and energy giant, started out with a PoV in one business unit, which then turned into an industrial pilot and then, as of July 2019 has scaled to a digital solution used in 4 industrial complexes and 2 business units.

quantify the advantages of using blockchain. The solution can then grow to encompass multiple product lines and potentially establish industry standards.

Figure 2.2 shows a blockchain network for a food traceability use case. Blockchain solutions have been formed around existing smaller ecosystems. Participating in an ecosystem is becoming increasingly in vogue as doing so allows companies to move beyond what's traditionally possible for them within the capability confines of a vertically integrated organisation and the dynamic limitations of a supply network. Ecosystems allow organisations to deliver products or services that they would otherwise not have the technological capabilities to deliver nor the end-customer understanding to imagine. Figure 2.3 illustrates how global supply chains are increasingly intersecting multiple ecosystems.

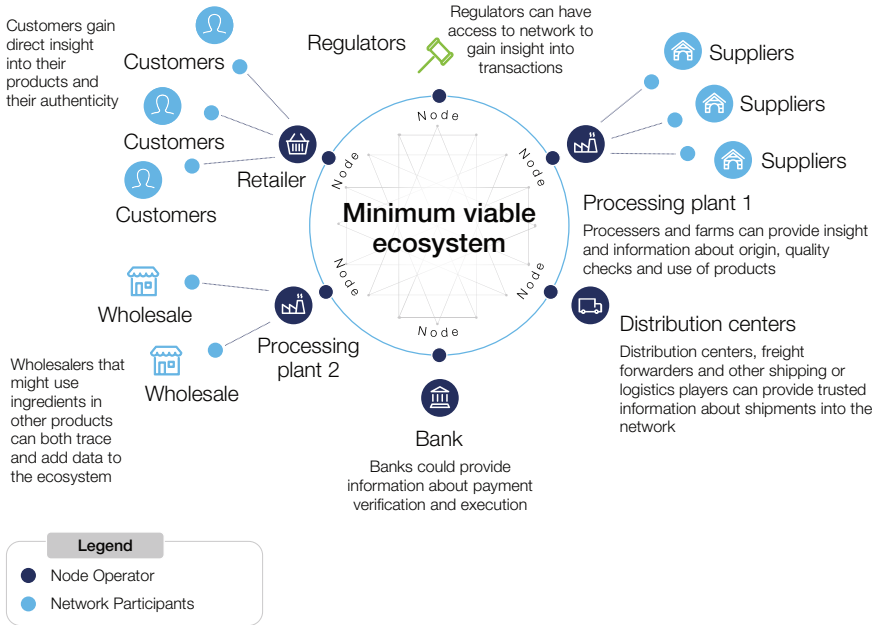


Figure 2.2 – Illustrative example of a network of participants for a supply-chain traceability use case<sup>35</sup>

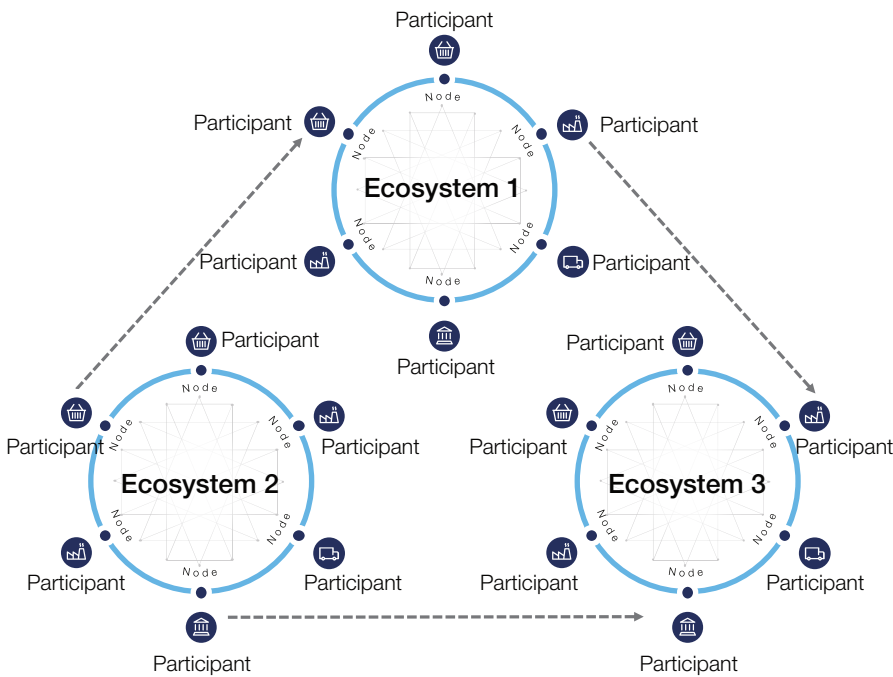


Figure 2.3 – Global supply chains intersect multiple ecosystems<sup>36</sup>



### 3. Potential blockchain collaboration models

*What are the various partnership models through which a blockchain ecosystem organises today?*

As shown in Figure 2.2, a blockchain ecosystem can be thought of as a **network of participants** with shared business processes and relationships that create and allocate business value. A blockchain is a complex alliance that will generally involve several to many actors with shared objectives, but unique points of view on how to achieve those objectives.<sup>37</sup>

The individual participants may have different business models, different roles in the ecosystem, or even be competitors. What binds them together and enables the ecosystem is the business value it provides for each participant.

In that context, selecting a model for a shared blockchain project depends on who needs to participate to enable the network to be most effective. The initial model can also evolve into other models as more participants join the network as previously discussed.

A brief overview of some of the collaboration models that have been used in the supply-chain space so far:

- **One-party led:** Single-party blockchain projects enable cross-enterprise workflow for mutual benefit. For example, Bumble Bee Foods<sup>38</sup> has united several stakeholders of the fishing industry, leading an effort to track-and-trace of yellowfin tuna from the Indonesian ocean to the dinner table.

More on Bumble Bee solution:<sup>39</sup> All the various stakeholders of the fishing ecosystem, who take the fish from the sea to the packagers, transporters, distributors and retailers will be able to record details of yellowfin tuna on blockchain technology. This information will be available on the customer front QR code which would boost customer's confidence about the food they eat. Bumble Bee operates in a complex ecosystem with multiple stakeholders with highly focused businesses. As an external big player with bird's eye view – it makes strategic sense for Bumble Bee to lead this as a one-party initiative and revolutionise the food supply chain.

- **Strategic business associations like a joint venture (JV) or consortium:** These are examples of associations with two or more organisations or governments with the objective of participating in a common activity or pooling their resources for achieving a common goal.<sup>40</sup> A looser consortium model is increasingly prevalent in the blockchain space, even in lieu of a more formal JV, because in many instances the latter is just too complicated.

A key question to ask when forming a strategic business association, is whether the group should form a new legal entity, or simply enter into a formal contractual arrangement among the consortium members. This decision will be driven by many considerations, including tax, financing and regulatory requirements.

See the module [Consortium Formation](#) on more details for developing a consortium.

#### Example

BunkerTrace<sup>41</sup> is a JV between Forecast Technology Limited and BLOC (Blockchain Labs for Open Collaboration), a solution used to track marine fuel.

#### Examples

OneAgrix,<sup>42</sup> a B2B marketplace that enables consumers to check the provenance and halal certifications of food items.

The Institutes RiskBlock Alliance, which helps bring together risk-management professionals, insurers, and blockchain developers to work on industry-specific use cases.

- **Regulatory:** This category includes shared projects among government agencies or parties that have to report to themselves to help ensure compliance verification. A good example here would be the shared project between Marine Transport International and the Recycling Association to use a blockchain-based tool to capture data and satisfy compliance requirements concerning shipments of recyclable waste from Britain.

Within all three above-mentioned business models, one of the most critical considerations is how the ecosystem will be funded. Business model funding is somewhat independent of the ecosystem model and can include for-profit versus non-profit, annual contribution, fee for service, transactional fees or some mixture. There is a clear cost to connect to the ecosystem and deliver on the organisation's individual responsibilities as a member, but there are also resource considerations and funding for the governance and operations that will be required. All must be identified and taken into account as the ecosystem is established.

These matters are explored in further detail in the subsequent modules [Consortium Formation](#) and [Consortium Governance](#).

## 4. Typical roles in a blockchain ecosystem

*What are the roles and responsibilities of each participant in an ecosystem?*

### Who brings what to the table?

In an ecosystem, the participants are those who are involved in the workflow that is being automated. Typically, those entities make up the supply chain and collectively participate in the production of goods or services. For a blockchain project to succeed, each participant in the ecosystem will need to contribute data and resources that are beneficial to the others.

There may also be users of the information that do not actively contribute to the production of the goods or services at hand. For instance, a user might be a consumer who wants to verify that the product they are purchasing was sustainably produced, while other participants in the ecosystem might be parties involved in the production or handling of the product who need to update data about its shipment, related payments, and compliance.

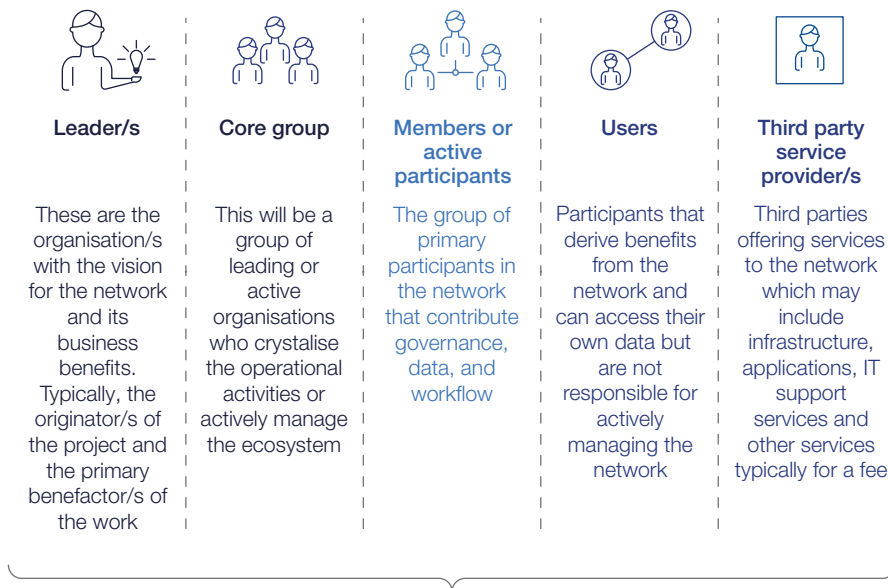
When planning for the ecosystem, it is critical to identify the actors to be included and identify how they interact from a business perspective. Below identify key participant relationships:



*Benefits from a blockchain solution are not homogenous across the value chain. The success of the implementation lies in the capturing the varied benefits across the network and turning them into a strategic advantage.*

**George Bailey**, Managing Director,  
Digital Supply Chain Institute





Participants will at least need to take one of the roles. However, in most cases, they would assume more than one role

Figure 2.4 – Participants in a typical ecosystem

Participants will at least need to take one of the above roles. However, in most cases, they will take up or participate in multiple roles.

Every participant must commit to a shared network that provides benefits for others, because each participant’s success is, at the core, based on the success of the group.

For a tool to assist with the mapping of actors and their different interactions, see the module [Digital Identity](#) and more specifically the tool [Table: Mapping out actors and interactions](#).

### A blockchain network - roles and responsibilities

Hyperledger explains a **blockchain network** as follows: A blockchain network is a technical infrastructure that provides ledger and smart contract services to applications. Primarily, smart contracts are used to generate transactions which are subsequently distributed to every peer node in the network where they are immutably recorded on their copy of the ledger. The users of applications might be end users using client applications or blockchain network administrators. In most cases, multiple organisations come together as a consortium to form the network and their permissions are determined by a set of policies that are agreed by the consortium when the network is originally configured (more on consortium formation in the module [Consortium Formation](#)).

#### Context matters

The perspective of the user of this toolkit might differ depending on the user’s role within their organisation. A businessperson, such as a supply-chain leader, will view the ecosystem from a perspective of good and services that move across the network including purchase orders and invoices along with the automation of associated business process. A systems person will be more interested in the technical architecture of the network, connection of the nodes and how data moves across the network and how processes or smart contracts are triggered.



Understanding the different roles at both a business and system level, requires an understanding of the variants and awareness of the context. In any discussion on the topic, it is hence important to align on the verbiage and terminology used. Take for instance the term 'network participant'. A businessperson might use 'network participant' to refer to a group of people/organisations working together on a common goal with blockchain technology (many times the same connotation as with 'ecosystem') whether through a consortium, JV or other collaboration model. A more technical perspective will possibly refer to 'network' as one layer in the technology stack and basically comprising of the 'network nodes' (so which organisations are node operators where the type of protocol, consensus mechanism etc is relevant). In this context, widely used, network participants are users of the blockchain network that are involved in operational governance.

Following are blockchain-related roles that an organisation is likely to come across.

### **Different types of permissions are granted to participants of a blockchain network:**<sup>43</sup>

- Read: Who can access the ledger and see transactions
- Write: Who can generate transactions and send them to the network
- Commit: Who can update the state of ledger

### **Another way to look at roles on the network level:**

- Data providers: Members of the network who write and commit data to the network
- Data users: Typically the readers of the network
- Some users may play both of the above roles
- Validators: a blockchain validator is responsible for verifying transactions within a blockchain

The naming and specifics of these roles may vary depending on the protocol and other variables in question. For example, in Hyperledger Fabric, the roles are broken down as:<sup>44 45</sup>

- **Peer nodes:** The blockchain network is comprised primarily of a set of peer nodes (or, simply, peers). Peers are a fundamental element of the network, form the basis for a blockchain network and host ledgers and smart contracts. Peers maintain the state of the network and a copy of the ledger.
- **Clients:** Clients are applications that act on behalf of a person to propose transactions on the network.
- **Orderers:** The mechanism by which applications and peers interact with each other to ensure that every peer's ledger is kept consistent with each other is mediated by special nodes called orderers. The ordering service accepts endorsed transactions, orders them into a block, and delivers the blocks to the committing peers.

### **Agreed roles and responsibilities are necessary**

The table below uses the roles outlined above to illustrate how business relationships and systems-level relationships might intermingle. When designing an ecosystem, it will be helpful to identify the role for each participant at a business level and at the system level (Table 2.1 provides a simplified matrix which could be useful for this task):

Table 2.1 – Simplified overview and example of identifying roles and responsibilities

Roles	System level designations	Permissions
Leaders	Data owners/users	Readers
Core group	Data owners/providers/users/validators	Readers/writers
Members	Data providers/users/validators	Writers/node operators
Users	Data providers/users	Readers/writers

## 5. Ecosystem governance

*What are the key governance considerations when forming a blockchain ecosystem?*

Establishing an ecosystem with the associated governance is a complex undertaking that needs to be driven by the business owner. It is important to note that one governance structure may enable the startup of the network while a different structure may enable scaling, such as when additional competitors begin to participate. So, the need for agility, as the ecosystem grow and develop, will be necessary. This gets into the complexity of scaling.

While the rewards from collaboration can be high, agreeing on what constitutes a fair and well-designed consortia governance system, let alone a joint blockchain platform, can be challenging. This is where many industry collaboration efforts have fallen apart. Ultimately, all parties must get benefits from participation in the network. It is unlikely that anyone will participate if such participation creates additional work for them without clear benefits.

In addition to establishing the network and defining business and technical governance, there are many legal considerations to starting a new project successfully. A more detailed discussion is taken up in the subsequent modules – see [Consortium Formation](#), [Consortium Governance](#) and [Legal and Regulatory Compliance](#).

## 6. Short-term versus long-term value drivers

*Has one considered both the short-term and long-term value propositions for the ecosystem?*

During formation of a business-focused ecosystem (or more formally a consortium) it is critical to reach agreement on not just the initial value levers to be pursued by the ecosystem but also the longer-term vision to be pursued. See the module [Consortium Formation](#) on more details for developing vision for a consortium. The value drivers will evolve over time as participants better understand the value of digitising their supply chains.

An example to illustrate this short-term versus long-term dilemma: The ecosystem will likely have to opt for a specific blockchain technology stack as part of pursuing its initial set of value levers. Typically, blockchain technology is only a part of an overall solution and will need to interface with Enterprise Resource Planning systems and other IT systems including, possibly, other blockchain architectures that may differ by participant.

Establishing the appropriate governance and management practice is essential to enabling the ecosystem to evolve to the dynamic needs of its participants.

## TOOLS AND RESOURCES

# 7. Essential steps and questions when forming an ecosystem

Below is a list of five key steps and questions to ask when forming an ecosystem. When designing a blockchain ecosystem, it is important to address these key steps and questions to ensure that an organisation has a model that can provide the expected business benefits for the organisation and other ecosystem participants.

Navigating these considerations requires project managers to have in-depth understanding of the targeted ecosystem and the full-backing of C-suite executives.

It is also worth noting that proper consideration of an ecosystem design and dynamics will not guarantee success of the project. But an ill-conceived ecosystem will almost certainly result in failure. In fact, it is the most common reason for not achieving desired results.<sup>46</sup>

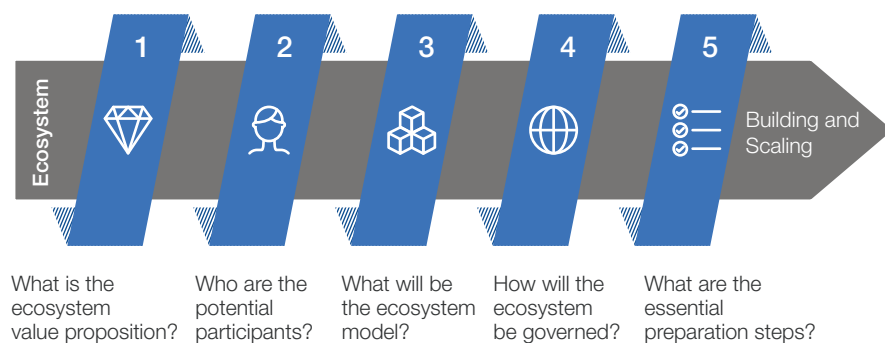


Figure 2.5 – Summary of key steps and questions in building and scaling the ecosystem

### Step 1: Ecosystem value proposition

As always, the journey starts by defining why the organisations involved are pursuing a joint blockchain solution. This step includes defining the issues to tackle and fundamental purpose of the ecosystem’s actions.

These are some questions to ask:

- What business problem does the proposed solution address for the ecosystem as a whole?
- How would the blockchain-enabled solution impact each of the currently involved participants and what value propositions will the participants in the ecosystem be able to reach consensus on pursuing?

## Step 2: Expected participants

Now it is important to answer a big question from the perspective of those who are essential participants in the ecosystem: Will they want to invest in blockchain and view it as the essential technology?

This is where most organisations fall down. They go off and say, “Let me try blockchain.” But they don’t have a set of success objectives and overlook involving others. It is important during the PoV to involve potential ecosystem members. Safe to say that if not, then the organisation will likely miss some of the key design points that will incentivise them to participate in the future.

These are some questions to ask:

- Who are the target participants, and why would they want to join the ecosystem?
- Why would target participants find the new value proposition and solution desirable?
- What are the incentives for each of the required participants to engage in the ecosystem, and how does the blockchain solution form a viable business future for them?
- Will the ecosystem be open or closed?
- How does the currently available blockchain technology enable the envisioned value propositions?
- Who are the necessary participants to be successful? What is the MVE?

## Step 3: Ecosystem model

An organisation will start to have an idea on which collaboration model will be a best fit for their purpose.

These are some questions to ask:

- Which of (a) one-party led, (b) strategic business association, or (c) regulatory is the best model? Any other arrangement makes most sense?
- How might the model need to change over time?

## Step 4: Ecosystem governance

It is important to consider early on who will operate the network and how it will be governed. The characteristics of the network will help determine the desired structure. Governance specific for a consortium model is explored in more detail in the module [Governance Consortium](#) and early considerations in the module [Consortium Formation](#).

More detailed questions to ask:

- For the value propositions agreed to under step 1, what consortium governance will be required to bring it to life?
- What governance model will constitute a fair, scalable and robust arrangement for all?
- How will value and cost from the blockchain solution be fairly allocated?

## Step 5: Organisation's preparation

At this stage in the process, each organisation should have some idea about what benefit it might derive from joining the proposed ecosystem. It should, however, conduct more detailed due diligence at this point before proceeding further.

A few important questions to ask:

- What are resources and necessary capabilities for initial development of the ecosystem?
- Is the proposed solution lawful?
- What are key risks and possible missteps?