

Autonomys: Foundation Layer for AI3.0

Dr. Chen Feng | Dariia Porechna | Jeremiah Wagstaff

Abstract

As AI integration accelerates, we face a pivotal redefinition of human and machine agency in society. Autonomys offers a vision that maintains human economic relevance in an AI-augmented world. We present the Autonomys Network—a decentralized infrastructure for secure, self-sovereign human-AI collaboration. Built from first principles, it achieves security, scalability, and decentralization through the novel Subspace Protocol. Decoupling consensus from execution, the Autonomys Network enables independent scaling of transaction throughput and storage, crucial for realizing decentralized, human-centric AI, or AI3.0.

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Background and Vision

The rapid advancement of AI technologies is ushering in a new era of economic and social transformation. Recent breakthroughs in machine learning have led to AI systems capable of performing tasks once thought to be exclusively human. This progress has sparked debates about the future of work and human-AI collaboration. Concurrently, blockchain technology has introduced novel paradigms for decentralized systems and digital identity.

These developments have occurred against a backdrop of growing concerns about data privacy, algorithmic bias, and AI capability concentration. As we approach the potential development of Artificial General Intelligence (AGI) and Artificial Superintelligence (ASI), it is imperative we establish frameworks that ensure AI systems align with human values and preserve individual agency in an increasingly automated world.

Age of Autonomy

Autonomys proposes a new paradigm of radical autonomy through our ecosystem, fostering a future where technology enhances human autonomy.

Key features of this paradigm include:

1. Accessible Participation

The Autonomys Network requires only an SSD to join as a farmer, ensuring a low barrier to entry. This allows individuals to contribute to and benefit from the network regardless of their resources.

2. AI Agent Augmentation

As AI development trends toward edge devices, users can deploy personal Autonomys agents that access their contextual data and act autonomously on their behalf. These agents, secured through Auto ID verification, can handle tasks like scheduling appointments, managing finances, and coordinating activities while allowing users to maintain granular control over permissions. This enables a secure ecosystem where humans can customize and deploy AI agents that amplify their capabilities, while preserving their autonomy.

3. Data Sovereignty

Individuals retain control over their personal data, with the option to monetize it for AI training purposes, creating a new economic model for data ownership.

4. Decentralized Learning

The network facilitates collaborative AI development through decentralized learning initiatives, allowing users to contribute to and benefit from collective intelligence.

5. Verifiable Interactions:

Through Auto ID and Auto Score, the network ensures secure and transparent interactions between humans and AI entities, building trust in the AI-integrated ecosystem.

By combining accessible infrastructure, AI augmentation, and robust identity systems, Autonomys aims to preserve human agency in an increasingly automated world. This vision of radical autonomy empowers individuals to self-augment with AI technologies, while maintaining control over their digital presence, and can be reached by building the foundations for AI3.0.

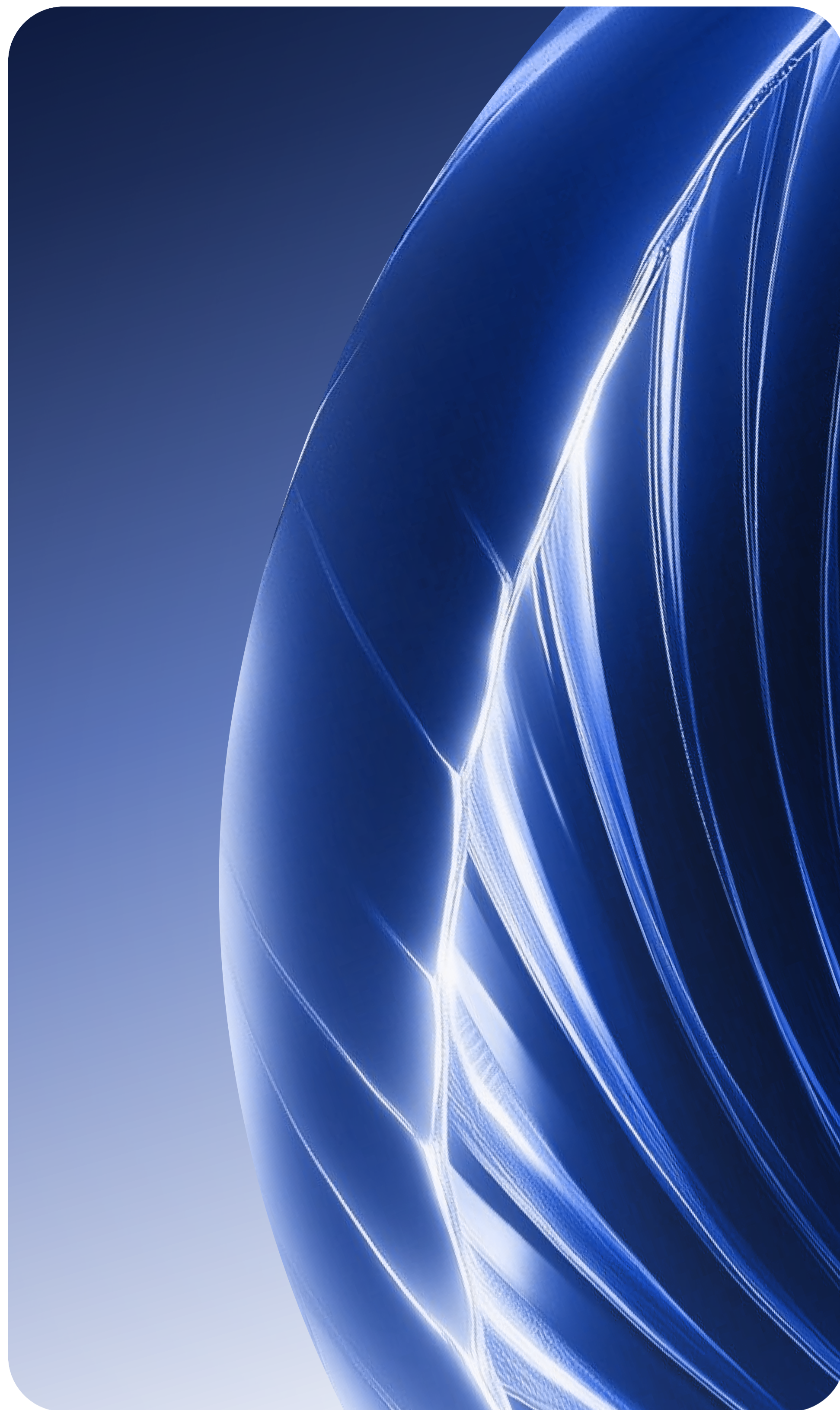
AI3.0

AI3.0 represents a paradigm shift in artificial intelligence, building upon previous iterations:

- 1. AI1.0:** Centralized machine learning with passive human consumption.
- 2. AI2.0:** Centralized generative AI offering interactive experiences controlled by Big Tech.
- 3. AI3.0:** Decentralized, human-centric, agentic AI built by and for users.

Key features of AI3.0:

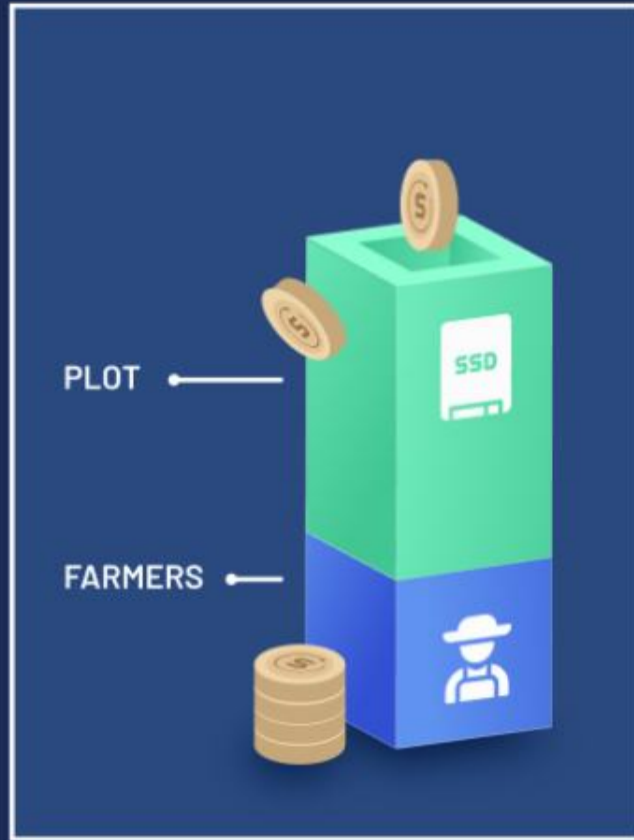
- Decentralized, open-source AI development and deployment.
- Advanced, customizable AI agents personalized to individuals.
- User control over personal data and digital presence.
- Democratized access to AI technologies through web3-enabled AI ecosystems.
- Enhanced human autonomy through seamless AI collaboration.



The Autonomys Network AI3.0 stack encompasses several layers:

- **dApp/Agent Layer:** Facilitating the development and deployment of AI-powered dApps and on-chain agents.
- **Execution/Domain Layer:** Secure, scalable computation for AI training, inference, and agentic workflows
- **Consensus Layer:** Verifiable decentralized sequencing and transaction validation.
- **Storage Layer:** Distributed storage ensuring data integrity and permanent availability.

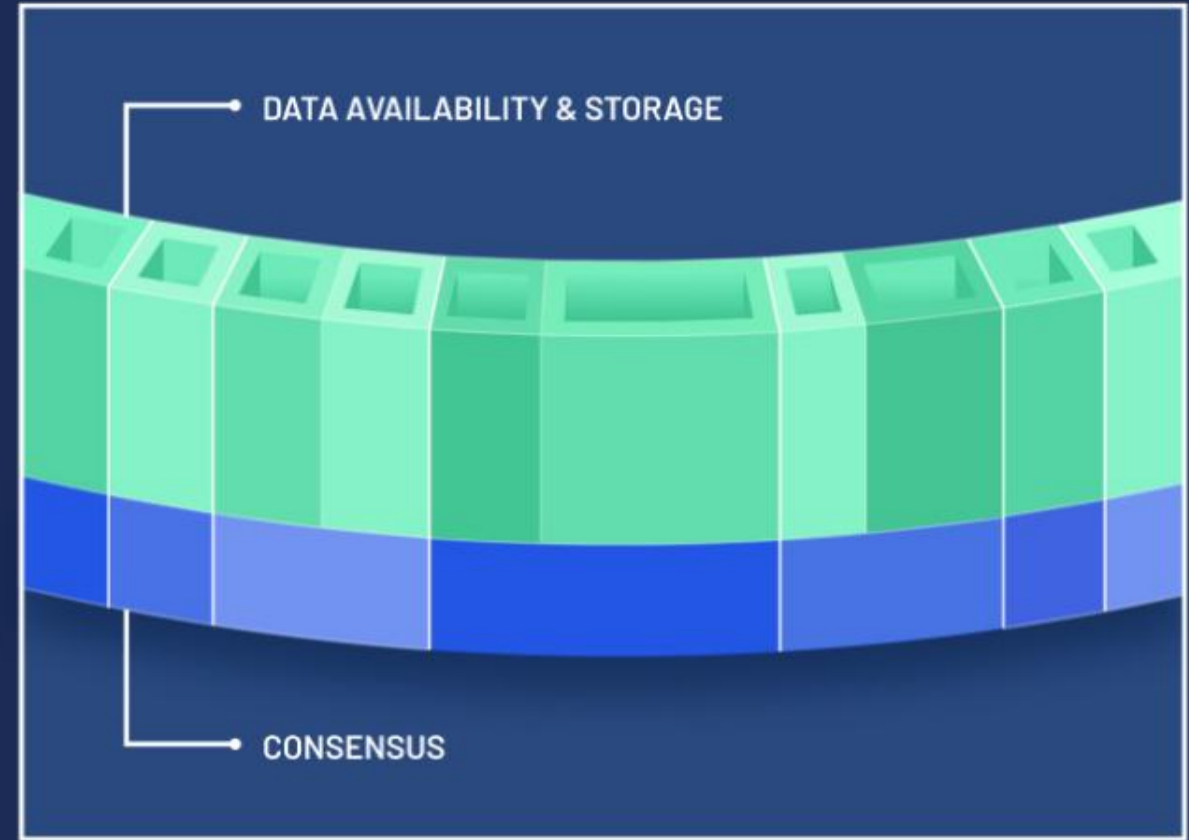
PLOT & FARMER



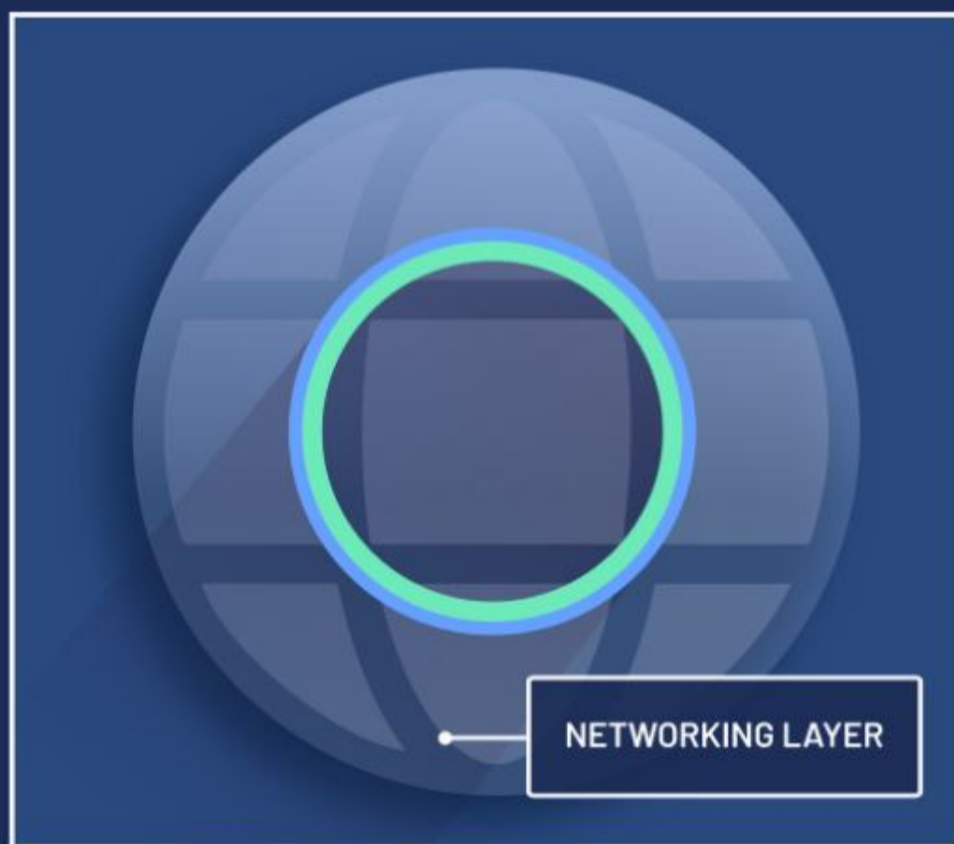
FARMERS CAN HAVE MULTIPLE PLOTS



FARMERS CONTRIBUTE STORAGE TO PROVIDE CONSENSUS



CONSENSUS RING



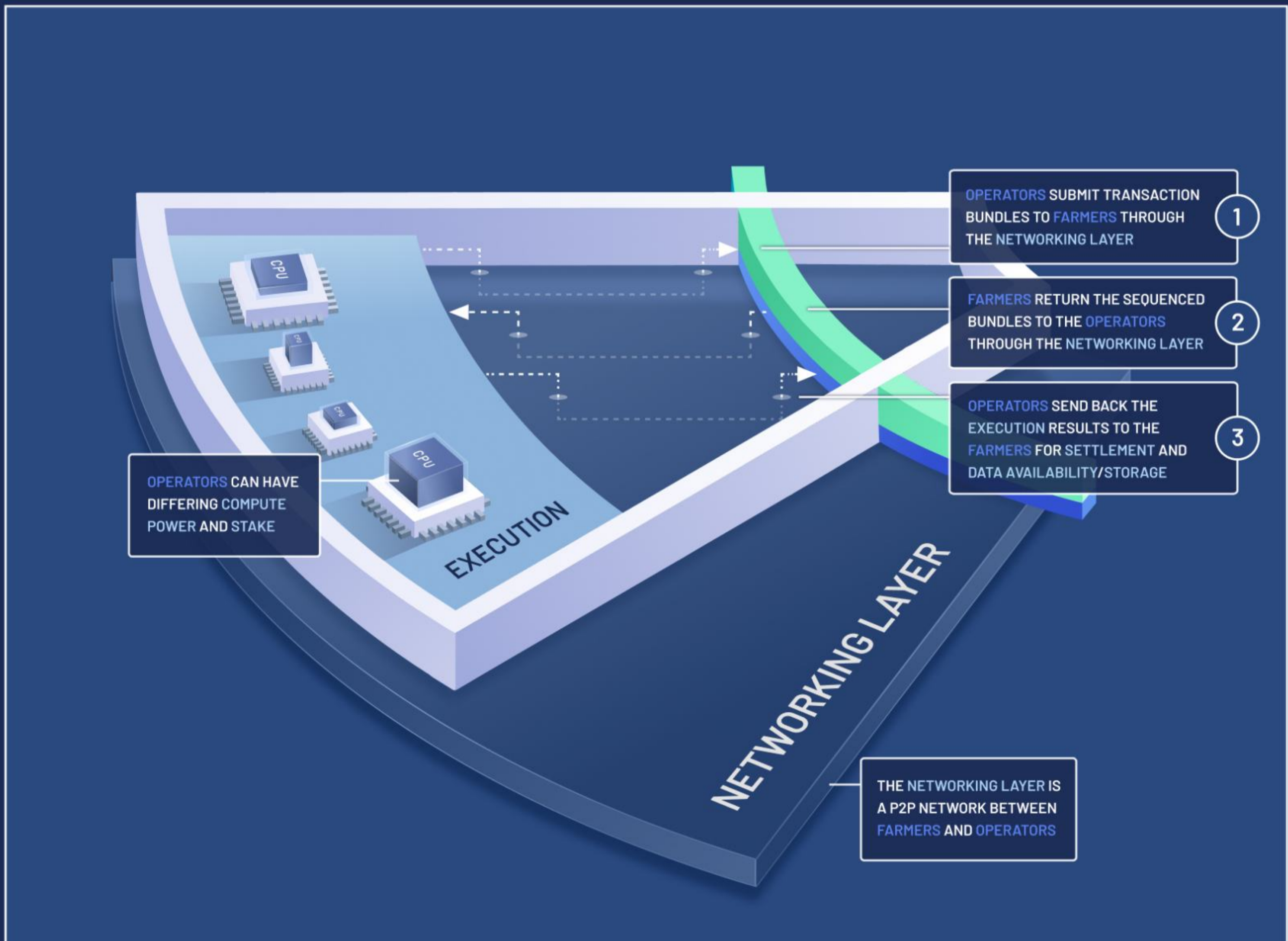
DOMAINS ARE MODULAR, DECOUPLED EXECUTION ENVIRONMENTS



DOMAINS SHARE CONSENSUS



OPERATORS & FARMERS CONTRIBUTE COMPUTE AND STORAGE TO DOMAINS VIA THE NETWORKING LAYER



NEW DOMAIN BEING LAUNCHED WITH CUSTOM OPERATORS



The Autonomys Network

The Autonomys Network AI3.0 stack encompasses several layers:

1. Accessible Participation

Facilitating the development and deployment of AI-powered dApps and on-chain agents.

2. Execution/Domain Layer

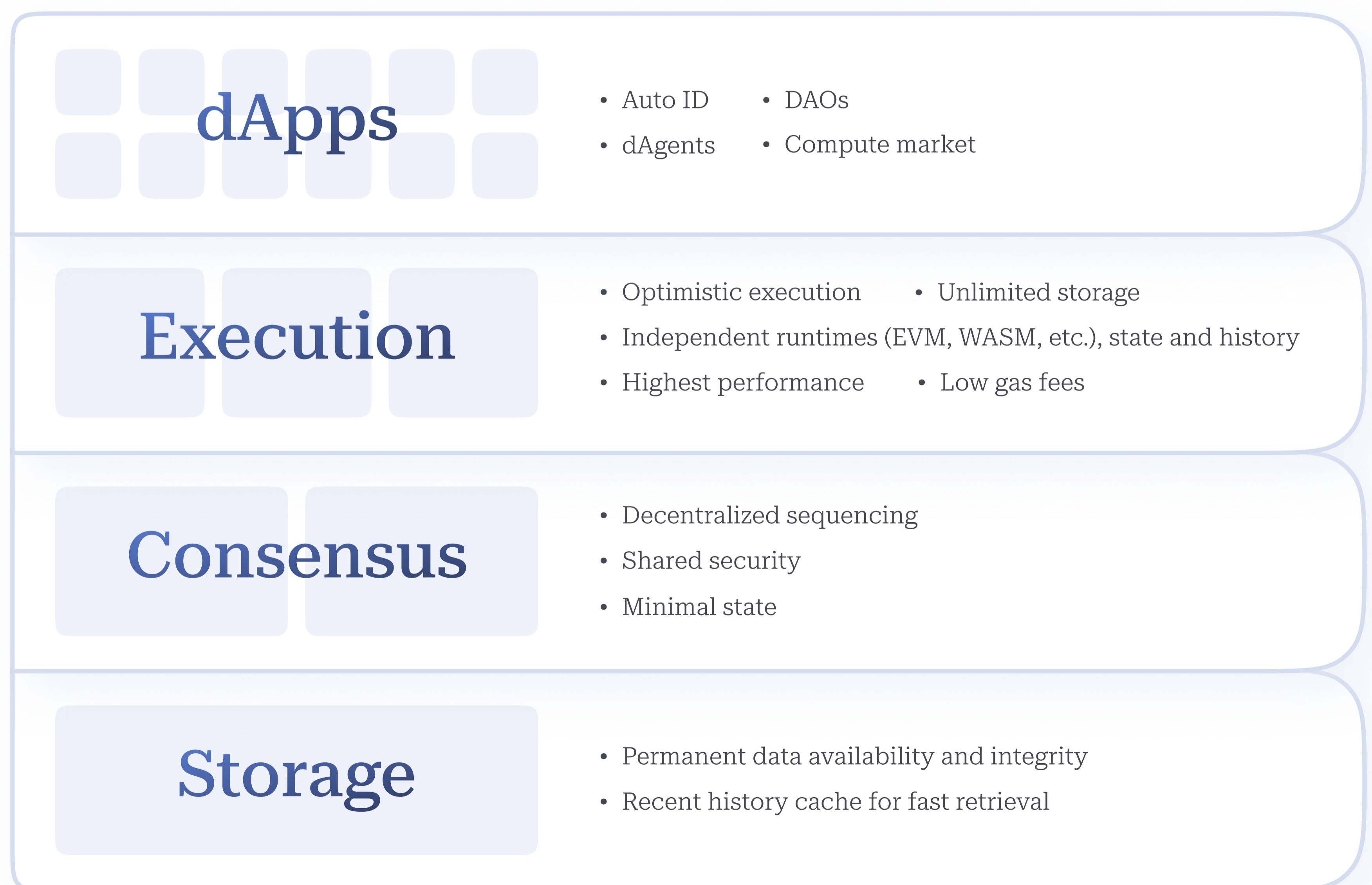
Secure, scalable computation for AI training, inference, and agentic workflows.

3. Consensus Layer

Verifiable decentralized sequencing and transaction validation.

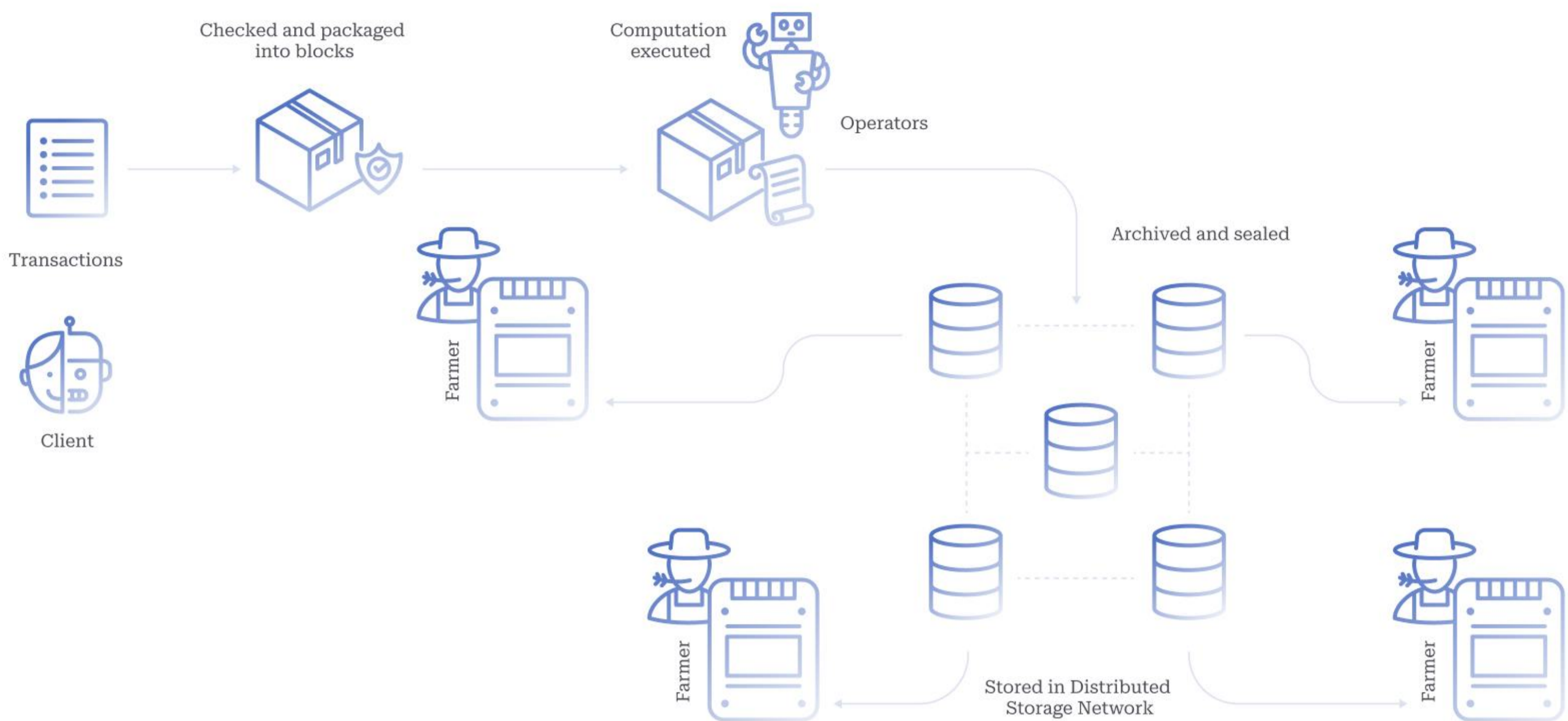
4. Storage Layer

Distributed storage ensuring data integrity and permanent availability.



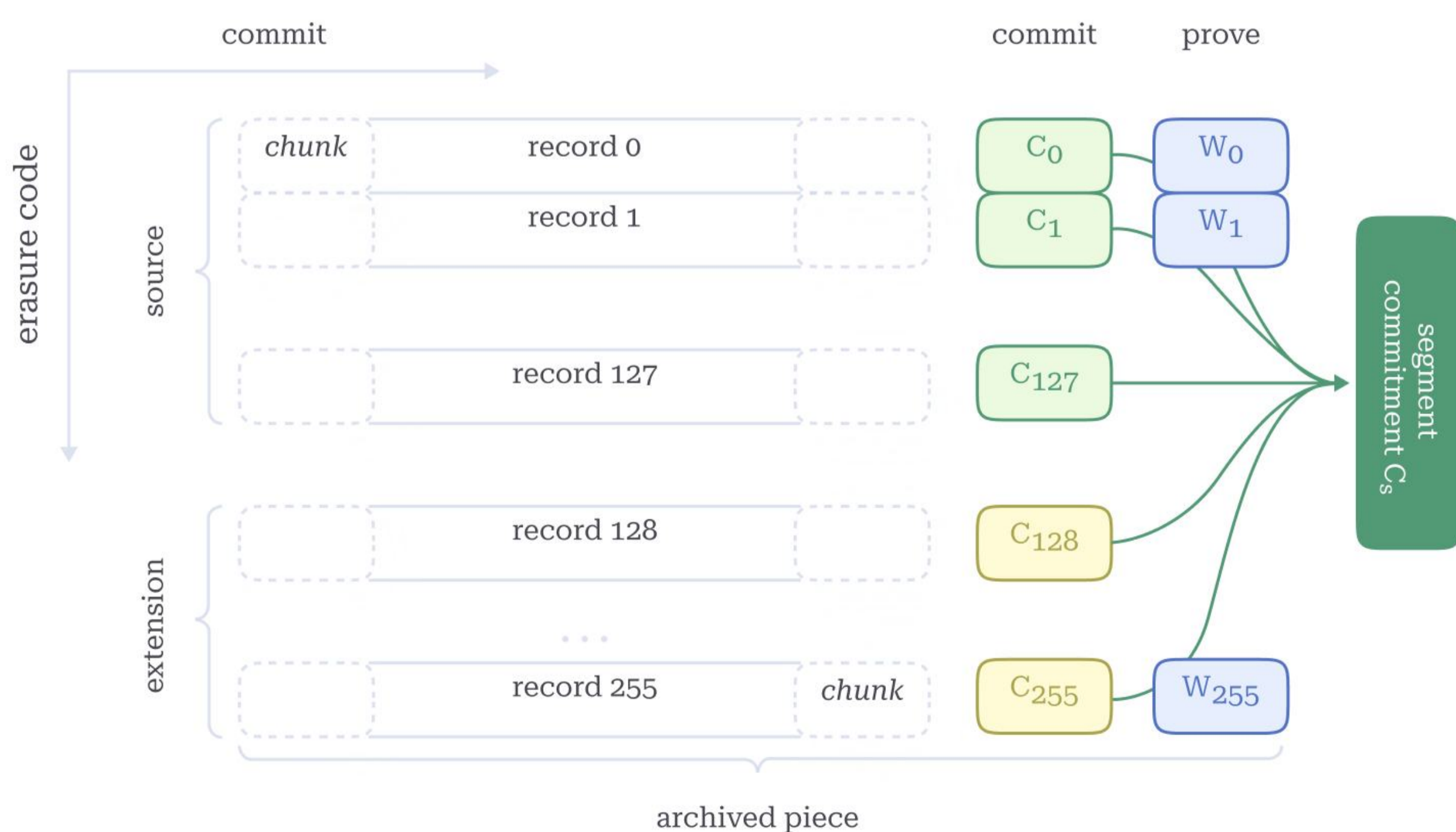
Subspace Protocol

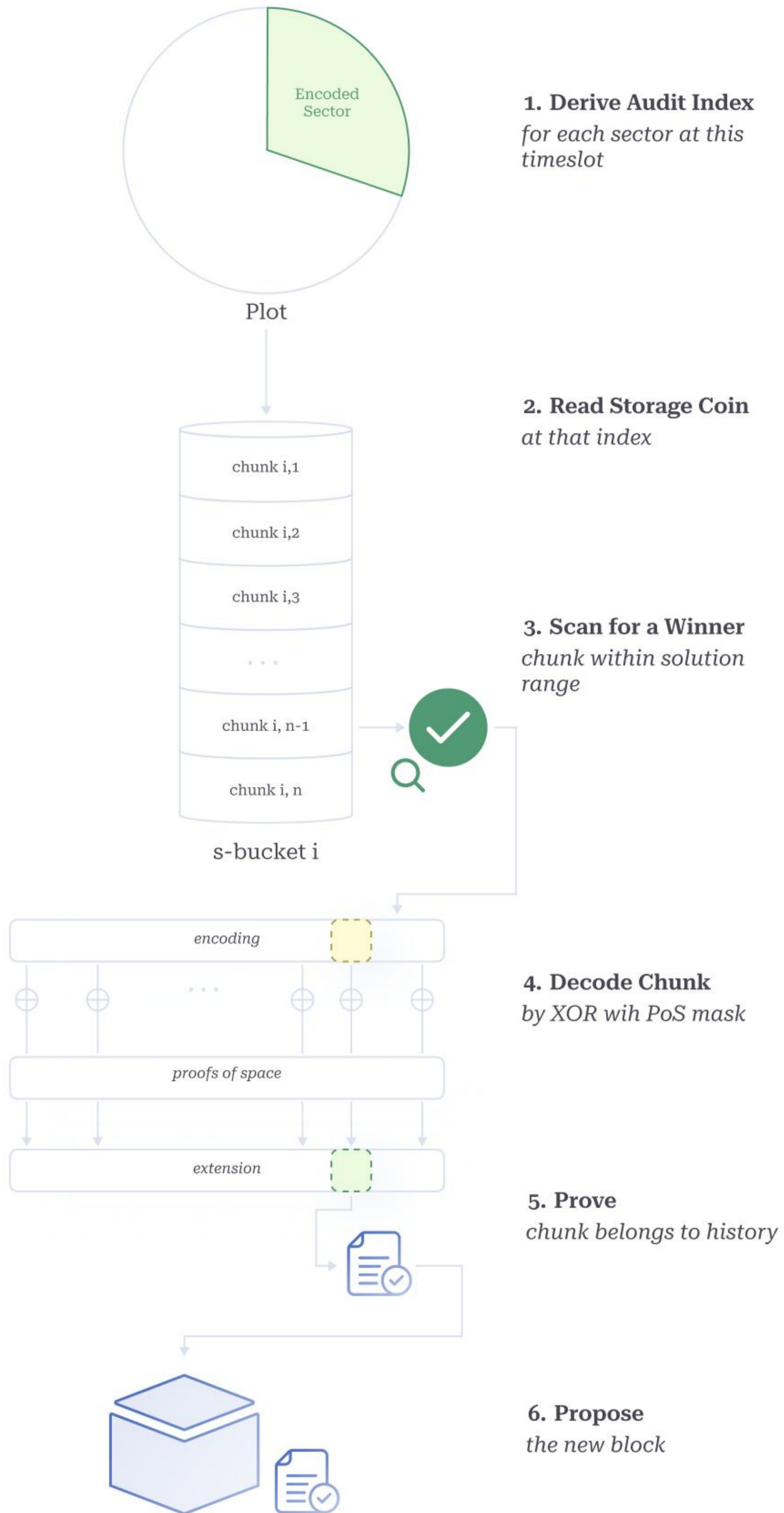
The proliferation of AI applications and decentralized technologies demands a robust, scalable infrastructure that can securely store and process vast amounts of data while maintaining true decentralization. At the core of the Autonomys Network is the Subspace Protocol, a blockchain designed to address these key challenges:



5.1 Proof-of-Archival-Storage (PoAS)

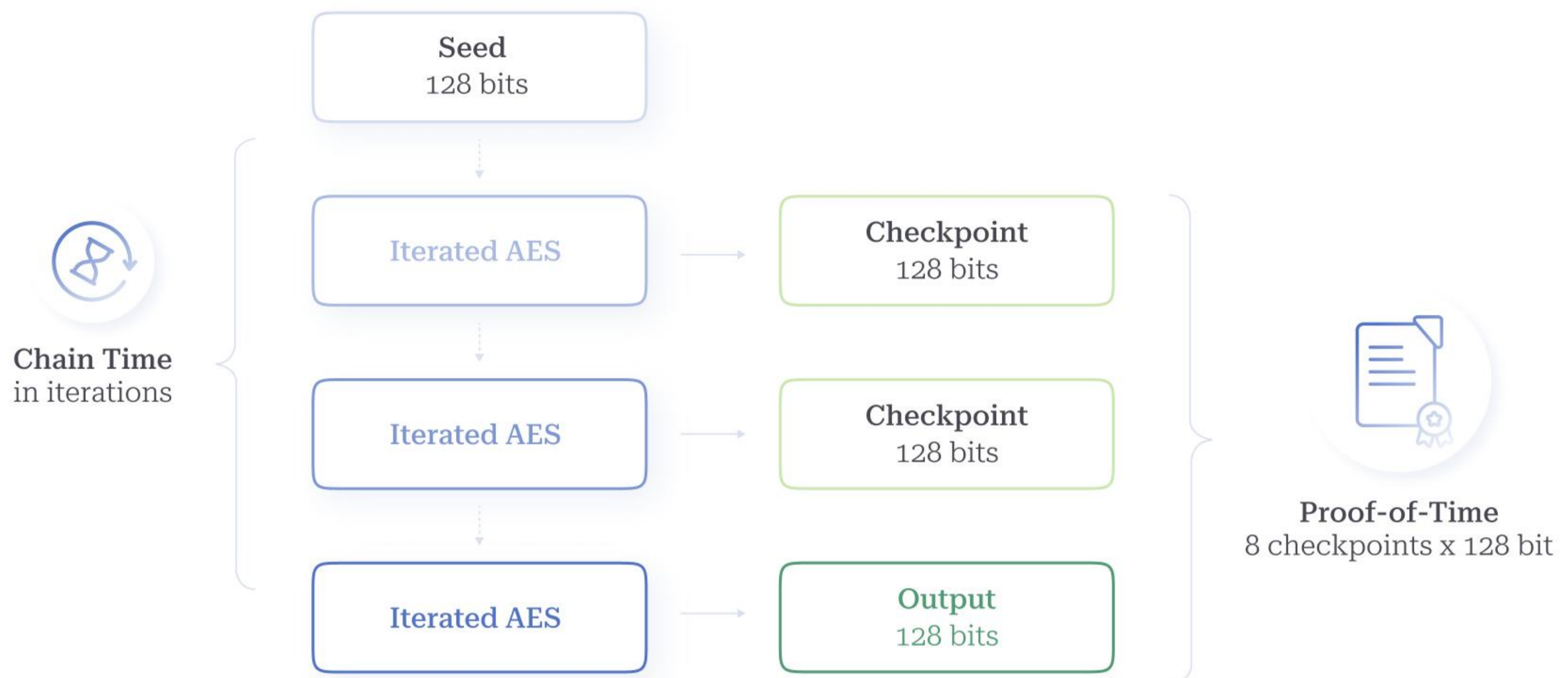
PoAS is our unique consensus mechanism where network participants (farmers) store and prove ownership of unique partial replicas of the blockchain's history. This approach addresses the farmer's dilemma and ensures efficient, decentralized storage of historical data.





5.2 Proof-of-Time (PoT)

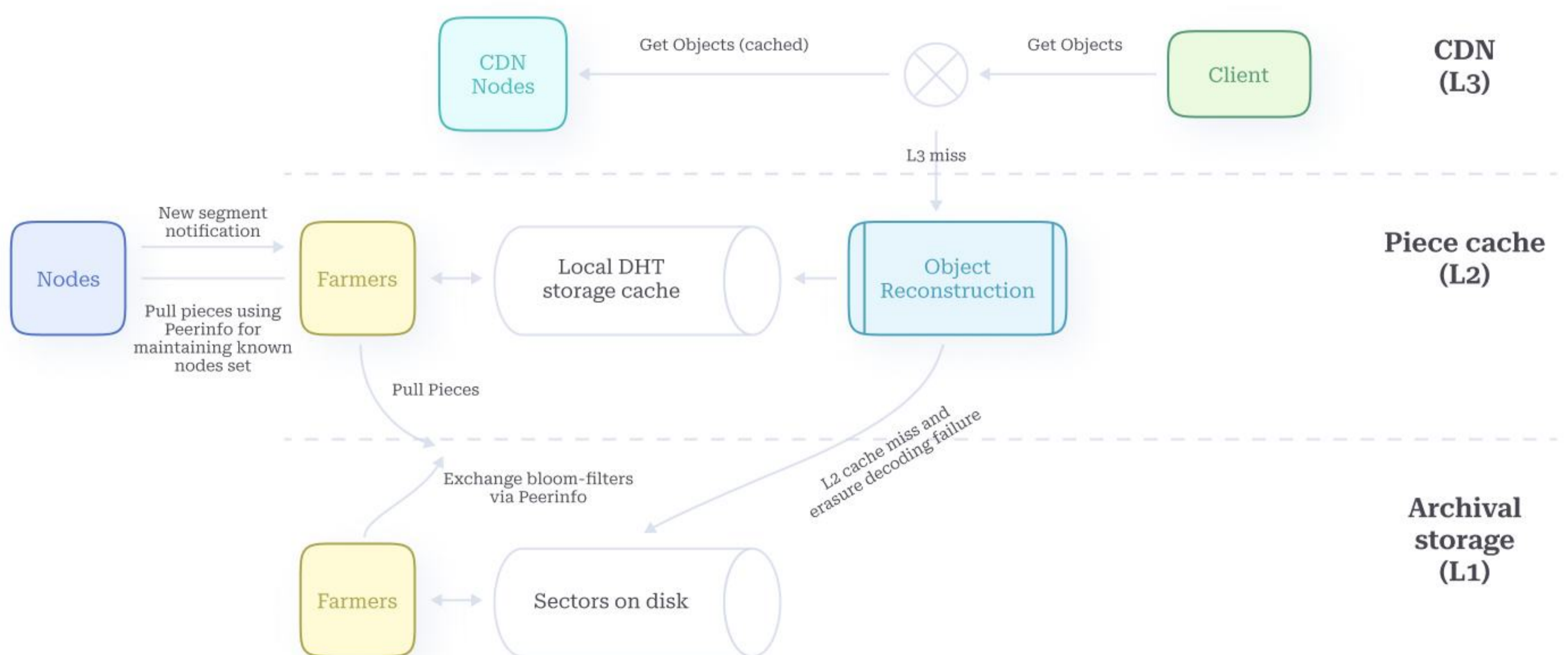
PoT is a randomness beacon that interlinks with PoAS to prevent long-range attacks and ensure unpredictability in block production. It uses repeated AES-128 encryption and implements instruction-level parallelism for efficient verification.



5.3 Distributed Storage Network (DSN)

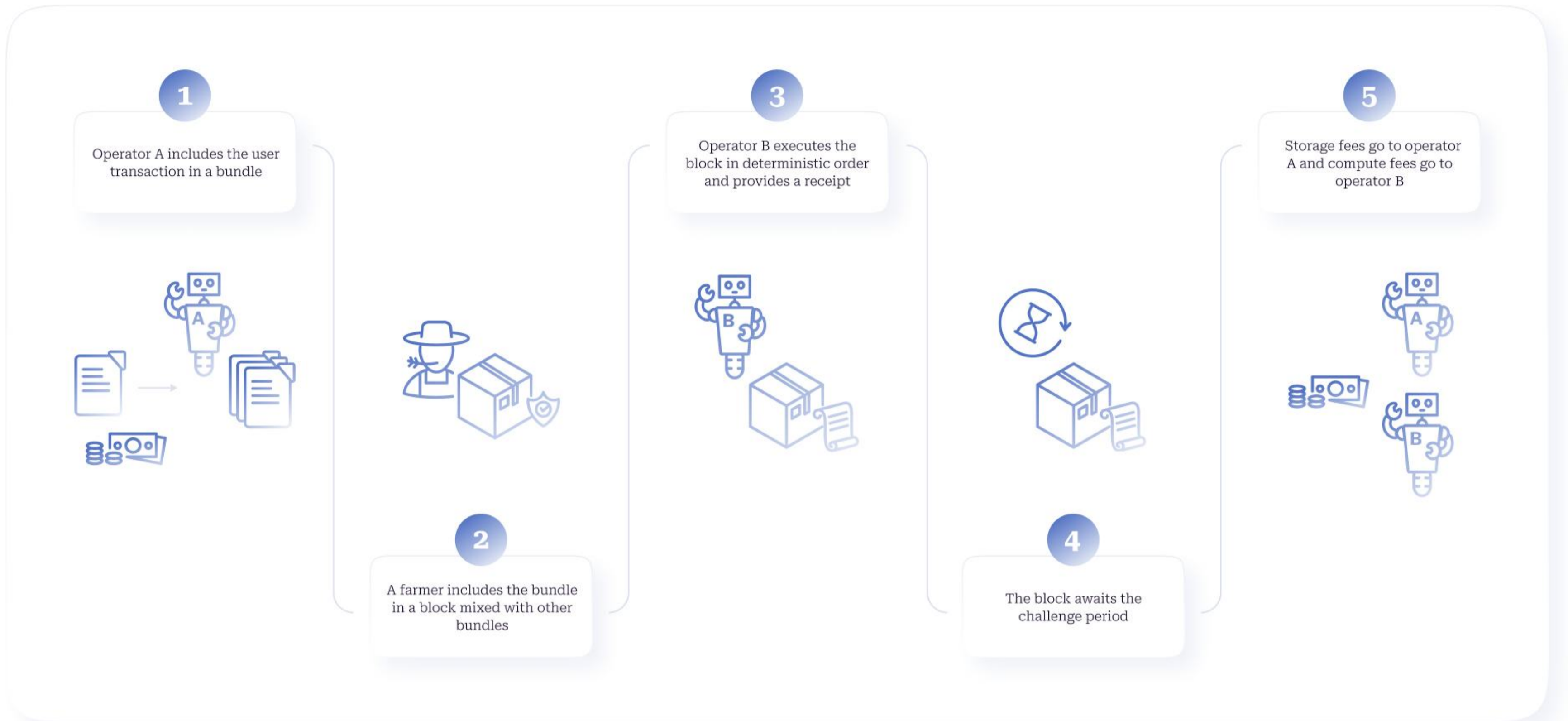
The DSN ensures consistent permanent storage over time, allowing historical data to expand beyond individual farmer capacity. It includes multiple layers for efficient data retrieval and long-term storage:

- **Content Delivery Network (L3):** Optimized for fast retrieval under normal conditions.
- **Pieces Cache Layer (L2):** Facilitates efficient piece retrieval for data reconstruction and farming.
- **Archival Storage Layer (L1):** Fundamental layer for permanent storage and durability of all chain data.



5.4 Decoupled Execution (Domains)

The protocol separates consensus from computation, allowing for scalable transaction processing and efficient resource allocation. It addresses the verifier's dilemma while maintaining security and decentralization.



Autonomys' AI3.0 Infrastructure

6.1 Auto ID: Self-Sovereign Identity Infrastructure

Auto ID establishes a robust, self-sovereign identity framework for both humans and agents with properties including self-sovereignty, traceability, verifiability, universality, and interoperability.

6.2 Auto Score: Probabilistic Proof-of-Personhood

Auto Score offers a composable, privacy-preserving proof-of-personhood protocol, aggregating various pieces of evidence to create a nuanced measure of digital personhood.

6.3 Content Provenance & Data Sovereignty

The integration of content provenance with Auto ID empowers users with control over their data sharing preferences, and provides a framework for verifying digital asset authenticity.

6.4 Data Contribution & Compensation

Autonomys enables participation in decentralized learning initiatives, while maintaining privacy and control over personal information, implementing a data valuation framework and compensation mechanism.

6.5 Decentralized Learning & Proof-of-Training

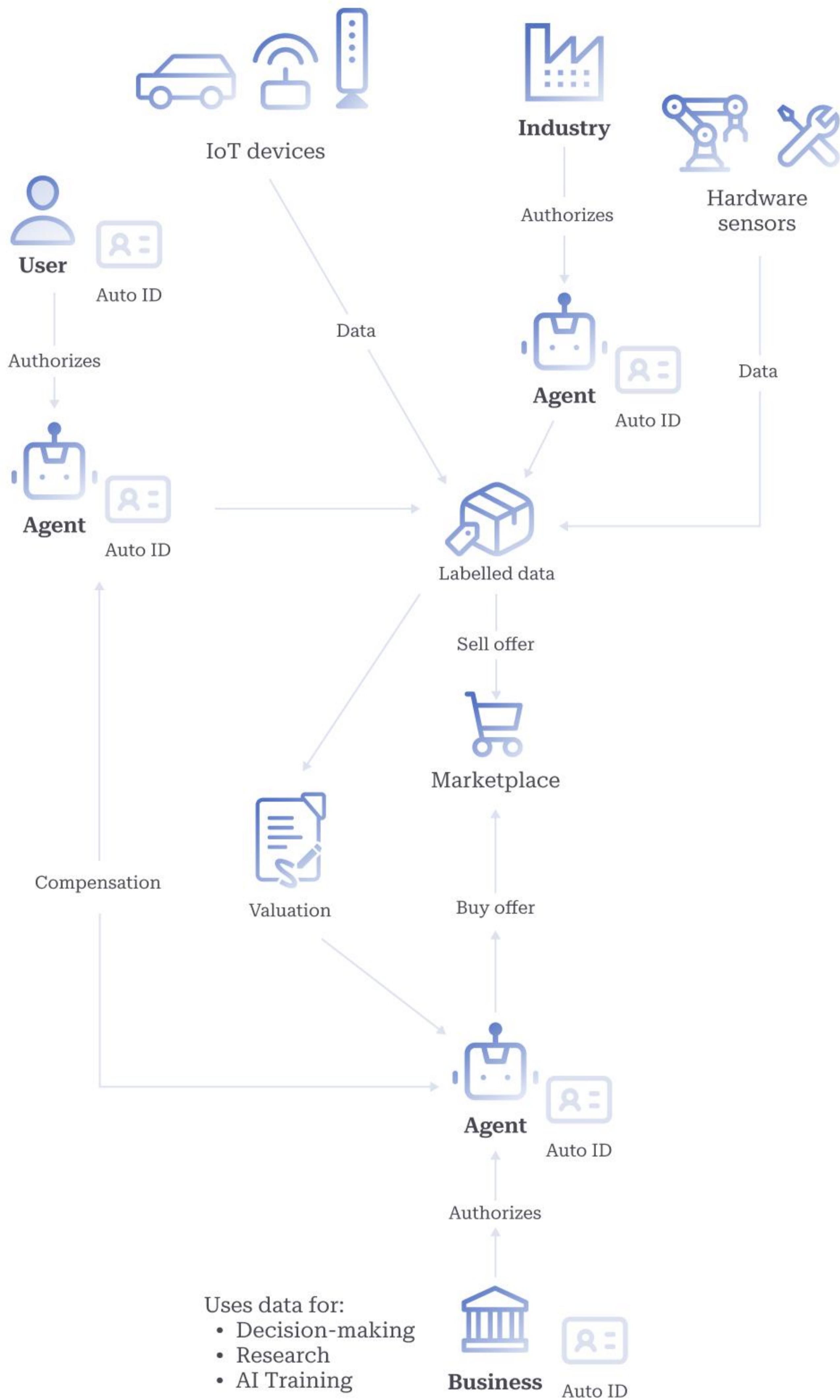
The network facilitates decentralized learning, addressing challenges such as state storage, bandwidth requirements, and dynamic workload adjustment. It introduces a Proof-of-Training (AI-PoT) protocol adaptable as a specialized domain.

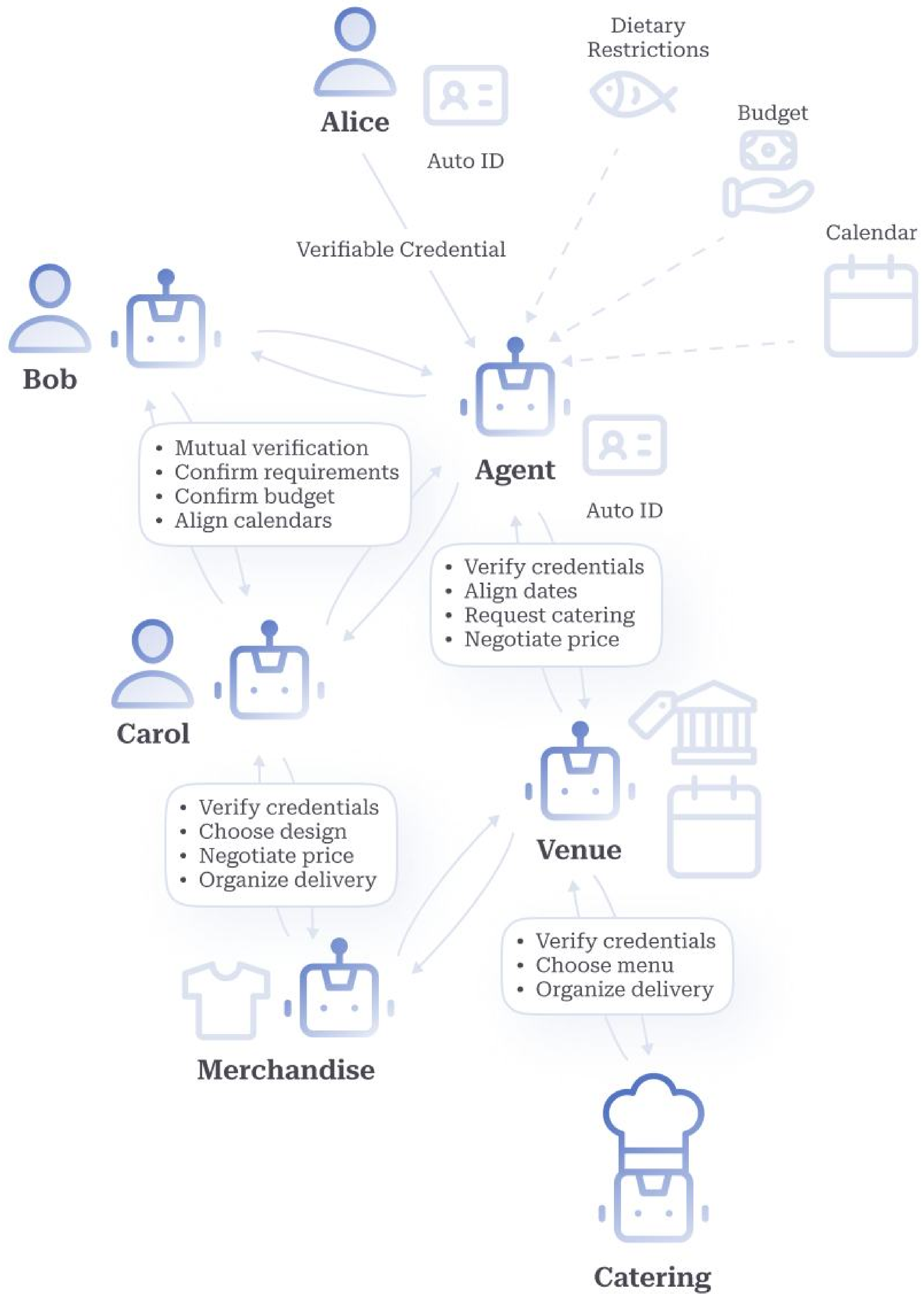
6.6 Agent Infrastructure

Autonomys provides the foundation for an ecosystem of AI agents that can act on-chain on behalf of users, supporting both edge-device and high-performance agents.

6.7 Open Collective Intelligence & the Global DAO Mesh

A novel framework that leverages open collective intelligence (OCI) through interconnected Auto DAOs that form a global DAO mesh for distributed problem-solving.



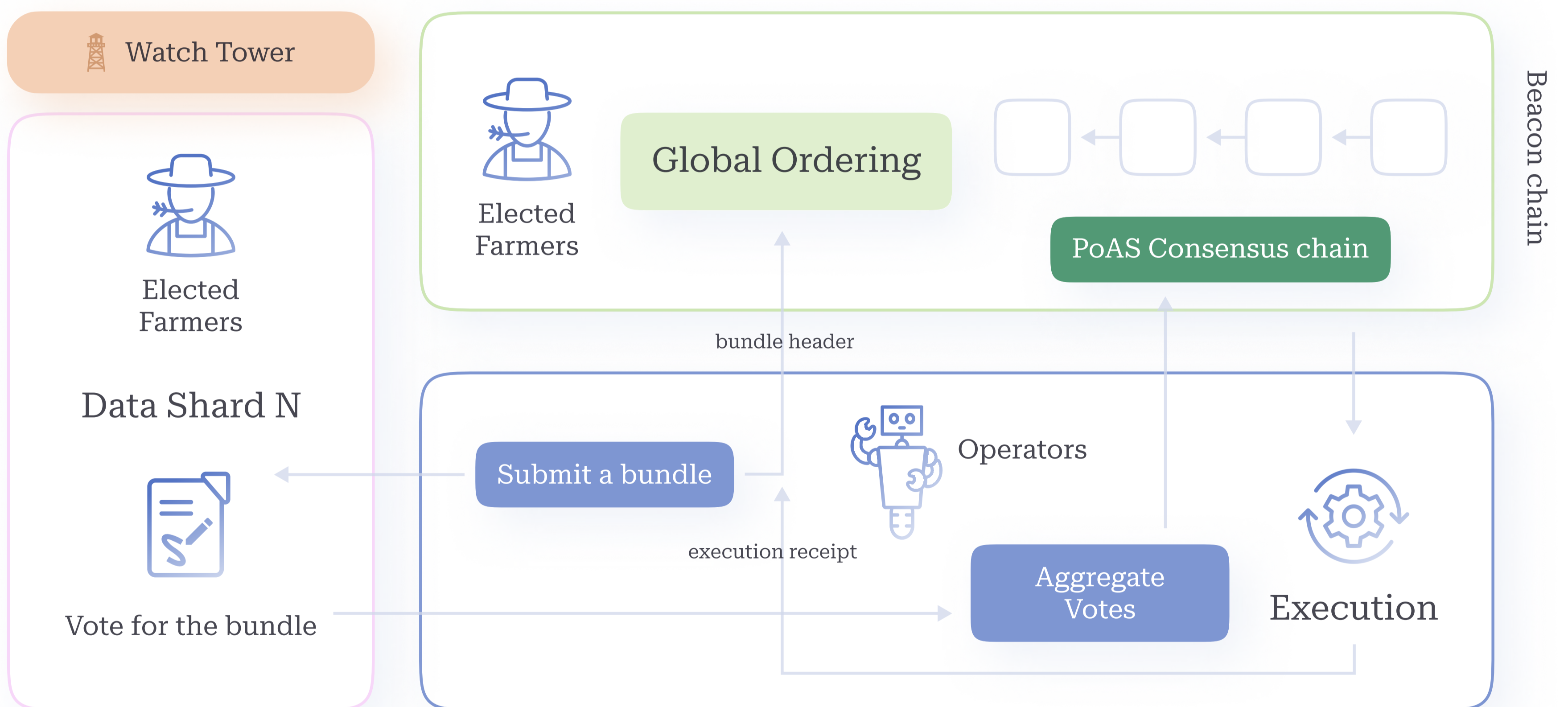


Scalability

Autonomys aims to achieve high throughput while maintaining decentralization through:

- A sharding approach using cryptographic sortition.
- A beacon chain for overall consensus.
- Data shards for parallel processing.
- Mechanisms to prevent data withholding attacks.

This solution allows the network to potentially achieve throughput of 500,000 TPS or more, addressing key physical constraints in blockchain systems.



Conclusion

The Autonomys Network represents a dual solution, addressing both the core challenges of web3 infrastructure—embodied in the farmer's and verifier's dilemmas and blockchain trilemma—and the emerging needs of an AI-augmented world. Through cutting-edge technologies like Proof-of-Archival-Storage consensus and decoupled execution domains, the network provides robust, decentralized infrastructure for permanent storage, provenance, and compensation for AI training data. Combined with innovations like Auto ID, this creates a comprehensive ecosystem where humans and AI agents can interact securely and verifiably. As we move toward AI3.0, Autonomys stands as the only open-source, collaborative foundation layer enabling accessible, verifiable, and secure decentralized AI development and deployment.

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