

# Decentralized Governance

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**MAX PLANCK INSTITUTE**  
FOR SOFTWARE SYSTEMS

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# Who Am I?



## Computer Scientist

- Bachelor (UFOP), Master (UFMG), and PhD (MPI-SWS) in Computer Science



## Vast academic experience

- UFOP, UFMG, ELTE, MPI-SWS, and good publication record.



## Vast industrial experience

- Kunumi, Chainlink Labs, Matter Labs



## Taught and organized classes and seminars

- EEDS, UFOP, UFMG, UdS/MPI-SWS, received award nominations.

## Socially disruptive technologies



### Social Computing

- Vast topics of interest, publications.



### Machine Learning

- Most innovative ML health software in Brazil by IT Forum 365, promoted by PwC and ITMidia.



### Decentralized technologies

- Vast topics of interests, talks, papers.

## Research interests

# Decentralized Technologies – Blockchains



## Decentralized Governance 🗂️

- Fairness in Token Delegation: Mitigating Voting Power Concentration in DAOs ([under submission](#))
- **Understanding Blockchain Governance:** Analyzing Decentralized Voting to Amend DeFi Smart Contracts ([under submission](#))
- On the Centralisation of Governance Power in Decentralized Autonomous Organizations ([under submission](#))

## Airdrops 💧

- Airdrops: Giving Money Away Is Harder Than It Seems ([under submission](#))
- Crypto Airdrops and Finance in Digital Cultures: From Speculation to Sociality ([under submission](#))

## Data 📈

- A Public Dataset For the ZKsync Rollup ([FC-CAAW25](#))
- The Writing is on the Wall: Analyzing the Boom of Inscriptions and its Impact on EVM-compatible Blockchains ([FC-CAAW25](#))

## DeFi / MEV 🚗

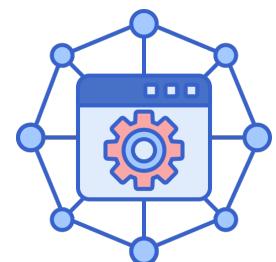
- The Express Lane to Spam and Centralization: An Empirical Analysis of Arbitrum's Timeboost ([under submission](#))
- Liquid Staking Tokens in Automated Market Makers ([Marble 24](#))
- Cross-Rollup MEV: Non-Atomic Arbitrage Across L2 Blockchains ([ArXiv24](#))
- Quantifying Arbitrage in Automated Market Makers: An Empirical Study of Ethereum ZK Rollups ([Marble 24](#))
- Cross-border Exchange of CBDCs using Layer-2 Blockchain ([CfC 24](#))
- Dissecting Bitcoin and Ethereum Transactions: On the Lack of Transaction Contention and Prioritization Transparency in Blockchains ([FC 23](#))
- Selfish & Opaque Transaction Ordering in the Bitcoin Blockchain: The Case for Chain Neutrality ([IMC 21](#))

## ZK 🔒

- Unrolling the Performance of ZK-Rollups through Stochastic Modeling ([IEEE SMC 25](#))

## And more 💎

# What Is a Decentralized Autonomous Organization (DAO)?



## Decentralized Governance

- **Decision-making authority is distributed among members** instead of being concentrated in a central entity.
- **Benefits:** Increased inclusivity, resistance to centralized power abuse, and enhanced resilience.



## Transparency

- Operations, decisions, and treasury **management are recorded on a blockchain, visible to all members** and stakeholders.
- **Benefits:** Builds trust and accountability within the community.



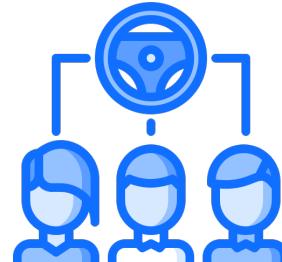
## Smart Contract Automation

- **Rules and operations of the DAO are encoded in smart contracts**, enabling autonomous execution of tasks **without intermediaries**.
- **Benefits:** Efficiency, reliability, and reduced risk of human error.



## Token-Based Membership and Voting

- **Members hold tokens** that represent **voting power** or rights within the DAO. Governance **often** operates **on principles like one-token-one-vote** or quadratic voting.
- **Benefits:** Aligns incentives, fosters active participation, and enables scalable governance.



## Community-Driven Purpose

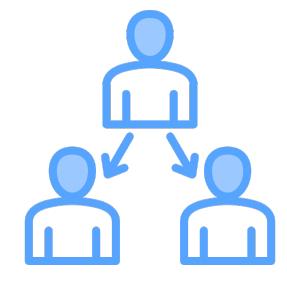
- DAOs are **typically mission-oriented**, focusing on goals such as funding projects, managing decentralized protocols, or creating shared value for members.
- **Benefits:** Engages a global, like-minded community united by a common vision.

# What Are the Key Characteristics?



## Token ownership

- It represents a **stake in the system**, allowing participation in decision-making.



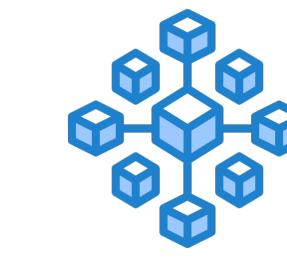
## Token delegation

- It enables holders to transfer **voting power to trusted representatives**, similar to liquid democracy.



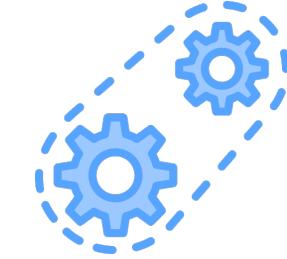
## Who can vote?

- Anyone with governance **(delegated) tokens** can vote on proposals via secure blockchain platforms.



## On-chain vs off-chain voting

- On-chain voting ensures **transparency and immutability**.
- Off-chain voting is **faster** but less transparent.



## Most typical voting systems

- Majority voting and quadratic voting.
- Locking tokens.
- Continuous voting.
- Fixed or dynamic quorum.



## DAO Operating Systems



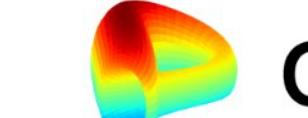
## Investment DAOs



## Collector DAOs



## Protocol DAOs



## Service DAOs



## Media DAOs



# Case Study: Compound and Uniswap



## Characterize governance protocols

- They are **active and regularly used**, with a steady flow of proposals.
- The majority of the **proposals receive significant support**.



## Analysis of token concentration

- A small group of **10 voters holds a significant voting power**.
- Proposals only required** an avg. of 3–5 voters to obtain at least **50% of the votes**.



## Analysis voting cost

- We reveal a **huge variation in voting costs**.
- Voting costs can be unfairly expensive for small token holders**, which has fairness implications for the decision-making process.



## Voting pattern of voters

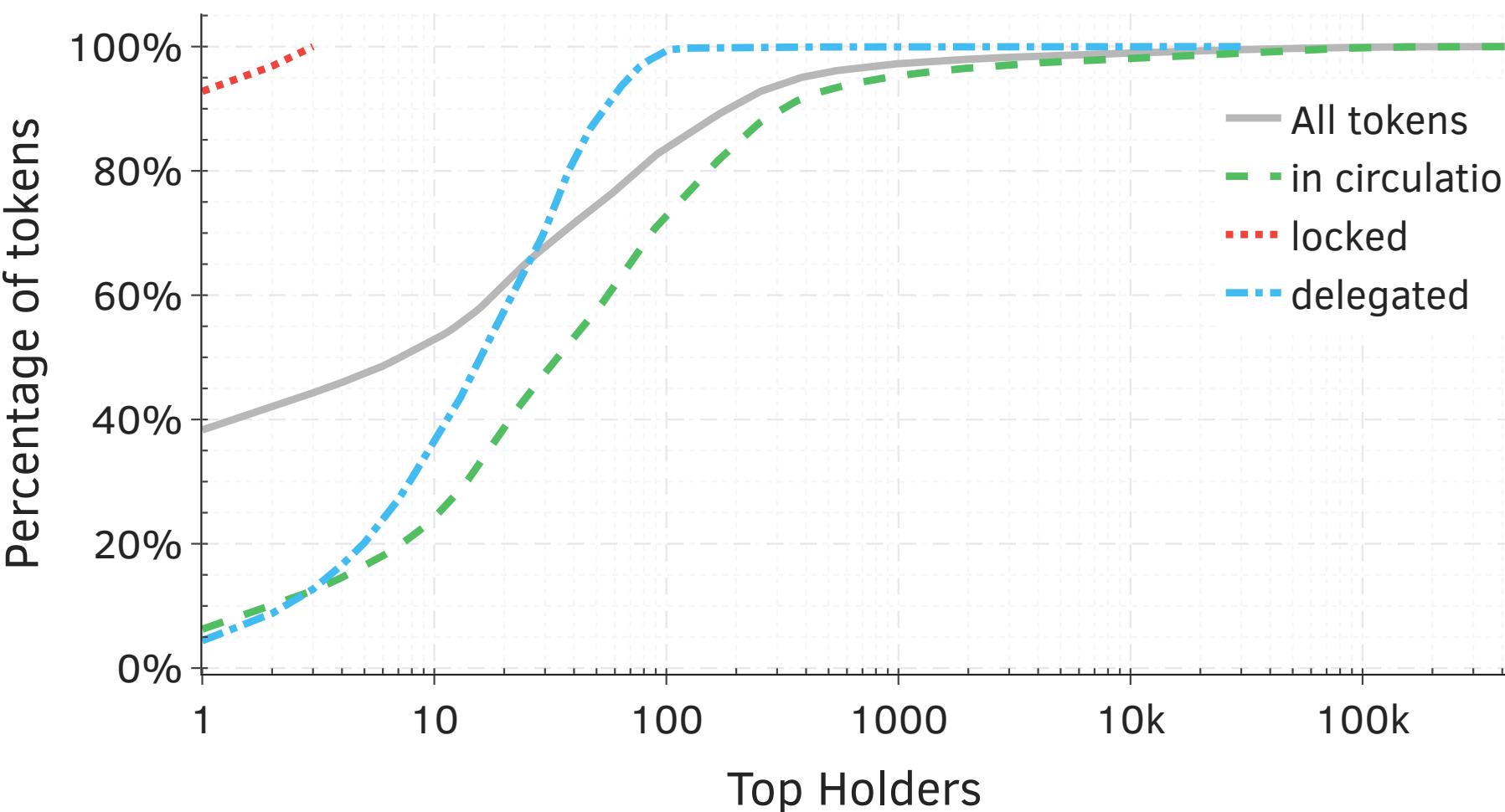
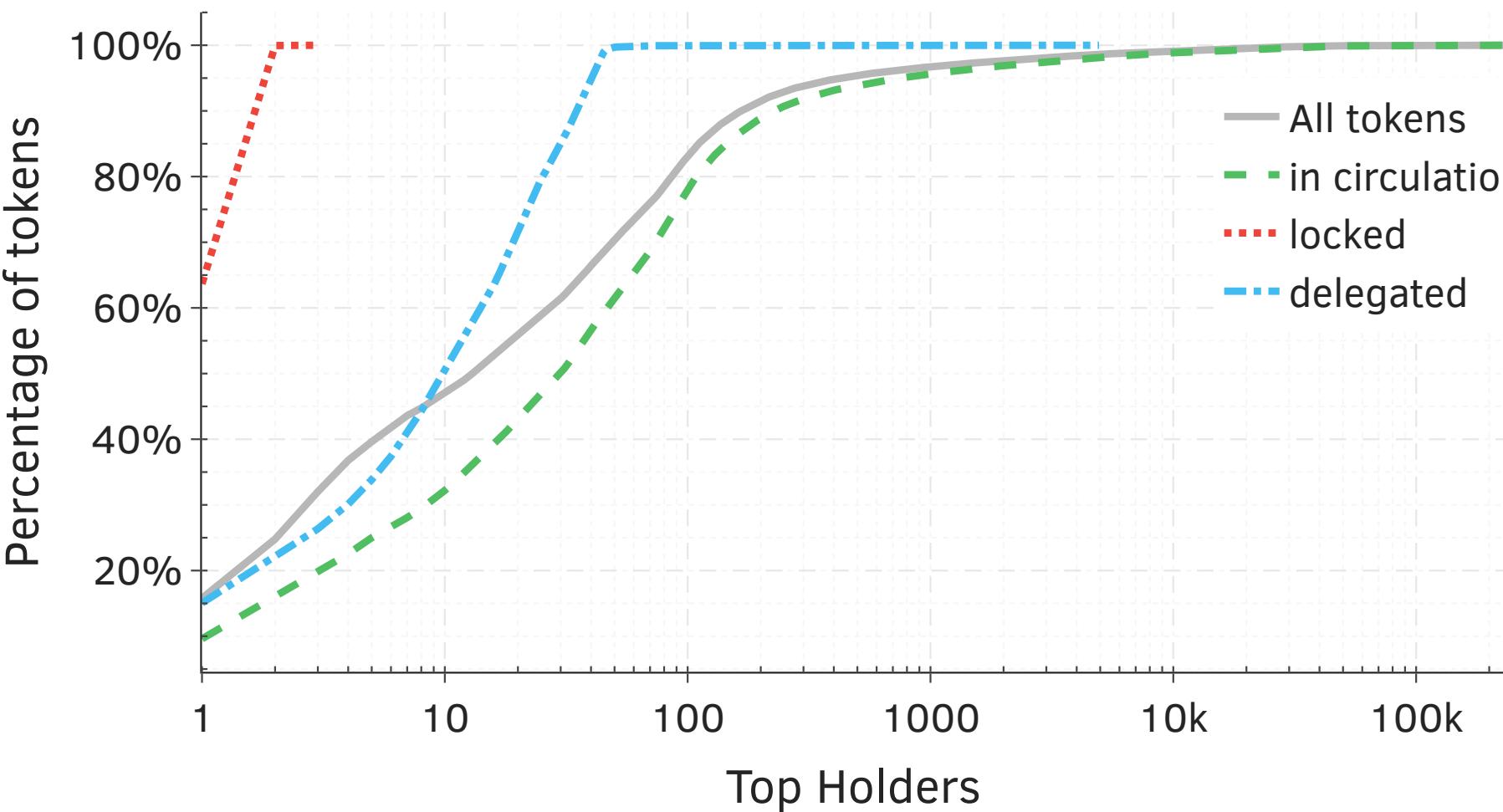
- We discover **potential voting coalitions** among the top voters in **Compound** **UNISWAP**
- This could exacerbate concerns of **voting concentration**.



- It leads to real-world consequences.
- Smaller voices are drowned out.
- Participation might decrease.
- Open doors for vulnerabilities.



# The Problem of Governance Token Concentration



## Users actively vote on proposals

- **88.63% in favor**, on average.

## Voting costs vary significantly

- From \$0.03 to \$294.02, detrimental to small token holders with an **average cost of \$6.82 per vote**.
- **Normalized costs per vote** unit reveal an average of **\$598.97**, posing fairness concerns.

## Voting power is concentrated

- **10 voters holding 50.53% and 35.73% of all tokens for Compound and Uniswap**, respectively.
- On average, **proposals only required 3–5 voters to pass**.

## Powerful voters potentially form coalitions

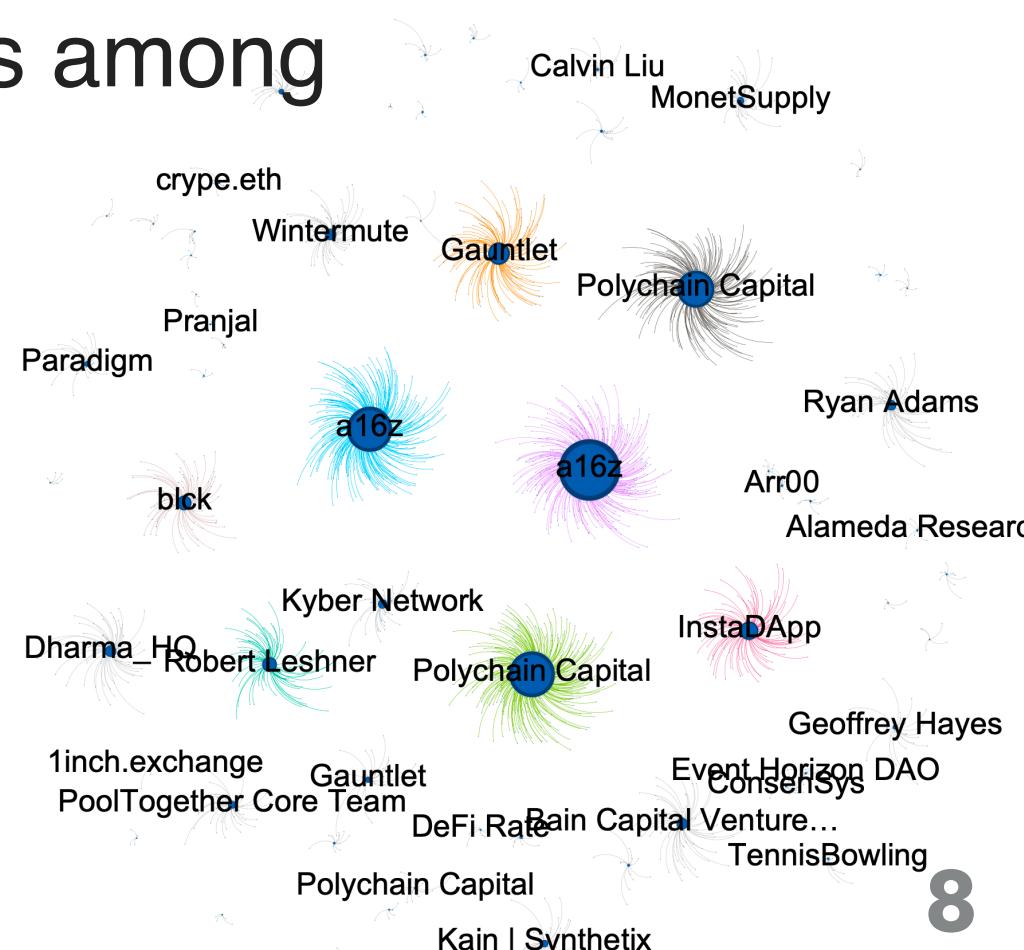
- It raises concerns about **voting concentration**.

Understanding Blockchain Governance: Analyzing Decentralized Voting to Amend DeFi Smart Contracts – [arxiv.org/abs/2305.17655](https://arxiv.org/abs/2305.17655)

# How Does Delegation Typically Work Today?



- **DAO vs. Traditional Elections:** Unlike traditional systems (nationality-based voting power), DAOs require active delegation of voting power (to self or others).
- **Key Question:** **Amongst all participants, who should token holders choose as their delegate?**
- **Platform Influence:** Dashboards displaying DAO information (delegated tokens, voting records) can inadvertently bias choices towards highly-ranked participants.
- **Consequence:** Potential "*rich get richer*" dynamic, concentrating power and undermining decentralization.
- **User Challenge:** Difficult for token holders to identify delegates truly aligned with their interests among numerous options.





# Tally: a Platform Designed To Support DAOs

## Key Features of Tally 🍀

- **Token Launch:** It provides tools for deploying tokens, ensuring scalable distribution and seamless integration with EVM chains.
- **Governance Management:** It enables on-chain proposal creation, voting, and execution. It supports frameworks like OpenZeppelin Governor and offers features such as delegate registration and transparent voting power management.
- **Staking Solutions:** Its staking system allows protocols to distribute fees to token stakers, aligning economic incentives between protocol usage and token holder rewards. It supports features like liquid staking tokens (LSTs) and integrates with restaking protocols.
- **Tally Protocol:** It introduces a liquidity layer for governance tokens, enabling token holders to earn staking rewards while maintaining voting rights.

The screenshot shows the Compound governance interface on the Tally platform. At the top, it displays "Ethereum", "ERC20", and "10,000,000 Supply". The main header is "Compound", with a sub-header: "Compound is an algorithmic, autonomous interest rate protocol built for developers, to unlock a universe of open financial applications." Below this, there are three main statistics: "Delegates 13.68K", "Proposals 398", and "Treasury \$ 8.4M". The "Proposals" section is currently selected, showing a list of recent proposals:

| Proposal                                            | Status            | Value          | Address Count |      |              |
|-----------------------------------------------------|-------------------|----------------|---------------|------|--------------|
| [Gauntlet] - COMP Rewards Recommendations (Part ... | ACTIVE            | May 21st, 2025 | 554.58K       | 0.71 | 27 addresses |
| WOOF! <> Compound 2025                              | PENDING EXECUTION | May 18th, 2025 | 797.21K       | 0    | 798.09K      |
| Initialize cWRONv3 on Ronin                         | EXECUTED          | May 14th, 2025 | 700.94K       | 0    | 700.94K      |
| [Gauntlet] Supply Cap Recommendations (04/28/25)... | EXECUTED          | May 5th, 2025  | 520.07K       | 0    | 520.07K      |
| Initialize cWETHv3 on Unichain                      | EXECUTED          | May 2nd, 2025  | 650.94K       | 0    | 650.94K      |

On the right side, there are sections for "My voting power" (with a "Connect Wallet" button), "Contracts and parameters", and "Notifications".

Used by ★



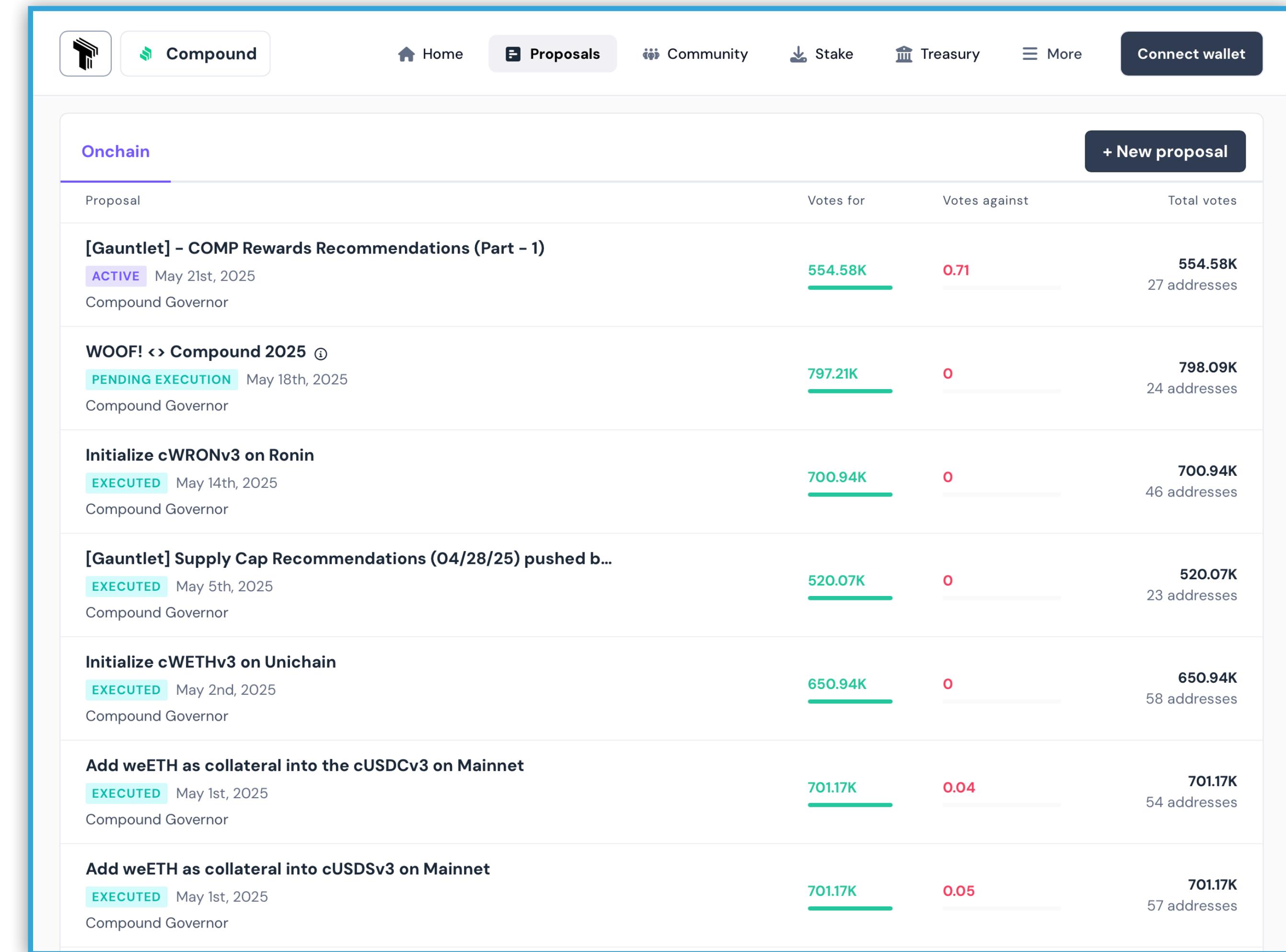
and others...



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Used by ★



UNISWAP

Compound

era

and others...



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Used by



and others...

**Delegates**

| Delegate          | COMP         | Description                                                                                                   |
|-------------------|--------------|---------------------------------------------------------------------------------------------------------------|
| a16z              | 361.02K COMP | No bio provided<br>Trusted by 350 accounts                                                                    |
| bryancolligan     | 198.03K COMP | No bio provided<br>Trusted by 15 accounts                                                                     |
| 0xE95...1318      | 170K COMP    | No bio provided<br>Trusted by 10 accounts                                                                     |
| Geoffrey Hayes    | 101.01K COMP | No bio provided<br>Trusted by 27 accounts                                                                     |
| Event Horizon DAO | 94.46K COMP  | A public-access voter block which onboards new voters and delegates to DAOs by g...                           |
| Gauntlet          | 90.07K COMP  | No bio provided<br>Trusted by 41 accounts                                                                     |
| MonetSupply       | 85K COMP     | delegate, risk analyst @ BA Labs (Block Analitica), defi lending and stablecoin ...<br>Trusted by 41 accounts |
| Arr00             | 80K COMP     | Long time Compound delegate. Creator of Governor Bravo, borrow caps, proposer wh...                           |

**Who are the delegates?**

Delegates create and vote on proposals. Token holders can update their delegate at any time.

[Learn more](#)

**Top Delegates**

| Delegate          | Percentage |
|-------------------|------------|
| a16z              | 3.6%       |
| bryancolligan     | 1.9%       |
| 0xE95...1318      | 1.7%       |
| Geoffrey Hayes    | 1%         |
| Event Horizon DAO | 0.9%       |

**Details**

| Statistic                  | Value |
|----------------------------|-------|
| Total Supply               | 10M   |
| Delegated Tokens           | 2.87M |
| Quorum (Compound Governor) | 400K  |



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Used by



and others...

Delegates

al0z

No bio

✓ All Focus Areas

Public Goods

Decentralization

Treasury Management

Working Groups

Grants Programs

Community Outreach

Protocol

361.02K COMP

bryancolligan

198.03K COMP

No bio provided

361.02K COMP

Geoffrey Hayes

101.01K COMP

No bio provided

170K COMP

Event Horizon DAO

94.46K COMP

No bio provided

94.46K COMP

Gauntlet

90.07K COMP

No bio provided

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MonetSupply

85K COMP

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Used by



and others...

Delegates

Sort by: Voting Power

Sort by: Received Delegations

Sort by: Random

Who are the delegates?

Learn more

Top Delegates

Details

| Delegate          | COMP         | Accounts Trusted |
|-------------------|--------------|------------------|
| a16z              | 361.02K COMP | 350 accounts     |
| bryancolligan     | 101.01K COMP | 27 accounts      |
| Geoffrey Hayes    | 170K COMP    | 10 accounts      |
| Event Horizon DAO | 94.46K COMP  | 28 accounts      |
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| Arr00             | 80K COMP     | 14 accounts      |

3.6%  
1.9%  
1.7%  
1%  
0.9%

Total Supply: 10M  
Delegated Tokens: 2.87M  
Quorum (Compound Governor): 400K

# Ranking Order Can Influence User Choices



Google how many pages users look at when searching on Google

All Images Videos Short videos Web Forums News More Tools

AI Overview

Most Google users primarily focus on the first page of search results, with a significant majority (over 91%) not going beyond. While the first page is the most heavily utilized, the second page does see some traffic, though less than the first. It's also important to note that the specific pages users see can vary based on their location, search history, and other factors. [Learn more](#)

Here's a more detailed breakdown:

**First Page Dominance:**  
Over 91% of users don't go past the first page of search results. [Learn more](#)

**Second Page Engagement:**

Show more

It's crucial to be on the first page of the search results. According to one survey, 93.4% of all Google users will only look at the first page when choosing the result that they want to select. A mere 6.6% will continue on and check the results that are on the second page. [29 Mar 2024](#)

contentcustoms.com  
<https://www.contentcustoms.com> · 2024/03/29 · do-user... [Learn more](#)

Do users actually look at the second page of search results?

About featured snippets · Feedback

People also ask :

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What percentage of Google searches go past the first page? [Learn more](#)

How many pages does Google search? [Learn more](#)

What Can We Do About It? 🤔

# A Proactive Solution: Interest-Aligned Delegation Matching



- **Address a critical challenge in DAO governance:** Optimizing delegation matching!
- **Like in traditional democracy:** voters vote for a politician when they have their interests aligned.

## Why not do the same with token delegation in DAOs?

- **Goal:** Provide governance systems with tools to:
  - Users delegate to voters who are better aligned with their interests.
  - Reduce delegation bias.
  - Improve transparency of voting power distribution.
- **Example:** A "*Delegation Advisory*" system, similar to voting advisories in democratic elections.
- **Enhanced Decision-Making:** Lead to more secure, decentralized, and effective DAO governance.

# Roadmap



## Data Acquisition

- On-chain data (Ethereum & other archive nodes).
- Text-based data: Off-chain discussions (Forums, Discord).
- Other relevant data platforms (e.g., Nansen, Messari, Tally).



## Voting Behavior Analysis

- Analyze how voters engage on proposal discussions.
- Extract topics of interest for each voter.
- Publish results in an academic paper.



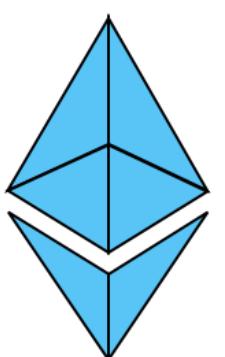
## Implement Delegation Matching Algorithm

- Design and build a MVP of delegation matching system.
- Implement a simulation environment framework to test the system.



## Test and Evaluate

- Deploy the matching algorithm by partnering with delegation platforms / DAO projects.
- Evaluate the performance via A/B testing and/or simulations.



ethereum



ARBITRUM

**OPTIMISM**

zkSync **era** ■



# How can we improve DAOs?



- ▶ What **metrics** can accurately **quantify** the level of decentralization in a DAO?
- ▶ How to provide **incentives for people to vote**?
  - ▶ Can they game the system? If there is a chance they will.
- ▶ How to **avoid/mitigate** voting buying, intimidations, or coercion?
- ▶ How can DAOs achieve **privacy** for their participants **while maintaining** some form of **transparency**?
- ▶ How can DAOs **leverage emerging technologies** (e.g., multi-chain) for better scalability and security?
- ▶ How can we rigorously analyze and **verify** DAO governance models?
  - ▶ How can we **automate testing and experimentation** in DAOs?
- ▶ How can we **design user-friendly interfaces** for DAO participants?

# Contact

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