COXY: Tokenizing Tertiary Student Credentials On-Chain White Paper

Global On-Chain Academic Profiles for 264 Million Students

By Coxygen Global (Pty) Ltd

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1. Abstract

This white paper proposes a global, Cardano-based infrastructure for trusted, portable academic identities and credentials for the world's 264 million higher-education students. The goal is to turn the entire learning journey—courses, assignments, research, internships, and projects—into verifiable, tamper-resistant credentials anchored on Cardano with Privacy.

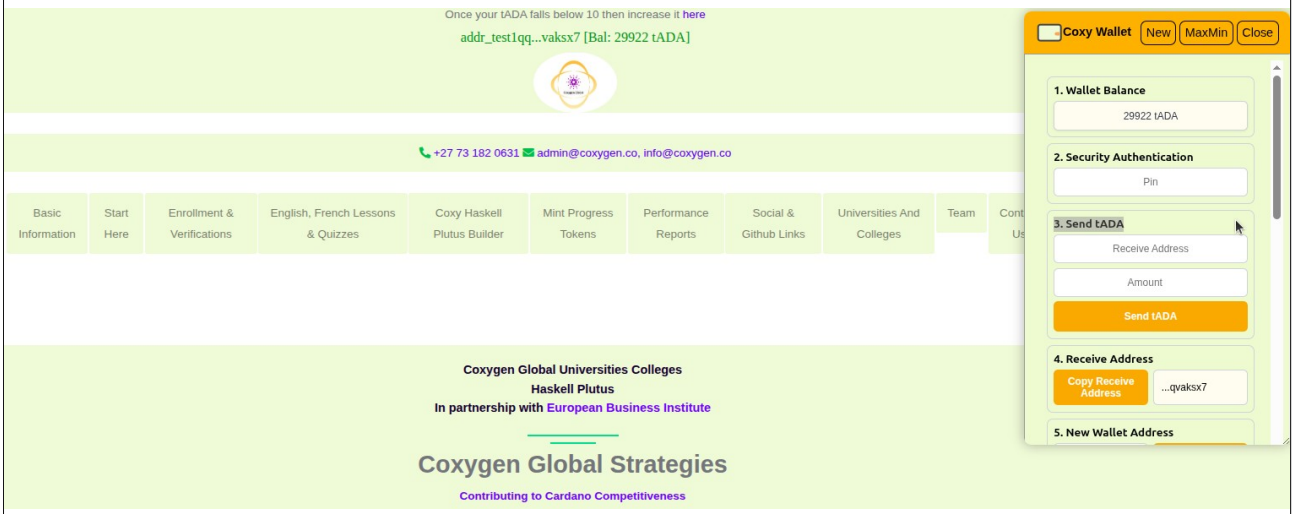
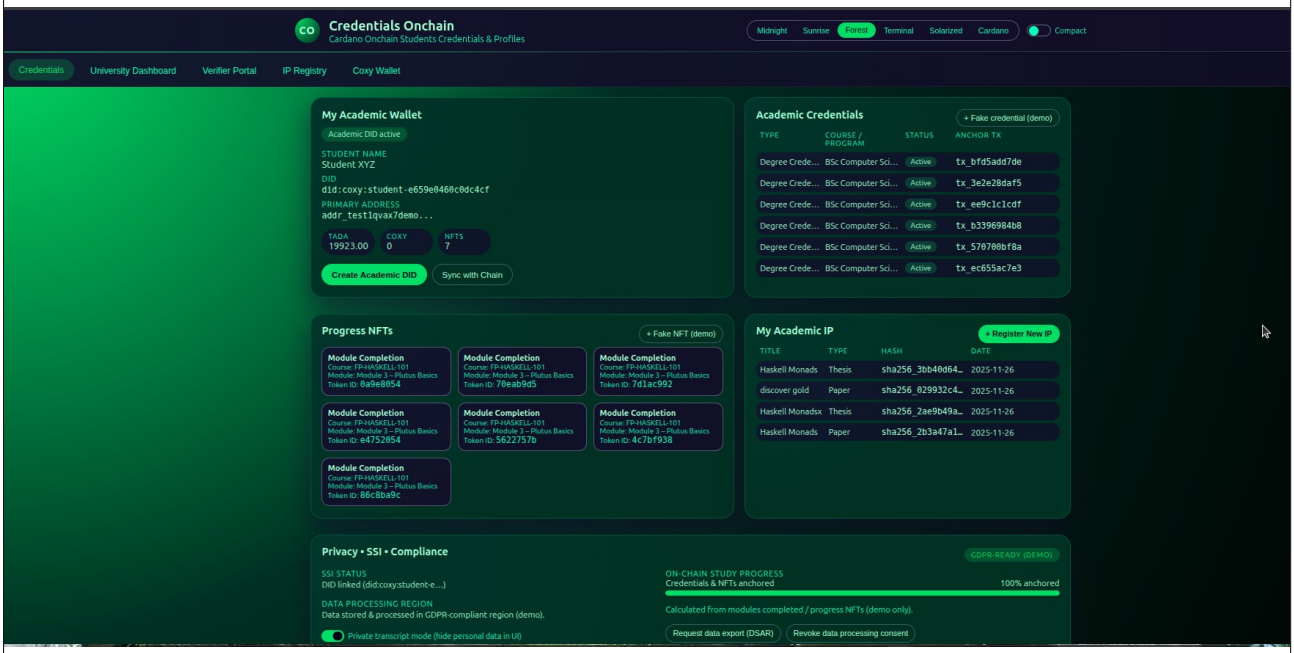


Figure 2: Current Universities Dapp

The system builds on the existing Coxygen universities dApp and Coxy Wallet, shown abaove. It is already used by over 500 enrolleed students: learning Haskell Plinth/Plutus, minting on-chain progress NFTs, and are receiving transaction hashes in their emails. The proposal is to extend this into a Tertiary Students On-Chain Academic Profile Tracker with self-sovereign identities, verifiable credentials, and an upgraded

Academic Wallet, all supported by a native Cardano token that aligns incentives for students, universities, employers, and builders.

The tokenomics is designed for sustainable, long-term growth. The network aims to remain open, affordable, and governed by its community as it scales from thousands to millions of users.



2. Background & Motivation

2.1 A Global, Mobile Student Population

Higher education now serves hundreds of millions of students worldwide, and international mobility keeps growing. Yet access to education is uneven, recognition of credentials across borders is slow, and many learners struggle to prove their qualifications when they move countries, change institutions, or apply for work.

In practice, students often repeat courses they have already passed or miss out on jobs and scholarships simply because their achievements cannot be verified quickly and reliably.

2.2 Academic Fraud & Credential Risk

Credential fraud is a serious and growing problem. Many job applicants misrepresent their qualifications, and many employers either do not or cannot reliably verify academic records. At the same time, digital and paper credentials are easy to forge at scale, which undermines trust in institutions.

Even when there is no fraud, records can be lost through disasters, institutional failures, or forced migration. Refugees and displaced learners are often unable to prove their education, despite having earned it. The result is wasted human potential.

2.3 Why Cardano?

Cardano is a third-generation, proof-of-stake blockchain designed with academic rigor, formal methods, and a strong focus on identity and governance. Its native asset model simplifies issuing both fungible tokens and NFTs. The extended UTXO model supports deterministic, safer smart contracts for credential and identity

use cases. Existing identity tooling such as Atala PRISM provides patterns for storing credentials off-chain while anchoring proofs on-chain.

Cardano also offers low, predictable transaction fees, which is essential for students and institutions in low-income regions.

2.4 Existing Foundation: Coxygen & Coxy Wallet

Coxygen's universities dApp and the Coxy Wallet provide a working foundation:

- Hundreds of students are enrolled in Haskell/Plutus programs.
- Students already mint on-chain progress NFTs as they complete modules.
- Transaction hashes are emailed to them for transparency.
- The Coxy Wallet is browser-based, PIN-protected, preconfigured with multiple wallets, and pre-funded with test ADA to reduce onboarding friction.

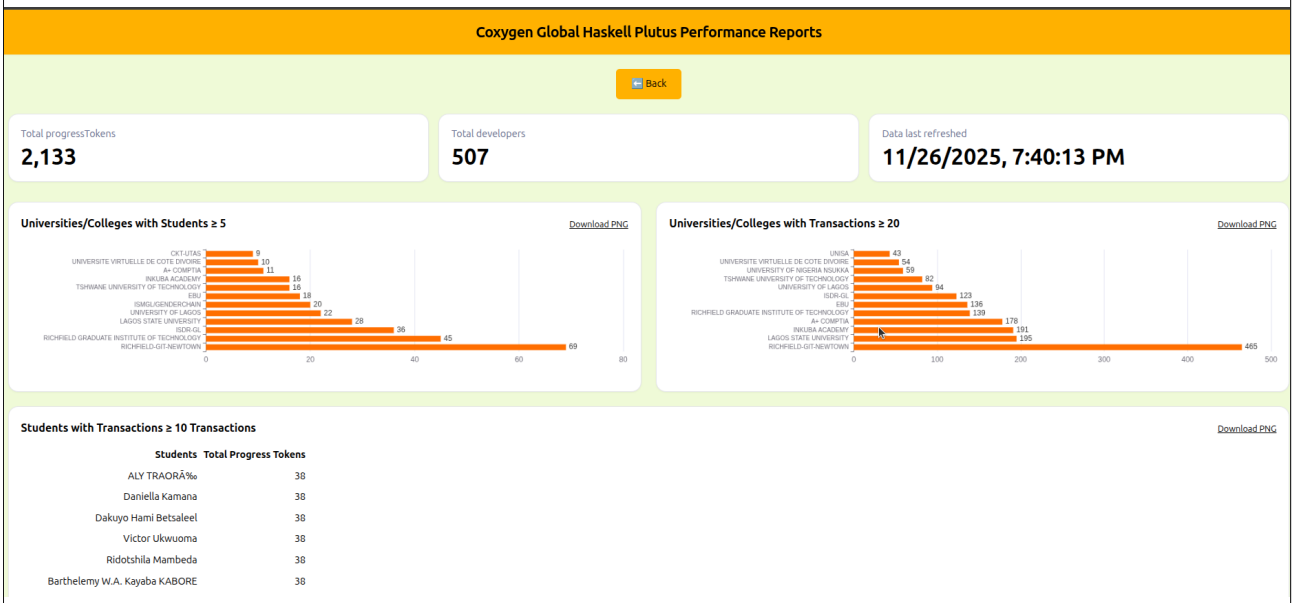


Figure 3: Report on Students stats and onchain transactions on Cardano

This proves that students will use blockchain tools when the user experience is simple, and that the stack (Helios + Coxylib + Coxy) can reliably manage on-chain interactions in live educational settings. The next step is to expand from module NFTs to global, lifelong academic identities and token-driven incentives.

3. Vision

The vision is a global, Cardano-native academic reputation network where every learner can own, control, and selectively share a cryptographically verifiable record of their entire learning journey. Employers, universities, and scholarship providers should be able to verify claims in seconds without relying on a single central authority.

In this network, every exam, project, internship, and thesis can be represented as a verifiable credential or intellectual property record. A native token coordinates fees, rewards, governance, and long-term sustainability.

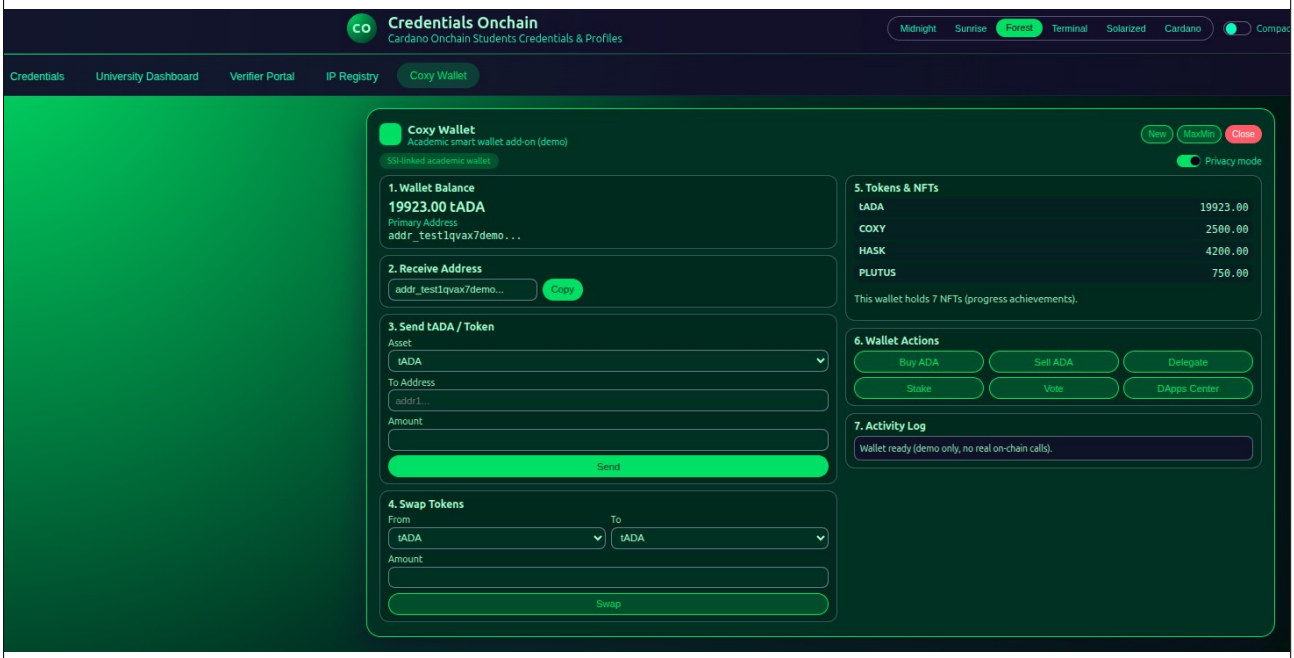
4. System Overview

The system consists of an upgraded Coxy Academic Wallet for students, on-chain smart contracts for academic profiles and intellectual property, a self-sovereign identity (SSI) layer using decentralized identifiers (DIDs), portals for institutions and employers, and a protocol token that powers fees and governance.

4.1 Core Components

Coxy Academic Wallet (Student Client)
The existing Coxy Wallet evolves into a student-focused Academic Wallet. It manages ADA, native tokens, and NFTs, and adds support for DIDs, verifiable credential storage, and academic IP records. It keeps a simple PIN-based UX so that non-technical students can use it easily. Credentials and IP artifacts are stored off-chain in encrypted form, while keys and on-chain proofs are managed in the wallet.

On-Chain Academic Profile Tracker
Cardano smart contracts and metadata standards are used to track academic progress NFTs, credential anchors (hashes of off-chain credentials), and research or IP tokens. Minimal metadata is stored on-chain, while sensitive data remains in verifiable credentials off-chain.



SSI / DID Layer
Students and institutions have decentralized identifiers. Institutions issue verifiable credentials that describe programs, courses, grades, and dates. These credentials are stored off-chain (for example, in the student's wallet and optional institutional backups) and referenced on-chain through hashes and issuer identifiers. The chain maintains proofs of existence and revocation.

Institution & Employer Portals
Universities use a portal to issue and manage credentials, mint progress NFTs, and handle revocations or corrections. Employers and other verifiers use a portal or API where they paste a DID or verification link and receive cryptographic proof that a credential is valid and current.

Protocol Token (COXY, Working Name)
A Cardano-native fungible token powers protocol fees, staking, governance, and treasury-funded initiatives.

5. Detailed Architecture

5.1 Data & Credential Model

Each student generates a DID inside the Coxy Academic Wallet. The DID is anchored on Cardano or a compatible identity layer. No personal information is stored on-chain; only identifiers and cryptographic commitments are recorded.

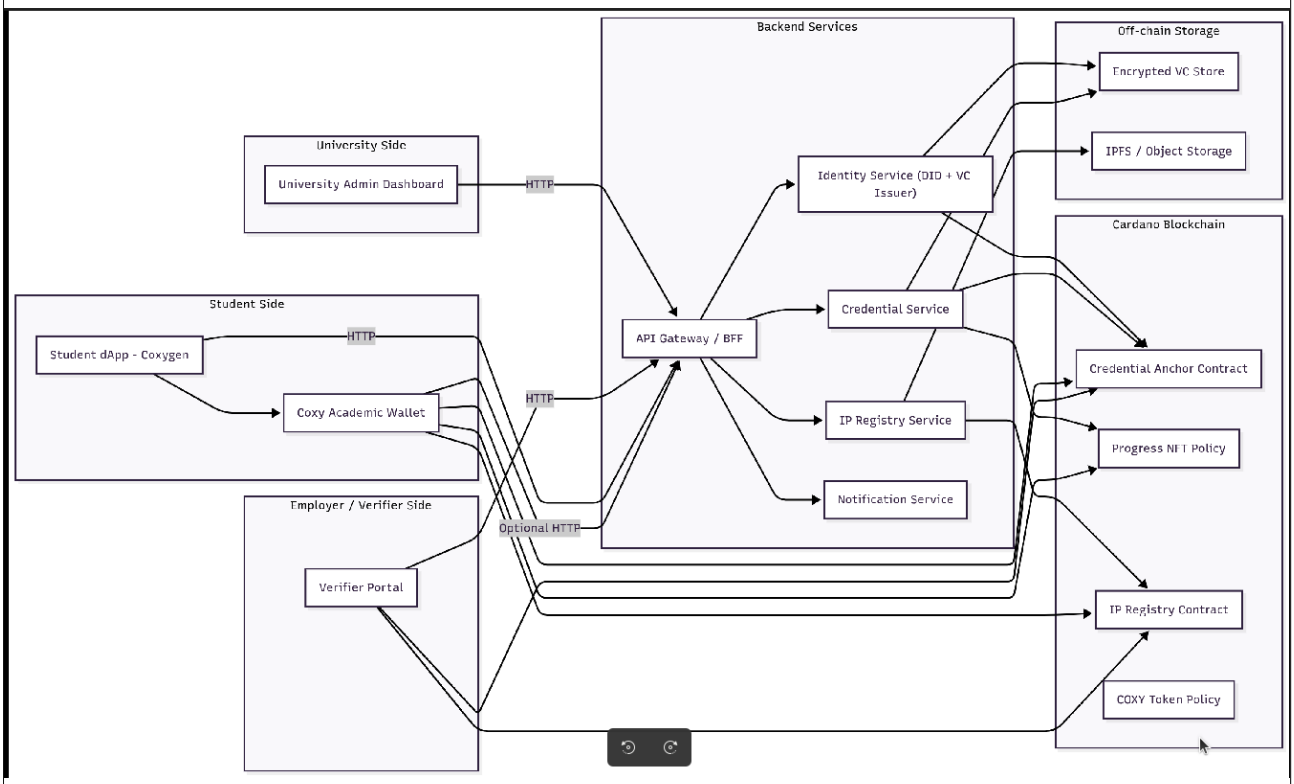


Figure 4: The Students, Credential Issuers and Verifiers interact with Cardano via API services

When a university issues a credential, it creates a verifiable credential describing the program, course, module, grade, and date. This credential is encrypted and stored in the student's wallet, and optionally in an institutional vault. A hash of the credential, along with the issuer's DID and minimal public metadata, is written to an on-chain credential anchor.

Course modules or milestones can also be represented by NFTs that are linked to the student's DID. These NFTs carry only minimal metadata, while the full academic detail remains inside the verifiable credential.

Academic outputs—such as theses, code, datasets, and papers—are hashed and registered in an IP registry contract as tokens with metadata like title, abstract, type, and timestamp, plus optional links to IPFS, GitHub, or institutional repositories. This creates immutable evidence of authorship and a traceable research history.

5.2 Privacy & GDPR Alignment

Privacy is central to the design. Personally identifiable information such as names, emails, ID numbers, and detailed grades stays off-chain and encrypted. On-chain data is limited to hashes, pseudonymous identifiers, and minimal metadata.

Students control who sees which credentials. Verifiers can receive only the specific claims they need (for example, that a learner holds a degree in a certain field with a minimum grade), backed by cryptographic proofs. Following SSI patterns used by systems like Atala PRISM helps align the design with GDPR and similar data protection regulations while still leveraging a public ledger for integrity and availability.

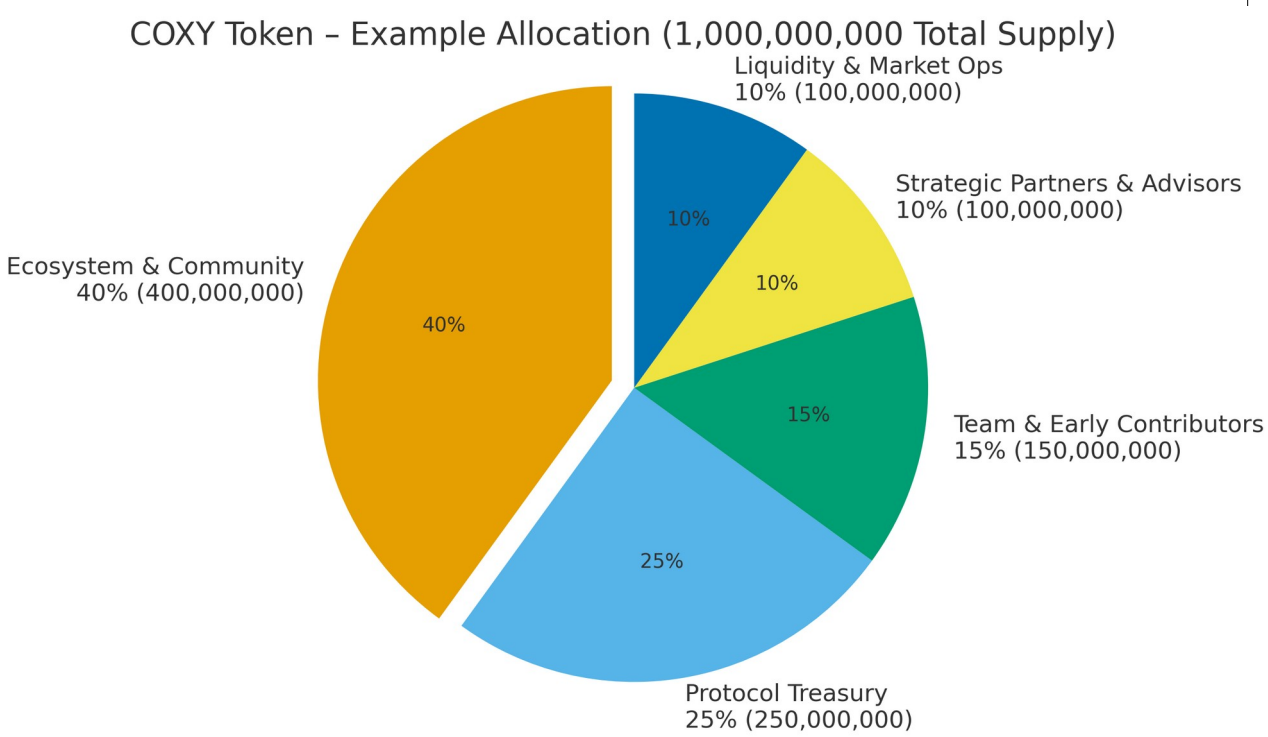
6. Tokenomics

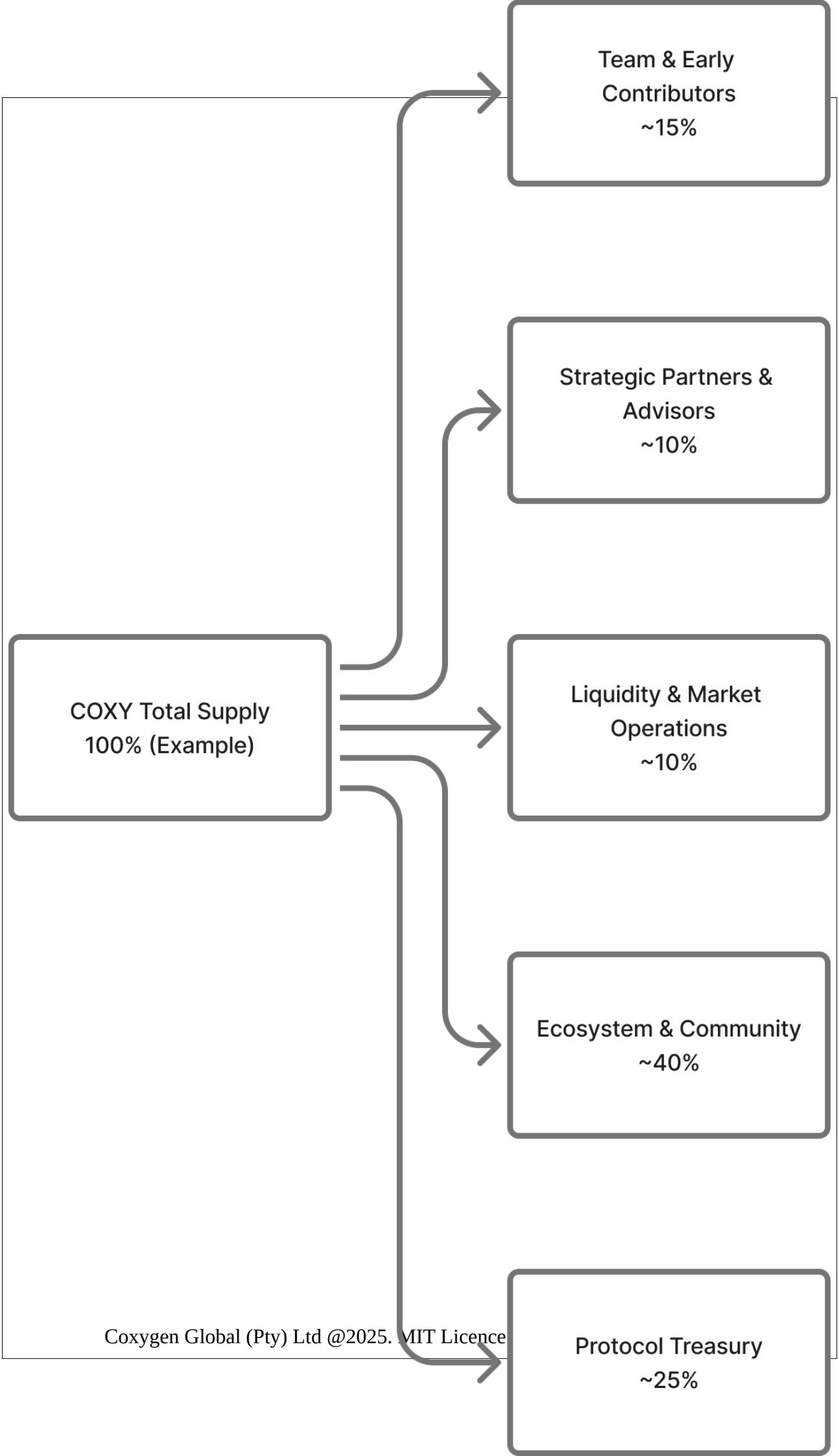
6.1 Objectives

The COXY token is intended to align incentives between students, universities, employers, and ecosystem builders; to fund ongoing development; to secure critical operations through staking and slashing; and to enable community governance. It is conceived primarily as a utility and governance token rather than as a speculative asset. Any future launch would need to comply with local regulations and should not be seen as an offer or solicitation.

6.2 Type, Supply & Allocation

COXY is a Cardano native fungible token with a fixed total supply of 1,000,000,000 tokens. The full supply is minted under a time-locked, governance-controlled monetary policy, with no further inflation once vesting completes.





A representative allocation model might reserve the largest portion for ecosystem and community use, followed by a protocol treasury, then team and early contributors, strategic partners, and a smaller portion for liquidity and market operations. Exact percentages and vesting schedules can be finalized through community discussion before any launch.

6.3 Utility

COXY has several core uses:

- **Protocol Fees:** Small fees in ADA plus COXY are paid for creating credential anchors, registering IP tokens, and performing advanced verification. These fees are shared between the treasury and participating institutions, and can include a modest burn or lock-up component to link value to real usage.
- **Staking & Security:** Accredited issuers and verifiers stake COXY to signal commitment. Misconduct or repeated fraudulent behavior may lead to slashing, creating an economic deterrent to abuse.
- **Governance:** Token holders can vote on protocol upgrades, parameters such as fee rates, treasury spending, and lists of trusted institutions.
- **Access & Discounts:** Institutions or enterprises holding or staking certain thresholds of COXY may receive discounts on fees and priority support.

In addition, the system can introduce non-transferable “Academic Reputation Points” issued as soulbound tokens to recognize verified teaching, mentorship, peer review, or open-source contributions. These points can influence governance as a reputation layer separate from financial stake.

7. Economic Flows

When a university issues a credential or progress NFT, the student pays a small fee in ADA, potentially subsidized by the protocol or the institution. A micro-fee in COXY is distributed among the protocol treasury, the issuing institution, and possibly a burn or lock mechanism.

When an employer or another institution verifies a credential, they pay a small fee through the verification portal or API. This fee rewards the treasury and the institutions maintaining infrastructure for credential issuance and verification.

As more students join and more credentials are issued, on-chain activity and fee volume grow. The treasury then uses its funds to support new integrations (for example, with learning management systems and HR systems), open-source SDKs, and student-led projects. This, in turn, attracts more institutions and verifiers, creating a positive feedback loop.

8. Global Student Growth Strategy

The protocol targets all types of learners:

- Tertiary students in universities and colleges, including traditional, open, and distance-learning institutions, as well as technical and vocational training providers.
- International and refugee students, for whom credential portability and resilience are crucial.
- Non-traditional learners such as bootcamp participants and MOOC students, who can receive micro-credentials and stackable progress records.

Regional partners in Africa, Europe, Latin America, and Asia can help localize user interfaces, documentation, and compliance with regional regulations. Student ambassadors can drive wallet onboarding and credential literacy, while developer ambassadors build new applications on top of the credential layer.

9. Technical Roadmap (High-Level)

A phased roadmap could look like this:

1. **Core Protocol & Academic Wallet:** Implement DID and credential anchoring, upgrade the Coxy Wallet to support DIDs and verifiable credentials, and deploy credential and IP registry contracts on Cardano testnet.
2. **Institutional Pilots:** Integrate with a small group of universities, refine credential schemas and workflows, and gather UX, legal, and governance feedback.
3. **Employer & Verifier Network:** Launch a verification portal and API, onboard early employers and scholarship providers, and start measuring verification volume.
4. **Governance & Treasury Activation:** Introduce governance processes and begin funding integrations, research, and tooling from the protocol treasury.
5. **Scaling & Interoperability:** Explore layer-2 solutions such as Hydra for higher throughput, work on interoperability with other networks and SSI ecosystems, and collaborate on standards with global bodies and regulators.

10. Governance Model

The protocol is governed in a DAO-like structure. COXY token holders and holders of non-transferable reputation tokens can submit and vote on proposals, update parameters, and direct treasury spending.

To balance financial stake and earned reputation, governance can use a bicameral or weighted structure, where one “chamber” represents token holders and another represents reputation holders such as educators and institutions. Governance may also maintain registries of accredited institutions, define requirements for becoming an issuer or verifier, and manage dispute resolution processes.

Transparent, on-chain analytics will track credential issuance, verification activity, and treasury spending to support informed decision-making.

11. Risk Analysis

Several categories of risk must be managed:

- **Regulatory Risk:** Token classification and credential regulations differ across jurisdictions. The system should emphasize utility and governance functions, and seek legal review before any token launch or large-scale deployment.
- **Institutional Adoption:** Universities tend to move slowly. Pilot programs, testnet environments, and strong UX and legal support can lower the barrier to adoption.
- **User Experience:** Many students are unfamiliar with wallets and private keys. The Coxy Academic Wallet’s simple PIN-based UX, pre-funded addresses, backups, and in-course tutorials are intended to address this.
- **Security & Privacy:** Credential leaks or compromised wallets could harm users. Keeping personal data off-chain, encrypting credentials, following best practices for key management, and performing regular audits and bug bounties are critical.

- **Competition and Network Effects:** Other credential solutions will exist. Interoperability with open standards and a strong focus on student ownership and open governance are key differentiators.

12. Team

The team is composed of productive and committed students from different universities and colleges. Coxygen Global currently operate in seven countries, with over 30 universities and more than 15 facilitators. Our markers also come from diverse countries. An important advantage is that the decentralized application is already being used by over 500 enrolled students. Tokenization will help this grow far beyond our current scale.

13. Conclusion

Education is becoming more digital, mobile, and borderless, but most academic records remain locked in paper documents and siloed databases. This paper outlines how Cardano, self-sovereign identity, verifiable credentials, and a student-friendly Academic Wallet can be combined to create a global academic network where credentials are tamper-proof, portable, instantly verifiable, and ultimately controlled by the learner.

The next steps are practical: prototype on Cardano testnet and mainnet, run pilots with universities and employers, refine governance, and gradually decentralize control over the protocol and treasury. If executed well, this network can become a core part of Cardano’s real-world impact, bringing truth, transparency, and resilience to the academic journeys of students everywhere.