

# Fairness in Token Delegation: Mitigating Voting Power Concentration in DAOs

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3rd Edition of the TUM Blockchain & Cybersecurity Salon

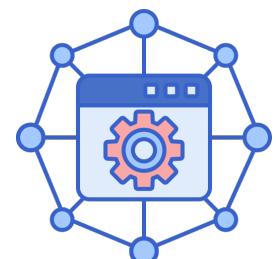


MAX PLANCK INSTITUTE  
FOR SOFTWARE SYSTEMS

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johnnatan-messias.github.io

# 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.



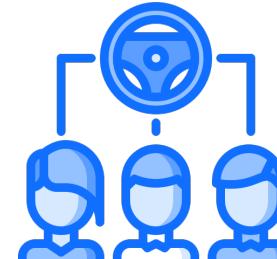
## Smart Contract Automation

- **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

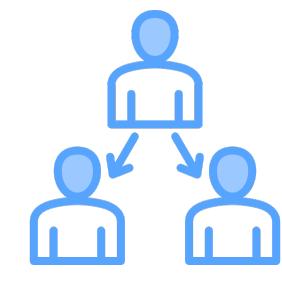
- DAOs are **typically mission-oriented**, focusing on goals such as funding projects, managing decentralized protocols, or creating shared value for members.
- **Benefits:** Engages a global, like-minded community united by a common vision.

# What Are the Key Characteristics?



## Token ownership

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



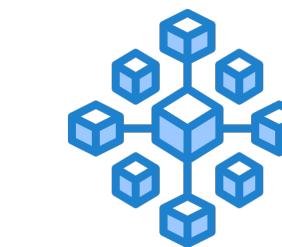
## Token delegation

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



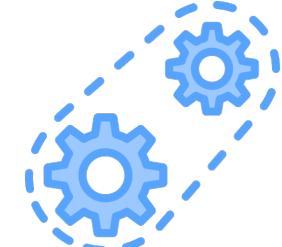
## Who can vote?

- 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





# 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**.





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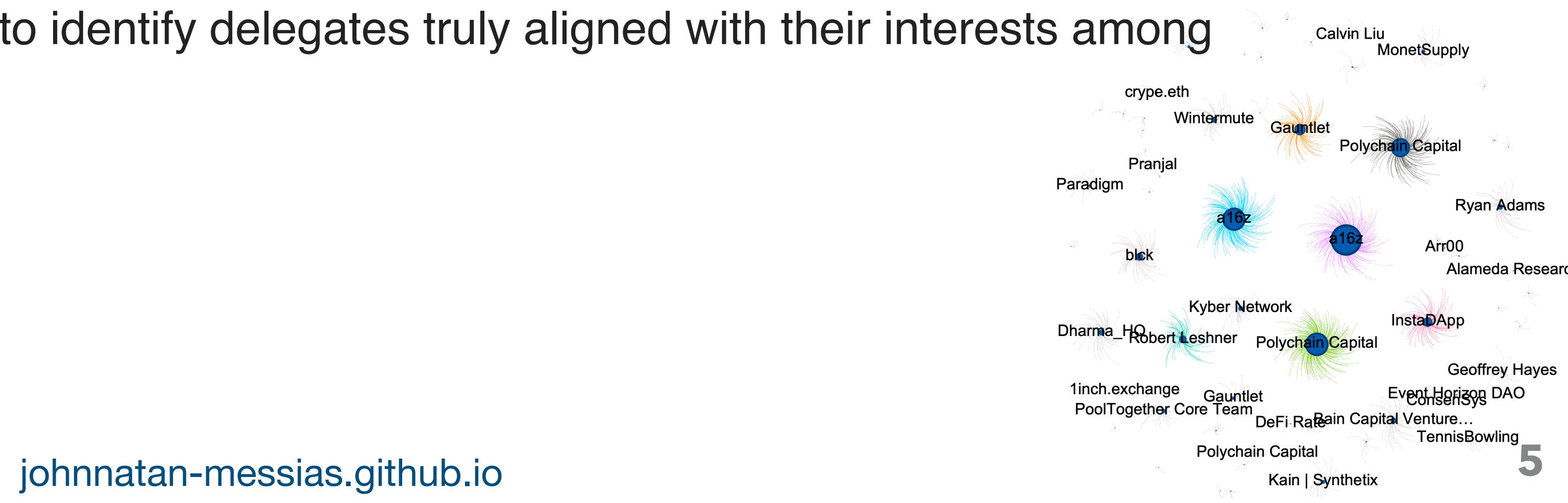


- It leads to real-world consequences.
- Smaller voices are drowned out.
- Participation might decrease.
- Open doors for vulnerabilities.



# 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 says "Compound" with a logo. Below it, a sub-header states: "Compound is an algorithmic, autonomous interest rate protocol built for developers, to unlock a universe of open financial applications." On the left, there are three summary boxes: "Delegates 13.68K", "Proposals 398", and "Treasury \$ 8.4M". The "Proposals" box notes "There are active proposals". On the right, there's a "My voting power" section with a note to "Connect your wallet to see your voting power and start delegating" and a "Connect Wallet" button. Below these are sections for "Proposals" (listing several recent ones like "[Gauntlet] - COMP Rewards Recommendations (Part ...)", "WOOF! <> Compound 2025", etc.) and "Contracts and parameters". At the bottom, there's a "Notifications" section.

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The screenshot shows the Tally platform interface for the Compound Governor. The top navigation bar includes links for Home, Proposals (which is active), Community, Stake, Treasury, More, and Connect wallet. A button for '+ New proposal' is located in the top right. The main content area is titled 'Onchain' and lists several proposals:

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

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The screenshot shows the Tally platform's interface for the Compound protocol. The main section displays a grid of delegates, each with a profile picture, name, COMP amount, and a brief description. Below the grid, a chart titled "Top Delegates" shows the distribution of voting power among the top 10 delegates. A sidebar on the right provides summary statistics: Total Supply (10M), Delegated Tokens (2.87M), and Quorum (Compound Governor) (400K).

Delegate	COMP	Description
a16z	361.02K COMP	No bio provided Trusted by 350 accounts
bryancolligan	198.03K COMP	No bio provided Trusted by 15 accounts
0xE95...1318	170K COMP	No bio provided Trusted by 10 accounts
Geoffrey Hayes	101.01K COMP	No bio provided 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 Trusted by 41 accounts
MonetSupply	85K COMP	delegate, risk analyst @ BA Labs (Block Analitica), defi lending and stablecoin ... Trusted by 41 accounts
ArrOO	80K COMP	Long time Compound delegate. Creator of Governor Bravo, borrow caps, proposer wh...



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The screenshot shows the Tally platform's interface for managing Compound's delegates. The main page displays a grid of delegates, each with a profile picture, address, COMP amount, and a 'Delegate' button. A modal window is open for the delegate 'al0z', listing their focus areas: All Focus Areas, Public Goods, Decentralization, Treasury Management, Working Groups, Grants Programs, Community Outreach, and Protocol. The right side of the screen features a chart titled 'Who are the delegates?' showing the distribution of COMP supply among top delegates, with a legend identifying 'a16z', 'bryancolligan', 'OxE95...', 'Geoffrey Hayes', 'Event Horizon DAO', 'Gauntlet', 'MonetSupply', and 'Arr00'. Detailed information for each delegate is provided in a sidebar.



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The screenshot shows the Tally platform interface for the Compound protocol. The main section displays a grid of delegates, each with a profile picture, name, COMP balance, and the number of accounts they are trusted by. Below each entry is a 'Delegate' button. A dropdown menu is open over the first two entries, showing sorting options: 'Sort by: Voting Power' (selected), 'Sort by: Received Delegations', and 'Sort by: Random'. To the right of the grid, there's a sidebar with a question 'Who are the delegates?', a note about delegates creating proposals, a 'Learn more' link, and a 'Top Delegates' section featuring a line chart and a legend. The legend identifies the top delegates by color: a16z (purple), bryancolligan (teal), Ox7E95...1318 (red), Geoffrey Hayes (blue), and Event Horizon DAO (yellow). The sidebar also provides details about the total supply (10M), delegated tokens (2.87M), and Quorum (Compound Governor) (400K).

Delegate	COMP	Accounts Trusted
a16z	361.02K	350
bryancolligan	101.01K	15
Ox7E95...1318	170K	10
Geoffrey Hayes	90.07K	27
Event Horizon DAO	94.46K	28
Gauntlet	85K	41
MonetSupply	80K	41
ArrOO	80K	14

# 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.

**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...  
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?



# Ranking Order Can Influence User Choices

Google search results for "how many pages users look at when searching on Google".

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

**People also ask :**

- How many visits does Google search have?
- What percentage of Google searches go past the first page?
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Amazon.de search results for "flash drive".

**Eligible for free delivery:**  
 Free Delivery by Amazon  
Free Shipping by Amazon to eligible destinations

**Flash Drive Capacity:**  
 Up to 2 GB  
 4 GB  
 8 GB  
 16 GB  
 32 GB  
 64 GB  
 128 GB & above

**Hardware Interface:**  
 USB  
 USB 2.0  
 USB 3.0  
 Lightning  
 USB 3.2 Gen 1  
 USB 3.2 Gen 2  
 USB 1.0  
**Brands:**  
 SanDisk  
 Intenso  
 Samsung  
 Kingston  
 Hama  
 PHILIPS  
 Verbatim  
**Customer Reviews:**  
**Price:**  
€2 – €4,400+  
**Deals & Savings:**

**Results:**  
1-16 of 569 results for "flash drive"

**Amazon Basics 256GB USB 3.1 Flash Drive - Read Speed up to 130Mbps - Black**  
Options: 2 sizes  
★★★★★ 24,267  
500+ bought in past month  
€20.42  
Get 60 days of Audible free  
FREE delivery Wed 28 May on eligible first order  
Or fastest delivery Tue 27 May  
**Add to basket**

**KOOTION USB Stick 64GB Pack of 5 Memory Sticks USB 3.0 Memory Stick Metal 64GB 5 Flash Drives Memory Sticks High Speed Data Storage Backup for PC/Mac/Desktop/Laptop/Game Consoles**  
Options: 8 sizes  
★★★★★ 1,798  
50+ bought in past month  
€26.99  
FREE delivery Tue 3 Jun on eligible first order  
Or fastest delivery Tue 27 May  
**Add to basket**

**KOOTION USB C Stick, 128 GB USB 2.0 Memory Stick OTG 2-in-1 USB Stick 128G Flash Drive Type C Flash Drive 128 GB for PC/Laptop, Android Type-C Mobile Phone**  
Options: 14 sizes  
★★★★★ 12,128  
1K+ bought in past month  
**Limited time deal**

**Amazon product ranked first 😊**

**Sponsored products next** 😃

# 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.



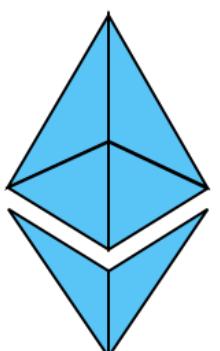
## Implement Delegation Matching Algorithm

- 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.



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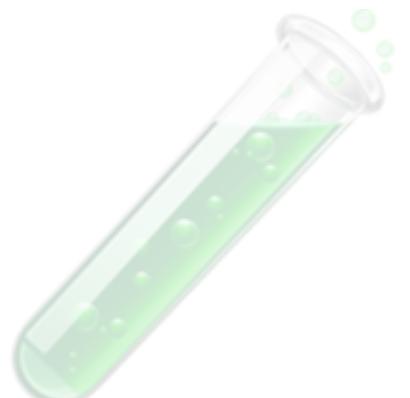
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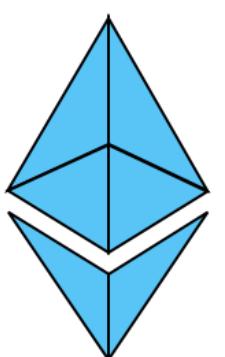
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# How can we improve DAOs?

- ▶ **Fairness is Fundamental**
  - ▶ Fair token delegation is not a luxury but a necessity for the legitimacy and long-term success of DAOs and DeFi.
- ▶ **Problem**
  - ▶ Delegation matching is a critical, unsolved challenge in DAO governance, impacting decentralization and fairness.
- ▶ **Proposed Solution**
  - ▶ An interest-aligned delegation matching mechanism.
    - ▶ Address voting power concentration and participation barriers.
    - ▶ Enhanced transparency, reduced bias, stronger security, and more effective, truly decentralized DAO governance.
    - ▶ To promote genuine fairness, increase decentralization, and build more robust and representative DAO ecosystems.
- ▶ **Key Questions**
  - ▶ How many delegates are actually available?
  - ▶ Are their opinions diverse?
  - ▶ How wealthy are the delegates?



# Contact

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