

# Decentralized Governance

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**MAX PLANCK INSTITUTE**  
FOR SOFTWARE SYSTEMS

[johnnatan-messias.github.io](https://johnnatan-messias.github.io)

# 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

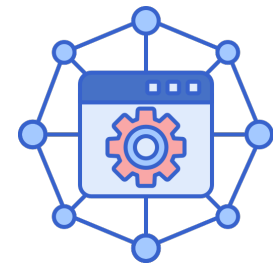
- The Express Lane to Spam and Centralization: An Empirical Analysis of Arbitrum's Timeboost ([under submission](#))
- Liquid Staking Tokens in Automated Market Makers ([Marble 24](#))
- Cross-Rollup MEV: Non-Atomic Arbitrage Across L2 Blockchains ([ArXiv24](#))
- Quantifying Arbitrage in Automated Market 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.

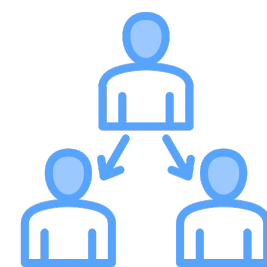


# What Are the Key Characteristics?



## Token ownership

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



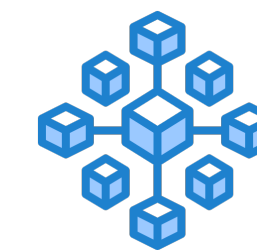
## Token delegation

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



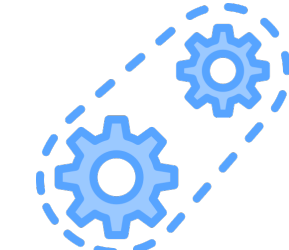
## Who can vote?

- 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

-  ARAGON
-  MolochDAO
-  COLONY
-  Orca Protocol











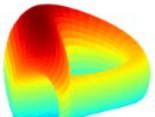






Investment DAOs

-  MetaCartel Ventures
-  theLAO
-  Flamingo
-  GCR
-  Komorebi
-  Duck DAO
-  UdacityFund











Collector DAOs

-  PleasrDAO
-  FlamingoDAO
-  Gremlins
-  FingerprintsDAO
-  BRRDAO
-  herstoryDAO
-  MUSE0DAO
-  Whale

Protocol DAOs

-  MAKER
-  Compound
-  UNISWAP
-  AAVE
-  Yearn
-  SYNTHETIX
-  Index Coop
-  PieDAO
-  LIDO
-  Sushi
-  Curve
-  pool together
-  tornado
-  KeeperDAO
-  Badger
-  hDAO
-  RaribleDAO

Service DAOs

-  RAIP GUILD
-  DXdao
-  PartyDAO
-  MetaFactory
-  Fire Eyes
-  Reverie
-  NeptuneDAO
-  LexDAO
-  MetaverseDAO
-  Llama

Social DAOs

-  FWB
-  Seed Club
-  GITCOIN
-  FiatLuxDAO
-  Metafam
-  KrausHaus
-  Bright Moments
-  SquiggleDAO
-  ProsperDAO

Media DAOs

-  BanklessDAO
-  FOREFRONT
-  GCR
-  DarkstarDAO

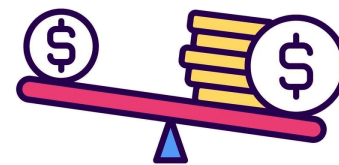


# Case Study: Compound and Uniswap



## Characterize governance protocols

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



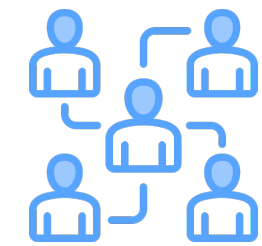
## Analysis of token concentration

- 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

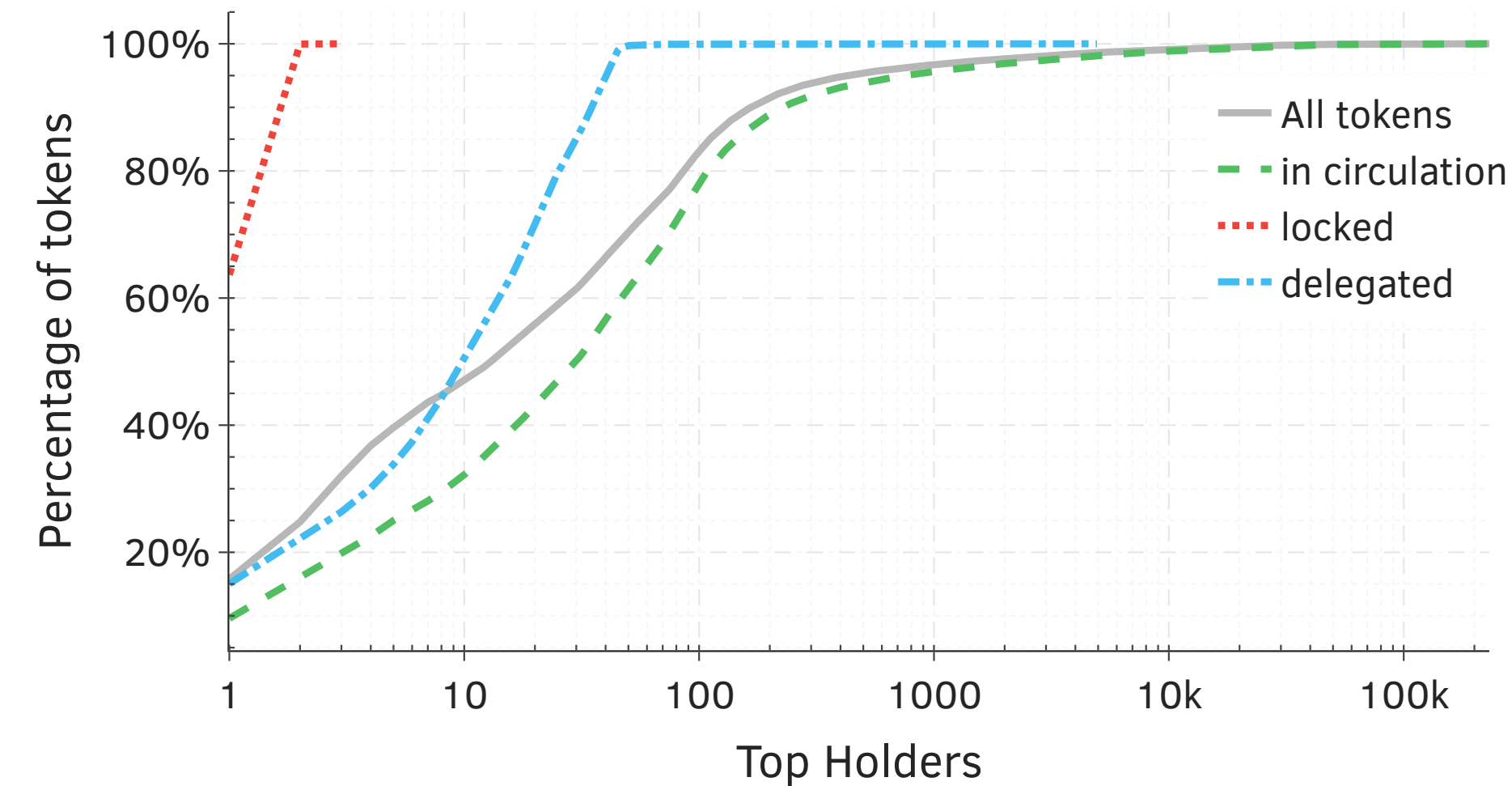
- We discover **potential voting coalitions** among the top voters in  **Compound**  **UNISWAP**
- This could exacerbate concerns of **voting concentration**.



- 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

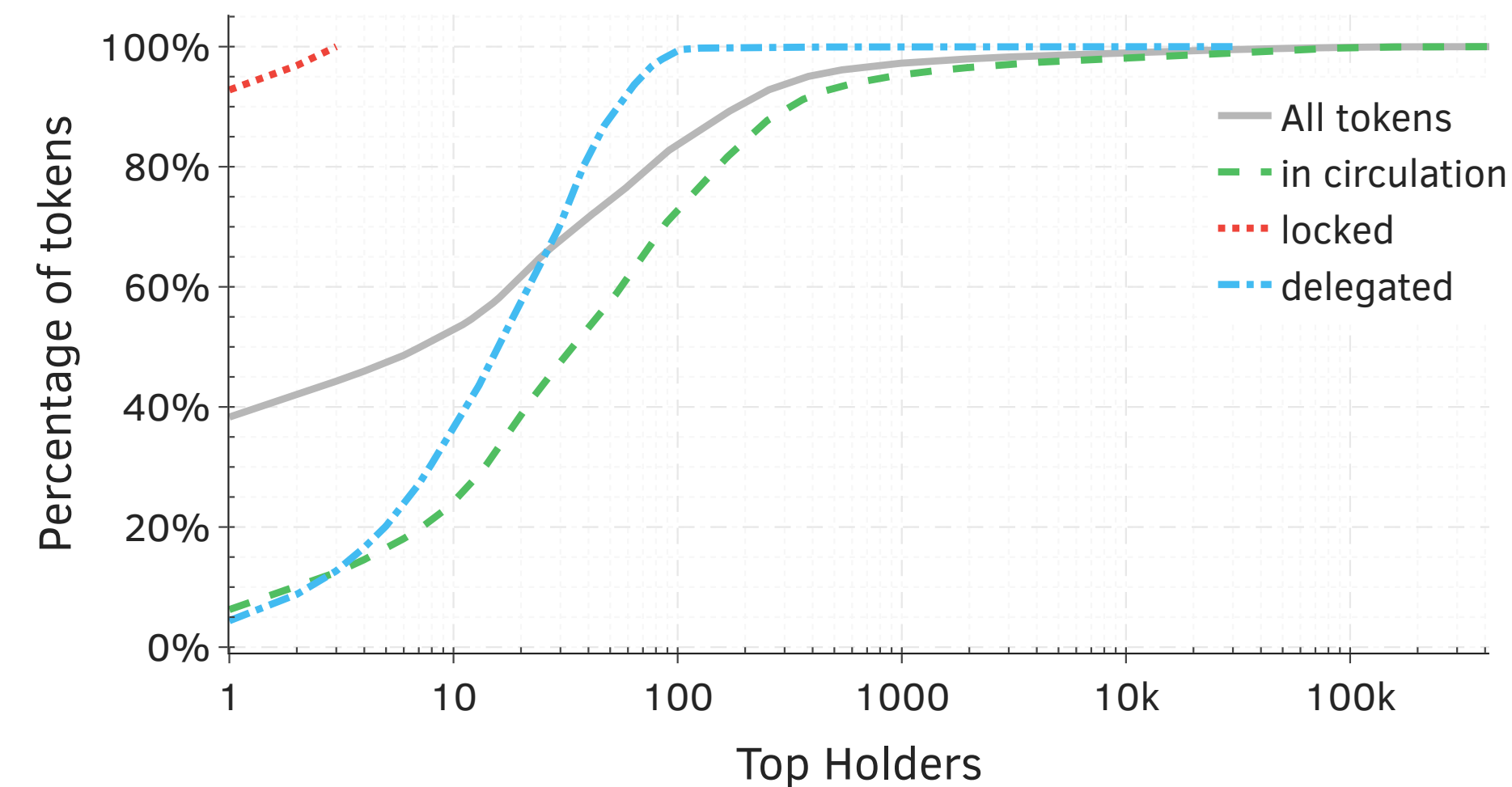
- From \$0.03 to \$294.02, detrimental to small token holders with an **average cost of \$6.82 per vote**.
- **Normalized costs per vote** unit reveal an average of **\$598.97**, posing fairness concerns.

## 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**.



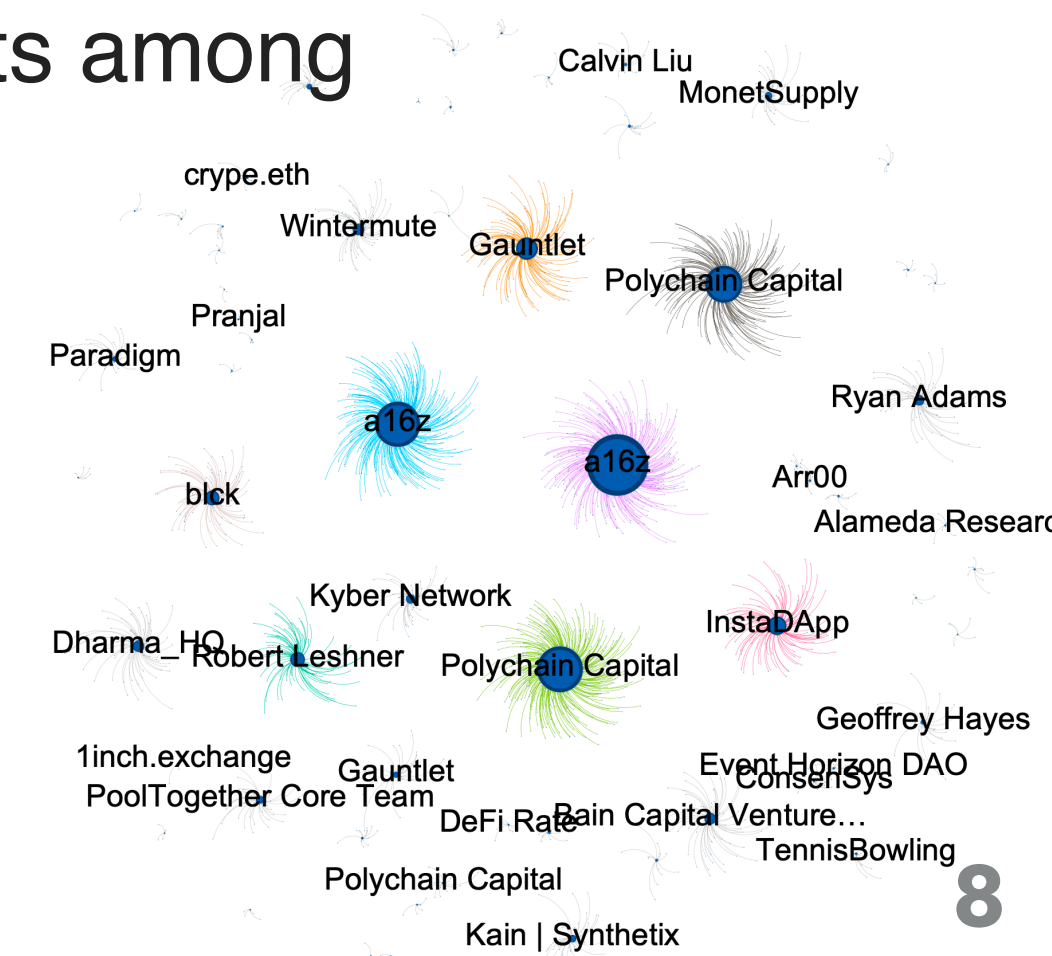
Understanding Blockchain Governance: Analyzing Decentralized Voting to Amend DeFi Smart Contracts – [arxiv.org/abs/2305.17655](https://arxiv.org/abs/2305.17655)



# 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.

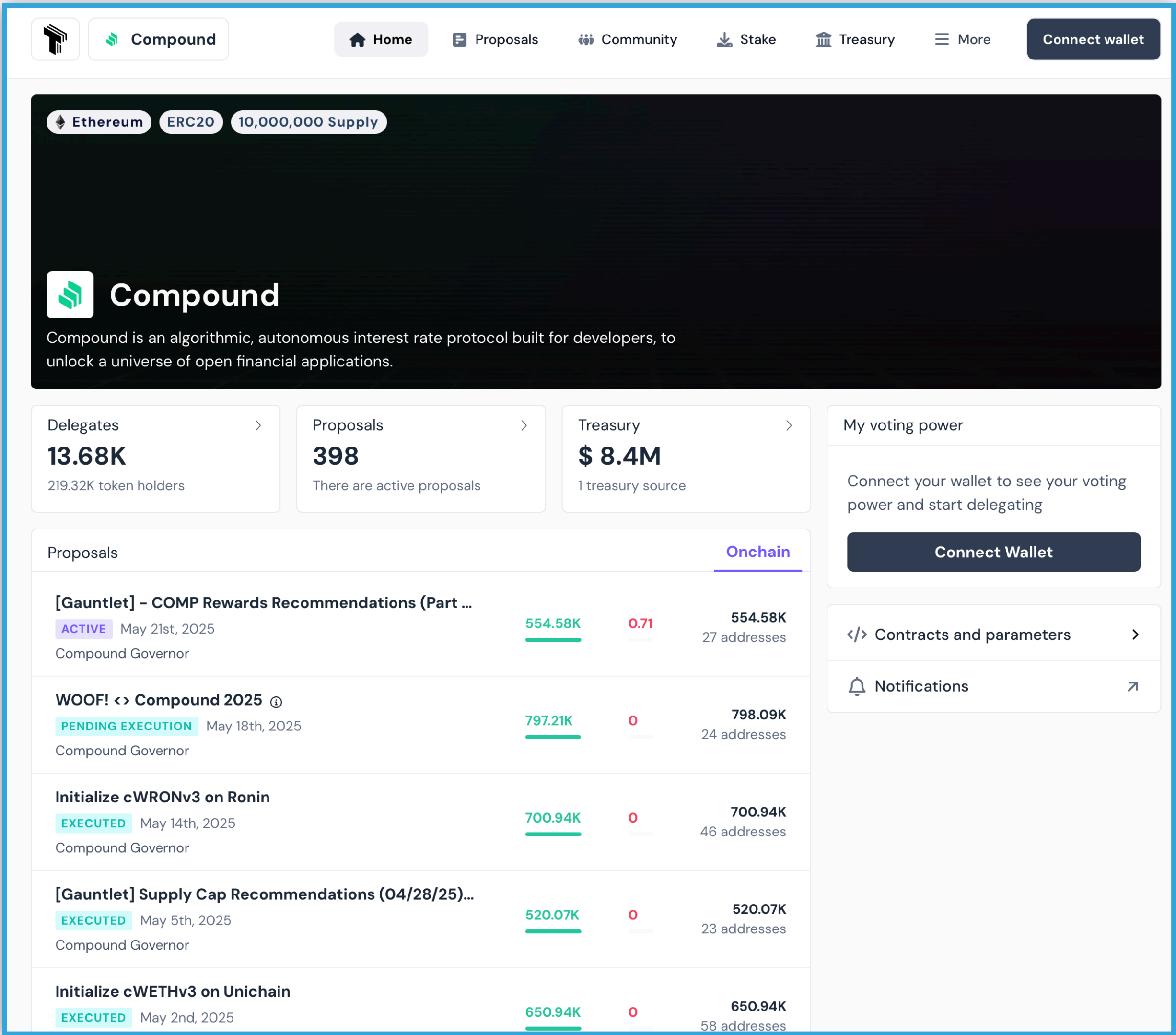


# Tally: a Platform Designed To Support DAOs



## 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 DAO interface on the Tally platform. The top navigation bar includes links for Home, Proposals, Community, Stake, Treasury, and More, along with a 'Connect wallet' button. The main header displays 'Ethereum', 'ERC20', and '10,000,000 Supply'. The Compound logo and description are prominently featured. Below this, a summary section shows 'Delegates: 13.68K (219.32K token holders)', 'Proposals: 398 (There are active proposals)', and 'Treasury: \$ 8.4M (1 treasury source)'. A 'My voting power' section prompts users to 'Connect your wallet to see your voting power and start delegating' with a 'Connect Wallet' button. The 'Proposals' section is filtered to 'Onchain' and lists several active and executed proposals, including 'Gauntlet - COMP Rewards Recommendations', 'WOOF! <> Compound 2025', 'Initialize cWRONv3 on Ronin', '[Gauntlet] Supply Cap Recommendations', and 'Initialize cWETHv3 on Unichain'. Each proposal entry shows its status, date, funding amount, and the number of addresses involved.











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<div>  Compound</div> <div>HomeProposalsCommunityStakeTreasuryMore</div> <div>Connect wallet</div>			
Onchain <div>+ New proposal</div>			
Proposal	Votes for	Votes against	Total votes
<div><b>[Gauntlet] – COMP Rewards Recommendations (Part – 1)</b></div> <div>ACTIVE May 21st, 2025</div> <div>Compound Governor</div>	554.58K	0.71	554.58K 27 addresses
<div><b>WOOF! &lt;&gt; Compound 2025</b></div> <div>PENDING EXECUTION May 18th, 2025</div> <div>Compound Governor</div>	797.21K	0	798.09K 24 addresses
<div><b>Initialize cWRONv3 on Ronin</b></div> <div>EXECUTED May 14th, 2025</div> <div>Compound Governor</div>	700.94K	0	700.94K 46 addresses
<div><b>[Gauntlet] Supply Cap Recommendations (04/28/25) pushed b...</b></div> <div>EXECUTED May 5th, 2025</div> <div>Compound Governor</div>	520.07K	0	520.07K 23 addresses
<div><b>Initialize cWETHv3 on Unichain</b></div> <div>EXECUTED May 2nd, 2025</div> <div>Compound Governor</div>	650.94K	0	650.94K 58 addresses
<div><b>Add weETH as collateral into the cUSDCv3 on Mainnet</b></div> <div>EXECUTED May 1st, 2025</div> <div>Compound Governor</div>	701.17K	0.04	701.17K 54 addresses
<div><b>Add weETH as collateral into cUSDSv3 on Mainnet</b></div> <div>EXECUTED May 1st, 2025</div> <div>Compound Governor</div>	701.17K	0.05	701.17K 57 addresses

Used by 



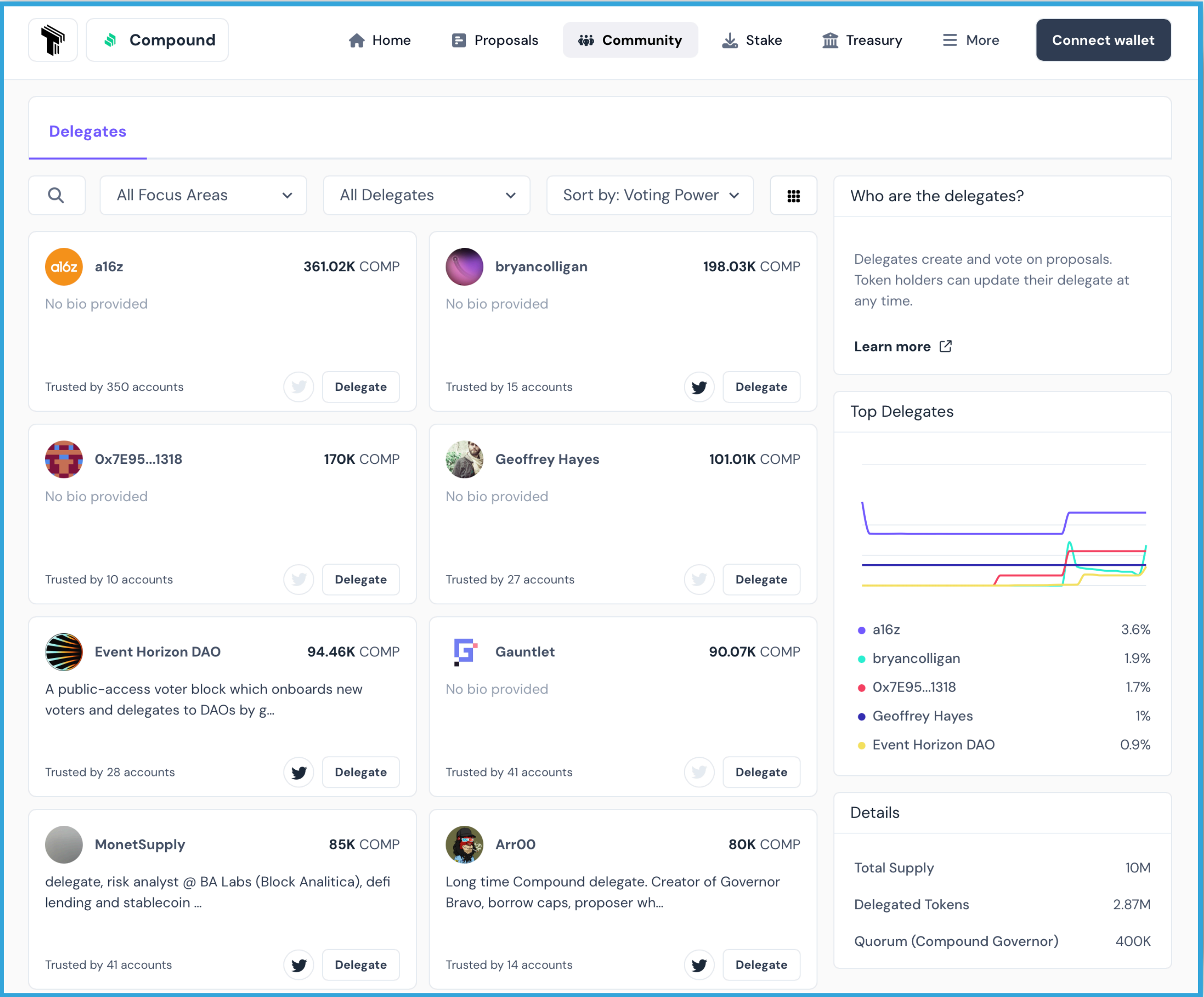
and others...

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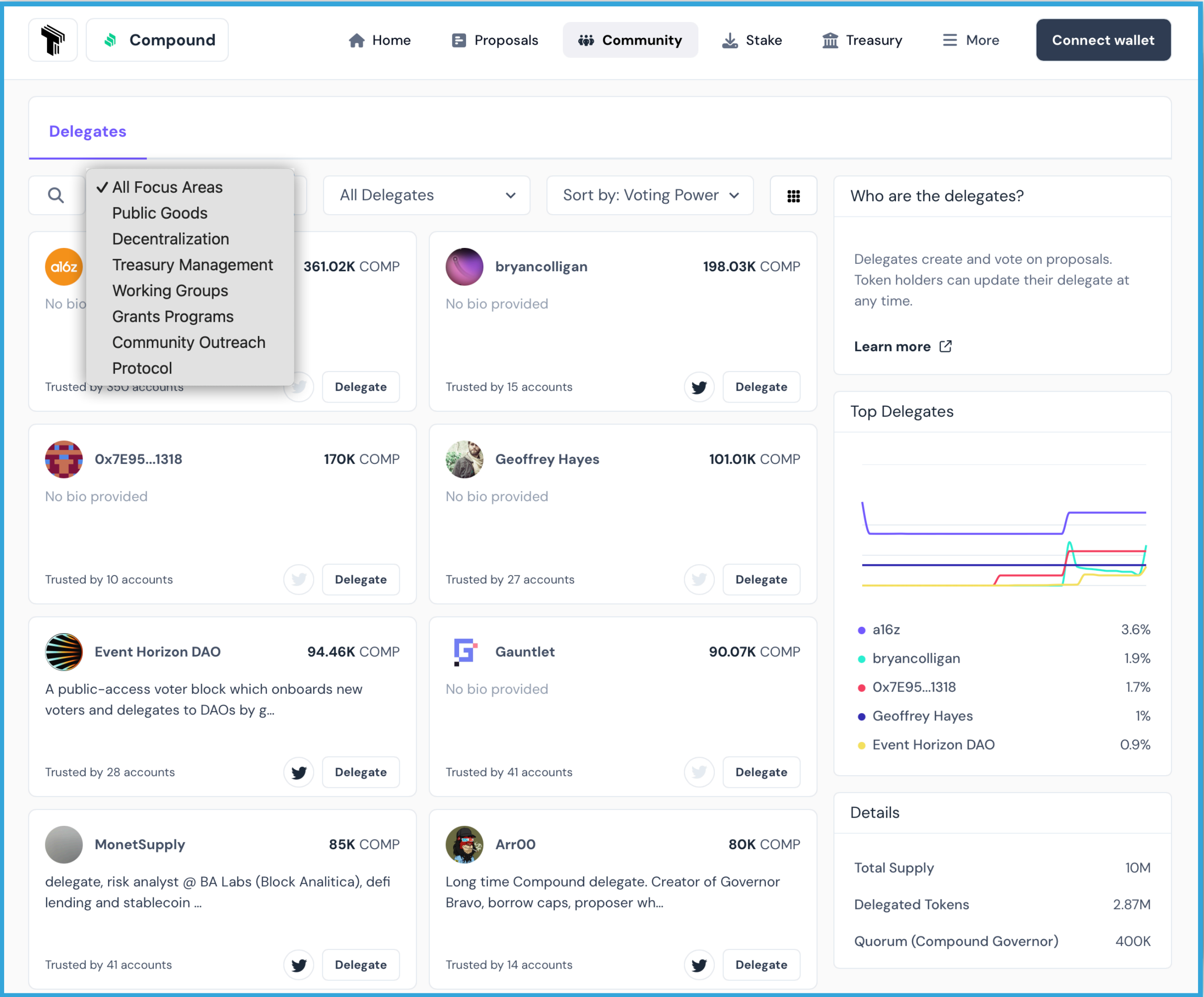


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The screenshot displays the Tally platform's 'Delegates' page. At the top, there's a navigation bar with links for Home, Proposals, Community, Stake, Treasury, and More, along with a 'Connect wallet' button. The main content area shows a list of delegates, each with a profile picture, name, bio, and voting power in COMP. A dropdown menu is open over the first delegate, 'a16z', showing focus areas: All Focus Areas, Public Goods, Decentralization, Treasury Management, Working Groups, Grants Programs, Community Outreach, and Protocol. On the right, there's a section titled 'Who are the delegates?' explaining the role of delegates and a 'Learn more' link. Below that, a 'Top Delegates' section features a line chart and a table of the top delegates.

Delegate	Voting Power (COMP)
a16z	361.02K
bryancolligan	198.03K
Ox7E95...1318	170K
Geoffrey Hayes	101.01K
Event Horizon DAO	94.46K
Gauntlet	90.07K
MonetSupply	85K
Arr00	80K

Delegate	Percentage
a16z	3.6%
bryancolligan	1.9%
Ox7E95...1318	1.7%
Geoffrey Hayes	1%
Event Horizon DAO	0.9%

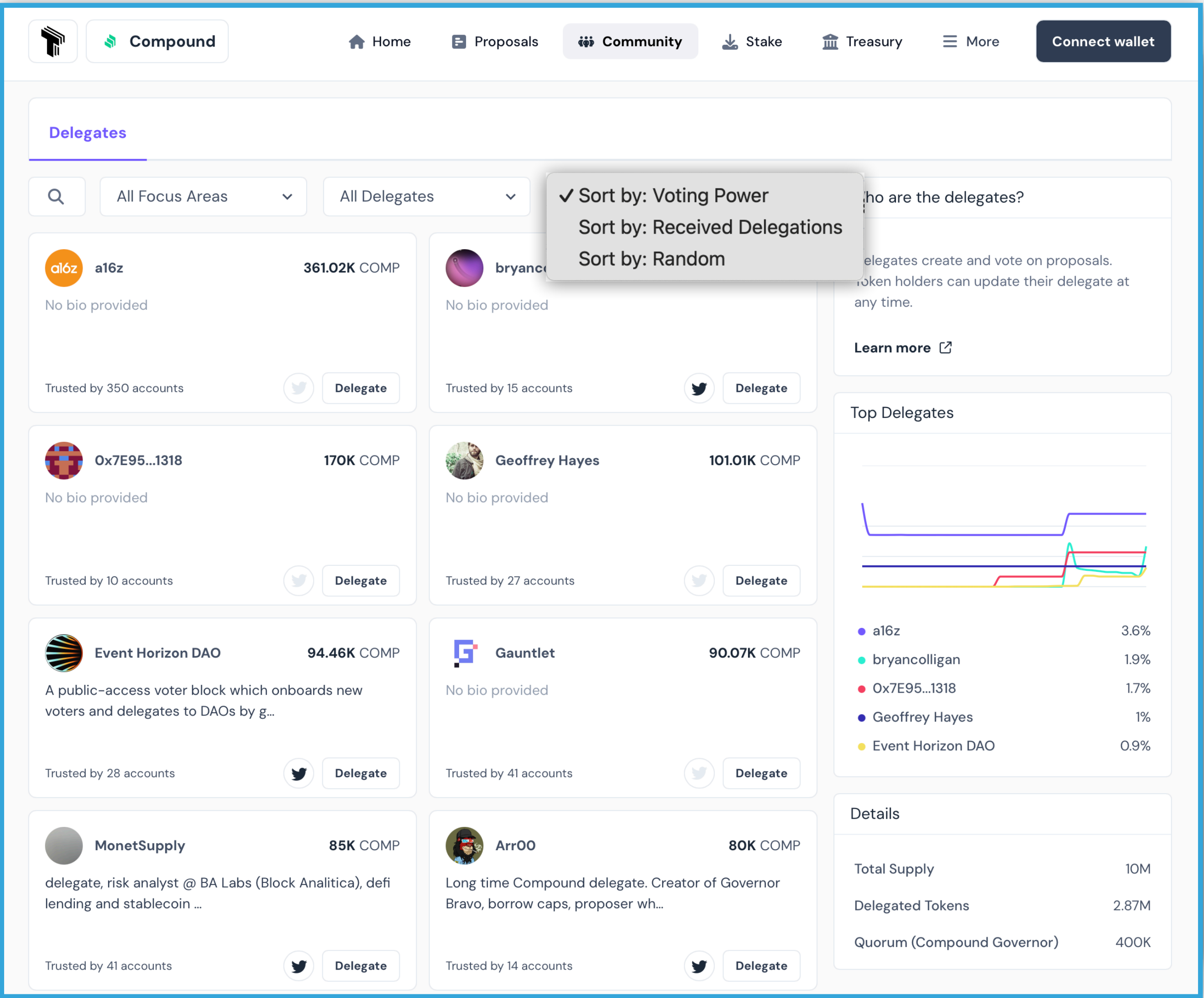
Details	
Total Supply	10M
Delegated Tokens	2.87M
Quorum (Compound Governor)	400K

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The screenshot displays the Tally platform interface for Compound. The top navigation bar includes links for Home, Proposals, Community, Stake, Treasury, and More, along with a 'Connect wallet' button. The main section is titled 'Delegates' and features a search bar and dropdown menus for 'All Focus Areas' and 'All Delegates'. A dropdown menu is open, showing sorting options: 'Sort by: Voting Power' (selected), 'Sort by: Received Delegations', and 'Sort by: Random'. The delegates are listed in a grid, each showing a profile picture, name, bio, and voting power in COMP. Each delegate has a 'Delegate' button and a 'Trusted by' count. On the right, there is a 'Top Delegates' section with a line chart and a table of the top delegates.

Delegate	Voting Power (COMP)	Trusted by
a16z	361.02K	350 accounts
bryancolligan	101.01K	15 accounts
Ox7E95...1318	170K	10 accounts
Geoffrey Hayes	101.01K	27 accounts
Event Horizon DAO	94.46K	28 accounts
Gauntlet	90.07K	41 accounts
MonetSupply	85K	41 accounts
Arr00	80K	14 accounts

**Top Delegates**

Delegate	Percentage
a16z	3.6%
bryancolligan	1.9%
Ox7E95...1318	1.7%
Geoffrey Hayes	1%
Event Horizon DAO	0.9%

**Details**

Metric	Value
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

Learn more

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.

Here's a more detailed breakdown:

**First Page Dominance:**  
Over 91% of users don't go past the first page of search results.

**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.

contentcustoms.com

https://www.contentcustoms.com › 2024/03/29 › do-user...

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

?

About featured snippets

🗨️

Feedback

People also ask

How many visits does Google search have?

▼

What percentage of Google searches go past the first page?

▼

How many pages does Google search?

▼

**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**





# 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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