TEA PROJECT

TRUSTED EXECUTION & ATTESTATION

Elevating Decentralized Trusted
Computing to a **T**

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Executive Summary

What we do:

- Decentralized cloud computing platform
- Host rich, yet fully decentralized apps
- 2-layer Web3 tech stack
- Trusted computation environment

Why we're doing it:

- Existing blockchains are decentralized but slow
- Cloud computing is centralized and unreliable
- Traditional dApps still require a host and aren't truly decentralized

How we do it:

- Root of Trust - hardware, blockchain, and proof of time
- Dual token system - utility token and NFT
- Bonding curve for app tokens

Who are the players:

- Miners - mining, hosting, investing
- Developers - app development, investing
- Curators/investors - investing

Problems with existing blockchains and cloud computing

Traditional blockchains are slow...

Existing blockchains are decentralized but slow, which prevents applications from running at the speed of traditional cloud computing apps.

... and aren't fully decentralized

While dApps are built on the blockchain, many still require a host. They share the fundamental weakness that cloud computing apps have: centralization.

Cloud Computing? Still centralized and untrustable.

The cloud computing business model relies on monetizing user data; even though basic data security is in question, private data is held by tech giants who also have the ability to censor web users.

The TEA Project Combines the Best of Blockchain & Cloud Computing
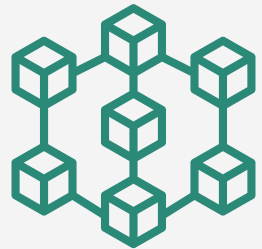
Traditional Blockchain

- Decentralized but slow
- Consensus required because of Byzantine fault tolerance (BFT)

Cloud Computing

- Centralized.
- Can run rich apps/possibly censored
- Potential privacy breaches

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+ Rich Application

+ Decentralization

- Decentralized
- **Rich UX dApps run on layer-2 non-BFT consensus; layer-1 blockchain handles BFT**
- Runs rich apps at full speed + no censorship
- Privacy protected by TPM chip

OUR SOLUTION

TEA Project: A two-layer Web3 tech stack and token ecosystem.

A Decentralized Cloud

A decentralized trusted cloud computing DAO where miners run the nodes.

2-Layer Web3 Tech Stack

A 2-layer tech stack combining blockchain with the ability to let individual miners host rich UX dApps. While traditional cloud apps achieve speed at the high cost of centralization, TEA Project's TApps run full speed while still remaining decentralized.

## Trusted Computation Environment

A trusted and secure computation environment that protects privacy and is censorship-resistant.

The TEA Project's Two Layer Setup

Layer 2

- Layer2 nodes (CML* nodes) only trust other CML with certificates issued by layer1. This allows them to ignore Byzantine faults and reach cloud computing performance and scale.
- Programming logic and data are secured inside hardware protected enclaves.

  *CML is an NFT in the TEA network. A TEA mining node can only be activated by associating a CML with it.

Scalability ✓

The Blockchain Trilemma

Security

Decentralization ✓
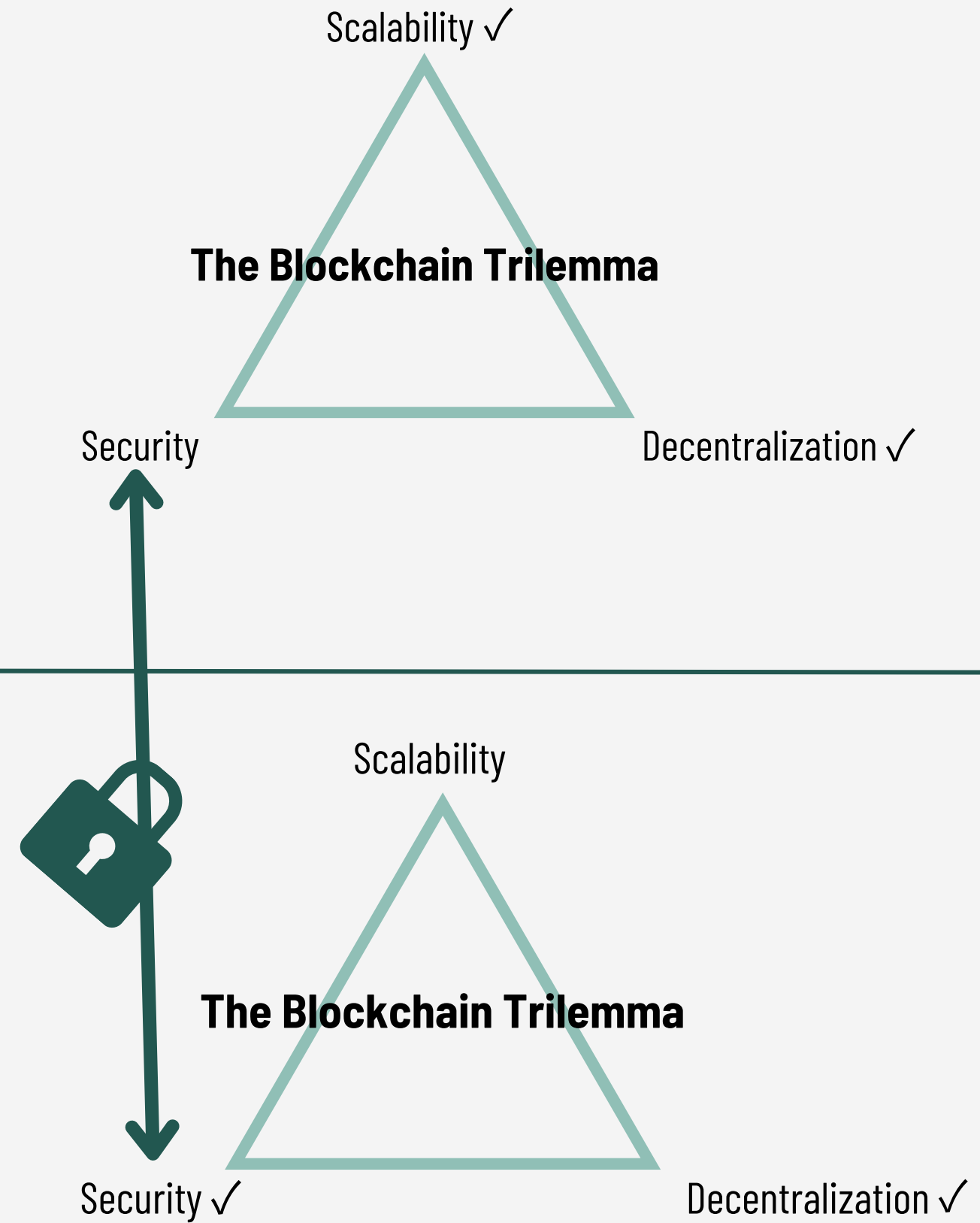
Layer 1

- Layer1 nodes don't run application logic. They deal with Byzantine fault and issue certificates to layer 2 CMLs that pass validation through remote attestation.
- Consensus on the verification result from Layer 2.
- Manages TEA token economy.
- Verifies blocks using Polkadot PoA for consensus.

Scalability

The Blockchain Trilemma

Security ✓

Decentralization ✓

The Benefits of the TEA Project's Two Layer Setup

Layer-2 dApps run full speed

The best consensus is no consensus. There's no consensus on layer-2 so that dApps can execute at full cloud speeds on this layer.

There's no "roll-up" function

Both chains together enable cloud speeds with trustable decentralization. But they're separate, and our layer-2 doesn't roll-up txs to be confirmed by the layer-1.


TEA's Layer-1 can migrate to a parachain   Polkadot.

TEA Project's layer-1 is built on substrate and can migrate to a parachain slot. Other DOT parachains can offload computing tasks to us at reduced cost with increased efficiency.

Security: The TEA Project's Root of Trust (RoT)

In traditional blockchain...

- There is two RoT (Root of Trust), consensus and cryptography.
- dApps run on the blockchain directly (layer-1)
  - Not possible to get scalability while maintaining decentralization and security.
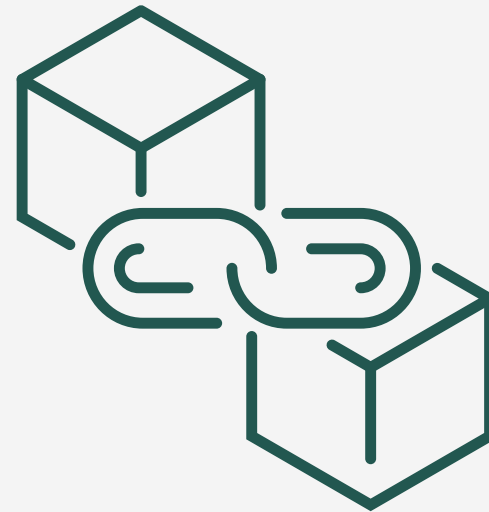
The TEA Project

- Three RoT:hardware, blockchain, and time.
- dApps run inside hardware protected enclaves on layer-2. No humans (including the app developer and the miners) can have any control of the apps nor can they extract any data from the running enclaves.
- Applications run on layer2 (CML nodes) without any knowledge about blockchain and consensus, as if it were running on cloud computing. These apps run decentralized by virtue of TEA Project's 2-layer blockchain design.

Three-tier Architecture for App Developers

1. Presentation

- Static compiled SPA (Single Page Application for web) or mobile client stored on IPFS with a unique CID as identifier.
- Because IPFS is completely decentralized storage, that's all that's needed for the front-end to be decentralized
- As long as there's a CID, the front-end code can always be loaded. And since there's no web server, even a domain name is no longer needed.

2. Application

- Compiled into WebAssembly (WASM) modules hosted in any mining node's hardware enclave
- Many programming languages are easily compiled into WASM which reduces app dev time
- Nobody (including the devs and miners) has any control of the apps nor can extract any data from the running enclaves.

3. Data

- Two types of data
  - A CRDT database for eventually-consistent data
  - A distributed state machine for strong-consistency data
    - GPS satellites provide accurate time under the watch of trusted TPM chips and are used as the basis for the final ranking of all replicas. Since time is stable in our universe, it follows that each replica can achieve strong consistency through trusted time data.
- The TEA Project's state machine functions just like a decentralized database that developers can use in their apps.

Handling Bad Actors

- No one knows if any one node will be running a valuable task.
- The constant remote attestation, phishing tasks, & token economy governance saddles Byzantine faulting with a high opportunity cost.
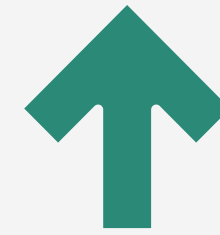
Increasing Cost of Attacks

- Verified randomness
- Distributed computing
- Hardware protection
- Cost of hardware life-cycle
- Diversity in tech stack
- Blockchain-based penalty and incentive

Decreasing Payouts of Successful Attacks

- Decentralized storage
- Partial data
- Phishing tasks

Hardware Support

The roadmap for supporting various Root of Trust (RoT) verification chains depends on the underlying hardware

Architecture	TEA Support	Technology + RoT Verification	Cloud IaaS for Rent?
Amazon Nitro	Completed	• Similar to TPM • Centralized cloud	✓
Raspberry Pi w. GPS & TPM	On roadmap	• TPM-Based • Decentralized	✗
3rd-Party Hardware Provider	On roadmap	• Partnership w. mining hardware manufacturers • Allows dual-mining related projects (HNT & FIL)	✗

TEA Project Versus Competitors

	How Devs Onboard	Layer-1	Miners	Decentralization
TEA Project	Easy onboarding using same 3-tier architecture	Runs as middleware layer to other chains (e.g. parachain)	Requirements (TPM / GPS) within reach of ordinary consumers	Openness to programming languages / diversity of miners
Competitor #1	New language + persistent memory (instead of databases)	Everything happens on its layer-1	Needs special hardware / RAM (2TB / 4TB)	Centralized through • miner infrastructure • Programming language
Competitor #2	Easy Docker deployment	Some partnerships (Polygon / Solana)	Unused datacenter capacity / consumers can deploy as Kubernetes clusters	Privacy of app data is up to the datacenter providers. Can't enforce that datacenter won't steal app data.

Two Tokens of the TEA Project

TEA

- Utility token used as gas.
- TEA is used by consumers to interact with TApps.
- 100 million pre-mined + block rewards for miners.
- Burnt by DAO when CML seeds are bought at auction.

NFT: Camellia (CML)

- A TEA mining node can only be activated by associating a Camellia NFT with it. CML functions as a mining license and credit record.
- Miners buy new Camellia seeds through open bidding and burning TEA.
- 10 000 CML limit.
- Camellia seeds are unique NFTs. They each have varying defrost times, life spans, and productivity determined via an algorithm.

How tokens are used

Miners

At the very beginning, miners buy CML to start mining to earn TEA.

Presale Investors

Presale investors can use TEA to stake to miners and earn TEA revenue from their mining.

dApps

When dApps are deployed, clients buy TEA to purchase computing services (dApps). Miners earn the TEA from the clients and share the revenue with their stakeholders.

DAO Burns TEA
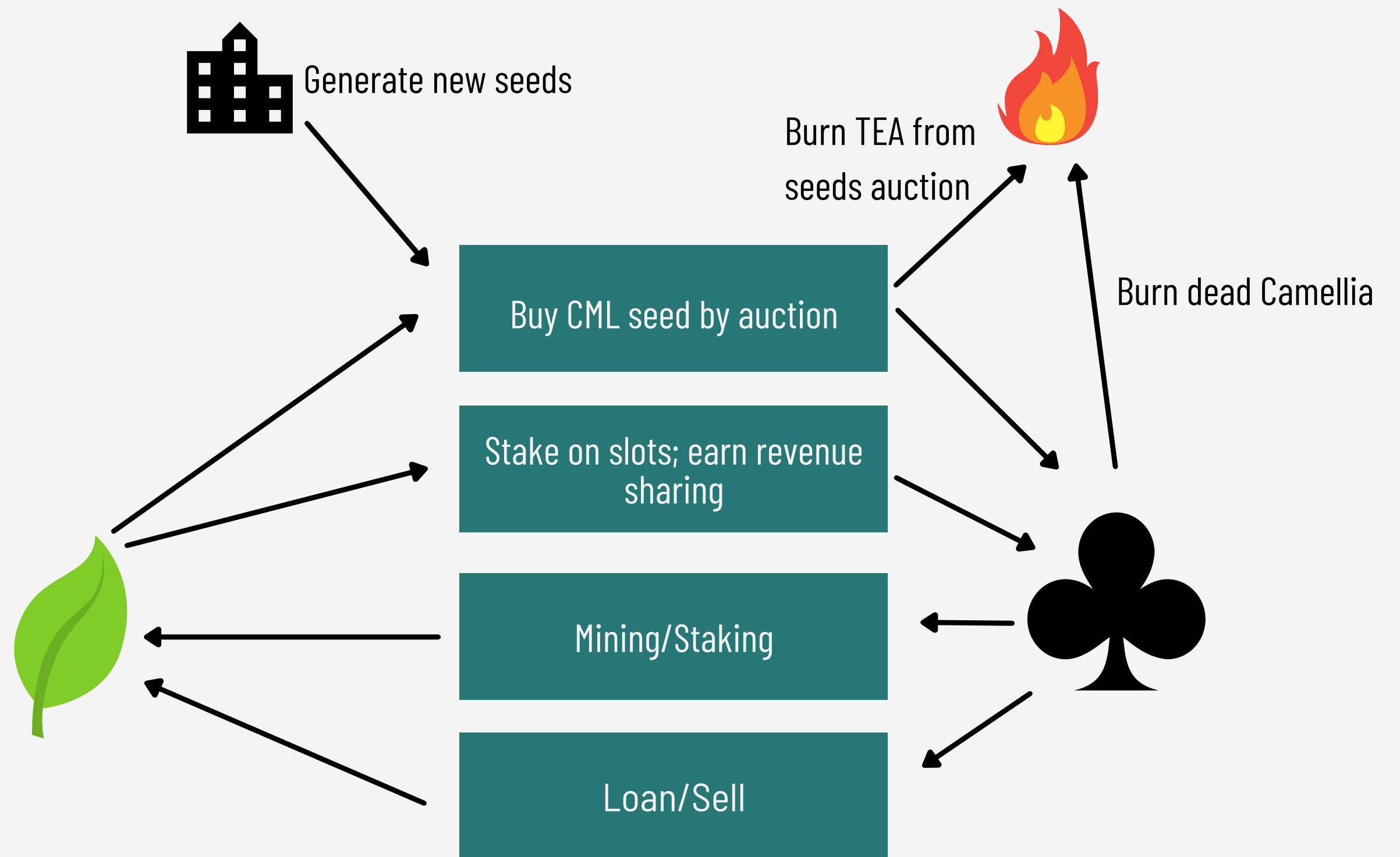
New miners joining the TEA network & bid for new CML seeds necessary for mining. The DAO burns the received TEA payment from the winning bidder.
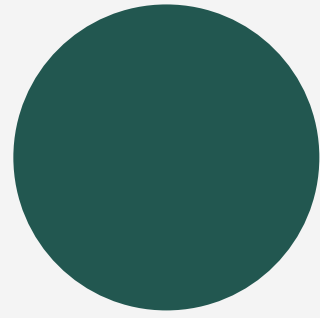
DAO Ensures CML Scarcity

The DAO generates seeds based on auction prices and maintains a reasonable scarcity of CML.
Each CML seed has a limited lifetime which adds to its scarcity.

CML Life Cycle

Generate new seeds

Burn TEA from seeds auction

Burn dead Camellia

Buy CML seed by auction

Stake on slots; earn revenue sharing

Mining/Staking

Loan/Sell

Early Stage Miner Economy: FOMO & Scarcity

Prior to the maturity of the TEA Project's Web3 Rich dApps ecosystem, a mining economy is necessary to keep the TEA economy running.

Code monitors how busy/idle the miners are on the network. New CML are issued & put up for auction if miner utilization passes a set threshold to put some slack back into the system. Additionally, TEA's carefully designed token economy creates NFT scarcity during mining. The scarcity encourages miners to reinvest their harvest back into CML instead of selling. Miners are of course free to host whatever TApps they wish with free market principles guiding them towards hosting TApps that are popular and able to reward miners.

TEA doesn't require a GPU, ASIC or a hard drive. It only requires the Camellia NFT and cheap secure hardware such as an RPi with a GPS module and a TPM chip. The TEA Project will offer a TEA Box Raspberry Pi mining machine in the future complete with TPM chip, GPS module, and preinstalled with a CML seed necessary for mining.

Bonding Curve Token Sales for TApps

Decentralized apps on the TEA Project are called TApps.
TApp developers can issue TApp tokens on a bonding curve.

Investors can back a TApp by purchasing the TApp's tokens on its bonding curve. Early adopters are rewarded for their investment as their TApp token price increases when more people buy the project's token on its bonding curve.

As early investors benefit from more investors buying into the TApp token, many will advertise on their social media profiles to attract others. These various bonding curve projects act as another method of onboarding new users into the TEA ecosystem.

The 3-Phase Rollout

Phase 1:
Miners

- The TEA Project aims to build a healthy ecosystem by starting with the miners.
- Miners plant CML into their mining machines and harvest TEA tokens from hardware mining.
- Mining machines host Web3 applications and are rewarded in TEA tokens based on the app's consumed computing resources.
- Miners can burn TEA to buy more CML.
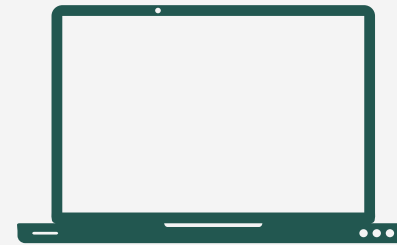
Phase 2:
Developers

- Focus shifts to onboarding developers, including tech education & outreach on how to build on the TEA ecosystem.
- Hackathons / grant program released and SDK available.
- Build apps using the TEA dev framework (similar 3-tier architecture to existing cloud applications, but without a host).
- Devs apps listed in TApp store and hosted by miners.
- App revenue goes directly to a bonding curve shared by app developers, hosting miners, and investors.

Phase 3:
Consumers

- Consumer outreach phase: now that rich TApps are available in the TApp store, the TApps are marketed to consumers.
- Positive feedback loop: more consumers enter ecosystem -> devs can see what apps consumers want -> devs focus on making TApps that meet consumer demand -> popular TApps financially reward both miners and developers.

TEA Project Makes Trustable Decentralized Edge Computing Possible

Accessibility

Every family can have a TEA box in their home
(i.e. integrated in their router)

- Code comes to the data.
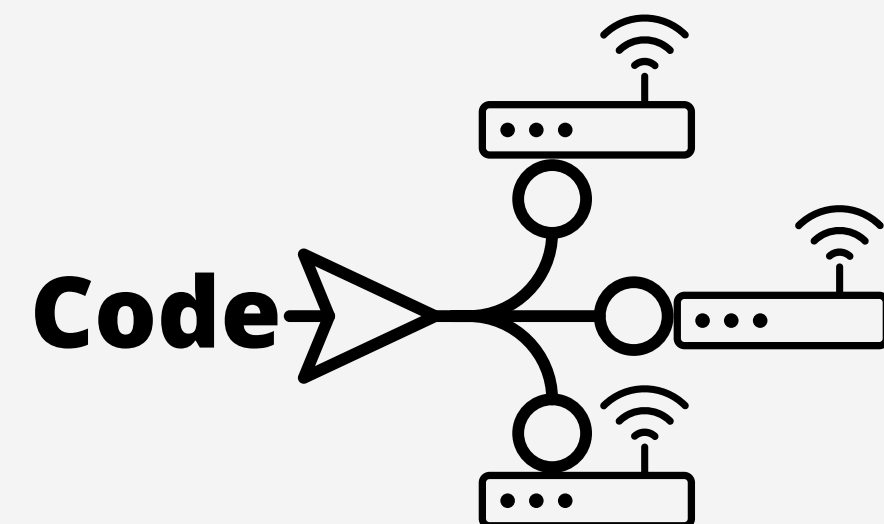- The TEA box allows families to keep their private data safe while interacting with apps.

Innovation

If we can integrate TEA modules in decentralized edge nodes, then we open up a new distributed computing infrastructure

- Data can remain on these distributed devices and the code is sent to the data
- The data and code meet together and are computed not at the data center but where the data is stored.

Milestones

2019
- TEA Project starts in 2019
- Self funded until 2021

2020
- First milestone in Nov 2020: Released the AI image recognition demo running on simulator

2021 Q2
- Second milestone ongoing in 2021
- Gluon wallet
- Web3 Foundation Open Grant
- Migrating TEA runtime to Amazon Nitro
- Seed round secured including investment from Hashkey

2021 Q3
- Preview 1 version launch
- Begin Go2Market strategy starting with miners' economy
- Testnet starts

2021 Q4
- Public mining in preview mode
- Rich dApps running on network

2022 Q1
- Testnet mining up to epoch 9
- TEA Party dApp released

2022 Q2
- Mainnet starts
- TEA <-> ETH bridge operational
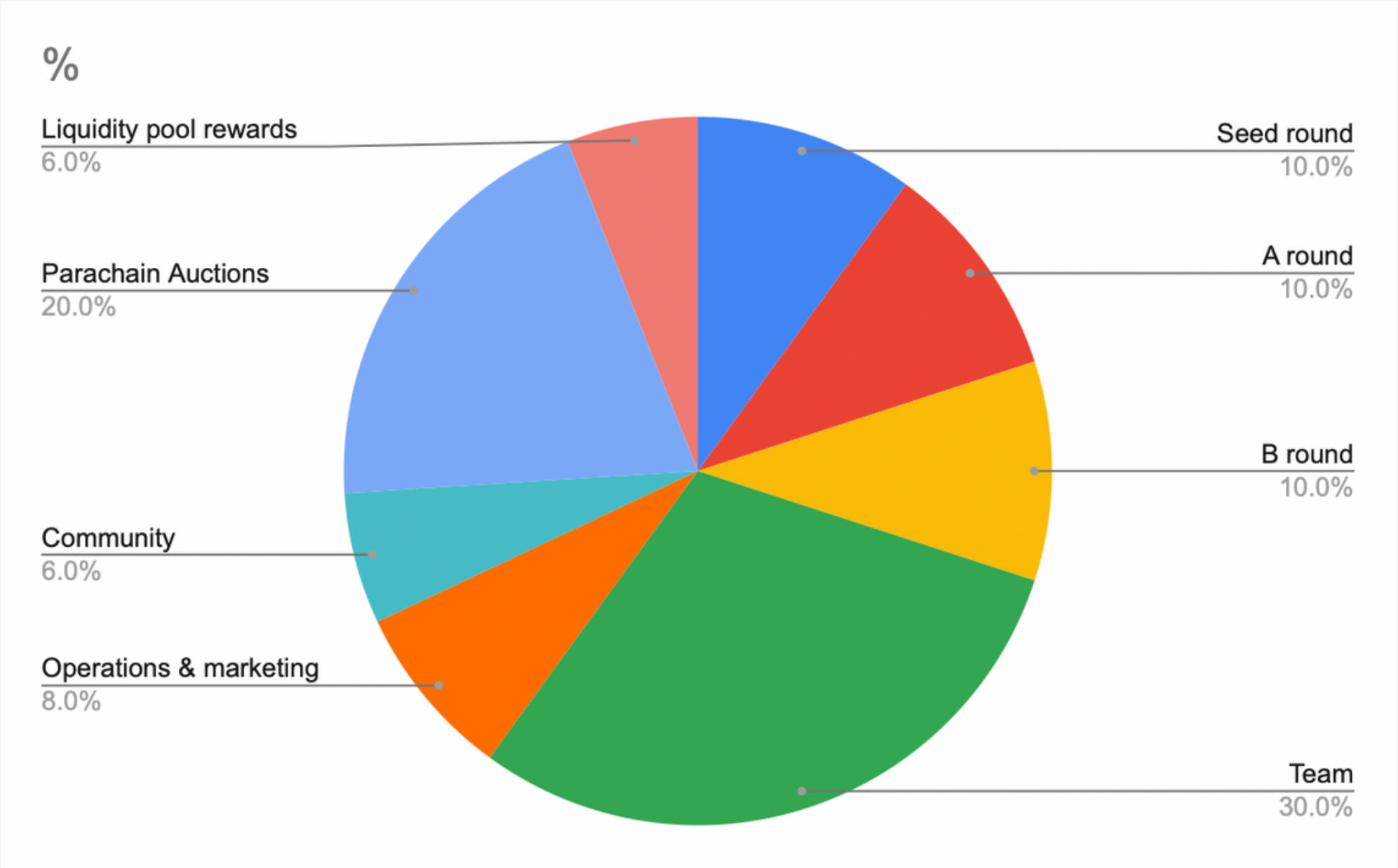- Layer-1 Cumulus code integration in preparation for parachain auction

FUNDING ROUNDS

Seed round: $1 million investment with $10 million valuation

Next round goal: $5 million investment with $50 million valuation

TEA TOKEN ALLOCATION
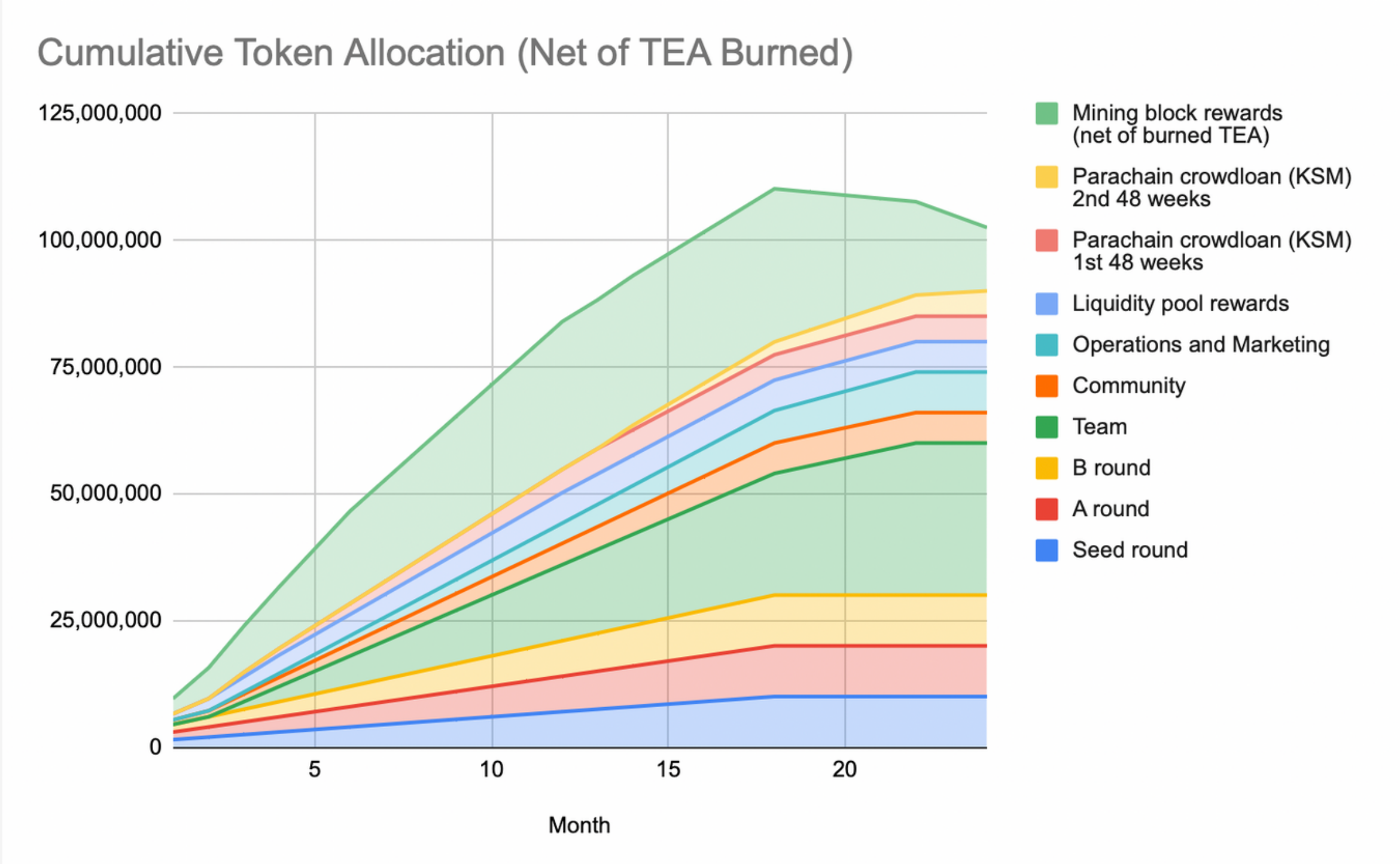
Allocations	%	Total TEA
Seed round	10%	10M
A round	10%	10M
B round	10%	10M
Team	30%	30M
Operations & marketing	8%	8M
Community	6%	6M
Parachain Auctions	20%	20M
Liquidity pool rewards	6%	6M
Total	100%	100 Million

Vesting schedules	Immediate unlock	Vesting
Seed, A, B rounds	10%	5% per month for 18 months
Team & Community	0%	2 month lockup 5% per month for 20 months
Parachain auctions	10%	linear vesting for length of slot lease

%

Liquidity pool rewards 6.0%

Parachain Auctions 20.0%

Community 6.0%

Operations & marketing 8.0%

Seed round 10.0%

A round 10.0%

B round 10.0%

Team 30.0%

TEA TOTAL SUPPLY AFTER 2 YEARS (NET OF BURNED TEA)

	TEA (2 Years)
Total allocated TEA supply	90,000,000
Public service (mining rewards) TEA	46,724,731
Total unlocked TEA supply	136,724,731
Total CML sold after 2 years (forecast)	6,200
Average CML price (forecast)	5,500
TEA burnt for CML after 2 years (forecast)	34,200,000
Total unlocked supply after 2 years	102,524,731

Cumulative Token Allocation (Net of TEA Burned)

Legend:
- Mining block rewards (net of burned TEA)
- Parachain crowdloan (KSM) 2nd 48 weeks
- Parachain crowdloan (KSM) 1st 48 weeks
- Liquidity pool rewards
- Operations and Marketing
- Community
- Team
- B round
- A round
- Seed round

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Run rich dApps on the blockchain at cloud speeds by leveraging silicon security and time.