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# STATEMENT OF WORK

22-S2-2-C-Immutable

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# Introduction

This semester, the Immutable Qualification project is set to tackle several critical work packages to enhance our NFT 2.0 platform. Our focus will extend across the Microcredential Framework, Compliance, Application Process Uplift, Decentralised Hosting, and Project Maintenance. Each package is designed to refine the platform's utility, compliance, user experience, and technological robustness.

## Background Information

Blockchain is a decentralized, distributed ledger technology that enables secure, transparent and tamper-proof transactions between parties without the need for intermediaries. It uses cryptographic techniques to ensure the integrity of data and provides a high level of security against fraud and hacking.

Ethereum enables programmable blockchain applications running permissionless, it offers a low threshold for users to interact with those applications. In the past years, thousands of DAPPs concerned with finance, healthcare, supply chain management, and more are now experimenting with blockchains. Blockchain applications are built in the form of smart contracts, which are self-executing contracts with the terms of the agreement directly written into the code and can be used to automate and streamline many processes in various industries.

## Vision

Our vision is to create a cutting-edge platform that not only meets the current standards of the National Microcredential Framework but also paves the way for the future of digital

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qualification verification. We aim to automate and decentralize the verification process, making it more efficient and user-friendly.

## Objectives

1. **Microcredential Framework & Compliance:** Align with the National Microcredential Framework by updating the platform with necessary metadata and ensuring compliance.
2. **Application Process Uplift:** Automate the institution verification process to facilitate faster and more reliable user verification requests.
3. **Decentralised Hosting:** Research and deploy the platform on a decentralized hosting service to enhance security and reliability.
4. **Project Maintenance:** Continuously improve the platform through bug fixing, UI/UX enhancements, and updating the System Architecture Document (SAD).

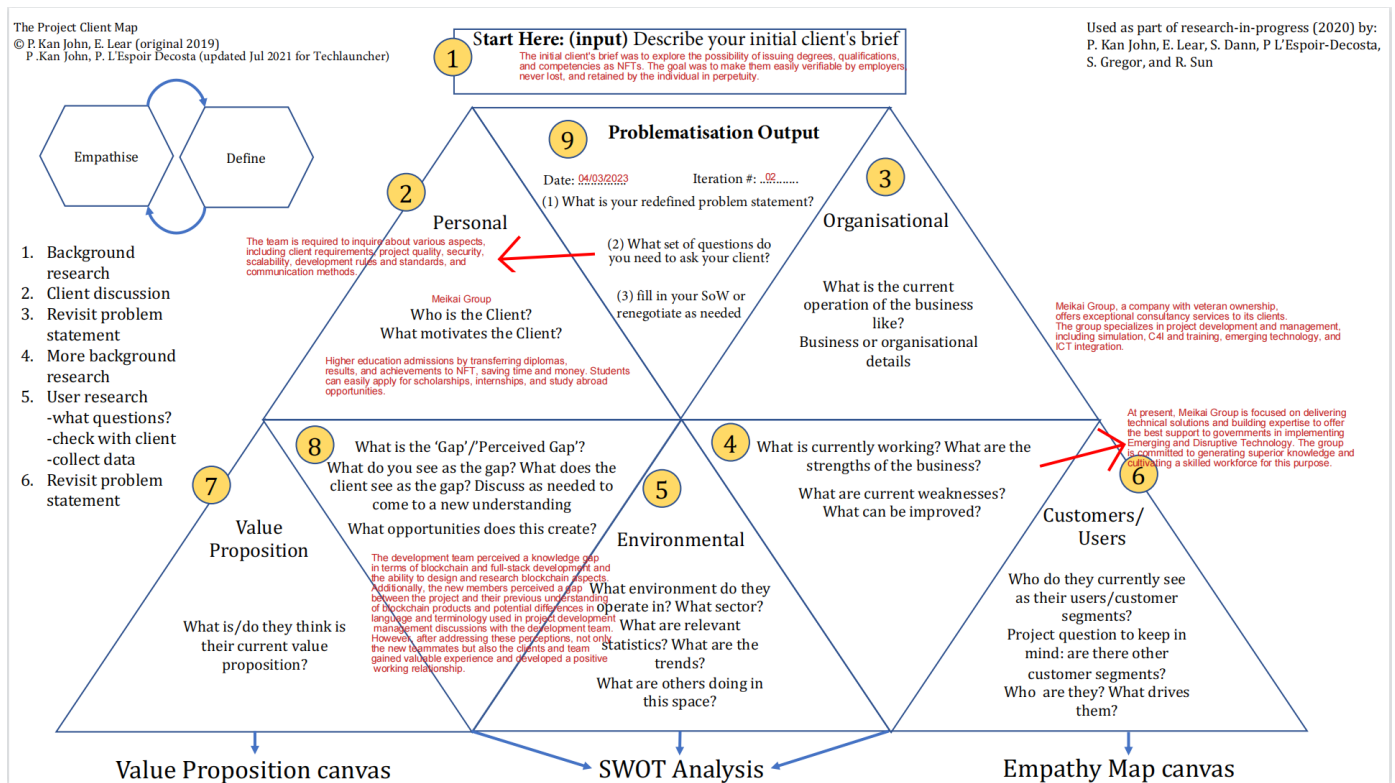
## Stakeholder Analysis

| Stakeholder                                       | Power/Interest in the project  |
|---|--|
| <b>Contour Project Manager &amp; Tech Manager</b> | High Power: The managers act to manage the process of the project to make sure the team on track<br>Low Interest: Managers work on the big picture and are less interested in the outcomes in details.   |
| <b>Contour Managing Director</b>                  | High Power: Director has a significant stake in the project as he manages its life cycle and coordinates with other stakeholders<br>High Interest: Director is responsible for monitoring the project's progress and mitigating any potential risks, such as exceeding the budget or missing delivery deadlines. |
| <b>Tech Launcher Tutor, Shadow Team, Examiner</b> | Low Power: They give advice and only monitor the process and work down for the project<br>Low Interest: They mainly focus on how the work is done instead of the project outcomes  |
| <b>Users, Institutions, Authorities</b>           | Low Power: They are not directly involved and not able to directly impact the project  |

High Interest: They are interested in the project outcomes as how it will change their life and work

## Client Map

The project client map outlines the key steps involved in working with clients on the project for this semester. Through this engagement, we aim to refine our platform to better meet the needs of users and comply with the National Microcredential Framework, ensuring our project aligns closely with stakeholder expectations and industry standards.



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## Scope of Work

Building on the foundation of MVP 2.0 delivered in the previous semester, our goal for this term is to further refine and enhance the MVP by bolstering its stability, scalability, and security, while also ensuring compliance with the National Microcredential Framework. Additionally, we plan to automate the institution verification process to streamline the application and improve user experience. An essential part of our scope is to transition to decentralized hosting to increase the robustness and global reach of the platform, and to carry out regular maintenance to ensure continuous improvement in the system's UI/UX and functionality.

## Project Deliverables

For this semester, the core deliverables for the Immutable project's MVP will focus on upgrading the existing MVP to version 3.0. The enhancements will include integrating a comprehensive compliance system aligned with the National Microcredential Framework, which requires incorporating all necessary metadata and adhering to the Department of Education's Qualification Framework. We will also automate the institution verification process to enable real-time approvals of user NFT requests. This will not only improve the efficiency but also the responsiveness of the NFT 2.0 administration. In addition, we will identify and implement a suitable decentralized hosting solution to ensure the platform's robustness and scalability on a global level. Regular project maintenance will involve iterative improvements to the UI/UX design, as well as updates to the System Architecture Document (SAD) to keep all stakeholders well-informed of the product's architecture and features.

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## Scheduling/Milestones

| Milestones                                       | Estimated Delivery Date |
|--|-------------------------|
| 1. Initiate the Project Repo/Onboarding          | 07/03/2024              |
| 2. Project Audit 1                               | 08/03/2023              |
| 3. National Microcredential Framework Compliance | 28/03/2024              |
| 4. Project Audit 2                               | 29/03/2024              |
| 5. Institution Verification Process Uplift       | 28/04/2024              |
| 6. Project Audit 3                               | 10/05/2024              |
| 7. Decentralized Hosting Research and Launch     | 19/05/2024              |
| 8. Immutable MVP v3.0 Release                    | 24/05/2024              |
| 9. Showcase Package Release                      | 28/05/2024 [TBD]        |

### Project: NFT2.0 - Immutable and Non-transferable Qualifications

#### Milestone 1: Initiate the Project Repo/Onboarding

**Start Date: 28/02/2023**

**Due Date: 07/03/2024**

#### Goals:

- Completion of statement of work, team charter, landing page and roadmap, etc. and assignment of team members to roles and tasks.
- New members join GitHub, view set-up guide, configure front-end and back-end environments locally

#### KPI:

- Complete 100% of initial preparation

#### Milestone 2: Project Audit 1

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**Start Date: 04/03/2024**

**Due Date: 08/03/2024**

**Goals:**

- Let every team member especially new members to get known and prepared for audit 1
- Every member can give a 2–3-minute speech on one aspect during presentation

**KPI:**

- New team members basically get acquaint with the project and the process of the audit

**Milestone 3: National Microcredential Framework Compliance**

**Start Date: 11/03/2024**

**Due Date: 28/03/2024**

**Goals:**

- Comprehension of the National Microcredential Framework.
- Update the website's NFT request page to include all necessary metadata as stated in the Framework.
- Conduct compliance checks with the Department of Education's Qualification Framework.

**KPI:**

- Completion of a comprehensive review of the National Microcredential Framework.
- Successful update of the website's NFT request page to include all necessary metadata.
- Passing a compliance check with the Department of Education's Qualification Framework.

**Milestone 4: Project Audit 2**

**Start Date: 23/03/2024**

**Due Date: 29/03/2024**

**Goals:**

- Each team member has a clear mind of his/her work and keep working on it
- Determine the work allocation for each team member reasonably
- Every member can give a 2–3-minute speech on one aspect during presentation

**KPI:**

- Team members can successfully complete the 2nd audit.



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### **Milestone 5: Institution Verification Process Uplift**

**Start Date: 01/04/2024**

**Due Date: 28/04/2024**

**Goals:**

- Automate the verification layer to facilitate real-time approvals of user NFT requests.
- Transform the original process flow to an uplifted flow map, enabling automatic verification response handling.

**KPI:**

- Automation of the verification layer to enable real-time approval of user's NFT requests.
- Finalization of the uplifted process flow map indicating streamlined verification procedures.

### **Milestone 6: Project Audit 3**

**Start Date: 06/05/2024**

**Due Date: 10/05/2024**

**Goals:**

- Prepare the conclude the work of this semester
- Every member can give a 2–3-minute speech on one aspect during presentation

**KPI:**

- The team can fully cover the work detail of this semester.
- Team members can successfully complete the audit.

### **Milestone 7: Decentralized Hosting Research and Launch**

**Start Date: 14/04/2024**

**Due Date: 19/05/2024**

**Goals:**

- Identify top candidates for decentralized hosting platforms and provide detailed reports.
- Deploy the NFT 2.0 platform onto a selected decentralized hosting platform, utilizing a TestNet currency.

**KPI:**

- Identification and evaluation of eight decentralized hosting options.

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- Detailed reporting on the top four selected platforms, assessing features, costs, and credibility.
  - Successful deployment of the NFT 2.0 platform on a selected decentralized hosting solution.

#### **Milestone 8: Immutable MVP v3.0 Release**

**Start Date: 20/05/2024**

**Due Date: 24/05/2024**

##### **Goals:**

- Finalize the MVP v3.0 with all updates and enhancements integrated.
- Ensure the database complies with the Digital Consortium Database Schema.
- Complete extensive bug fixes to improve system stability and security.
- Implement UI/UX enhancements for a more intuitive and user-friendly experience.
- Update the System Architecture Document (SAD) to reflect the new changes and improvements made in the MVP v3.0.

##### **KPI:**

- The successful launch of MVP v3.0 with no critical bugs.
- Full compliance with the Digital Consortium Database Schema verified through testing.
- Documented resolution of all identified bugs from the previous iterations.
- Positive feedback from user testing sessions on the UI/UX improvements.
- The SAD accurately detailing the final system architecture, data flow, and components, with version control showing all changes made in this release cycle.

#### **Milestone 9: Showcase Package Release**

**Start Date: 24/04/2024**

**Due Date: 28/05/2024 [TBD]**

##### **Goals:**

- Prepare the poster for the project
- Make a video to introduce the project

##### **KPI:**

- The team can deliver the poster and video on time.



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## Place of Performance

| Activity description          | Location/Method   |
|-------------------------------|---|
| <b>Client Meeting</b>         | Online via Microsoft Teams / On-Campus / On-Site (Contour Advisory Company) |
| <b>Group Meeting</b>          | Online via Zoom / On-Campus   |
| <b>Communication</b>          | Online via Microsoft Teams  |
| <b>Project</b>                |   |
| <b>Development/Scheduling</b> | GitHub repository & project   |
| <b>Tutorial</b>               | On-Campus/Online  |
| <b>Lecture</b>                | On-Campus   |

## Resource

Our project aims to create an Immutable Qualification platform that utilizes a variety of cutting-edge technology stacks and APIs. We will be using React, Vite, and CSS to develop a user-friendly and responsive front end, as well as Spring Boot and Axios to develop a robust and secure back end. Our storage layer stacks will include IPFS and Pinata, which will enable us to securely store and manage digital content on the blockchain. We will be testing our platform on the Sepolia testnet to ensure that it is reliable and efficient before deploying it on the mainnet. For off-chain database management, we will be using MySQL. Finally, we will be using Hardhat, Etherscan, and Alchemy APIs to develop our ERC-721 smart contracts, which will power the platform's NFT mint process. Overall, our project will utilize a wide range of cutting-edge technology stacks and APIs to create a platform that is both user-friendly and secure, and that leverages the power of blockchain to provide immutable and verifiable certification of qualifications.

|                              |                                     |
|------------------------------|-------------------------------------|
| <b>Technical stacks</b>      | React, Solidity, Node.js, Java, CSS |
| <b>API stacks</b>            | Alchemy, Pinata, Etherscan          |
| <b>Decentralized storage</b> | IPFS                                |
| <b>Testnet</b>               | Sepolia                             |
| <b>Off-chain database</b>    | MySQL                               |



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## Project Risks

The potential risks of project could come from many aspects like technology, security, financial market, and politics, etc. Among these risks, there mainly exist three kinds of risks, which are IPFS decentralized storage risk, IPFS data transfer security risk, and the impact of Ethereum price volatility on Dapp development.

First is the IPFS decentralized storage risk. As we known, IPFS applies the distributed network to store and transfer files, which saves bandwidth by retrieving data from other peers at once. Each user can request content based on their unique CID, and IPFS will retrieve the data based on the CID from multiple nodes at once, then it is then transferred to the user in the quickest, most efficient way possible. However, since IPFS uses a distributed network to store and transfer files, if some nodes go offline or the data is tampered with, the files may not be retrieved and transferred correctly. It might lead to issues such as data loss, data corruption, and data unavailability. These issues may occur if certain nodes become offline or if data is tampered with in some way.

The second risk is the IPFS data transfer security risk, because IPFS data transfer is public, there exists the chance of leaking sensitive information. Also, since the data is stored in a distributed manner, there may be a risk of data tampering or theft.

The third risk is the price volatility on Dapp development. As a kind of cryptocurrency, its market price and trades move rapidly so that the investor and developer as well as other stakeholders need to be aware of the relevant profitability risk, confidence risk and transaction cost risk.

## Potential Cost

In terms of the potential cost of this project, we are not expected to confront many risks mentioned above since this project will be in experimental phase for a long time and the whole

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project won't use the mainnet to develop and deploy the product. Instead, we will be using TestNet, which describes when a blockchain protocol or network is not yet up and running at its full capacity. A TestNet is used by programmers and developers to test and troubleshoot all the aspects and features of a blockchain network before they can confirm the system is absolutely secure and ready for the mainnet launch. Hence, registering and using the mainnet (i.e., Ethereum) may cost some fee to acquire access.

Also, we plan to identify and implement a suitable decentralized hosting solution to ensure the platform's robustness and scalability on a global level. It may cost some rent fee.

## Technical Constraints

### Decentralization

Decentralization is one of the key features of blockchain technology and is a critical aspect of its value proposition. However, decentralization can also create technical constraints and challenges that need to be addressed. One of the biggest challenges is the need to maintain consistency and coherence across the network, despite the absence of a central authority or coordinator. This requires the development of sophisticated consensus algorithms and communication **protocols** that allow nodes to coordinate and reach agreement on the state of the network. Additionally, decentralized systems may be vulnerable to attacks or disruptions from malicious actors, which requires the development of robust security and defense mechanisms to ensure the safety and reliability of the system.

### Safety

In terms of safety, there are several technical constraints to consider. One is the safety of the smart contract code, which must be designed and written with safety in mind to ensure that it does not inadvertently cause harm or damage to the Ethereum network or its users. Another constraint is the safety of the IPFS storage system, which must be designed to prevent data loss or corruption that could compromise the safety of the NFTs. Finally, safety considerations must

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also be considered when designing the user interface and user experience for the system, to ensure that users can safely and securely interact with the NFTs without accidentally causing harm or loss of data.

## Scalability

Scalability is another important technical constraint to consider when building a blockchain-based system for NFT-based education credentials. The system must be designed with scalability in mind to ensure that it can handle large volumes of transactions and data as it grows and expands over time. This includes considerations such as the efficiency and speed of the Ethereum network, the storage capacity of the IPFS system, and the design of the smart contract code to ensure that it can handle large numbers of users and transactions without becoming overwhelmed. Additionally, the system must be designed to allow for easy upgrades and improvements as new technologies and features become available, to ensure its ongoing scalability and adaptability.

## Stability

Stability is a fundamental aspect of any software project, especially in decentralized systems where reliability is paramount. Ensuring stability requires robust error handling and fault tolerance mechanisms to gracefully handle unexpected events or failures without compromising the overall integrity of the system. In addressing stability concerns, the project will prioritize ongoing maintenance efforts. This involves establishing regular updates and bug fixes to address any issues that may arise during the project's lifecycle.

## Compatibility

Compatibility with existing systems and standards is crucial for seamless integration and interoperability, particularly in decentralized ecosystems where multiple platforms and



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technologies may coexist. Compatibility constraints may include ensuring that the blockchain protocol used is compatible with widely adopted standards and protocols, such as Ethereum's EVM (Ethereum Virtual Machine), to facilitate smooth interaction with other blockchain-based applications and services. Compatibility also extends to aligning with the National Microcredential Framework, which requires incorporating all necessary metadata and adhering to the Department of Education's Qualification Framework. To address compatibility concerns, the project will leverage a microcredential framework. This framework will facilitate seamless integration with existing systems and platforms, ensuring interoperability and compatibility across different environments.

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# Acceptance

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| for and on behalf of the Contour Pty Ltd ABN | ) |  |
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| (Signature of Client)                        | ) | Quin Robinson  |
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|  | ) | (Printed name of Witness)  |
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| Phil Sammons                                 | ) | 13/03/2024   |
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| (Printed name of Client)                     | ) | Date   |

1. SIGNED BY [NUOXI QIN U7527676]

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Nuoxi Qin

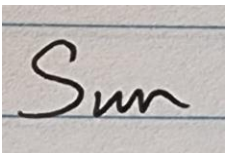
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Nuoxi Qin



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Bohong Sun

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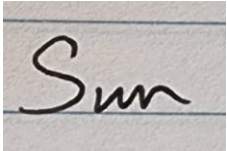
04-03-2024

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Date

2. SIGNED BY [BOHONG SUN U7546803]

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) (Signature of Student)

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Nuoxi Qin

) Bohong Sun

(Signature of witness)

) (Printed name of Student)

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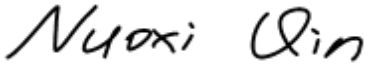
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3. SIGNED BY [LINXI LI U7095375]

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4. SIGNED BY [MITCHELL BARKER  
U7284995]

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) M.D. Barker

) (Signature of Student)

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Nuoxi Qin

) Mitchell Barker

(Signature of witness)

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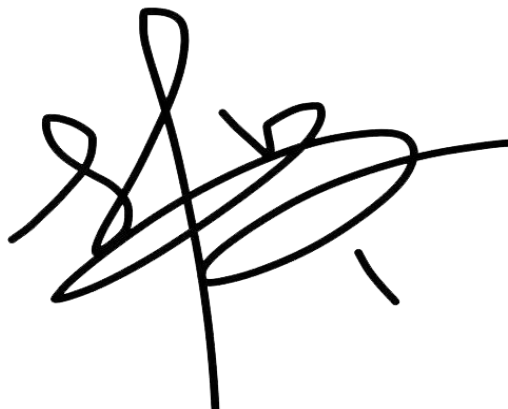
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5. SIGNED BY [ANDY CHIH U7574003]

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) Andy Chih

Nuoxi Qin

(Signature of witness)

) (Printed name of Student)

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Nuoxi Qin

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(Printed name of witness)

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) 06-03-2024

) Date

6. SIGNED BY [SONGXUAN LI]

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Songxuan Li

) (Signature of Student)

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Nuoxi Qin

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(Signature of witness)

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) 06-03-2024

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