

# Aevir Whitepaper: Building Decentralized Collective Intelligence

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## Foreword

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Artificial intelligence is rapidly evolving into a new factor of production, its influence comparable to the steam engine of the industrial age and the semiconductor of the information age. However, this exponential technological progress stands in stark

contrast to the high centralization of underlying economic value and governance power. The three core resources—data, computing power, and cutting-edge algorithms—are concentrating in the hands of a few tech giants at an unprecedented speed, forming an insurmountable barrier. In this paradigm, the public, as the ultimate producers of data and contributors of value, are at the bottom of the value distribution chain, their creations captured by platforms at near-zero marginal cost.

The challenge we face is not merely technical, but a profound socio-economic structural issue. When society's collective intelligence is encapsulated in an opaque black box, its benefits and applications are dictated by centralized entities, unequal value distribution is only the surface. The deeper risks lie in the stagnation of social innovation and the marginalization of individual autonomy.

The proposal of **Aevir** is not to build another, more efficient AI model, but to design a verifiable and executable “**Economic Constitution**” for a decentralized collective intelligence economy. We believe that the fundamental solution to unequal value distribution does not lie in ex-post human intervention or moral appeals, but in the a priori mathematical and axiomatic design of economic rules. By precisely defining the processes of value creation, distribution, capture, and flow using rigorous mathematical language, we strive to minimize the trust cost in economic activities and ensure that the execution of the protocol does not rely on any centralized arbiter.

Aevir is a grand socio-economic experiment, whose success depends on our ability to collectively build a positive-sum game environment that both incentivizes the emergence of individual wisdom and ensures the maximization of collective benefit.

This whitepaper aims to outline Aevir's macro vision and foundational blueprint. Given the system's complexity, specific technical specifications and execution mechanisms are detailed in the following specialized documents. These documents will be disclosed progressively as the process moves forward:

- “Aevir Tokenomic Whitepaper”
- “Aevir AI Framework Whitepaper”
- “Aevir Blockchain Whitepaper”
- “Aevir Community Governance Whitepaper”

# Abstract

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**Aevir** is a decentralized intelligent collaboration network driven by the **Proof of Intelligent Contribution (PoIC)**. It transforms the consensus computing work of maintaining a blockchain network into contributions beneficial to “**collective intelligence**,” aiming to build a self-evolving AI ecosystem that aggregates global wisdom and is jointly owned and governed by contributors.

Aevir’s core mechanism, PoIC, primarily drives three core components: the **Aevir Knowledge Market**, the **Aevir Blockchain**, and the **Aevir Intelligent Ecosystem**, covering the complete intelligence lifecycle from training data sources and distributed model training to Agent development and application. High-quality knowledge, DePIN, D-moe architecture models, vertical domain models, and diverse Agents within the ecosystem are mutually catalyzed and collaborate, driven by tokens, to evolve together.

As the infrastructure for the future intelligent internet, Aevir converts the cost of maintaining blockchain network security into “**intelligent contributions**” for creating high-quality content and distributed training, effectively solving the inefficiency of traditional consensus mechanisms and the data monopoly of centralized AI. By building a value network that integrates a knowledge market, distributed training, and an Agent economy, Aevir continuously incubates “**collective intelligence**” co-built and shared by all humanity.

The protocol adopts the **AEV+AUV dual-token model** and adheres to the **100% Fair Launch** principle, strictly linking token distribution to genuine intelligent contributions. Aevir is committed to returning the rights of creation, ownership, and governance of AI to every participant, jointly building an intelligent future that serves the public interest and is governed by a global community.

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# Chapter 1: Industry Evolution

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## 1.1 From Information Interconnection to Intelligent Collaboration

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The evolution of the internet can be divided into several stages, each deepening the dimension of connection and the mode of value creation.

- **Information Internet (Web 1.0):** This stage was represented by portal websites, with the core being the realization of “**unidirectional information connection.**” Information was produced and distributed by centralized institutions, and users primarily acted as passive consumers of information.
- **Social and Mobile Internet (Web 2.0):** The popularization of social media and smartphones ushered in the “read-write” era, realizing “**bidirectional human-to-human connection.**” Users became content creators, and the platform economy flourished. However, this model was built upon the uncompensated appropriation of user data, making platforms the centralized control points for data and value distribution.
- **Value and Intelligent Internet (Web 3.0 & AI):** Currently, we are entering a new stage. Blockchain technology, through its decentralized and immutable characteristics, has built a “**Value Internet,**” aiming to allow value to flow as freely as information. Simultaneously, AI, as a new productive force, is changing the way value is created. The goal of the Aevir protocol is to combine these two technologies to build a network that can both freely circulate value and continuously create intelligence.

## 1.2 Pain Points in the Artificial Intelligence Industry

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The current development of AI technology is primarily driven by a centralized model. While this model demonstrated high efficiency in the early stages of technology, its inherent structural flaws are becoming increasingly apparent, forming four major challenges.

### **1.2.1 Data Silos**

The biggest bottleneck in current AI development lies in the data barriers and predatory economic models constructed by centralized giants. These giants monopolize the profits from the vast majority of high-value data globally, trapping users in closed systems without ownership or profit rights. This mechanism not only deprives data providers of their due returns but also stifles innovation opportunities for small and medium-sized developers through data hegemony. When contributors of high-quality data cannot be incentivized, they keep their data in silos, and the entire AI ecosystem loses the possibility of evolution without the influx of new high-quality data. Breaking this barrier and returning data value to the providers has become an inevitable requirement for the next stage of AI development.

### **1.2.2 Uneven Distribution of Computing Power**

The training costs for cutting-edge large models have soared to tens of millions or even hundreds of millions of dollars, turning AI research and development into an extremely capital-intensive competition. The high barrier to computing power constitutes an insurmountable obstacle to innovation, shutting out small and medium-sized enterprises, academic institutions, and independent developers, leading to the premature death of many potential projects. Ironically, however, a massive amount of global consumer-grade edge computing power (GPU/CPU) remains idle and dormant for long periods. This scarcity and high cost of centralized computing power, coupled with the idleness and waste of edge computing power, constitutes an extreme resource mismatch.

### **1.2.3 Privacy Issues**

Centralized AI services require users to upload private data to cloud servers for processing. In this process, users completely lose control over their data. Whether it is sensitive business secrets or personal biometric information, they face the risk of being misused, leaked, or used for targeted advertising. Without the protection of “usable but invisible” privacy-preserving computation, the convenience of AI comes at the cost of sacrificing user privacy and security.

## 1.2.4 Knowledge Quality Issues

With the proliferation of AIGC and the solidification of the traffic economy, the digital world is facing a severe “signal-to-noise ratio” crisis. On the one hand, homogeneous synthetic data generated by AI is rapidly flooding the network. If models continue to use these “data echoes” for recursive training, it will trigger “**model collapse**,” leading to intelligent degradation and cognitive distortion. On the other hand, centralized algorithms, in pursuit of click-through rates, tend to promote emotional content while marginalizing in-depth information. This dual pollution not only exacerbates the human information cocoon effect but also dilutes the high-quality “**human ground truth data**” required to sustain AI evolution, causing the digital ecosystem to fall into a vicious cycle where bad money drives out good.

## 1.3 Edge Intelligence and Model Collaboration: The Rise of Vertical Small Models

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The future of AI is not a single “omniscient and omnipotent” brain in the cloud, but a “**group of experts**” distributed in users’ pockets.

- **Vertical Domain Edge Small Models (SLM):** Future models will be highly optimized for vertical domains such as law, medicine, and personal assistance (1B-7B parameters). They will run locally on **CPU/GPU/NPU**, featuring low latency, zero cost, and absolute privacy security.
- **Collaborative Intelligence:** Generative AI is rapidly evolving to run on the edge. Future complex demands (such as “planning a trip”) will be automatically decomposed by the device locally, calling upon multiple edge small models for navigation, finance, medical, and other tasks to complete the request collaboratively. This is the only way to make AI scalable, affordable, and private, and it is the best vehicle for the Aevir ecosystem.

## 1.4 Core Vision

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In the face of the above limitations, Aevir chooses to build a new paradigm based on decentralized principles.

### 1.4.1 Foundational Principles

The Aevir ecosystem adheres to the following principles:

- **Absolute Fair Launch (100% Fair Launch):** The Aevir protocol is community-driven from the start. The total supply of 1 billion AEV tokens has no allocation reserved for the team, advisors, or early investors. All tokens are fairly distributed to participants through **Intelligent Contribution (PoIC)** to the network.
- **Privacy-First Distributed Intelligence (Privacy-First Distributed Intelligence):** The protocol adopts privacy-preserving computation technologies such as Federated Learning to build an intelligent training model where “**data stays local, value is shared globally.**” Users’ raw data remains on local devices, and only encrypted and anonymized model parameter updates are used for aggregation, aiming to fundamentally resolve the conflict between AI development and personal privacy protection.
- **Diversified AI Assets (Diversified AI Assets):** The core intelligent assets produced by the protocol are multi-layered and composable. This includes: D-moe architecture models and various vertical domain models generated through collective intelligence, which form the foundation of the ecosystem’s capabilities; Personal Intent Agents trained by users based on their own data, representing individual needs; and various Agents and AI applications built upon the ecosystem. Together, they form a complete intelligent ecosystem.
- **Assetization of Wisdom (Knowledge NFT Protocol):** In Aevir, various high-quality knowledge contributions are incentivized with tokens. Furthermore, whether it is a vertical domain model generated by the protocol through collective intelligence or a Personal Intent Agent trained by an individual based on their own data, both can be encapsulated as **NFTs**. These NFTs are not only intelligent agents in the digital world but also intelligent assets that can be traded, leased, and programmatically combined.
- **Community as the Protocol (Community as the Protocol):** Key decision-making power for the protocol belongs to the community. Every critical parameter and major upgrade of Aevir will be decided by the **AevirDAO**, composed of veAEV holders. The evolution path of the protocol is dynamically shaped by the collective wisdom of the community.

### 1.4.2 Ultimate Goal

Aevir's long-term goal is to build **Decentralized Collective Intelligence**. This is a self-evolving intelligent ecosystem formed by aggregating global wisdom. This ecosystem consists of massive high-quality knowledge, D-moe architecture models, specialized vertical models, and diverse Agents.

In this network, everyone's knowledge, experience, and judgment can become nourishment for the growth of this "collective intelligence." In turn, the intelligent achievements generated by collective intelligence are fed back to every individual in the form of services through open protocols.

By building a value network that integrates a knowledge market, distributed model training, and an Agent economy, Aevir continuously incubates "**collective intelligence**" co-built and shared by the community, and returns the rights of creation, ownership, and governance of AI to every participant, jointly building an intelligent future that serves the public interest and is governed by a global community.

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## Chapter 2: Market Positioning and Differentiation

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### 2.1 Limitations of Decentralized AI Projects

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Existing projects combining AI and blockchain have explored different directions but often suffer from specific limitations.

#### Comparison of Existing Solutions

The common limitations of these solutions can be summarized as:

- **Decoupling of Incentive and Value Creation:** Rewarding computing resources but not effectively rewarding intelligent outcomes.

- **Fragmentation of Content and Model:** Lack of a direct value transmission mechanism between the content ecosystem and AI model training.
- **High Barrier to User Participation:** Excluding a large number of non-technical users from the core value creation system.

## 2.2 Challenges of Federated Learning

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Federated Learning technology itself is not new, but its large-scale commercial application is hindered by the dilemma of the “tragedy of the commons.” Open-source Federated Learning frameworks lack two key elements:

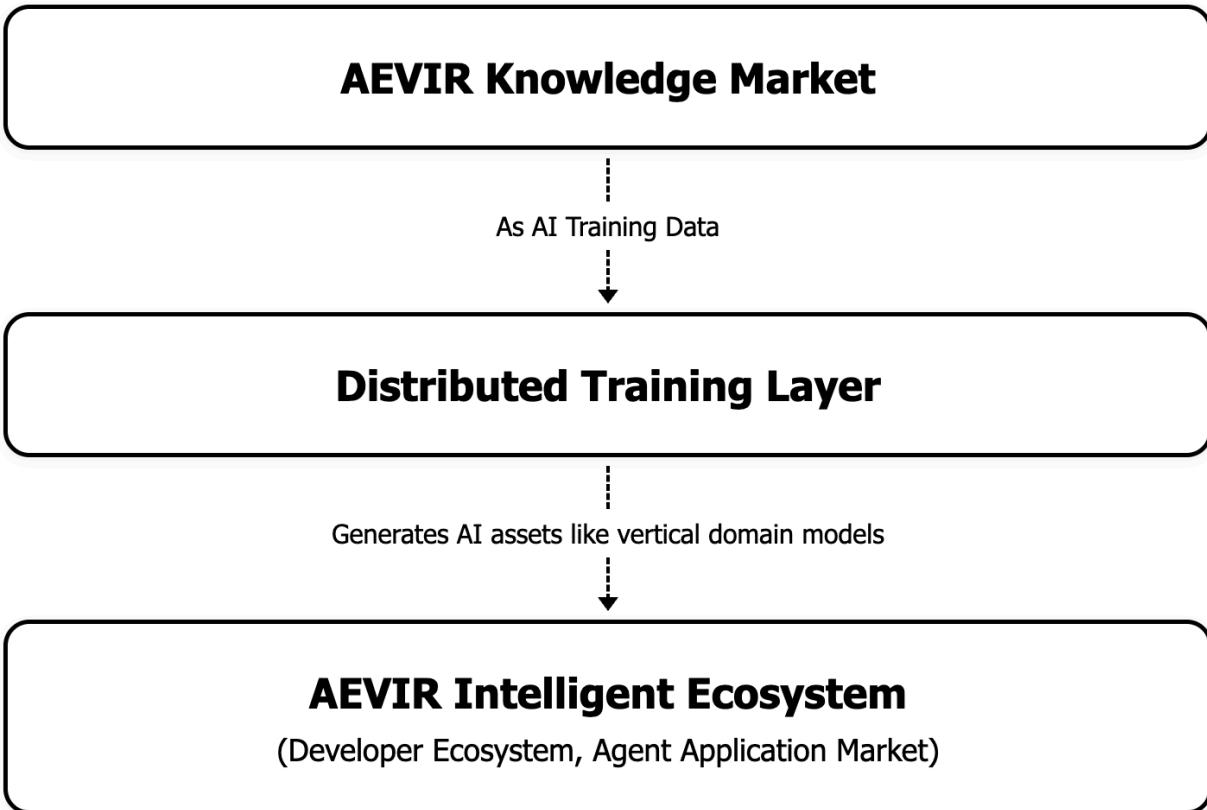
- **Incentive Mechanism:** Lack of a strong, fair, and reliable economic incentive model to drive individuals and institutions worldwide to continuously contribute their data and computing resources.
- **Coordination Mechanism:** In a decentralized environment, how to effectively coordinate global nodes, verify their contributions, and precisely allocate value is a complex problem. Centralized coordination methods violate the original intention of decentralization, and their efficiency and credibility are questionable.

Aevir’s design aims to provide a complete “**Incentive and Coordination System**” for Federated Learning. Through the PoIC consensus and the dual-token economic model, the protocol precisely quantifies every valid intelligent contribution (content or training) as an on-chain asset and automatically and transparently distributes value through smart contracts, thereby solving the motivation problem for participants.

## 2.3 Aevir’s Positioning

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Aevir is positioned to pioneer an ecosystem that covers the entire process of intelligence, from source to creation to application. Its structure can be summarized into three interconnected layers:



Aevir is the first protocol to deeply integrate these three domains:

1. **Knowledge as Training Data:** The AEVIR Knowledge Market not only serves users, but its generated structured knowledge units also directly serve as training material for models, ensuring data purity.
2. **Training as Value Creation:** Distributed training, through PoIC consensus, transforms from a cost center into the network's core value creation engine.
3. **Intelligence as Asset:** The outcomes of AI models, including models, personalized Personal Intent Agents, and various applications built upon them, are materialized as intelligent assets that users can own, trade, and combine, allowing the dividends of AI development to be more widely shared.

This end-to-end ecosystem structure, from source to creation to application, constitutes Aevir's core design.

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# Chapter 3: Aevir Core Design

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## 3.1 Design Principles

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Aevir's technical decisions follow three design principles.

- **Direct Value-Contribution Mapping:** The protocol must be able to precisely identify and quantify contributions beneficial to the ecosystem, whether it's creating a profound answer or completing an efficient round of AI model training. This is the foundation for building a fair incentive system. When contributions can be fairly measured, participants are motivated to make high-quality contributions.
- **Privacy-Preserving Collaboration:** Users' personal privacy and data sovereignty must be protected at the highest level. Collaboration must be built on a foundation of voluntariness and informed consent. The protocol uses a combination of technologies like Federated Learning and Differential Privacy, aiming for an ideal state: even if other participants in the network are malicious, the individual user's data privacy remains secure.
- **Composability:** All core components of the protocol, especially the Personal Intent Agent and the various Agents and AI applications built upon vertical domain models, should be designed as open, standardized modules. Anyone can permissionlessly call, combine them, or build new applications on top of them. An open and composable ecosystem possesses stronger network effects and innovation potential.

## 3.2 Overall Architecture

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Aevir adopts a layered architecture, with clear responsibilities and collaborative work for each layer. It is a dedicated chain for executing intelligent contribution pricing, verification, and settlement.

## Application Layer

- AEVIR Knowledge Market DApp, Agent Marketplace, 3rd-Party Applications...

## Intent Layer

- User Behavior Analysis, Intent Vector Extraction, Personal Intent Agent Generation & Management

## Training Layer

- Federated Learning Engine, Aggregation & Generation of Vertical Domain Models, Contribution Validation

## Consensus Layer

- PoIC (Proof of Intelligence Contribution) Consensus, Node Management, Block Production, Transaction Confirmation

## Infrastructure Layer

- Aevir Blockchain, P2P Network, Decentralized Storage, Cross-Chain Interoperability, Contributor Hardware Nodes

- **Application Layer:** The interface for direct user interaction, including the Knowledge Market, distributed training platform, Agent Application Market, and future third-party applications built by developers.
- **Intent Layer:** The intermediate layer connecting user behavior and AI intelligence. It runs locally on the user's device, analyzes interaction data, transforms it into a standardized "**Intent Vector**," and uses it to train and manage the user's Personal Intent Agent.
- **Training Layer:** The protocol's "**computational core**." It organizes and coordinates global nodes for distributed AI model training through the Federated

Learning engine, and securely aggregates contributions to drive the evolution of vertical domain models.

- **Consensus Layer:** The underlying foundation of the network. It uses the PoIC consensus algorithm to ensure transaction security on the Aevir blockchain and is responsible for measuring the “**Intelligent Contribution**” of hardware and knowledge nodes globally, thereby distributing AEV tokens.

### 3.3 Blockchain Consensus Mechanism and Roles

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To meet the high-frequency interaction demands of AI training and inference while ensuring decentralization, Aevir adopts a **dual-layer consensus architecture**: separating high-frequency transaction execution from final block consensus to achieve a balance between efficiency and security.

- **Execution Layer:** Achieves second-level transaction finality through internal **BFT (Byzantine Fault Tolerance)** consensus by “**Pledge Executors**,” responsible for handling high-frequency smart contract calls and state updates.
- **Consensus Layer:** Selects the Proposer and Validation Committee based on **PoIC weight** and **VRF (Verifiable Random Function)** mechanism, responsible for block packaging and finality confirmation.

Under this architecture, the network defines the following five core roles, each performing its duty to maintain the ecosystem’s operation:

- **Intelligent Contributor Node (ICN)**
  - **Role Positioning:** Provider of computing power infrastructure (Physical Layer) and value engine of the network.
  - **Core Responsibilities:**
    - Deploy GPU/TPU hardware to run local AI model training and inference tasks.
    - Act as a “Service Hub” to provide data indexing and on-chain channels for Knowledge Contributors.
    - Execute the specific computation work for PoIC (Proof of Intelligent Contribution) and submit proof of work.
- **Knowledge Contributor Node (KCN)**
  - **Role Positioning:** Data foundation of collective intelligence.

- **Core Responsibilities:**
  - Provide high-quality knowledge, data, or models verified by the community through interaction in the Knowledge Market.
  - Provide a pure data source for the training of the D-MOE architecture model, and do not directly participate in block generation elections.
- **Pledge Executor (SEN)**
  - **Role Positioning:** High-performance node responsible for high-frequency transactions.
  - **Core Responsibilities:** Execute complex smart contracts and calculate the network-wide score, achieving second-level transaction finality through internal BFT consensus, and packaging the processed data for submission to the Proposer.
- **Proposer / Block Leader**
  - **Role Positioning:** Producer of blocks.
  - **Selection Logic:** Selected by a VRF random function weighted by **IntelliPoint** (Intelligent Contribution Score). The higher the node's Intelligent Contribution Score, the greater the probability of being selected to package transactions and receive the proposal reward.
- **Validation Committee / Witness Group**
  - **Role Positioning:** Supervisor of the Consensus Layer.
  - **Formation Logic:** Composed of ICN nodes with the highest IntelliPoint ranking (Top 50%), selected by lottery, and rotated periodically.
  - **Core Responsibilities:** Audit the legality of block data and the PoIC credentials, ensuring the finality of network consensus and preventing malicious behavior.

## 3.4 Aevir Standardized Hardware (ASH)

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**Aevir Standardized Hardware (ASH)** defines the physical benchmark for Intelligent Contributor Nodes, ensuring the network possesses efficient local training (supporting LoRA/QLora) and concurrent processing capabilities. All nodes must be equipped with a **TPM module** to verify PoIC contributions via a **TEE environment**, and meet network standards of **uplink  $\geq$  500Mbps** and **latency < 20ms**.

ASH is divided into three tiers based on computing power scale:

### 1. Edge AI Node (Individual/Developer)

- **Target:** Running Personal Intent Agents and participating in lightweight D-MOE architecture model fine-tuning.
- **Core Benchmark:** High-end consumer-grade CPU (with NPU required, e.g., Apple M4/Intel Ultra/Ryzen 9000); GPU with  $\geq$  24GB VRAM (RTX 4090/5090 or equivalent AMD); Memory  $\geq$  64GB.

### 2. Professional AI Workstation (Enterprise/Research Institution)

- **Target:** Medium-scale model training and high-frequency inference for vertical domains.
- **Core Benchmark:** Multi-PCIe lane workstation-grade CPU (Threadripper/Xeon); Dual-card/Multi-card interconnect (RTX 5090 x2 or professional cards A6000/W7900); 128GB ECC Memory; RAID Storage.

### 3. HPC Server Cluster (Infrastructure/Computing Center)

- **Target:** Core computing backbone of the network, undertaking large-scale foundational model iteration.
- **Core Benchmark:** Data center-grade GPU (H100/B200/MI300X); Support for NVLink/Infinity Fabric high-speed interconnect; 10Gbps+ uplink bandwidth.

## 3.5 Technology Stack Selection

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The technology selection aims to balance innovation with engineering maturity.

- **Consensus Mechanism: PoIC Consensus.** Combining PoIC with BFT finality (e.g., Tendermint). PoIC is responsible for value creation and incentive distribution, while BFT consensus is used for rapid block confirmation, ensuring fast transaction finality.
- **Smart Contracts: EVM Compatibility.** This allows Ethereum developers to seamlessly use familiar Solidity language and tools to develop on Aevir, lowering the barrier to ecosystem construction.
- **Storage Layer: IPFS + Arweave Hybrid Solution.** Frequently accessed data is stored on IPFS for fast access, while high-value knowledge units are permanently stored on Arweave, ensuring their persistence.

- **Privacy Protection: Differential Privacy + Secure Multi-Party Computation (MPC).** Differential Privacy adds mathematical noise when nodes upload model updates, protecting user data. MPC can be used during the model aggregation phase to ensure that the coordinating server cannot see the raw model updates of individual nodes.
  - **Cross-Chain: Native support for LayerZero and IBC protocols.** By integrating with mainstream cross-chain protocols, Aevir aims to achieve asset and data interoperability with ecosystems like Ethereum and Cosmos.
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## Chapter 4: PoIC Consensus Mechanism

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### 4.1 Limitations of Blockchain Consensus Mechanisms

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Mainstream consensus mechanisms suffer from inherent issues of efficiency or fairness:

- **Proof of Work (PoW):** Secures the network by consuming vast amounts of energy for hash computation. While secure, its energy consumption is enormous, and the computation itself generates no value beyond network maintenance.
- **Proof of Stake (PoS):** Links block production rights to the amount of staked tokens, significantly reducing energy consumption. However, PoS can lead to a Matthew effect of capital, where entities holding more tokens receive more rewards, potentially leading to the centralization of network power and profit.

Blockchain requires a new consensus paradigm that can transform the cost of network maintenance into the benefit of value creation, while simultaneously curbing the excessive concentration of capital.

### 4.2 Proof of Intelligent Contribution (PoIC)

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The core philosophy of PoIC is that the “work” of maintaining network security should itself be “**intelligent work**” that contributes to the network’s core value—“**collective intelligence**.”

Under the PoIC mechanism, an intelligent contributor's **IntelliPoint** (Intelligent Contribution Score) in the network determines their share of rewards and eligibility to become a Proposer. It is the weighted sum of the Training Score and the Knowledge Contribution Score, reflecting the node's comprehensive contribution level. This score is determined by the following core formula:

$$P = (w_t P_t^\alpha + w_l P_l^\alpha)^{\frac{1}{\alpha}}$$

Where:

- **IntelliPoint (P):** The node's final composite score, which determines Proposer eligibility and a portion of the reward distribution.
- **TrainingPoint ( $P_t$ ):** A metric measuring the AI computing resources (e.g., GPU power) contributed by the node to the network.
- **LibraryPoint ( $P_l$ ):** An on-chain metric measuring the knowledge contribution value of a single node, verified by the community.
- $w_t, w_l$ : Weight coefficients adjustable through network governance, representing the relative importance of computing power contribution and knowledge contribution.

The DAO can dynamically adjust the parameters of this function through governance proposals based on the strategic needs of the network at different stages. For example, during the network's cold start phase, a higher knowledge contribution weight can be set to incentivize content creation; in the network's mature phase, the computing power contribution weight can be increased to focus on deepening AI capabilities.

In addition, the protocol defines the following key metrics for value measurement at other levels:

- **KnowledgePoint:** An on-chain metric measuring the knowledge contribution value of a single piece of content, verified by the community.
- **ReputationPoint:** An on-chain metric measuring the knowledge contribution value of a single user, verified by the community, primarily used to distribute rewards from the knowledge contribution pool.

## 4.3 Knowledge Contribution Score (KnowledgePoint & LibraryPoint) Scoring Mechanism

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To ensure the fairness and anti-manipulation of the knowledge contribution scoring, the protocol has designed a multi-dimensional scoring system.

### A. Community Curation: Voting Verification and Reputation Weighting

- **Quadratic Voting Verification:** Users use AUV tokens to vote on various knowledge items in the Knowledge Market.
- **Reputation-Weighted Curation:** Voting power is weighted by a reputation system. A user's voting weight is jointly determined by their reputation and stake, ensuring that veteran, credible contributors have a greater influence on curation.

### B. Content Quality Filtering and Data Purity

To prevent spam and illicit content from polluting the ecosystem, the community will select and deploy a “**Gatekeeper AI**” through DAO voting. The duties of this AI are strictly limited to filtering obviously illicit content, without judging the correctness of opinions or facts, to protect freedom of speech and diversity of views, and ensure the **Data Purity** of the AI model training data.

### C. Time-Weighted Reward Mechanism

The final reward for a knowledge unit is not distributed all at once but is divided into two parts: one part is instantly distributed based on initial voting popularity, and the other part is linearly released over a future period based on metrics such as the content's sustained citation count and frequency of valuable updates, to incentivize the creation of long-term valuable content.

## 4.4 Training Score (TrainingPoint) Scoring Mechanism

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Verifying decentralized AI training contributions is a technical challenge, and the protocol adopts a phased implementation strategy.

## A. Phase One: Performance Benchmarking

In the early stages of the network, a pragmatic verification method is adopted:

1. The network periodically releases a standardized training task and a public test dataset.
2. Participating nodes download the global model, train it on their local data, submit the model, run it on the standard test set, and report performance metrics.
3. A subset of randomly designated validation nodes will quickly re-run the test to verify the authenticity of the report.
4. The node's **TrainingPoint** will be calculated based on a combination of factors including its actual performance improvement, contributed hardware resources, and network stability.

$\text{TrainingPoint} = f(\text{Performance Improvement}, \text{Hardware Contribution}, \text{Online Stability})$

## B. Phase Two: Verifiable Computation (Roadmap)

The long-term goal is to introduce **Zero-Knowledge Proofs (ZKP)**, specifically zk-SNARKs, to achieve fully trustless verification. At that time, after completing training, a node can generate a concise cryptographic proof to confirm to the entire network that it honestly completed the training task without revealing any private data. Currently, the cost of generating ZKP is high, and the protocol will explore techniques such as batch proofs and recursive proofs to reduce the cost and make it economically viable.

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# Chapter 5: Technical Architecture Analysis

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## 5.1 PoIC Operation

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### 5.1.1 Ecosystem Roles and Responsibilities

The protocol designs flexible participation roles to accommodate participants with different resource levels:

- **Intelligent Contribution Node (ICN)**
  - **Role Positioning:** Computing power infrastructure provider (Physical Layer).
  - **Core Responsibilities:**
    - Deploy GPU/TPU hardware to run local AI model training and inference tasks.
    - Act as a “Service Hub” to provide data indexing and on-chain channels for Knowledge Contributors.
    - Execute the specific computation work for PoIC (Proof of Intelligent Contribution) and submit proof of work.
- **Knowledge Contributor (KC)**
  - **Role Positioning:** Data and algorithm producer (Application Layer).
  - **Core Responsibilities:**
    - Upload cleaned high-quality datasets or fine-tuned model weights.
    - Bind to an ICN node to access the network, transforming intellectual achievements into on-chain assets.
    - Provide feedback and error correction for model outputs in the network.
- **Staking Executor Node (SEN)**
  - **Role Positioning:** Network security cornerstone (Consensus Layer - Base Layer).

- **Core Responsibilities:**
  - **Asset Staking:** Provide a large amount of **\$AEV** staking as economic collateral for network security.
  - **Transaction Verification:** Responsible for verifying the legality of all transfers, contract calls, and computation credentials submitted by ICNs in the network.
  - **State Maintenance:** Maintain a complete copy of the network-wide ledger data, ensuring data integrity.
- **Block Committer Committee**
  - **Role Positioning:** Consensus confirmation committee (Consensus Layer - Core Layer).
  - **Formation Logic:** Randomly selected from active Staking Executor Nodes (SENs) using the VRF (Verifiable Random Function) algorithm, with periodic rotation.
  - **Core Responsibilities:**
    - **Multi-Sig Confirmation:** Vote and sign on blocks broadcast by the Proposer to reach final consensus (Finality).
    - **Proposal Supervision:** Supervise whether the current round's Proposer is malicious (e.g., double signing, packaging illegal transactions).
- **Block Proposer**
  - **Role Positioning:** Block leader for the current round (Consensus Layer - Execution End).
  - **Formation Logic:** A specific node determined by an algorithm from the current “Block Commuter Committee” (e.g., selected by weight or random number).
  - **Core Responsibilities:**
    - **Block Packaging:** Package verified transaction pool data into a new block.
    - **Broadcast to Chain:** Broadcast the new block to the Committee for signature confirmation.
    - **Drive Beat:** Responsible for the network heartbeat within the time slot, ensuring the blockchain continuously moves forward.

## 5.1.2 Incentives and Penalties

### Block Reward Distribution

The **\$AEV** generated by each new block will be distributed based on two major dimensions: “**Consensus Maintenance**” and “**Ecosystem Contribution**.” The distribution ratio is dynamically adjusted according to the **Maturity Index** of the network, achieving a smooth transition from “**Infrastructure-Driven**” to “**Application-Driven**.”

#### Overall Distribution Structure Table:

Role Category	Early Stage (Infrastructure)	Mature Stage (Application)	Distribution Basis and Logic
Block Committer	15%	10%	<b>Single-point reward.</b> The node selected by the VRF algorithm from the Committee for the current round enjoys this percentage exclusively, incentivizing nodes to compete for block production rights.
Staking Executor (SEN)	5%	10%	<b>Shared reward.</b> All active staked nodes share this, calculated by staking weight. The percentage increases as network value grows to strengthen the underlying security wall.
Intelligent Contributor Node (ICN)	50%	30%	<b>Computing Infrastructure.</b> Rewards nodes providing GPU/TPU hardware. The high initial percentage is to rapidly stack the network’s total computing power scale.
Knowledge Contributor (KC)	30%	50%	<b>Ecosystem Vitality.</b> Rewards data and model providers. The percentage is highest in the later stage, ensuring the continuous generation of high-quality AI assets.

| Role Category | Early Stage (Infrastructure) | Mature Stage (Application) | Distribution Basis and Logic |

**Dynamic Adjustment Mechanism:** As network computing power saturates, the protocol automatically lowers the ICN weight and raises the KC weight, guiding value flow towards creators of high-quality data and models.

## Slashing Mechanism

To ensure network security and service quality, the system implements graded penalties for abnormal behavior, directly deducting the **\$AEV** staked by the node.

### Level 1: Minor Penalty (Liveness Faults)

- **Trigger Scenarios:**
  - SEN/Committee: Node offline, missing proposal slot, failure to participate in signing in time.
  - ICN: Computing power response timeout, unexplained offline status.
- **Penalty Measures:**
  - **Reward Suspension:** Deduction of all pending rewards for the current round or day.
  - **Jail:** Forced removal from the active node list, requiring a manual transaction and a small fine to reactivate.

### Level 2: Major Penalty (Security Faults)

- **Trigger Scenarios:**
  - SEN/Proposer: **Double Signing**, attempting to fork the blockchain.
  - ICN: Submitting **Fake Proof** of computing power, malicious tampering with model results.
- **Penalty Measures:**
  - **Slashing:** Deduction and destruction of **5% to 100%** of the staked collateral, depending on the severity.
  - **Permanent Exclusion:** The node's private key is blacklisted by the protocol, permanently prohibiting participation in consensus and mining.

## 5.2 Federated Learning Engine

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The Training Layer is responsible for organizing global nodes to collaboratively evolve AI models. It primarily involves Federated Learning training for D-moe architecture models and various vertical models.

### 5.2.1 Federated Learning Workflow

1. **Model Distribution:** The coordinating server distributes the latest version of the global model (i.e., the latest D-moe architecture model or a specific vertical domain model) to the nodes participating in the current training round.
2. **Local Training:** Each node trains the model on its local private data. The data does not leave the local device during this process.
3. **Gradient Upload:** The node calculates the local model update (gradient) and uploads it after adding noise using Differential Privacy technology to protect privacy.
4. **Secure Aggregation:** The coordinator collects the encrypted gradients from each node and calculates a weighted average based on each node's weight to update the global model. This process will be enhanced with **Secure Multi-Party Computation (MPC)** in the future.
5. **Iterative Loop:** The new global model becomes the basis for the next training round, starting a new cycle.

## 5.3 From Data to Personal Intent Agent

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The Intent Layer is responsible for transforming users' digital footprints into valuable intelligent assets.

### 5.3.1 Definition of “Intent”

“Intent” is the abstraction and vector representation of the deep needs behind user behavior, including explicit intent (e.g., search queries), implicit intent (e.g., browsing preferences), and deep intent (potential needs inferred through correlation analysis).

### 5.3.2 Conversion Path from Data to Agent

User behavior data is analyzed by an AI model locally, and an encrypted intent vector is extracted. Users can choose to use these vectors to train a personalized **Personal Intent Agent** model, and finally mint it as an **ERC-721 standard NFT** through the **Knowledge NFT Protocol**. The entire process is fully controlled by the user, who can update, pause, or delete their Agent at any time.

## 5.4 AEVIR Knowledge Market

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The AEVIR Knowledge Market is a decentralized knowledge economy. Users initiate topics to solicit knowledge, and other members contribute content around these topics. Through a collective evaluation mechanism that incorporates reputation-weighted voting, they jointly identify and confirm high-quality knowledge. Verified knowledge contributions are converted into quantifiable on-chain value. This design aims to effectively incentivize the continuous production of high-quality knowledge and provide a reliable data source for the AI training of the Aevir network.

Its core components include:

- **Domain:** A classified directory of knowledge, used to organize content across different professional areas.
- **Questopic:** A specific question or discussion topic initiated by a user using AUV tokens within a specific domain, or a piece of knowledge, insight, or article, which serves as the starting point for knowledge creation.
- **Publish:** When publishing a Questopic, the user must choose to publish it on an **Intelligent Contributor Node**. The topic and knowledge quality of the Questopic are important sources for the **Library Point** of the Intelligent Contributor Node in the PoIC consensus mechanism.
- **Discussion:** Users participate in the discussion of a Questopic using AUV tokens, and their discussion is also considered assessable knowledge.
- **Evaluation:** Users use AUV tokens to vote on various topics and discussion content based on reputation weighting, thereby assessing knowledge quality.
- **Knowledge Cleaning:** High-quality knowledge is processed and cleaned by the node's data processing model and human intervention, forming structured datasets that can be used for model training.

- **Knowledge Unit:** The specific content collection within a Questopic, such as questions, answers, or related discussions, as well as the cleaned structured data. To balance efficiency and decentralization, the complete content of the knowledge is stored in off-chain distributed storage, while its metadata, content hash, ownership, and evaluation results are encapsulated as standardized data units recorded on-chain, ensuring verifiability and immutability.

## 5.5 AEVIR Intelligent Ecosystem

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The AEVIR Intelligent Ecosystem is the decentralized collective intelligence ecosystem built by the Aevir protocol. It is based on a high-quality knowledge source and integrates the entire process from model training and application development to the flow of the Agent economy. The ecosystem consists of four core parts: Training Knowledge Source, Distributed Training and Vertical Domain Models, Developer Ecosystem, and Agent Economy.

### 5.5.1 Training Knowledge Source

This is the data foundation that AI models in the Aevir ecosystem rely on for training. It integrates two types of data sources: one is community general knowledge verified by the reputation-weighted voting mechanism and structurally organized; the other is specialized domain knowledge from Intelligent Contributors. This dual-track design aims to build a knowledge base with both breadth and depth, providing high-quality, trustworthy data input for subsequent vertical domain model training.

### 5.5.2 Distributed Model Training

The ecosystem is built upon the PoIC consensus protocol. The process begins with a single initiating node merging an open-source base with a specific domain knowledge base, generating an initial global model, and publishing a federated training task. Subsequently, the PoIC mechanism incentivizes nodes to join, utilizing local computing power to collaboratively optimize the model. This process ensures that raw data remains local, and the final iterative output is a vertical domain model, which is the core foundation of the ecosystem's intelligent capabilities.

### 5.5.3 Aevir Foundational Model: D-moe Architecture Model

The **D-moe architecture model** is Aevir's general foundational model, serving as the default training task for all network nodes. It adopts a Federated Learning architecture, utilizing the idle computing power of nodes to train on local Questopic knowledge. By continuously aggregating distributed model gradients, the D-moe architecture model can internalize the network's scattered structured knowledge into model parameters in real-time, thereby building a dynamically updated general model that covers all ecosystem knowledge.

- **Default Training Mechanism:** The D-moe architecture model adopts a unique “filling-in” federated training strategy. In the Aevir network, when an Intelligent Contributor Node is not assigned a specific vertical domain model training task, its computing power resources are not left idle but automatically switch to the default D-moe architecture model training protocol. This mechanism ensures that the network's computing power utilization rate is always maintained at a saturated state, transforming every unit of computing power into an increment of intelligence.
- **Knowledge Aggregation Based on Questopic:** The training data for the D-moe architecture model comes directly from the high-quality content verified by consensus in the AEVIR Knowledge Market.
  - a. **Local Learning:** The node downloads the latest copy of the D-moe architecture model global model and calls upon the high-quality knowledge units (Knowledge Units) belonging to different Questopics, which have been cleaned and are hosted on the node, as the training set.
  - b. **Federated Evolution:** The node performs fine-tuning training on the D-moe architecture model locally, extracts knowledge features, and generates model gradients, without revealing the raw data.
  - c. **Global Intelligence Emergence:** The gradients uploaded by thousands of nodes are securely aggregated, allowing the D-moe architecture model to absorb all cross-domain knowledge generated within the entire ecosystem in real-time.

### 5.5.4 Developer Ecosystem

Developers can integrate various external tools (such as APIs, data sources) and other models into the vertical domain models provided by the ecosystem, or perform secondary development, thereby building diverse and functional Agents and decentralized applications (dApps) for different application scenarios.

## 5.5.5 Agent Economy

This is the application and value flow layer for the ecosystem's intelligent outcomes. Its design includes aspects such as Personal Intent Agents, intelligent assetization, composability, and collaboration.

- **Agent Market:** A decentralized market for developers to publish and users to call various Agents.
  - **Personal Intent Agent:** Users can train a personalized Agent exclusively for themselves on their personal devices, based on the “Intent Vector” extracted from their digital behavior. The process ensures data privacy and control.
  - **Knowledge NFT Protocol:** A standard protocol for encapsulating AI models and Agents as on-chain assets (NFTs).
  - **Composability & Collaboration:** Agents within the protocol are designed as standardized, callable modules. When multiple Agents collaborate to complete a complex task, the AUV fees paid by the user are automatically distributed to the owners of every participating Agent via smart contracts, based on their contribution, forming an automated value distribution network.
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# Chapter 6: Dual-Token Economic Model: AEV and AUV

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## 6.1 Necessity of the Dual-Token Model

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A single-token model often faces a dilemma in complex economies: it must serve as both a store of value (requiring a stable price increase) and a medium of exchange (requiring a relatively stable price). These two demands are inherently contradictory. Aevir’s dual-token model aims to decouple these two demands:

- **AEV:** The network’s equity token, representing ownership and governance rights, capturing the protocol’s long-term value.

- **AUV:** The utility token within the ecosystem, used for transactions and payments, driving high-frequency economic activities within the ecosystem.

## 6.2 AEV Details

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- **Total Supply Cap:** 1 billion tokens.
- **Core Functions:**
  - a. **Network Fuel:** As the native token, it is used to pay network transaction fees (Gas).
  - b. **Network Security Staking:** Intelligent Contributors must stake AEV to ensure network security.
  - c. **Governance Rights:** Locking AEV grants veAEV, allowing participation in network governance.
  - d. **AUV Minting:** Users can mint the ecosystem utility token AUV by staking AEV.
  - e. **Value Capture:** Block rewards are distributed in AEV; a portion of network transaction fees and Agent Market revenue will be used to repurchase and destroy AEV, forming a deflationary mechanism.
- **Supply Mechanism:** Adheres to the **100% Fair Launch** principle, with no private sale or team reserve. The vast majority of tokens will be linearly released to network contributors over a long period through the PoIC consensus mechanism.

## 6.3 AUV Details

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- **Utility:** The utility token of the Aevir ecosystem, designed to drive internal economic activities. All high-frequency interactions within the ecosystem, such as initiating topics in the Knowledge Market, participating in topics and evaluations, and calling Agents and model services, require the consumption of AUV. It is also the medium for distributing creator rewards and Agent owner revenue, and the primary pricing and trading unit for AI assets like Agent NFTs.
- **Supply and Destruction:** Users obtain veAEV by staking AEV, and mint AUV by holding veAEV; this is the sole source of supply. All AUV consumed in ecosystem activities will be permanently destroyed.

- **Price Stabilization Mechanism:** When the ecosystem is prosperous, and the consumption (destruction) of AUV is greater than the output (minting), its value tends to rise, incentivizing more people to stake AEV; conversely, the value tends to fall, reducing supply. The DAO can also adjust the base minting rate through governance to maintain economic balance.

## 6.4 AUV Consumption Scenarios and Flow

Scenario	Description	AUV Flow
<b>Initiate Questopic</b>	User initiates a new topic in the Knowledge Market.	100% Burn
<b>Initiate Bounty</b>	User adds an AUV bounty to a specific topic to attract high-quality answers.	80% enters the topic's reward pool, 20% Burn
<b>Publish Answer</b>	User submits an answer, serving as a cost to prevent spam.	100% Burn
<b>Content Promotion</b>	Knowledge Contributor consumes AUV to purchase higher exposure for their content.	100% Burn
<b>Call Agent</b>	User calls a Personal Intent Agent or a professional Agent to complete a task.	Paid to Agent owners (users or developers) and protocol commission
<b>Mint Agent NFT</b>	Protocol fee paid when a user or developer mints a trained Agent as an NFT.	100% Burn
<b>Create Sub-DAO</b>	Community members initiate a proposal to create a new professional domain Sub-DAO.	Enters the main DAO treasury, used to support the launch and operation of the Sub-DAO
<b>Governance Challenge</b>	User challenges an approved governance proposal, requiring AUV staking.	If the challenge fails, the staked AUV is burned
<b>Mint Reputation Credential</b>	User can mint an SBT (Soulbound Token) as a credential after reaching a specific reputation level.	100% Burn

## 6.5 Value Flywheel

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This economic model is designed to drive a perpetual **Value Loop**, forming a powerful **Value Flywheel**:

1. **High-Quality Knowledge Contribution:** The AEVIR Knowledge Market incentivizes users to contribute high-quality knowledge, which becomes the pure data source for AI model training.
2. **PolC Incentive:** Intelligent Contributors (ICN/KCN) receive AEV rewards through the PolC mechanism.
3. **AEV Staking:** Contributors who receive AEV stake AEV to gain governance rights (veAEV) and the right to mint AUV.
4. **AUV Minting/Consumption:** AUV is minted as a utility token and consumed and destroyed by high-frequency activities within the ecosystem (e.g., Agent calls, Knowledge Market interactions).
5. **Agent Economy/Model Training:** The consumption of AUV drives the Agent economy and distributed model training, generating more intelligent outcomes.
6. **Value Recirculation:** The destruction of AUV and the repurchase mechanism of AEV recirculate ecosystem value to AEV holders, further incentivizing AEV staking and the long-term security of the network.

This flywheel ensures that the network's growth is self-reinforcing, sustainable, and that value distribution is closely tied to actual contribution.

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# Chapter 7: Roadmap and Community Governance

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## 7.1 Roadmap

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### Phase I: Genesis and Infrastructure (Completed)

- **Core Protocol:** PoIC consensus mechanism design and mathematical model verification.
- **Base Layer:** Aevir blockchain genesis block generation, core node network setup.
- **Economic Model:** AEV/AUV dual-token model design and smart contract deployment.
- **Community:** Core developer community recruitment and seed user testing.

### Phase II: Knowledge and Training (In Progress)

- **Knowledge Market:** AEVIR Knowledge Market V1 launch, enabling Questopic initiation, content contribution, and reputation-weighted voting.
- **Distributed Training:** Federated Learning Engine V1 deployment, supporting foundational training for the D-moe architecture model.
- **Hardware:** Aevir Standardized Hardware (ASH) benchmark release, ICN node recruitment.
- **Governance:** AevirDAO V1 launch, enabling on-chain voting for core parameters.

### Phase III: Intelligence and Application (Future)

- **Intent Layer:** Personal Intent Agent V1 launch, supporting user local data to extract intent vectors.
- **Agent Economy:** Agent Application Market V1 launch, supporting Agent minting, trading, and calling.
- **Technical Upgrade:** PoIC V2 upgrade, introducing zk-SNARKs verifiable computation (Roadmap).

- **Cross-Chain:** Native support for LayerZero/IBC protocols, enabling cross-chain interoperability for assets and data.

## 7.2 Community Governance

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Aevir is a community-driven decentralized protocol.

- **Governance Token: veAEV (Vote-Escrowed AEV).** Users obtain veAEV by locking AEV, and the weight of veAEV is directly proportional to the locked amount and the lock-up duration.
- **Governance Scope:** Includes but is not limited to adjusting the weight parameters ( $w_t, w_l, \alpha$ ) in the PoIC formula, adjusting the block reward distribution ratio, protocol upgrade proposals, and the introduction of new functional modules.
- **Governance Process:** Proposal Initiation -> Community Discussion -> veAEV Holder Voting -> Smart Contract Automatic Execution.

AevirDAO is committed to building a transparent, efficient, and fair governance system, ensuring that the protocol's evolution direction always aligns with the maximum benefit of collective intelligence.

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## Disclaimer

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This whitepaper is intended to provide an overview of the vision, design philosophy, and technical architecture of the Aevir protocol. It does not constitute any form of investment advice, or an offer or invitation to buy or sell any securities or tokens.

- **Technical Risks:** Blockchain and artificial intelligence technologies are still in their early stages of development, with unknown technical risks and challenges.
- **Regulatory Risks:** The global regulatory environment for cryptocurrencies and decentralized technologies is uncertain and may change in the future.
- **Economic Risks:** The value of AEV and AUV tokens may fluctuate, and losses may be incurred.

All readers should conduct their own due diligence and make any investment decisions after consulting with professional advisors. The Aevir team assumes no responsibility for any losses incurred due to reliance on the information in this whitepaper.