National Blockchain Adoption Strategy

Streamlining into a digital future

FEDERAL MINISTRY OF COMMUNICATIONS AND DIGITAL ECONOMY

Leveraging Digital Technology for National Economic Development

NITDA

Contents

Glossary

Bitcoin
The first cryptocurrency. Created in 2009.

Coin
Coin (also called altcoin) represents the value of a digital asset and is generated through an individual's independent blockchain.

Cryptocurrency
A digital currency that is created and verified through the use of encryption techniques.

Decentralization
The transfer of responsibility and authority from a centralized entity to a distributed network

Digital Asset
Intangible content that is stored digitally and has market value.

Distributed Ledger
A type of database with sequential records in a continuous ledger spreads across multiple sites.

Hash
A function that receives input and outputs an alphanumeric string called the "hash" value.

Mining
The verification process through which transactions are authenticated and added to a blockchain.

Peer-to-peer (P2P)
Interactions between two parties.

Serialization
The conversion of a data structure into a sequence of bytes.

Token
An asset built on an existing blockchain.

Wallet
A storage location for digital assets

Foreword

Blockchain has emerged as a technology with a potential to become a transformative force in multiple aspects of government and private sector operations. Its potential has been recognized globally, with a variety of international organisations and technology companies highlighting the benefits of its application in reducing costs of operation and compliance, as well as in improving the efficiency and security of business processes.

While the technical underpinnings of the technology can be intimidating to a large section of the policy and decision-makers – simply and functionally, blockchain can enable ease of collaboration for enterprises and the ease of living for our citizens by bringing in transparency across government and private sector interfaces.

Despite the fact that the technology is still in a nascent stage of its development and adoption, it continues to evolve. As such, it is important for stakeholders such as policymakers, regulators, industry and citizens to understand the functional definition of the entire suite of blockchain or distributed ledger technologies, along with legal and regulatory issues and other implementation prerequisites. Equally important is the fact that this technology may not be universally more efficient and thus specific use cases need to be identified to determine where it adds value and those where it does not.

The value of blockchain in facilitating trust in government and private sector interactions, followed by considerations when evaluating a blockchain use cases for implementation, possible challenges and lessons from the developed countries experiences in blockchain implementation showcase potential use cases that the ecosystem may consider implementing blockchain systems in a variety of contexts. It is meant to serve as an essential 'pre-read' to implementing a blockchain system in Nigeria and help guide broader thinking in the area.

Executive Summary

President Muhammadu Buhari, GCFR has shown a high level of commitment towards the diversification of the Nigerian Economy. The Federal Government has intensified efforts to move away from its heavy economic reliance on the oil and gas sector in order to allow the economy to leapfrog into an economy driven by digital technologies. This prompted the redesignation of the Federal Ministry of Communications as the Federal Ministry of Communications and Digital Economy (FMoCDE) on the 17th of October 2019 with one of its major priorities being the development and implementation of a Digital Economy Policy and Strategy for Nigeria.

Consequently, the FMoCDE developed a national policy and strategy that is anchored on 8 pillars being Developmental Regulation, Digital Literacy & Skills, Solid Infrastructure, Service Infrastructure, Digital Services Development & Promotion, Soft Infrastructure, Digital Society & Emerging technologies, and finally, Indigenous Content Development and Adoption. Therefore, the Digital Economy policy and strategy document provides the overarching framework for the execution of socio-technology initiatives by all Ministries, Departments and Agencies (MDAs) of the Federal Government to provide the required thrust for the attainment of an efficient, safe and productive Digital Nigeria.
Therefore, the National Information Technology Development Agency (NITDA), charged with the mandate to create a framework for the planning, research, development, standardization, application, monitoring, evaluation and regulation of Information Technology practices in Nigeria, is responsible for providing leadership and setting directions for all federal MDAs in the pragmatic and termed implementation of the Digital Economy policy and Strategy.

Hence, this National Blockchain Adoption Strategy document advances the efforts of Mr. President and the FMoCDE, through the Honourable Minister, Dr Isa Ali Ibrahim (Pantami), in creating and fostering an efficient, safe, and economically productive and viable Digital Nigeria using the blockchain technology. Blockchain is an emerging technology that provides a secure and fault-tolerant distributed ledger platform for transactions. It will facilitate the development of the Nigerian digital economy and will enable citizens to have more confidence in digital platforms.

National Adoption Blockchain Strategy (Proposed draft)

This document outlines the roadmap and strategies for the adoption of the blockchain technology by government in its digital transformation agenda. It also highlights the strategic objectives and initiatives that will be actively pursued by the Federal Government through designated MDAs during the stipulated period.

Vision and Mission

Vision

Use Blockchain technology as a platform for the transition into a digital economy.

Mission

To drive the adoption of blockchain technology in government in a way that supports efficiency, transparency, and productivity.

1 Introduction

The information technology industry is evolving rapidly with revolutionary changes being witnessed so often. New discoveries of emerging technologies are being made for businesses to dwell upon. The private sector, especially financial services companies are the earliest adopters of most emerging technologies, while the government is behind in the curve. With business technology rapidly advancing, companies stand to gain a competitive edge if they can stay current on IT trends that drive effectiveness. As emerging technologies such as Blockchain drive new business and service models, governments need to equally create and enforce regulations to protect citizens and ensure fair markets while letting innovation and business flourish.

The Nigerian government is inclined to employ its statutory responsibility towards emerging technologies to come up with corresponding strategies for a healthy ecosystem. Blockchain technology is one of the emerging discoveries in recent times. The technology is getting more popular as a quarter of large enterprises are venturing into blockchain, a figure expected to jump to more than 50% by 2020. For the government, the concern has been on how the technology can be used to foster healthy growth of the nation's digital economy and safety. Several governments have been awoken by this spade of emerging technology and have published strategies and policies to guide the adoption of the Blockchain technology. There is a need to have the right regulatory instruments and implementation strategy for the government to be able to guide the adoption of the technology by the public.

This strategy document being presented provides an overview of the blockchain technology, the reasons Nigeria needs to support a national adoption, enumerates, and proposes a suitable blockchain adoption model for Nigeria, and explores the requirements and the roadmap for implementation.

This blockchain adoption strategy aims to promote Blockchain technology in Nigeria and help in mitigating the risks regarding its implementation by government agencies, and corporate organizations. The strategy shall support the government to unleash the potential of blockchain and distributed ledger technologies (DLT) in the country, by supporting the digital transformation in several sectors and preventing risks related to their use.

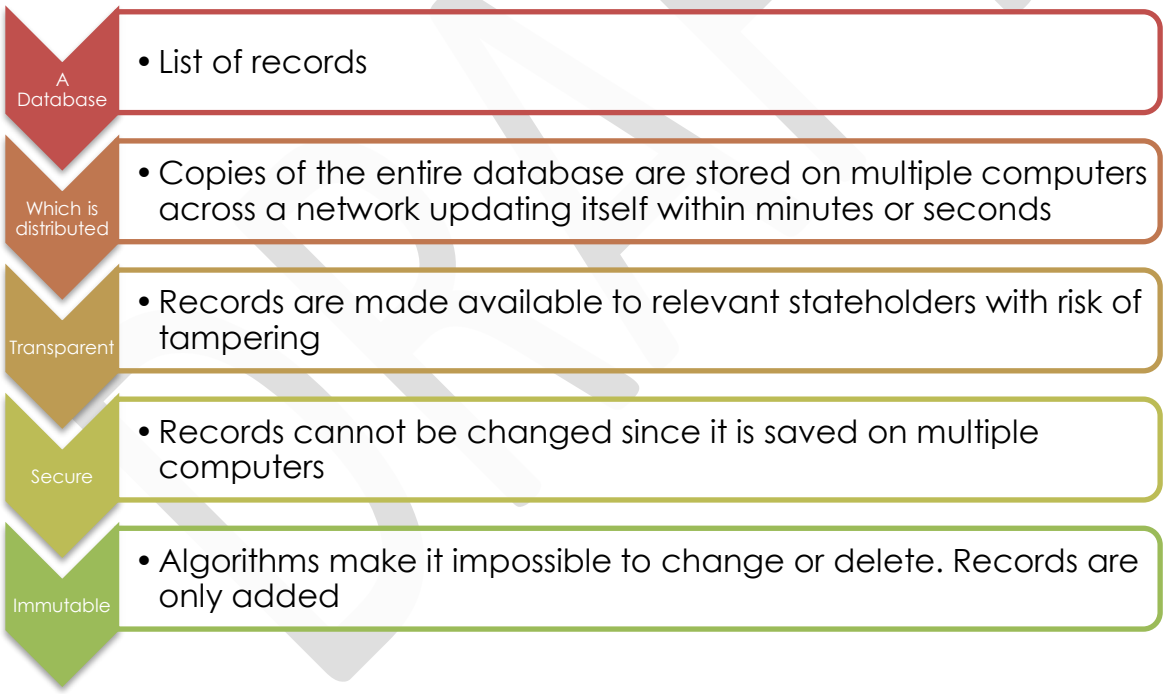
The primary objective of the Nigerian Blockchain Adoption Strategy is to identify and utilize the opportunities provided by Blockchain technologies to strengthen the country's security on cyberspace and stimulate the growth of the economy.

The roadmap will focus on several key areas including regulation, skills and capacity building, innovation, investment, and international competitiveness and collaboration.

2 Blockchain: New Trust Paradigm

2.1 Definitions

Blockchain can be understood as a shared database secured due to its structure that can reduce transaction costs while increasing transparency. Blockchain technology is one of the emerging technologies that support the digital transformation of countries and businesses. The decentralised nature of blockchain technology, along with its enhanced security and distributed ledger system are some of the key features that have made blockchain technology popular in a digital economy. Blockchain is a technology that offers a way for untrusted parties to reach agreement on a common digital history. A common digital history is important because digital assets and transactions are in theory easily faked and/ or duplicated. Blockchain technology solves this problem without using a trusted intermediary.



Understanding Blockchain

Today, blockchain is a powerful innovation that has the potential to impact the world economy by enhancing efficiency, streamlining processes and offering genuine privacy protection. The technology is widely explored across industries and multiple use cases are being experimented.

Despite the obvious use of blockchain in the financial service industry, non-financial players from retail, travel, healthcare, telecommunications, and public sector industries are also exploring the use of blockchain.

As a matter of necessity, many governments around the world have resolved to a common approach of proactively getting involved in the use of same technology to build relevant solutions that would help them understand and contribute to shaping the direction and future of this emerging industry with such potential impact on their operation

2.2 Nigeria's Adoption Landscape and Situation Analysis

The digital transformation process typically takes time to be adopted by the masses. The internet has been the groundwork and foundation for a digital economy. Most of the world's most valuable companies and governments have an internet-driven, platform-based models. Distributed ledger technology/blockchain has unlocked new economic value and could dramatically reduce the cost of transactions. It has the potential to become the system of record for all transactions. It also has the potential to create new channels for the development of a digital economy. The adoption process could be gradual and steady, as waves of technological and institutional change gain momentum.

Governments and businesses all over the world are realising the powerful potential usability of blockchain. Potential use cases in government include national identity management, healthcare, internal revenue monitoring, voting, secure financial services, and registries. Nigeria, however, is lagging due to the government institutions' sore-footedness and refractory approach to this undeniably ingenious innovation. This has been due to the disruptive nature of this emerging technology which has created a sort of resistance by the traditional and legacy approach of government processes. Nigerian financial sector witnessed a significant spike rise in its adoption since early 2016 with people venturing into virtual currency trading. This took financial regulators unawares and caused panic amongst them with several Investment Schemes surging into the market. These schemes took advantage of Bitcoin's wide adoption to promise unrealistic returns causing financial losses to the public. The events had caused a cautionary note being issued to the public by Nigerian government agencies like CBN, SEC, NDIC and EFCC to be careful about getting involved with Virtual currencies. Nigerian government had constituted "The National Forum on Virtual Currency" in June 2017, with

members being drawn from relevant stakeholder agencies to look into virtual currency activities in Nigeria and to come up with recommendations for regulation and national adoption.

From forecasts and projections by major technology pundits, it appears likely that blockchain technology will become significant in financial transactions worldwide, including Nigeria. Apart from being one of the major underlying technologies enabling virtual currencies such as Bitcoin, the distributed ledger technology has the potential of enabling the consummation of financial transactions using smart contracts at a lower cost, reduced completion time and overall improved efficiencies. Hence, Nigerian government cannot ignore this global development if the nation must accomplish her dream of becoming one of the top 20 economies in the world.

As for the private sector in Nigeria, there has been a decent spike in blockchain adoption with the recent events of the Bitcoin and other virtual currency trading activities. The vibrant youthful generation has taken up the challenge to explore the underlying technology of Bitcoin to reveal other potential use cases for the blockchain technology. This has opened a way for a number of blockchain start-ups to spring up with ideas that would solve real Nigerian problems creating employment and investment opportunities.

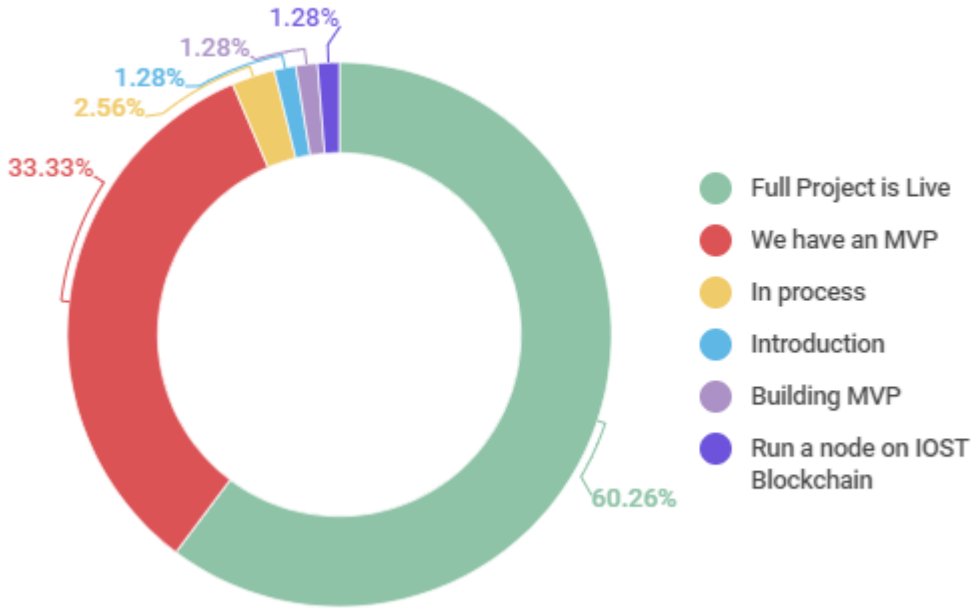
Early adopters of the blockchain technology quickly found ways to usurp authorities in all ramifications, from financial to security. As such, the technology built its first public reputation on the atrocities of the underworld, where the monetary token of the technology, popularly called the Bitcoin, was widespread for the payment of contraband goods and criminal services; including murder (although no death was recorded). Therefore, the default disposition towards the technology by government authorities across the globe was caution or outright rejection.

A survey was conducted in 2019 on over 70 blockchain start-ups in Nigeria by Blockchain Nigeria User Group, an active community of blockchain developers, investors, entrepreneurs, crypto traders, and enthusiasts. The survey conducted among the start-ups revealed that these Blockchain journeys were clearly riddled with challenges skewed towards adoption than implementation. It shows that companies had ventured into blockchain in different operational landscapes with more emphasis on finance, trading exchanges, wallet services andblockchain education, amongst others.

Nigeria blockchain start-up operational landscape 2019 Survey by Blockchain Nigeria User Group

Furthermore, it also suggests a good number of these blockchain start-up projects have either gone live or have an MVP. The survey generally shows the promising nature of blockchain technology adoption by businesses in Nigeria. Examples of potential use cases include the following:

(i) Tracking and tracing of drugs in the pharmaceutical supply chain
(ii) Claim verification and approval in the disbursement of fertilizer subsidy
(iii) Verification of university certificates
(iv) Transfer of land records



Blockchain Project Status. 2019 Survey by Blockchain Nigeria User Group

Though all these early adopters wanted to experiment with Blockchain to identify a futuristic solution, the road that led to their experiments were full of challenges. The major reasons for this were lack of awareness, evolving nature of Blockchain platforms, lack of clear government stand on the technology, lack of regulatory instruments and application integration challenges.

3 Necessity Framework and Benchmarking

3.1 Why Blockchain?

As a matter of necessity, many governments around the world have resolved to adopt a common approach of proactively getting involved in the use of the Blockchain technology to build relevant solutions that would help them understand and contribute to shaping the direction and future of this emerging industry with such potential impact on their operation.

Based on the current situation that some of the disruptive and unregulated markets riding on one form of blockchain /distributed ledger technology or the other such as virtual currencies and exchanges, highlighted below are some of the necessities why relevant agencies of government in Nigeria would need to get involved by experimenting with the blockchain technology in order to transform its challenges to opportunities:

I. The need to protect national sovereignty by defending the value of Naira in the global market through having adequate regulatory oversight and control of virtual currencies and exchanges.
II. The need for visibility into all financial activities for regulatory oversight.
III. Fight Money Laundering and corruption.
IV. Promote transparency and accountability in governance.
V. Consumer protection introduced by unregulated markets.
VI. Reduction of Capital flight through emerging markets
VII. Provide opportunities through new business models thereby creating jobs

Also noted in line with this strategy document are existing government issued strategies and policies which serve as reference point and baseline for drawing up this strategy document. These reference points used are such that conclusions drawn in these documents are in synergy with this blockchain strategy in order to achieve its vision.

Blockchain technology offers immense possibilities for business, government, and consumers. These include the opportunity for extraordinary economic growth and a safer and more secure Internet. Its ability to improve processes, increase cost-efficiency, and promote transparency in numerous industries is reforming the ways in which companies conduct business. For example, it can provide services and access to those that currently do not have them – the unbanked and underbanked – through faster and cheaper remittances and

digital identity solutions. Its potential, however, is being felt in many industries beyond financial services, such as healthcare, supply chain management, energy, transportation, insurance, voting, and many others.

3.2 Government Enabling Landscape

The key regulatory frameworks, policies, strategies, and guidelines providing support for emerging technologies such as blockchain to thrive and foster adoption by the public sector can be summarised as follows

3.2.1 National Digital Economy Strategy and Policy 2020-2030

The National Digital Economy Policy and Strategy has been developed to reposition the Nigerian Economy to take advantage of the many opportunities that digital technologies provide. The development of a digital economy will create new technological platforms and industries on one hand, while enhancing the efficiency and productivity of existing industries on the other. This strategy and policy aligns with the 8 pillars of the 'DIGITAL NIGERIA' Roadmap of the Federal Ministry of Communications and Digital Economy (FMoCDE). It is also a key enabler and driving force for adoption of the current digital age emerging technologies to drive a digital economy.

3.2.2 National IT Policy 2012

The goal of the National ICT Policy is to provide a framework for streamlining the ICT sector and enhancing its ability to catalyse and sustain socio-economic development. It seeks to transform Nigeria to a knowledge-based economy through digital transformation. The policy outlines key focus areas in which blockchain technology could thrive when adopted by the key stakeholders.

Policy focus Areas

I. Policy, Legal, Regulatory Framework
II. Internet and Broadband
III. Capacity Building
IV. ICT and Youth
V. Safety and National Security
VI. Coordinated ICT Development across all sectors
VII. Research, Development, and Innovation
VIII. Investment and funding
IX. Public Private Partnership

X. Open Data and ICT

3.2.3 E-Government Master Plan

The overall purpose and rationale of the e-Government Master plan is to strengthen the efficiency and transparency of public administration service. Its vision is to create a world class open and digitized government that connects with people to drive efficiency in public administration, responsiveness of civil services and transparency in governance leading to improvement of the quality of life of Nigerians.

3.2.4 Nigeria Cloud Policy 2019

This policy contributes to this goal by enabling the Nigerian Government (or public sector) access to cloud computing and other technologies enabled by the cloud, such as Artificial Intelligence, Blockchain, Machine Learning or IoT, among others. This is essential for the creation of an environment that spurs development and innovation in an organic way.

3.2.5 National Broadband Plan 2020-2025

The Nigerian National Broadband Plan 2020-2025 has several initiatives that are aimed at improving Broadband penetration in Nigeria, overcoming challenges with the deployment of a national fibre optic-based network to distribute approximately ten terabytes of capacity already delivered to landing points in Nigeria. The Nigerian Communications Commission (NCC) has pegged the current broadband penetration in the country at 37.87%, indicating a 7-percentage point increase from the 30% broadband target of 2018. The Federal Government's target is to grow the country's Broadband penetration to 70% by 2023 and to ensure that all parts of the country are provided high-speed Internet connectivity for equitable distribution of the benefits of the digital economy.

3.2.6 Nigerian Data Protection Regulation 2019

Data security and privacy is a major concern globally due to cyberattacks being on the rise in size, sophistication, and cost. The Nigerian Data Protection Regulation states the measures that entities must take to safeguard and protect private individual data. As blockchain technology is built in a decentralized fashion, with nodes running in different jurisdictions. Benchmarking this strategy against the regulation stipulated by the NDPR becomes necessary to ensure synergy and compliance.

3.3 Legal/Regulatory Framework

Nigeria has no legal framework or regulation guiding DLT/blockchain technology adoption. Cryptocurrency has been the frontline of blockchain application in Nigeria. The slow acceptance by the regulators is notable considering that Nigeria is reportedly the third largest holder of bitcoin in the world (McKenzie). A circular has been released by the Central Bank of Nigeria prohibiting the trading of cryptocurrencies by financial institutions in Nigeria. The CBN stated that any financial institution supporting the use of virtual currencies does so at its own risk. This caution is said to be pending "substantive regulation or decision by the CBN as they are not legal tender in Nigeria." The CBN cited its scepticism of cryptocurrencies on the possible exploitation of Nigerian citizens by criminals and terrorists.

A legal/regulatory framework issued by the government has become a paramount factor that would guide and determine the successful adoption of blockchain technology in both the public and private sector.

Also, in view are existing policies and regulations by NITDA, the National ICT regulator on Cloud (Cloud Policy) adoption and Data Protection Regulation (NDPR).

3.4 Common Standards

Standards are critical for interoperability and, as blockchain technology matures, it is crucial to ensure that there is a common standard that can support such interoperability between developed solutions. A common blockchain standard will enable existing solutions to be more efficient, have a greater level of security and avoid obsolescence. It will also encourage consumers to have the confidence required to adopt blockchain technology solutions. (Gartner, 2019). The International Standard Organization (ISO) has been in the fore front in establishing standardisation of blockchain technologies and distributed ledger technologies through its technical committee ISO/307. The committee is currently working to develop 11 ISO standards, with 42 participating entities and 12 observing members.

3.5 Potential Risks

As with any emerging and disruptive technology, blockchain exposes new challenges in terms of regulation. Ensuring that regulatory systems are fit for purpose for the future is a key challenge for the government. The successful

adoption of any new technology is dependent on the appropriate management of the risks associated with that technology. This is especially true when that technology is part of an organization's core infrastructure. Blockchain technology has the potential to be the backbone of many core platforms soon, thereby necessitating the need for the government to stand up to such risks by laying down guidelines, strategies, and policies in good time.

4 Strategy Framework

This strategy is developed with the purpose of using Blockchain as one of the emerging technologies for the transition into a digital economy. Its main aim is to drive adoption of blockchain technology in public administration, leading to improved efficiency, transparency, and accountability in governance and to open job creating opportunities in the transformation agenda of a digital economy.

This strategy for the Blockchain adoption is built on the following 6 key initiatives:

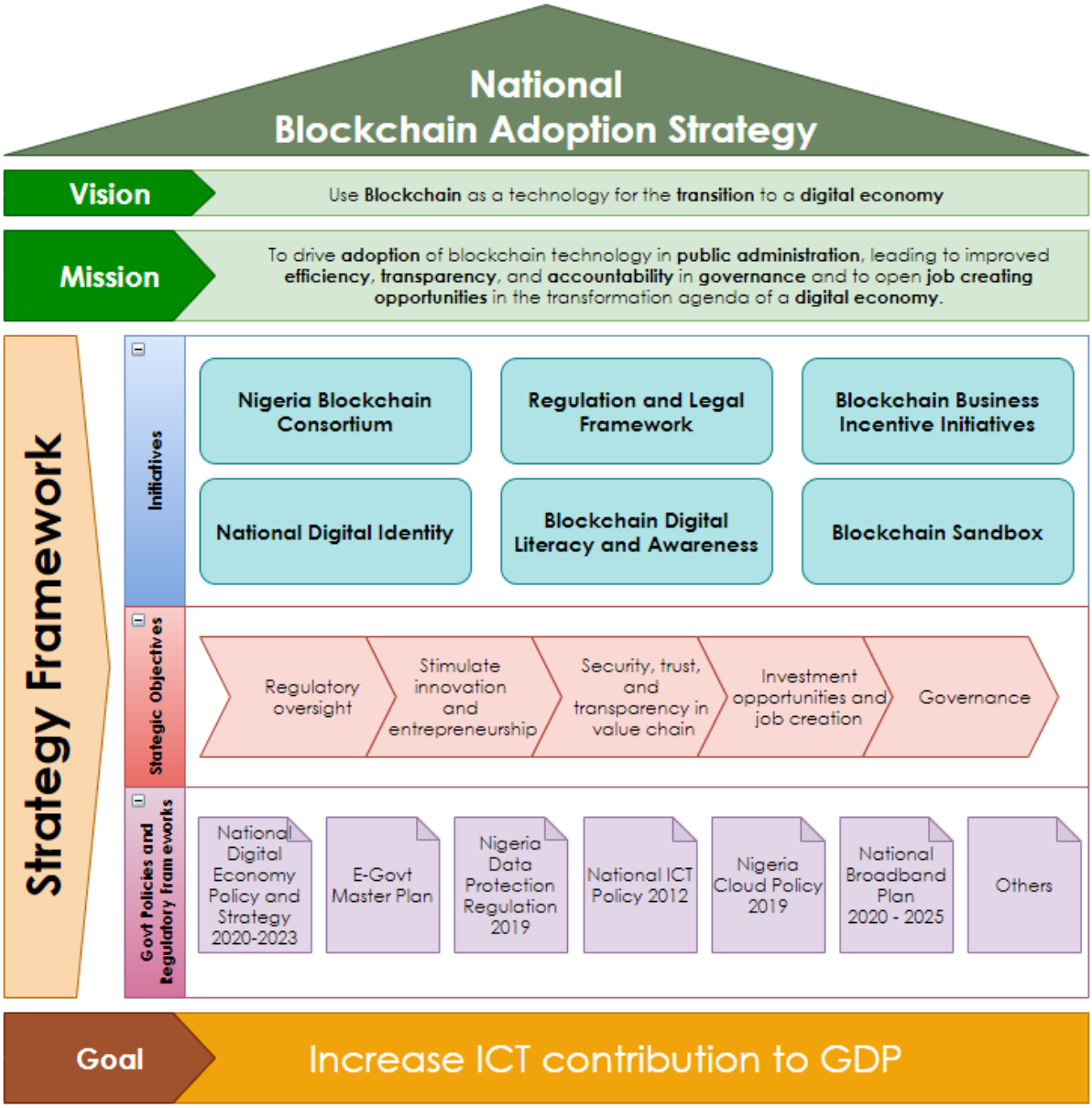
1) Establishment of Nigeria Blockchain Consortium.
2) Strengthening of the Regulatory and legal framework.
3) Focus of the provision of National Digital Identity.
4) Promotion of Blockchain digital literacy and awareness.
5) Creation of Blockchain business incentive programmes.
6) Establishment of a national blockchain sandbox for proof of concepts and pilot implementation.

These initiatives are specifically derived from the 8 pillars of Nigeria's Digital Economy Policy and Strategy (2020 – 2030). These initiatives are in line with the Digital Economy Policy and Strategy and will support in its successful implementation.

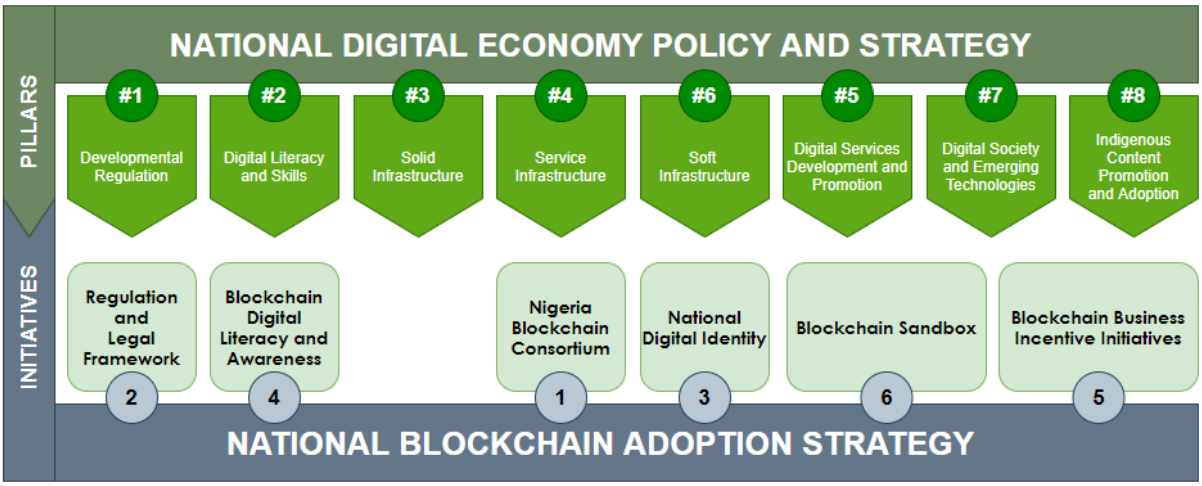
This document also outlines the following 5 strategic objectives:

1) Regulatory Oversight
2) Stimulate innovation and entrepreneurship
3) Security, trust, and transparency in value chain
4) Investment opportunities and job creation
5) Governance

This developed strategy puts into perspective existing government's policies, strategies, and frameworks and takes them into consideration in the design of the initiatives outlined. The goal of this strategy to key into the Economic Recovery and Growth Plan of the Federal Government by increasing the contribution of ICT to the Gross Domestic Product (GDP).



National Blockchain Adoption Strategy



Alignment with National Digital Economy Strategy and Policy

4.1 Initiatives

4.1.1 Nigeria Blockchain Consortium

A *Nigeria Blockchain Consortium (NBC)* to be constituted and prioritized with the primary objective to drive these initiatives and will initially be expected to consider how to effectively apply the use of this technology in public sector processes and services. The Blockchain Task Force (BTF) is to be championed by the National Digital Economy Council (NDEC) and membership is to be drawn from key stakeholder groups, relevant government agencies, and the private operators. The BTF is to be championed by NITDA being the regulatory arm for information technology in Nigeria. The NBC may be guided by certain criteria given it a clear direction and purpose to ensure effective implementation of this strategy towards achieving a digital economy.

NBC guiding criteria:

1. Support blockchain research, development, and education.
2. Assist in the creation of a flexible regulatory environment that enables experimentation.
3. Actively support blockchain adoption and deployment in the public sector.
4. Encourage collaboration with the private sector and citizens through an inclusive ecosystem.
5. Promote legal certainty for blockchain applications.
6. Use technology to solve real life problems / "tech for good" oriented.

4.1.2 Regulation and Legal Framework

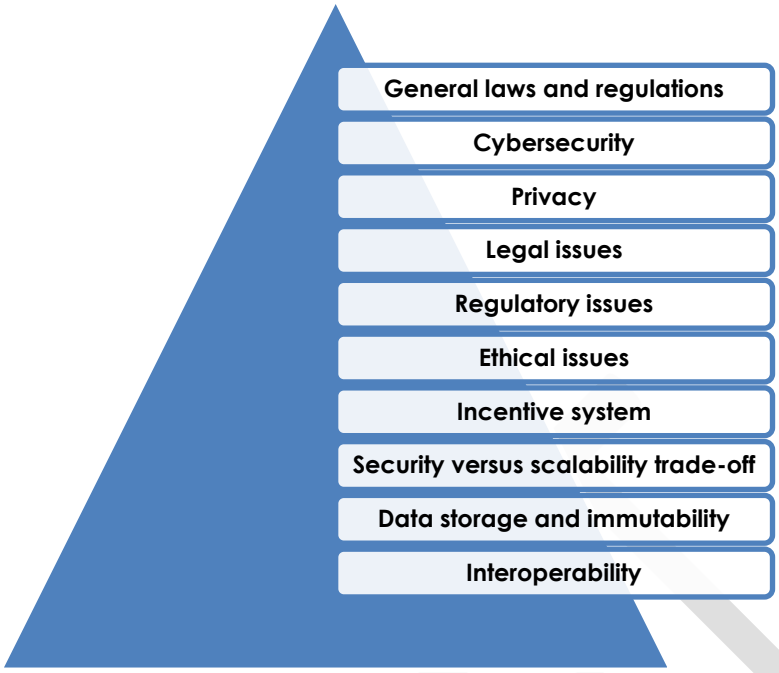
In the event to achieving a social, economic, and environmental policy objective of government especially in promoting a digital economy, one of the key factors to its achievement is a Regulatory instrument and a legal framework for certainty of emerging technologies. The approach to regulation should be one that encourages innovation and development.

The government seeks to establish a regulatory environment that is conducive to innovation and growth, to take advantage of the opportunities available. This can be achieved by ensuring the regulatory systems are principle based and technology-neutral, and that regulators consider the importance of enabling innovation and investment when interpreting and enforcing regulations. The regulatory outcomes may be guided by the Oxford Blockchain Regulation Framework outlined below.

Dimension	**Description**
Focus on outcomes	Desired outcomes are the main objective of the regulation and are used as a test of a given circumstance (assessing likelihood that a given behaviour is aligned with a particular outcome).
Protect all stakeholders	The Interests of all relevant parties are considered, not just those of primary market participants
Foster trust	The regulations, and the actions around enforcing or applying them, should promote trust in the system as well as transparency, enabling a more stable market
Balance competition	Regulation should support multiple parties and concepts of "Fairness", rather than favouring one group or class of competitors over another.
Promote innovation	New ideas should be permitted "room to run", provided that the other elements of the regulatory framework are not adversely affected

(Oxford Blockchain Regulation Framework)

These general regulatory regimes and issues will be properly addressed



In ensuring the right regulatory instruments are put in place, implementation of the Pillar #1 Developmental Regulation of the Digital Economy Policy and Strategy by the FMoCDE plays an instrumental role to its achievement. The pillar clearly outlines the policy objectives and implementation strategies necessary in achieving developmental regulation.

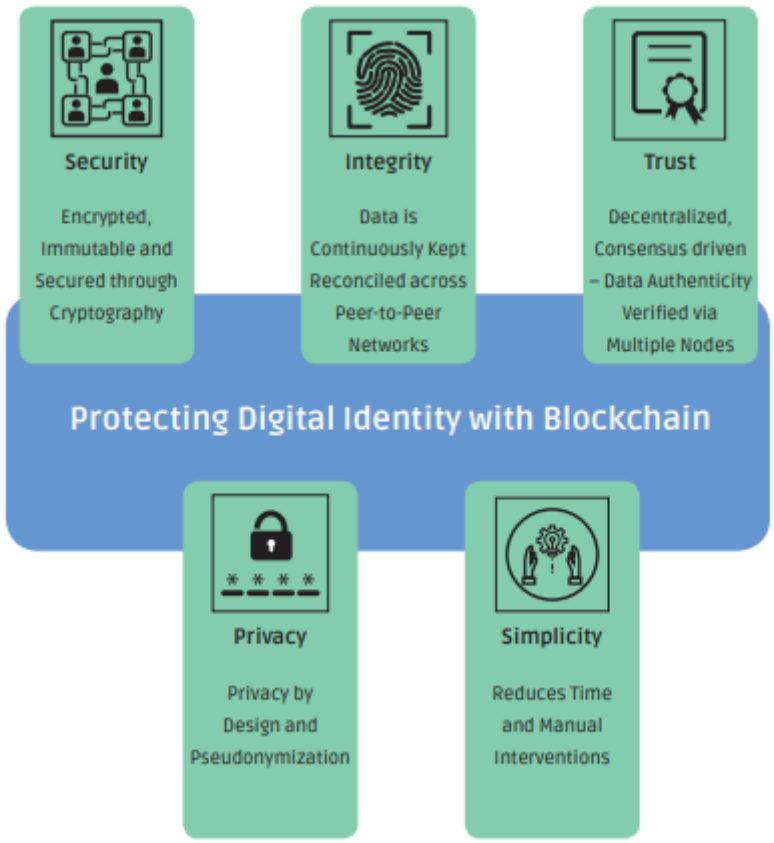
4.1.3 National Digital Identity Framework

The Digital Identity initiative is aimed at promoting the establishment of a national digital identification framework as it is a key driver to a digital economy. A program that would allow more government services to be available to people and businesses digitally at any time. The framework is to include everything from the policy and processes to the technology and systems. Digital Identity is a huge and complex challenge that involves multiple aspects. It touches upon areas such as governance, policy, operation, technology, and law. Therefore, it is necessary that national leaders and policy makers deeply understand the topic.

There are currently ongoing efforts around harmonization of biometrics and IDs such as National Identity Number (NIN), Biometric Verification Number (BVN), Voter IDs and SIM-card registration details. A committee has been setup with membership of about 30 government institutions that have access to citizen data. The committee is embracing an ecosystem approach to the integration that involves partnership with the private sector. These are efforts towards

implementation of Pillar #6 (Soft Infrastructure) of the National Digital Economy Policy and Strategy, which supports the accelerated implementation of a Digital Identity Programme. Adoption of Blockchain technology in providing a platform for the National Identity needs to be incorporated into the harmonization efforts and prioritized.

The Nigeria Data Protection Regulation (NDPR) aims to strengthen measures impacting Nigeria citizens' personal data and privacy. The NDPR lays down rules covering aspects such as processing of and restricting the free movement of personal data. The NDPR reiterates the importance of protecting identity information, this is where Blockchain solution would be explored, given its inherent characteristics of creating trust and transparency and user control, all key factors for digital identity management. These are 5 pillars of a blockchain based solution for digital identity.



Five Pillars of a Blockchain Based Digital Identity System

Digital Identity being a key driver of any Digital Economy, the World Economic Forum in 2016 published a report titled "A Blueprint for Digital Identity" outlining the need for establishing digital identity systems and its associated benefits. It

also reiterates why blockchain is suited for digital identity systems. Thus, promoting a blockchain-based national digital identity initiative is key to an enabling ecosystem for a more general blockchain adoption.

4.1.4 Blockchain Business Incentives

In Nigeria's transformation agenda to a digital economy, its strategy has recognised the need for prioritization of digital entrepreneurship and innovation especially in emerging technologies. The strategy also supports the emergence of new services and industries that are enabled by emerging technologies such as Blockchain. Blockchain technology adoption provides opportunities by creating new business models fostering job creation. By promoting blockchain adoption in public services through pilot programmes, it will have a replica effect in the private sector by springing up new blockchain business models. Government incentivised programmes for SMEs and start-ups also would have a positive effect on adoption.

Pillar #7 (Digital Society and Emerging Technology) focuses on tying the development of a digital economy to indices of well-being in the lives of citizens. It clearly outlines policy objectives and implementation strategies that would promote incentivized programmes for new business models.

Also, this initiative is in line with Pillar #8 (Indigenous Content Development and Adoption) which will provide a policy framework that gives preference to digitally skilled Nigerians for government funded projects. By promoting and adopting indigenous content, it will enable "Made in Nigeria" businesses to benefit from the increasing global market for digital technology.

4.1.5 Blockchain Digital Literacy and Awareness

It is important that Nigeria is not only a consumer of technologies and digital services of the 4th Industrial Revolution but active players in shaping it. For this to happen, there is a lot of work to be done by Government, Private Business, and the Education Sectors, it will take all three to position Nigeria for the Digital Economy opportunities. It is important to remember that without the innovative approach of human capital, digital economy is simply untenable; therefore, the development of the innovative potential of human capital in the modern economy is critical to our transformation process.

Pillar #2 (Digital Literacy and Skills) of the National Digital Economy Strategy and Policy clearly outlines policy objectives that gives life to this Blockchain

Strategy initiative. Emerging technologies such as Blockchain have been included and would be given emphasis in the curriculum, while implementing the policies and strategies of this pillar.

This strategy will be presented in key Business forums and industry-related organizations for identifying use cases, modelling proof of concepts (POC) and pilot implementations. Stakeholders to participate in industry conferences and events and promote an open dialogue with the private sector.

4.1.6 National Blockchain Sandbox

Some regulators, including CBN, FIRS and SEC, have been sceptical about the adoption of Blockchain technology , mainly due to some fraudulent activities associated with the use of activities of cryptocurrencies. This reservation has slowed down the adoption of blockchain and has prevented regulators from projecting a clear direction and legal certainty for blockchain technology in Nigeria. This has resulted in a high entry barrier into the blockchain space.

This strategy having mentioned the establishment of a Blockchain Task Force (BTF) to drive regulation and legal framework development, it has necessitated for a the creation of a blockchain sandbox framework for developers and non-developers alike to innovate and test run their ideas without fear of breaches and sanctions. The National Blockchain Sandbox will be championed by the key regulators mainly NITDA, CBN, FIRS, SEC, NDIC and others alike.

This initiative will boost Blockchain adoption in both private and public sectors by cutting entry barriers. Also, this initiative aligns with policy objectives and implementation strategies of pillars #5 (Digital Services Development and Promotion) and #7 (Digital Society and Emerging Technologies) of Nigeria's Digital Economy Policy and Strategy.

4.2 Strategic Objectives

This section of this document outlines the underlying principles for a blockchain strategy.

4.2.1 Regulatory oversight

To support blockchain technology application in consistency with Nigerian Laws, which achieves a balance between the need to promote and properly use new technologies and enhance innovation, on the one hand, and the

need to avoid money laundering and safeguard the rights of consumers on the other.

The Government will:

i. Identify the relevant laws and regulations that affect the adoption of Blockchain technologies with a view to promoting the adoption or initiating a review, as may be required.
ii. Establish a Blockchain Consortium, coordinated by a Blockchain Unit at the Regulatory Agency, to monitor the implementation of the Blockchain Strategy, drive awareness and sensitize the public on blockchain technologies.
iii. Create a compendium of relevant laws, policies, guidelines and regulations and disseminate these to stakeholders.
iv. Create an enabling environment for infrastructural development and investment in the ecosystem.

4.2.2 Stimulate innovation and entrepreneurship

This strategy objects to widen opportunities for innovation and entrepreneurship by introducing a new system for creation of new business models using Blockchain technology.

The Government will:

i. Partner with relevant institutions to integrate blockchain proficiency skills into the curricula of schools and skills centres across the country.
ii. Create a Blockchain Skills Challenge to inspire innovative Nigerians to solve national challenges through the use of Blockchain technologies.
iii. Mandate government institutions to acquire local blockchain solutions that address their needs.

4.2.3 Security, trust, and transparency in value chain

Digital Security is very paramount in any nation. Identity theft and fraud has been the norm in the digital space today. Data is either stolen or mixed up, and most times difficult to access. Blockchain offers a solution to known digital identity issues, where identity can be uniquely authenticated in an irrefutable, immutable, and secure manner. Also, enabling citizens to use the technology and its applications in a pragmatic and informed way.

The Government will:

i. Support efforts that promote the adoption of blockchain technologies as secure platforms for transacting.
ii. Support research to identify the best use cases for piloting the use of blockchain technologies in managing government transactions.
iii. Explore approaches to strengthen the level of trust that citizens have in the deployment of Blockchain technologies.

4.2.4 Investment opportunities and job creation

Blockchain has the potential to completely transform traditional models in several sectors both private and public. By promoting blockchain adoption and providing an enabling environment, new business models will spring up to open opportunities for businesses that will drive investments in a market such as Nigeria. This will have a ripple effect of creating jobs in a digital economy.

The Government will:

i. Create guidelines for investing in blockchain technologies.
ii. Incentivise the creation of jobs that are based on the use of blockchain technologies.
iii. Support research efforts that focus on the ways that blockchain can create viable sustainable jobs for the economy.

4.2.5 Governance

This strategy is aimed at increasing efficiency in government by enabling a digital blockchain platform. It also aims to establish a path to creating ground rules, which will allow organisations to establish governance structures that will help them navigate the technological landscape, while understanding some of the most important components of a strategic approach to policy and implementation.

The Government will:

i. Support the deployment of blockchain technologies in government institutions
ii. Identify, support and promote success stories on the integration of blockchain technologies in the public sector.
iii. Promote the development and deployment of government service platforms that are based on blockchain technologies.

5 Key Stakeholders for Successful Implementation

All individuals and institutions that have a role to play in the implementation of the Strategy. For example:

1. Federal Ministry of Communication and Digital Economy
2. National Information Technology Development Agency (NITDA)
3. Central Bank of Nigeria (CBN)
4. Nigeria Deposit Insurance Corporation (NDIC)
5. Securities and Exchange Commission (SEC)
6. Nigeria Immigration Service (NIS)
7. Nigeria Inter-Bank Settlement System (NIBSS)
8. Ministry of Budget and National Planning
9. Nigeria Communication Commission (NCC)
10. National Pension Commission (PENCOM)
11. Nigeria Insurance Commission (NAICOM)
12. Fintech Association of Nigeria
13. National Bureau of Statistic (NBS)
14. National Identity Management Commission (NIMC)
15. Independent National Electoral Commission (INEC)
16. Federal Inland Revenue Service (FIRS)
17. Nigeria Bar Association (NBA)
18. Corporate Affairs Commission (CAC)
19. Nigeria Customs Service (NCS)
20. Financial System Strategy (FSS2020)
21. Nigeria University Commission (NUC)
22. Association of Bureau de Change of Nigeria
23. Code of Conduct Bureau (CCB)
24. Investment Promotion Council
25. Nigeria Society of Engineers (NSE)
26. Stakeholders in Blockchain Technology Association of Nigeria (SIBAN)
27. Relevant Blockchain User Groups and Technology Associations

6 Blockchain Adoption Potentials and Blockchain Attributes

S/N	Potential for using blockchain	Blockchain Attributes
1.	Cashless Economy	Virtual Currency
2.	Mobile Money	Mobile penetration
3.	Payment System	Improved speed and low cost
4.	Need for common Technology platform among MDAs	Distributed ledger
5.	Quota system/ Federal character	Multiparty platform Suitable for driving unity in diversity
6.	Low financial inclusion	Low transaction cost
7.	Low financial literacy	Open and distributed
8.	High cost of money and financial services	Low cost
9.	High unemployment	New business models New emerging industry
10.	Technology inclined youth population	New business models New emerging industry
11.	High internet penetration rate	Data Security
12.	High penetration of mobile technology	Enhanced Security
13.	Anti-Corruption effort	Transparency and accountability Tamper proof record Real time audit

14.	Electronic voting	Transparency and accountability Tamper proof record Real time audit
15.	Need for independent and viable private sector	New business models
16.	Small & Medium Enterprise empowerment	New business models
17.	Need to develop a viable indigenous software industry	New emerging industry
18.	Youth empowerment	New emerging industry
19.	Dependence on foreign products and services	Open source
20.	Undue pressure on FOREX	Alternative currency
21.	e-Agriculture	Improved food security through the easy tracking of information in the food supply chain
22.	e-Health	Rapid and secure access to health records by authorized persons
23.	e-Transportation	Traceability and easy tracking of goods and fleets
24.	e-Entertainment	Reduce piracy and distribution of authentic content through the tracking of the lifecycle of digital assets

7 Way Forward

(To be discussed by Local Organizing Committee (LOC), with input from stakeholders).

7.1 Adoption Framework

(To be discussed by Local Organizing Committee (LOC), with input from stakeholders).

7.2 Roadmap

(To be discussed by Local Organizing Committee (LOC), with input from stakeholders).

8 Conclusion

DLT/Blockchains pose many challenges to governments such as privacy, security, access to law enforcement mechanisms and cryptocurrencies as a new type of asset. The goal for the ecosystem is therefore to establish governance structures that will help them navigate the technical landscape, while understanding some of the most important components of a strategic approach to policy.

The Blockchain Strategy document has focused on the application of blockchain to resolve business and governance process inefficiencies. Going forward, Nigeria will focuses on scaling up some of these pilots, in addition to pursuing selective pilots. Organisations need to be innovative enough to adopt flexible policies towards blockchain in order to be ready for a fast-paced and ever-changing technology landscape

The adoption of Blockchain will focus on recommendations to establish Nigeria as a vibrant blockchain ecosystem. The recommendations are stated in the document and some key recommendations focus on:

1. Regulatory and policy considerations for evolving a vibrant blockchain ecosystem
2. Creation of a national infrastructure for deployment of blockchain solutions that integrate identity and incentive platforms.
3. Promotion of research and development in blockchain, in addition to focus on skilling of workforce and students
4. Creating a bimodal procurement process to enable government agencies to adopt blockchain solutions

9 Bibliography

(Bibliography to be inserted here).