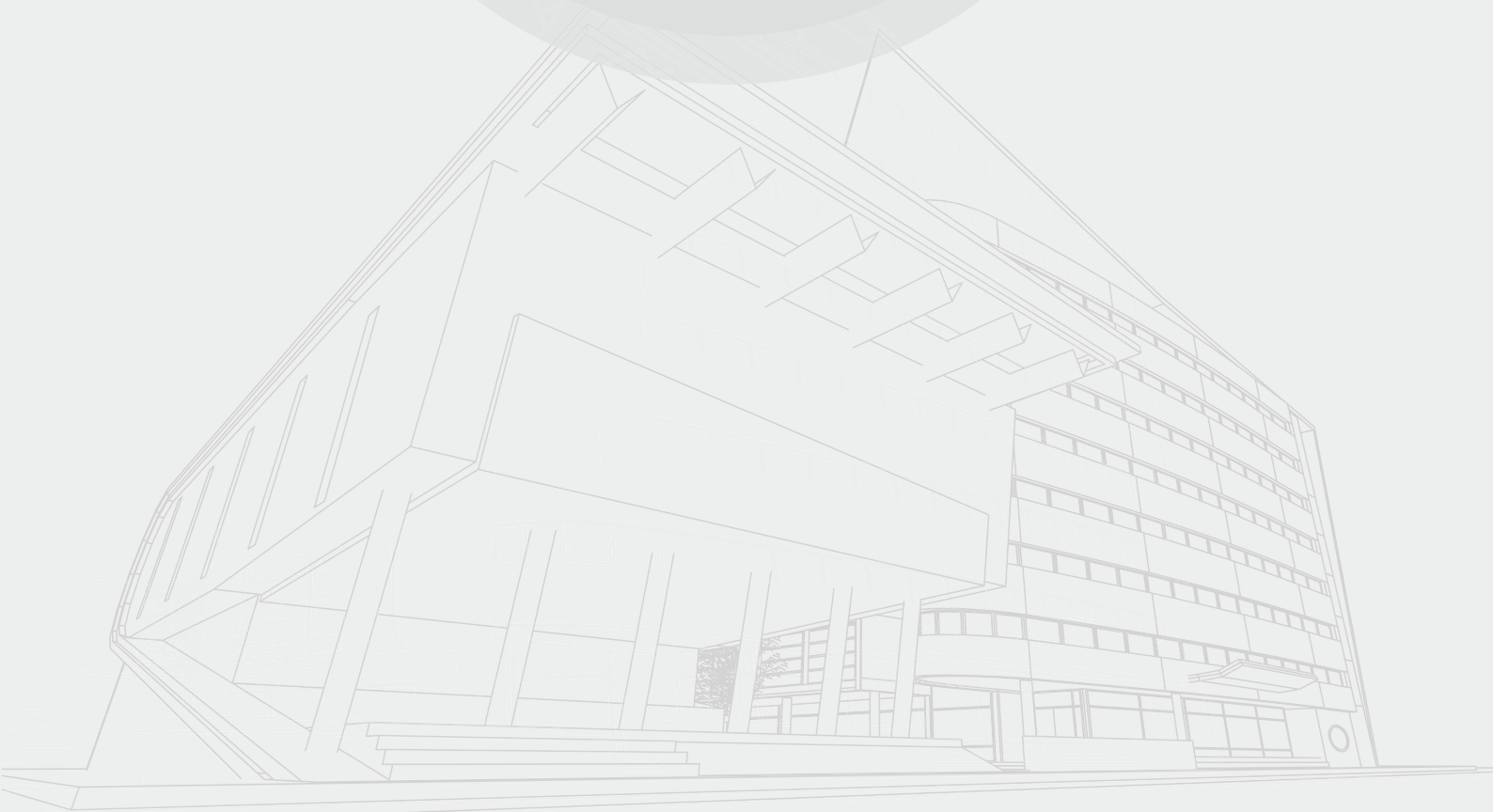




GOVERNMENT OF TAMIL NADU
INFORMATION TECHNOLOGY DEPARTMENT

Tamil Nadu Blockchain Policy
2020

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Executive Summary

Blockchain Technology will play a huge role in e-Governance in the near future. It is expected to enable governments to build secure, auditable and efficient government workflows and processes. These modernized workflows can equip the government to design citizen centric applications that cater to different verticals of governance including agriculture, healthcare, data security and integrity, identity management and benefits and subsidy distribution. Blockchain will benefit the residents of Tamil Nadu by delivering better and more secure governance and efficient service delivery.

To achieve these goals, this policy proposes a top driven strategy that will ensure that all Blockchain implementation in governance meets guidelines and standards for design, development and deployment to ensure uniform architecture and adherence to security protocols. Additionally, the policy proposes a State-wide Blockchain Backbone that can be used by Government Departments and public sector enterprises for building and deploying e-Governance applications. This will enable the Government Departments to deliver services to people securely and efficiently. In addition, the policy charts out regulations and security standards and addresses ethical or legal concerns arising from the technology.

It is essential to provide a suitable environment for developing and maturing the Blockchain ecosystem within the State. To this regard the policy suggests spreading awareness about the technology. The Policy also encouraging Research and Development in Blockchain technology by enabling academic and research institutions, start-ups and enterprises working on Blockchain technology through Blockchain forums and conferences .

The Policy also recommends aiding stakeholders in government departments and Bodies in understanding this Technology. This should enable them promote Blockchain and leverage the technology for designing workflows and frameworks. Lastly an oversight mechanism is proposed that will govern the Blockchain Initiative and ensure that the goals and objectives of the Policy are met and the Blockchain adoption within Tamil Nadu is successful.



1

Introduction

Governments can play an important role as a regulator as well as a consumer of Blockchain technology. Several governments around the world, notably Estonia, Georgia and Singapore¹, have introduced Blockchain Technology in governance. The Government of India and a number of State Governments in India are planning to implement this Technology for improving governance. The Hon'ble Prime Minister of India has highlighted the Blockchain technology as an important tool for bringing in transparency and efficiency to Government processes². Several State Governments have carried out proof of concept implementations in areas like land registration, healthcare and digital identity. The Hon'ble Chief Minister of Tamil Nadu has taken the Leadership in using this Technology and has announced the creation of Tamil Nadu State-wide Blockchain Backbone for delivering secure and efficient services to the people of Tamil Nadu³. The Government believes that this technology will enable them to enhance the quality of the services provide to citizens as well as bring in more efficiency and transparency to Government processes. While using Blockchain Technology it is also to be kept in mind that a wise selection of use cases is made and this technology is applied only when there is a clear advantage made out.

This Policy is a guide for the path ahead in using Blockchain technology within the State of Tamil Nadu.



2

Why Blockchain in e-Governance?

As a network technology that promises interoperability, transparency and immutability Blockchain has numerous end-benefits for governments. It can be harnessed for providing accountable and efficient governance to our citizens. Consider the following areas where Blockchain can have a sizeable impact.

1. Government processes require multiple departments to work together to provide a service to the citizen. Seamless data exchange between departments is critical to provide efficient service delivery. Smart contract enabled workflows and shared ledgers can track inter-departmental processes, bring in accountability and enforce data security and ownership.
2. Blockchain can be used as a source of authentication and verification for all the information and data produced by government departments.
3. Blockchain can enable authorities to verify the authenticity of documents by comparing the physical document copy against a version stored in a Blockchain. Storing the digital copy of the document in a Blockchain instead of a centralized server makes it more secure and immune to tampering.
4. Blockchain can also be used to build better supply chains for government, exchanging encrypted inter-department communication, and maintaining health records for citizens and so on.

The end goal in all these cases is providing better services to citizens. This document provides guidance for leveraging Blockchain to accomplish this for the residents of Tamil Nadu.

3

Goals & Objectives of the Policy

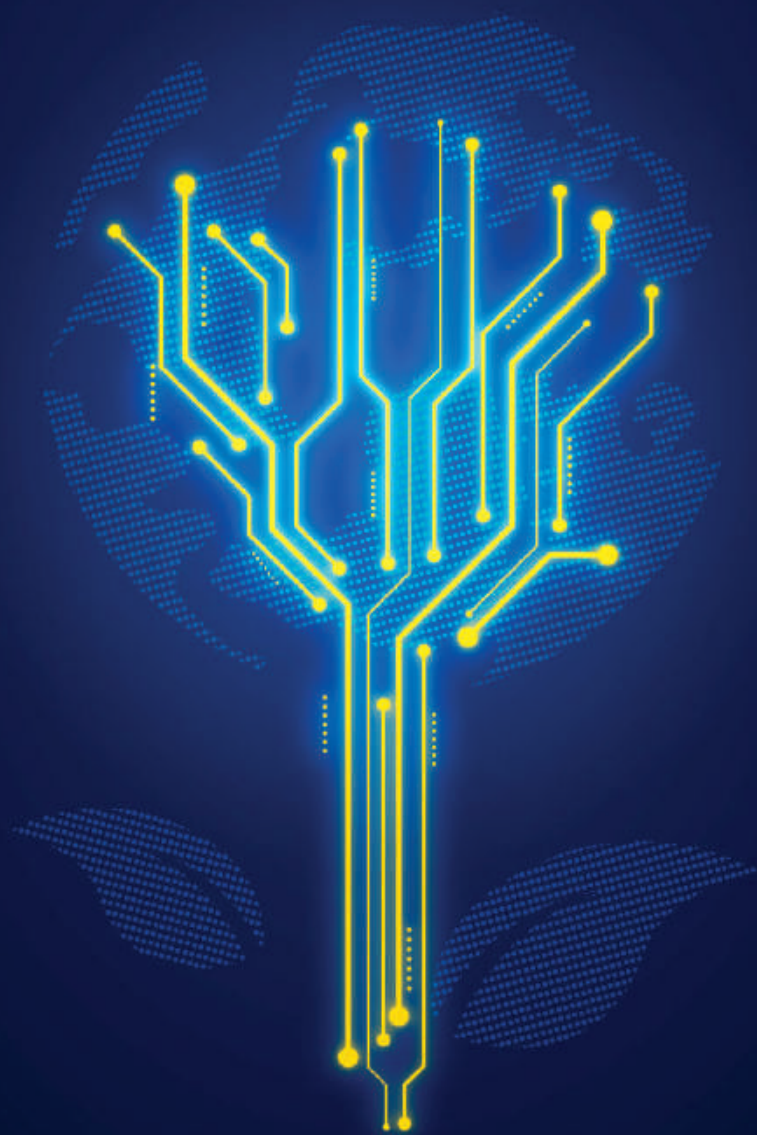
Following are the goals of this Policy -

1. To make Tamil Nadu a global leader in Blockchain Technology.
2. Provide faster, efficient, secure and transparent delivery of services to the people of Tamil Nadu by building new e-Governance Blockchain applications and to augment existing Governance workflows and processes with Blockchain.
3. To generate awareness and understanding about Blockchain technology in executives and senior officers of Tamil Nadu Government to promote adoption of the technology.
4. Provide new opportunities to people of Tamil Nadu and organizations of Tamil Nadu and help create a thriving ecosystem including Blockchain entrepreneurs and community development.
5. To promote and encourage mass adoption and implementation of Blockchain Technology in the State of Tamil Nadu across Government and industries.

Following are the primary objectives of this Policy -

1. To create a set of standards and guidelines to be followed by all Tamil Nadu Government Blockchain implementations to ensure enhanced interoperability, security, privacy and uniformity in technology stack across government departments.
2. To build a mature and self-sustaining Blockchain community to aid the growth of Blockchain technology in the state of Tamil Nadu.
3. To build a regulatory sandbox that can be used for building and deploying Blockchain applications.
4. Creating an oversight mechanism for ensuring successful rollout, adoption and implementation of the Blockchain policy of Tamil Nadu.





4

Applicability of the Policy

This policy will be applicable to the following –

1. Any authority or body in Tamil Nadu, established or constituted under any central or state law and owned or controlled by the Government of Tamil Nadu or which receives any aid directly or indirectly from the Government of Tamil Nadu.
2. Any organizational body such as cooperatives, trusts, societies, public sector undertakings and boards, whose composition and administration is controlled by the Government of Tamil Nadu or whose functions are of public interest for Tamil Nadu or whose officers or office bearers are appointed by the Government of Tamil Nadu.
3. Partnerships and joint venture Companies of the Government of Tamil Nadu.



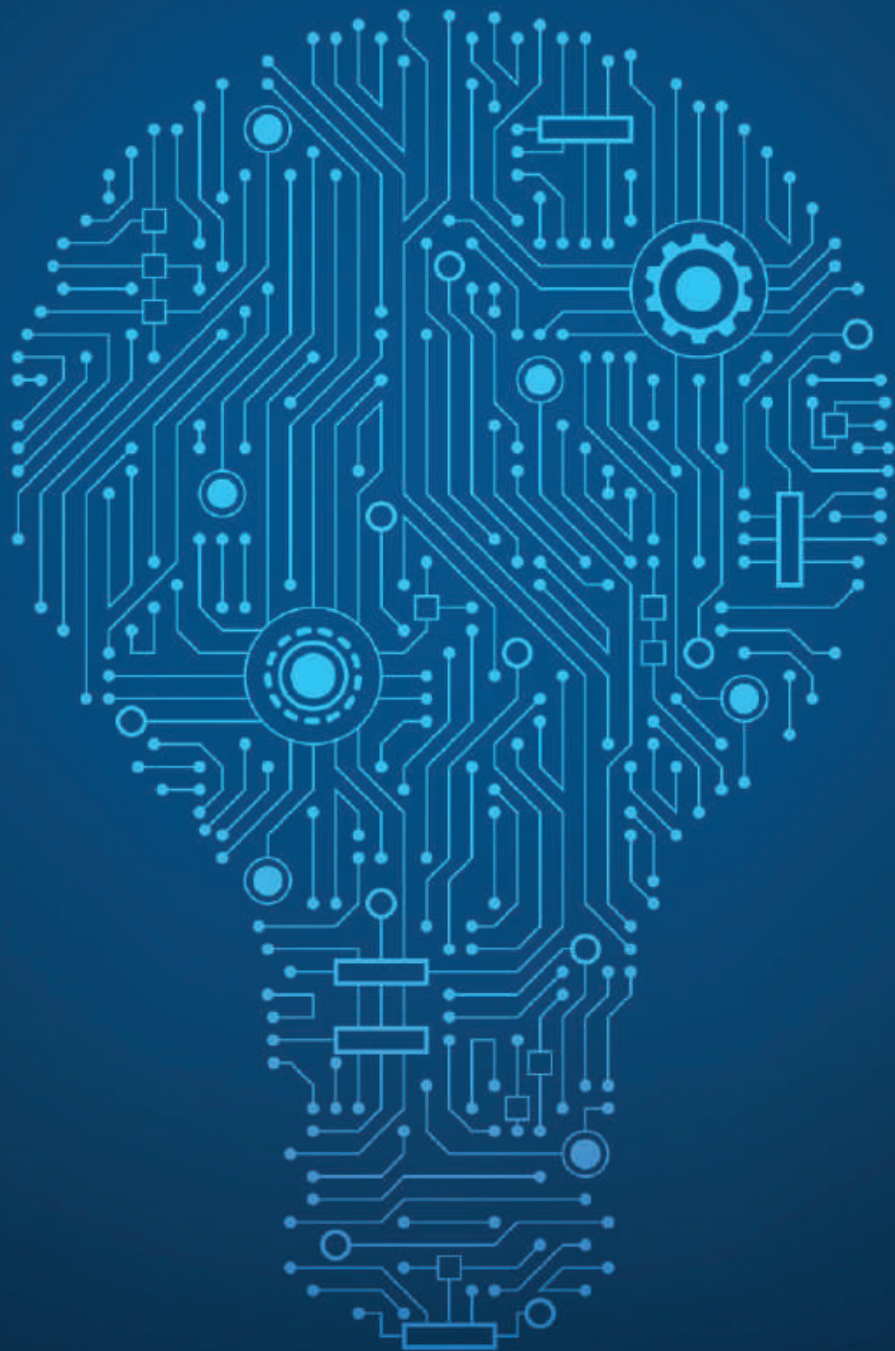
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Implementation Strategy

Following is the high-level strategy the policy will employ to achieve the end goals and objectives listed in Section 3 –

1. Envisioning a high-level design for building a common Blockchain Network for e-Governance Blockchain projects in Tamil Nadu.
2. Use case selection and prioritization for Blockchain in e-Governance.
3. Establishing standards and guidelines for designing, developing, and deploying Blockchain applications for e-Governance and for applications using the Tamil Nadu State Blockchain Backbone and implementing them.
4. Laying out a plan for Blockchain capacity building within Tamil Nadu for Government Executives and Officers.
5. Encouraging industry wide adoption by encouraging cross-Industry and cross-academia collaborations through a Forum for Blockchain Ecosystem Development.
6. Building a regulatory sandbox for blockchain applications.
7. Designing an oversight mechanism for implementing the Blockchain Policy.

The next sections of this document cover these initiatives in detail.



6

Tamil Nadu State-wide Blockchain Backbone

The policy recommends building a Blockchain Backbone infrastructure (network) for the state of Tamil Nadu. This infrastructure would function as the single source of truth and trust anchor for all government processes and data. This Blockchain Backbone would be used by the State of Tamil Nadu for reimagining governance and for encouraging adoption of Blockchain within the State. Following are some of the design recommendations for this network.

1. This infrastructure would be a hybrid blockchain platform hosted in state data centres, or on cloud or on-premise and would include participation from multiple stakeholders. It would be leveraged for building better G2G (Government to Government) and G2C (Government to Citizen) work flows and applications that will improve the lives of the residents of Tamil Nadu.
2. The Blockchain stack would have a modular architecture with modular components that can be used to build applications and workflows, significantly reducing the go-to-market time and cost for application development.
3. The platform would be capable of creating and deploying blockchain applications for all government departments and public sector enterprises of Tamil Nadu.
4. The seed nodes of the network (Initial nodes) shall be created and hosted by TNeGA. As new applications are deployed to production, the respective user department shall setup nodes on the peer to peer network to access their applications and secure the network from unauthorized modifications.

5. The infrastructure would work in a BaaS (Blockchain-as-a-Service) mode. Government would support stakeholders who choose to forgo hosting a Blockchain Backbone node. These stakeholders can use Application Programming Interface (API) to connect to the Blockchain Network and build applications. This will help reduce their overhead and enable numerous players to quickly get onboarded on the platform and start using it. Government may charge users for accessing and submitting transactions to the network.
6. To ensure sanctity and accuracy of data captured on the Blockchain, data added to the infrastructure needs to be cleaned, de-duplicated and processed before submitting it to the Blockchain.
7. The platform would have a modular, evolving, and open architecture which would provide access to other third parties and interoperate with other Blockchain networks if required.

Over a period, this platform would evolve as a trust anchor for all Government departments interacting with the citizens.



Use Case Selection and Prioritization

For Blockchain Technology to be successfully adopted in Tamil Nadu, Government of Tamil Nadu would select and prioritize the use cases for Blockchain implementation. The Government would prioritize the areas of Governance where Blockchain will have a significant positive impact. Initially following areas would be taken up for blockchain Implementation.

1. Data integrity and audit trails for government data and documents including inter and intra-organizational data and files and certificates, receipts, licenses, identification documents, blueprints etc. generated from the e-Sevai platform and other TN government portals.
2. Securing academic records, certificates, degrees and diplomas and providing a secure and trusted workflow for verification of these records by authorities and other stakeholders.
3. Creating a portable digital identity and implementing privacy protection for residents of Tamil Nadu.
4. Securing TN government websites and portals from cyber security threats and unauthorized modifications using Blockchain technology.
5. Securing land registration transactions and enabling cross-departmental workflows for land mutation.
6. Tracking agriculture produce and increasing profitability for farmers.
7. Creating a secure healthcare platform that caters to all the residents of Tamil Nadu.
8. Blockchain enabled platforms for seamless distribution of benefits to residents of Tamil Nadu.



Guidelines for Building Blockchain Applications

For the Blockchain initiative to be successful it is essential to have a set of guidelines and standards that need to be followed for building Blockchain applications on the State-wide Blockchain Backbone.

The TN Blockchain Policy Implementation Committee, Protocols and Standards Committee and Legal & Regulatory Committee (hereafter referred to as the committees in this section), would carry out the following tasks to ensure security, privacy and maturity of Blockchain applications.

1. The committees would audit and create a list of recommended Blockchain Platform(s) that would be used for application development. This list should be reviewed on a yearly basis. All organizations within the purview of this Policy shall use only these recommended platforms for developing Blockchain applications.
2. The committees would chart out standards for –
 - a. Consensus/Ordering Mechanisms
 - b. Governance framework for networks
 - c. Enterprise blockchain application development standards
 - d. Privacy preserving and consent management workflows
 - e. Test cases pertaining to security, scalability and interoperability
 - f. Identity and access controls management
 - g. Securely storing and retrieving public and private keys
 - h. Node on-boarding and off-boarding protocols

- i. Deployment processes
- j. Bug testing and bug reporting
- k. Smart contract standards and templates
- l. Smart contract deployment, versioning and retirement
- m. Arbitration workflow for disputes
- n. Workflow for pre-processing data to be captured on Blockchain
- o. Archiving ledger data
- p. SOP for dismantling and retiring a Blockchain Network

Organizations within the purview of this policy would need to abide by the above standards. This list would be updated based on developments in the field of Blockchain and the stakeholders would be notified.

3. The Committees would chart out a SOP for evaluating and approving requests submitted for network creation and application development. They would also create a plan for periodically auditing these applications and networks.
4. The Committees would work on designing and developing an interoperability protocol to enable other blockchain networks to integrate with the Blockchain Backbone and make it available to the stakeholders who need it.
5. The Committees would periodically regulate applications deployed on the Blockchain Backbone. Sector specific experts should be appointed to the committees who would lead network creation and network governance decisions for their respective sectors.

Following guidelines should be followed by all departments implementing Blockchain solutions.

1. All Blockchain network formation requests for government departments and public sector entities need to be submitted to the committees for approval and sign-off. Requests will be evaluated based on the impact and value-proposition of the network and the intended application(s). The Committees will oversee the compliance of all networks subject to this policy and approve creation of any such network. The same process is to be followed for dismantling and retiring a network.
2. Organizations willing to build applications on the Blockchain Backbone need to submit their request including application features and technical details such as application process flow and low level architecture to the Committees who will review the requests and approve the requests on a case-to-case basis.
3. Organizations would only work with Blockchain platforms that have been extensively peer reviewed and have been approved to be used in production by the committees. Underlying cryptographic algorithms used should not have security loopholes that can be exploited by malicious actors.
4. All applications deployed in production on the Blockchain Backbone need to follow standards prescribed by the Committees.
5. In the event that citizen private data is shared on a Blockchain, all stakeholders involved in building the application are responsible for ensuring that the applications have suitable access controls, consent seeking mechanisms and security measures in place to prevent any leak of confidential data and unauthorized access. Organizations should work towards implementing privacy preserving mechanisms such as zero knowledge proof workflows, so that citizen's identity and data is secure.
6. Consensus / ordering mechanism used for operating the Blockchain networks should be in line with guidelines issued by the committees.
7. Networks should have clearly defined rules for participation, participant roles and access control. It should have rules for node custodians, identity management (issuing and revoking keys) network access for non-node custodian participants etc. These rules should accompany the request for network creation. The committees should be notified in case participants are added

to / removed from the network. no rules should be changed without the approval of the committees.

8. Any blockchain infrastructure should have clearly defined network governance framework and clear rules for on-boarding and off-boarding participants, hosting nodes, blacklisting and debarring participants and nodes, deploying software and security patches, updating and backward compatibility of smart contracts, transactions submission and approval, consensus on ledger data, arbitration workflow (in case of disputes or disagreements) archiving data etc. These should be submitted to the committees while submitting the request for network creation or for application development on the Blockchain Backbone. In case of any changes, the committees approval must be sought.
9. Blockchain implementation should clearly list the different category of nodes including validating nodes. The updated node directory with the list of participants and their node details should be shared with the committees periodically.
10. Organizations should mandatorily implement a secure process for storing and retrieving keys used to access and submit transactions to the Blockchain network.
11. All blockchain networks and applications should be interoperable and compatible with the Tamil Nadu Blockchain Backbone to allow easy integration.
12. All applications deployed in production need to ensure that they are not in violation of any National Laws or State Laws of Tamil Nadu. This applies to funding and revenue generation mechanisms and any other guidelines published by the committees.
13. Complete confidentiality should be maintained with regards to the architecture and components of the application, network and Blockchain Backbone, especially in cases where publicly disclosing certain information might lead to compromising the security of the network or any dependent applications.

14. It is essential that applications follow a mobile first strategy, wherever feasible, to ensure greater inclusivity. Applications and workflows should provide support for feature phones as well as smart phones through mobile apps, SMS, IVRS and other inclusive communication channels.



Capacity Building & Awareness

Senior executives and officials of the government need to be aware of blockchain technology and have a good understanding of the opportunity it provides to augment their existing workflows and processes and build new services. At the same time, they need to understand the risks and suitable mitigations for using this technology and the security protocols that would be in place to leverage it successfully. The Policy propose the following initiatives –

- 1. Cross department and cross Industry blockchain Workshops** in association with Blockchain partners designed at decoding the technology for executives and making it relevant to challenges.
- 2. Short term events**– Workshops, Bootcamps, Panel Discussions and Intra-Department hackathons aimed at government departments understanding the technology and how they can implement it.
- 3. Long term events** – Professional courses designed for Government officials who need an in-depth know - how of Blockchain for policy making and designing frameworks for Public Welfare Schemes in collaboration with knowledge partners.



10

Encouragements for Adoption of Blockchain Technology

10.1 Forum for Blockchain Ecosystem Development :

A forum for Blockchain ecosystem development should be setup to promote collaborations between industry, start-ups and academia and build a mature Blockchain ecosystem. The forum should focus on the below –

1. Providing a cross-industry platform for leveraging Blockchain technology by connecting start-ups and Blockchain practitioners with different industry verticals and government departments.
2. Providing a forum for exchange of ideas for making Tamil Nadu a Global Leader in Blockchain Technology.
3. Outlining a high-level plan for evolving Tamil Nadu's Blockchain infrastructure with the focus on enabling private sector, start-ups and academia.

10.2 App Development Platform

Tamil Nadu State-wide Blockchain, would be a platform with pluggable business modules that can be installed or removed on a node depending on the requirements of the business use case. The business modules would be the Blockchain core software which will constantly sync with the other nodes in the network.

This modular architecture is expected to reduce the development life cycle for apps built on this platform. It would enable stakeholders to create custom node infrastructure specific use cases and reduce the overhead for nodes hosting the Blockchain Platform.

Developers can access these modules and the underlying Blockchain layer through API gateways. The Policy recommends that the TNeGA shall develop and distribute Software Development Kit (SDK) for the API gateways that can be used for app development.

The modular approach and SDKs will allow Government Departments to work with multiple start-ups and enterprises. They can leverage the underlying Blockchain Backbone for building Apps and integrating legacy solutions.

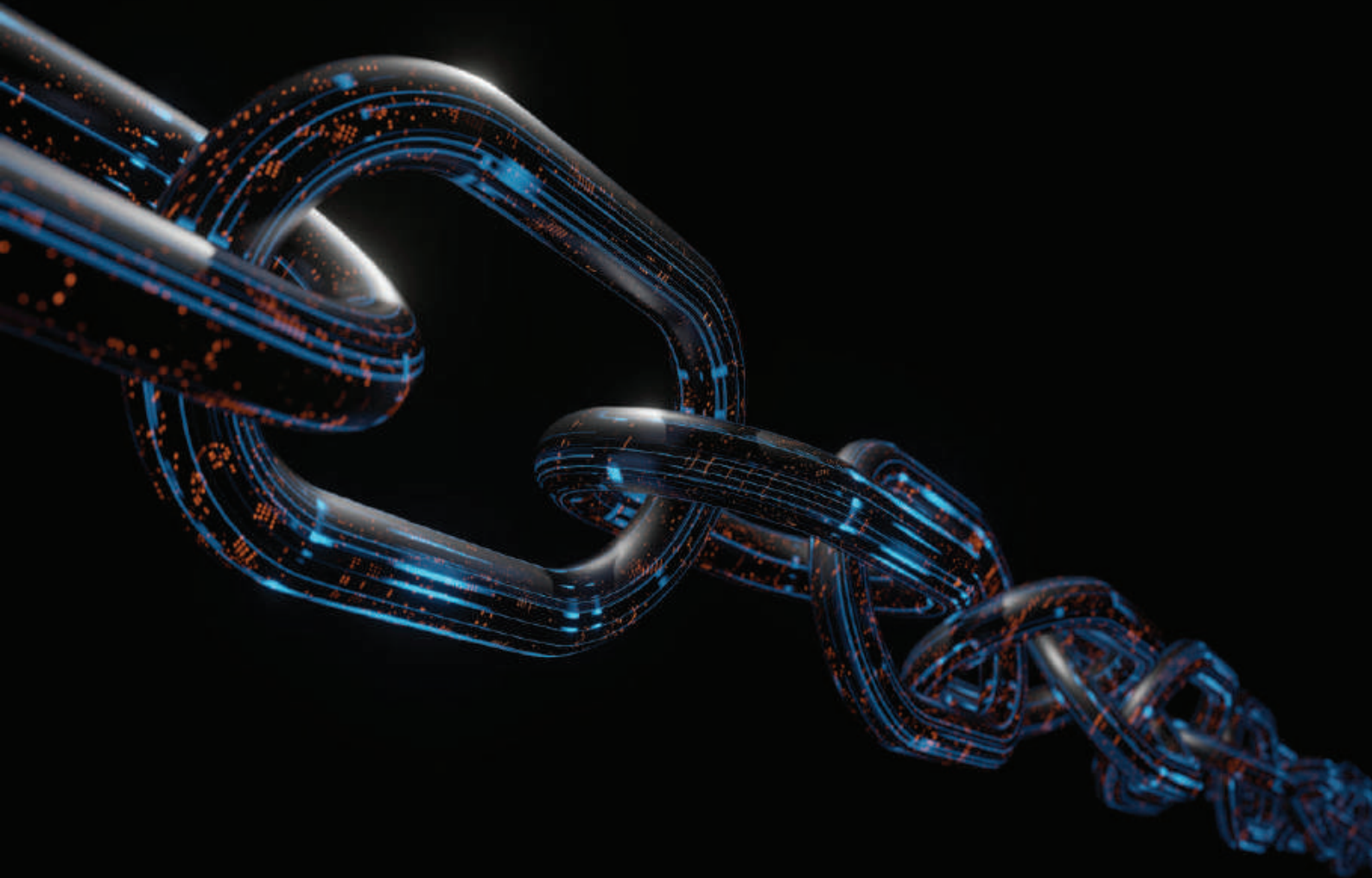


10.3 Regulatory Sandbox

The policy recommends that the Government should provision for a semi-regulated sandbox environment for building e-Governance applications using Blockchain. Application developers for the Blockchain Backbone need access to controlled testing environment for building and testing products and services. This controlled environment would be a complete or partial replica of the live environment with slightly relaxed regulations, so developers are able to recreate live-like scenarios and observe the behaviour of the applications and test the project's viability.

Regulators and policy makers benefit from sandboxes as they can draft policies and regulations in response and take a pro-active approach to new technical innovations. Sandboxes allow for evidence based decision making.

Projects should be on boarded to the regulatory sandbox blockchain in cohorts with fixed number of participants. Projects should be selected based on merit and the end benefit to the residents of Tamil Nadu amongst other parameters. All cohort participants should have a pre-determined timeline and milestones in which they would develop, test and deploy their final product. Presentations and demos would be a part of these milestones. The end goal of all projects inducted to the sandbox environment should be production implementation and live rollout.



Oversight Mechanism

For effective implementation of the policy and ensure that all stakeholders meet the goals and objectives of the policy, the policy recommends Formulating Committees and Regulatory bodies that will drive the implementation and adoption of Blockchain in the State.

These Committees should include representation from the Government, public sector, private sector and academia to enforce guidelines and ensure that the end goals are met.

Following are some of the important committees and bodies that should be set up:

11.1 TN Blockchain Policy Implementation Committee

This would be the core committee that drives and guides the implementation of Blockchain with the e-Governance structure in Tamil Nadu. The committee would be led by CEO, TNeGA and include Secretaries/Senior Officers from IT and other departments, participants from public sector enterprises working with Blockchain technology and renowned Blockchain experts from the industry and academia. The main mission of this committee would be to shape the vision of implementing Blockchain in the state and updating the policy in line with advancements in Blockchain Technology and prevailing conditions of Blockchain adoption in the State. Additionally, the committee should monitor the Blockchain Backbone project, ensuring the timelines and milestones are met and create future roadmap for the platform.

Following are the suggested rules and responsibilities of this Committee –

1. Ensure current and future blockchain implementations and applications in Tamil Nadu are aligned with the policy.
2. Drive adoption of blockchain technology and Blockchain Backbone across key Stakeholders in the ecosystem through training and workshops and seminars and academic Conferences.

3. Guide other committees to ensure that the guidelines and standards issued for Blockchain applications are adhered to.
4. Define and guide the roadmap of the Blockchain backbone and the end goals and objectives for each phase of development.

11.2 Protocols and Standards Committee

A protocol and standards committee would be setup. It would create and enforce security, architecture, coding and smart contract standards and SOPs for deploying and operating government Blockchain applications and applications deployed to the Blockchain Backbone. The committee would be led by CEO, TNeGA and include Secretaries/ Senior Officers from IT and other departments, Participants from public sector enterprises working with Blockchain Technology, and renowned Blockchain Experts from the Industry and academia, representatives from the Tamil Nadu state data centre and third party audit partners.

The protocols and standards that would be devised should include the following. This list is just indicative and not exhaustive –

1. Creating a broad technology stack that developers can leverage to design and build solutions.
2. Establishing data sharing and privacy norms. Defining what data can and cannot be shared. Ideally organizations should avoid sharing any citizen data on a Blockchain. In specific use cases requiring sharing of data, the data should be encrypted or identifying fields should be removed before posting it on Blockchain. Appropriate access controls should be implemented to ensure read/write access is available on a need to know/edit basis.
3. Designing suitable authentication protocols and access controls for accessing the Blockchain backbone APIs.
4. Creating best practices for designing Blockchain solution architecture and for production and test deployment as defined in the section on guidelines.
5. Defining a detailed Security Policy for all Tamil Nadu Blockchain applications.
6. Charting a Governance Framework for the State-wide Blockchain Infrastructure. The Governance framework will define the various roles, access to data, authorizers and verifiers, consensus protocol, node custodians and so on.

11.3 Legal and Regulatory Committee

A Committee would exist to make recommendations to the Government on upgrading the regulatory framework to derive maximum benefit from blockchain technology without any ethical or legal concerns. They would ensure that any production deployments should be within the purview of existing national and state laws and the regulatory framework.

Following are the suggested responsibilities of this Committee –

1. Study and recommend how notarization and authentication can be authorized through Blockchain technology so identity, documents and data generated and managed through Blockchain can be used as artefacts in the court of Law.
2. Defining a legal framework for arbitrating and settling disputes arising from smart contracts and Blockchain applications.
3. Establish a clear data privacy policy to define what can and cannot be shared on the Blockchain and who can have access to the same. Ensure that any Blockchain implementation is not in violation of a citizen's right to privacy.

The Committee should have representation from policy makers, technologists and the legal community to ensure successful adoption and implementation of Blockchain technology within the State.



12

Conclusion

This Policy provides a high-level plan for introducing and adopting Blockchain technology within the state of Tamil Nadu. The Government looks forward to implementing this technology within the e-Governance system and enable other Government departments and agencies to leverage it to build apps and solutions. The policy aims to strengthen Tamil Nadu's prowess in Blockchain technology and make it a leader globally and deliver citizen centric services that are faster, efficient and secure.

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