Guidelines for assessing blockchain needs and readiness

CHAPTER 02

Blockchain is gaining the increasing attention of Governments and the private sector. As a general-purpose technology whose utility transcends trade processes, various debates have emerged on the technology's potential to streamline processes, enhance transparency and improve accountability within the context of international trade processes. Importantly, the implementation of blockchain technology is similar to the implementation of most digital technologies. However, certain peculiarities of blockchain make it both unique and susceptible to inefficiencies if implemented in an unprepared or needless environment. While blockchain can bring various value propositions to several areas in trade processing, it is not an all-encompassing panacea for all the trade facilitation needs of Governments. Thus, a blockchain needs assessment will help Governments establish the areas where the technology can bring potential efficiency gains within the country's trade landscape and ensure optimal use. Furthermore, by undertaking a readiness assessment, Governments will ensure that the appropriate legal and regulatory environment exists and that stakeholders are prepared to efficiently use the technology.

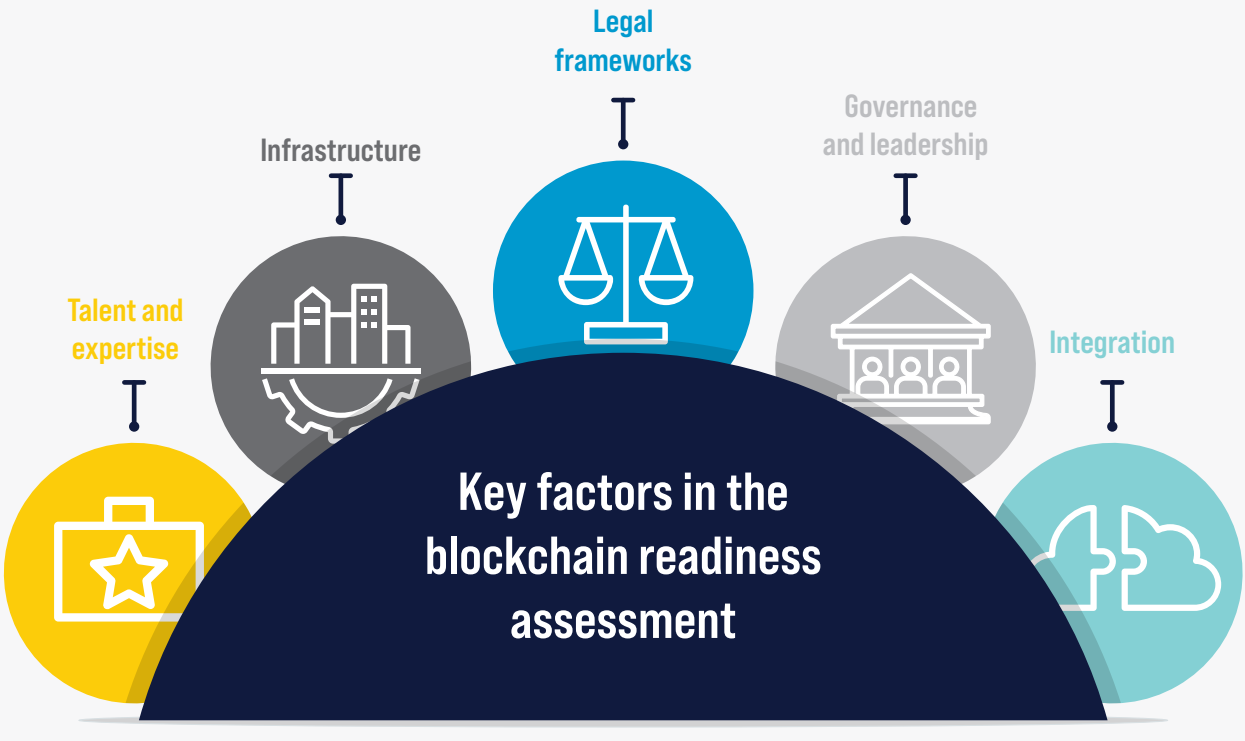
The present section outlines the processes and key factors to consider when undertaking blockchain needs and readiness assessments for Governments to successfully implement, sustainably manage and optimally use the technology for trade facilitation purposes. Undertaking these assessments will not only offer Governments the possibility to understand the trade facilitation problems that can be remediated by the technology but will also help Governments establish whether the required infrastructure, legacy systems and resources (both human and financial) exist to implement the technology. For most Governments today, the path to a successful and sustainable implementation of blockchain for trade facilitation remains unclear. Thus, before considering implementation, they need both a clear demonstration of the need for the technology and to ascertain the preparedness of their national environment in terms of resources, talent, expertise and regulatory frameworks that will support both the implementation and use of the technology.

A
Assessing preparedness for blockchain

In establishing a country's preparedness for the implementation of blockchain, a set of key indicators and technical factors focusing on regulation, infrastructure, resources, talent and expertise, as well as standards, are examined in the context of the broad requirements for blockchain implementation and use by the Government. These factors and indicators fall under five key dimensions, as shown in figure 4. It is imperative that the Government assesses its own readiness based on these key indicators and establishes any gaps that need to be filled in the technical, regulatory and policy environment before commencing the implementation process.

The five dimensions of readiness are further elaborated in the following sub-sections of this guide, beginning with the legal frameworks that would be needed to support a blockchain environment in trade facilitation. Addressing these dimensions will help Governments leverage the potential benefits of the technology while limiting the risks of failure and suboptimal use.

Figure 4. Key factors in the blockchain readiness assessment



Source: Compiled by ESCWA.

1. Legal frameworks

As a relatively new and fast-evolving technology, blockchain presents new legal, regulatory and compliance challenges to Governments. Most Governments, especially those of developing countries are still in the early stages of developing legal and regulatory frameworks for the broader digital economy. Thus, emerging technologies like blockchain present particularly significant challenges on issues around data management, data governance, digital identities, privacy protection and user safety. There are also challenges in relation to stakeholder knowledge of legalities and regulation. Any readiness assessment must therefore include a deep and broad overview of the suitability and applicability of existing laws in the country around new technical concepts such as digital signatures, digital identifiers, user privacy and data governance, as well as the legal gaps that need to be filled either with new laws or amendment to old laws. This will help close the divide between the required legal components of the technology and the technical capabilities of the technology for success. Furthermore, the readiness assessment must define the legal limits of the technology and a clear legal framework that outlines permissible use in order to curb abuse. The legal and regulatory component of the readiness assessment should also establish the legal basis for concepts such as data protection, intellectual property, smart contracts and user identities.

2. Technical infrastructure

Real-time applications of blockchain and its unique data management set-ups require two critical pieces of infrastructure to function reliably and efficiently in a country setting: reliable electricity and stable high-speed internet. While other infrastructure could be useful, these two are particularly necessary for the technology to work optimally. Unfortunately, most developing countries still have intermittent power cuts and unreliable internet systems, two phenomena that will lead to network halts, restarts and possible breakdowns of the blockchain network. While a readiness assessment will help ascertain the presence, reliability and preparedness or otherwise of electricity and internet infrastructure, as well as other supportive legacy systems, it will also encourage Governments take measures to overcome these challenges in the event that the environment is concluded to be unprepared. For example, a Government could decide to host the blockchain infrastructure within special infrastructure zones – domains that support critical Government infrastructure where internet and electricity are assured to be reliable enough – in order to protect the technology from frequent disruptions. Also, if a Government ascertains that it is unable to or lacks the reliable electricity and internet infrastructure to support a real-time database like those of blockchain, then other design options such as building on public permissionless blockchain may be explored as alternatives to the development and maintenance of a Government-owned fully functional private blockchain.

3. Talent and expertise

The availability and preparedness of the human resource that will implement the technology in the country is key to the success and sustainability of the implementation. The presence of both knowledgeable stakeholders and a talented workforce to ensure smooth implementation and optimal use of the tools of the blockchain infrastructure is crucial. Thus, a Government exploring the implementation of the technology must consider the availability of talent and expertise for implementing and maintaining the technology. Knowledge of the broader stakeholder base that will use the technology is also important in the assessment process. Governments need to ascertain their access to a pool of skilled professionals who can design, develop and maintain a blockchain-based system. Their expertise should cover areas such as cryptography,

distributed systems and cybersecurity. If talent and expertise gaps are identified in the assessment process, especially with regards to the implementation of a fully Government-owned blockchain, the Government could respond in one of two ways: either by finding an implementing partner within the private sector, industry, academia or by providing rigorous training to the workforce to undertake the implementation. Broader user and non-user stakeholder training will be key to ensuring optimal use of the technology post-implementation.

4. Technicalities of forward and backward integration

Once implemented, a blockchain will work in the context of a broader Government digital ecosystem for trade facilitation. This means standard applications and legacy systems such as cloud-based networks, conventional Web 2.0 applications running on traditional databases, and non-digital infrastructure that facilitate the Government's trade processes must work in tandem with the blockchain for a smooth trader experience. This will ensure that blockchain technology is used effectively and meets the needs of the different Government agencies. It requires both standardization of the interoperability processes as well as an understanding of the level of technical overhaul, restructuring and updates that will be needed. Establishing the Government's readiness to both transform the existing infrastructure that allows the integration of a blockchain ecosystem as well as prepare the environment for future infrastructure integration to meet future needs is important for the successful implementation of the technology.

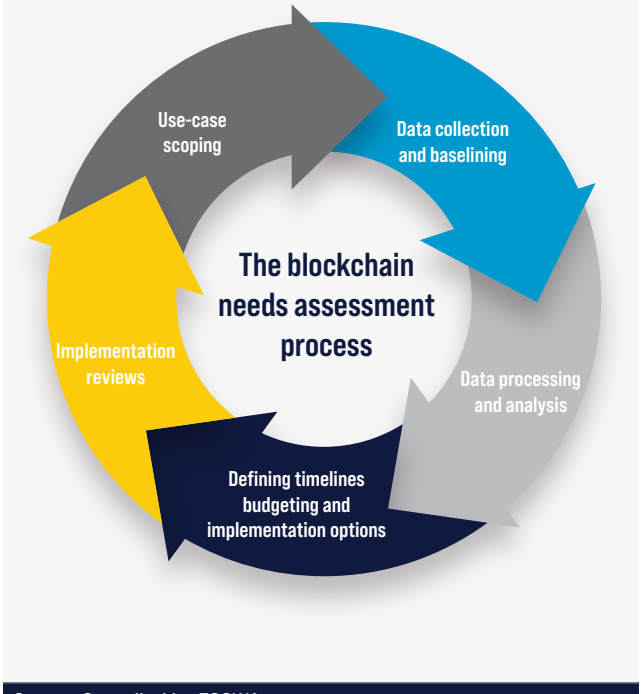
5. Governance, leadership and stakeholder preparedness

The leadership to oversee the adoption and use of blockchain technology as well as stakeholder preparedness to ensure optimal use of the technology are crucial for success. A high-level authority will be needed to oversee the implementation, and the day-to-day operational steps will require a knowledgeable, capacitated and well-educated middle-level workforce that is willing and able to support the implementation and use of the technology. This level of preparedness requires policies and guidelines, allocation of resources, authority and oversight to succeed. The arrival of new technologies may meet resistance to change by various types and levels of stakeholder groups. Leadership buy-in is thus crucial to resolve any resistance that the implementation process will meet.

B
Undertaking a blockchain needs assessment

There are several potential areas where Governments can use blockchain in their trade ecosystems to bring efficiency gains, help streamline daily operations and strengthen compliance. However, to deploy a blockchain-enabled trade environment, the use-case requirements should be considered. These will influence the design, architecture and process flows of the applications and solutions. The trade facilitation needs of Governments cannot all be met using blockchain, and some may be best fulfilled using other solutions. For example, the availability of information remains a key challenge in many trade environments.

Figure 5. Key steps in the blockchain needs assessment process



Source: Compiled by ESCWA.

In such cases, publishing information through conventional web portals and mobile applications could be the most resource-efficient approach to bringing transparency. A use-case of this kind does not need a blockchain. As shown in figure 5, key steps for assessing whether a trade facilitation use-case needs a blockchain include scoping the use-case scenario; collecting data and baselining the existing situation; processing and analysing the data collected to ascertain the likely efficiency gains; defining key timelines, the budget and implementation options; and finally, implementing process reviews which should be incorporated into any subsequent needs assessment for further use-cases, future scaling or adjustment purposes.

1. Scoping the use-case

Identifying and scoping the use-case(s) of the technology is the first step of the needs assessment. This helps to ascertain the envisaged intervention that will bring the most efficiency gains. While many trade facilitation needs, such as track and trace, trade audits, risk management and payment processing, could see significant improvements with the use of blockchain, some trade facilitation needs may be best implemented by non-blockchain solutions. Thus, defining those needs that can best be achieved with a blockchain to further ascertain the net efficiency gains that will be obtained from the intervention is key. This aspect of the needs assessment process will also help the Government to sharpen the technical, policy and regulatory objectives of the solutions that will be built on top of the blockchain. For example, if a Government has broader policy objectives of improving compliance, increasing trade competitiveness and improving revenue, use-case scoping should consider these policy objectives and how the implementation of blockchain will help meet them.

2. Data collection and baselining

The blockchain needs assessment involves understanding what exists, what works and what needs to change. Policy interventions can only succeed when the implementing body is fully aware of the existing landscape and therefore able to identify the changes required. This aspect of the needs assessment involves collecting both primary and secondary data through various methods such as policy reviews, interviews, surveys, focus groups and observations to ascertain the state of current trade processes and procedures and where the technology will bring the most value when implemented. It focuses on collecting data on the trade facilitation measures, establishing the desired future state of trade processes and focusing interventions on the gaps that need to be addressed to meet the discrepancies.

3. Processing and analysing data

Analysing data on existing trade facilitation measures helps with understanding links, patterns, themes and trends, in other words, the interrelationships between various components of the Government's trade facilitation needs. This

will allow individual and collective use-cases that require the technology to be aggregated. The analysis stage helps identify the most pressing trade facilitation issues and challenges that need to be prioritized in the implementation process. Furthermore, any discrepancies that may have been missed in the baselining step will be revealed in this aggregating stage and addressed accordingly.

4. Defining timelines, setting the budget and exploring alternative solutions

This stage of the needs assessment focuses on less technical, more practical considerations for successful and sustainable implementation. It also outlines the use-case challenges that may need to be addressed ahead of implementation. Setting feasible timelines, identifying resource requirements and stakeholder roles, and ensuring the cost-effectiveness of implementation options are crucial steps in the needs assessment process. Alternative solutions to address the identified trade facilitation needs, gaps or discrepancies should also be considered together with the cost considerations of each alternative technology. If trade audits can be cost-effectively implemented using cloud-based digital infrastructure and offer the same utility as a blockchain-based solution, why should the Government choose a blockchain? Furthermore, this step assesses the technical, policy and regulatory feasibility of alternative solutions in comparison to blockchain.

5. Implementation reviews

At this stage of the needs assessment process, trade facilitation measures that could benefit from blockchain have been ascertained and the implementation steps established. The process of implementation must be continuously reviewed to ensure that the technology is in continuous alignment with the trade facilitation needs of the Governments. This process could also assist the Government in expanding the technology to more use-cases, scaling it for more applications and adjusting it when necessary. Implemented solutions must be reviewed periodically to ensure that the trade facilitation needs of the country remain served by the technology. New trade facilitation needs that emerge along the way will require updates to the implemented applications. Thus, the solutions implemented will require continuous adjustments to ensure that they meet the identified trade facilitation needs and achieve desired outcomes.

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Needs assessments help the implementing Government, the stakeholders and the technical workforce ensure that the design and architecture of the blockchain and its applications meet the needs of the user groups and resolve the expected trade facilitation challenges of the broader stakeholder base. A multi-stakeholder, multi-agency and multi-team approach will be required to undertake the process of identifying all the critical trade facilitation gaps and discrepancies ahead of implementing the technology. This will ensure that software, policy and regulation are designed with a clear understanding of these trade facilitation gaps.