

The Illusion of Decentralised Governance

A Structural Analysis of 50 DAOs Across Eight Blockchain Networks

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DAOs promised to replace hierarchy with code-enforced community rule

- ▶ “Code is law” every token holder, equal voice.
- ▶ > \$22 B aggregate DAO treasury value (DeepDAO).
- ▶ The bet: smart contracts replace boards, charters, signatories.
- ▶ **Question: does the deployed code actually deliver that promise?**

DAO Architecture

Three pillars:

Blockchain

Transparent ledger of all actions.

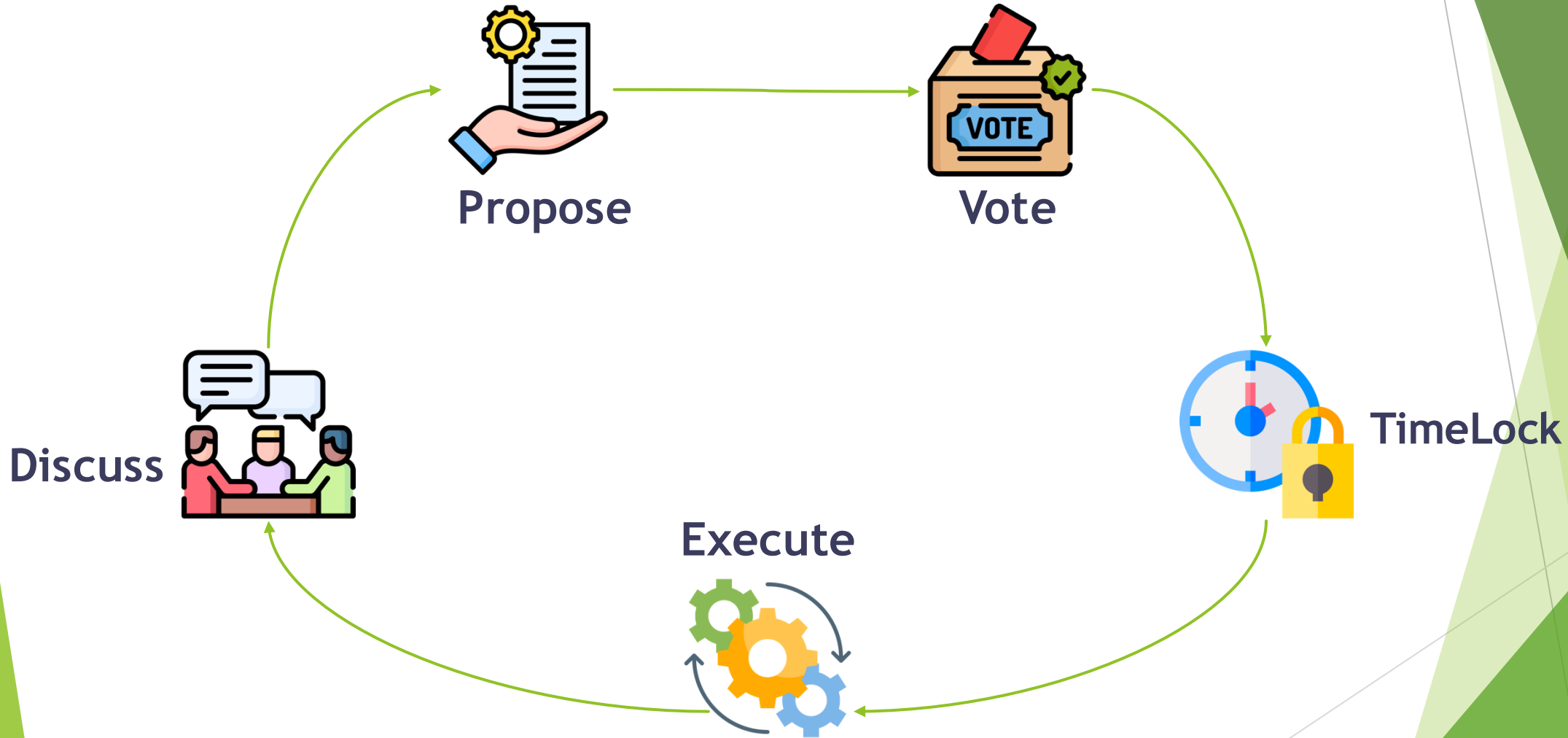
Smart Contracts

Rules encoded in code

Token Voting

Proportional voting power

DAO Architecture: Governance Lifecycle



Question: does the deployed code actually deliver that promise?

Literature evidence

Different categories of failure, documented by independent research groups across thousands of DAOs (reproducible patterns).

01 Concentration of Control

17 / 21 DAOs have <10 addresses with decisive power (Feichtinger 2023); insider control of voting outcomes (Appel & Grennan 2023); persistent voting-power concentration (Fritsch et al. 2024).

02 Participation Crisis

Median 4.16% turnout in our 50-DAO sample. Gas-free sensitivity deters small holders; cost-sensitive turnout and DeFi governance vulnerabilities (Dotan et al. 2023).

03 Process Integrity

99% of DAOs lack adequate documentation; 60% description-code misalignment (Ma et al. 2024).

State of the Art: The Gap

Work	Measures	Limitation
DeepDAO	Activity counts	No sustainability score
Feichtinger '23	Participation + power	No composite framework
Barbereau '22	Token inequality	Measures power, not governance outcomes
Wang '23	DAO characteristics	Descriptive only (Taxonomy, no metrics)
Park '23	Decentralisation	Not on-chain verifiable
Fan '24	Voting mechanisms	Mechanism analysis, no scoring

Open Problems in DAOs

Joshua Tan^{1,2}, Tara Merk^{3,1}, Sarah Hubbard⁴, Eliza R. Oak⁵, Helena Rong⁶, Joni Pirovich¹, Ellie Rennie^{7,1}, Rolf Hoefer⁸, Michael Zargham^{9,10,1}, Jason Potts⁷, Chris Berg⁷, Reuben Youngblom¹¹, Primavera De Filippi^{3,4}, Seth Frey^{12,13,1}, Jeff Strnad¹⁰, Morshed Mannan¹⁴, Kelsie Nabben^{7,14}, Silke Noa Elrifai^{15,11}, Jake Hartnell¹⁶, Benjamin Mako Hill¹⁷, Tobin South¹⁸, Ryan L. Thomas¹⁹, Jonathan Dotan^{20, 11}, Ariana Spring²⁰, Alexia Maddox²¹, Woojin Lim⁴, Kevin Owocki²², Ari Juels^{23,24}, and Dan Boneh¹⁰

¹Metagov

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⁴Harvard University

⁵Yale University

⁶Columbia University

⁷RMIT University

⁸Cultur3

⁹BlockScience

¹⁰WU Vienna

¹¹Stanford University

¹²University of California, Davis

¹³The Ostrom Workshop at Indiana University

¹⁴European University Institute

¹⁵Paris II (Panthéon-Assas)

¹⁶DAODAO

¹⁷University of Washington

¹⁸MIT

¹⁹Wentworth Institute of Technology

²⁰EQTY Lab

²¹La Trobe University

Are the rules themselves encode oligarchy?

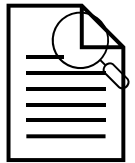
- ▶ Behavioural lens: who exercises power.
- ▶ **Structural lens: what the contract allows in the first place.**
- ▶ Parameters are not neutral: threshold, quorum, timelock, proxy, treasury.
- ▶ **Our contribution:** read the architectural envelope straight from the contracts.
- ▶ Complementary to, and a precondition for, behavioural decentralisation.

Methodology

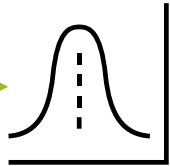
Selection



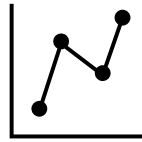
Extraction



Normalisation



Analysis



- ▶ Dataset: 50 DAOs
- ▶ Sources: smart contracts on-chain
- ▶ Extracted values: token standard, threshold, quorum, voting delay, voting period, timelock, proxy pattern

Dataset

<i>DAO Name</i>	<i>Token Standard</i>	<i>Threshold (T)</i>	<i>Quorum (T)</i>	<i>Voting Delay (b)</i>	<i>Voting Period (b)</i>	<i>Timelock delay (s)</i>	<i>Proxy Pattern</i>
Uniswap	ERC-20	1.000.000	40.000.000	13.140	40.320	172.800	EIP-897
Arbitrum	ERC-20	1.000.000	300.000.000	21.600	100.800	259.200	EIP-1967
ENS	ERC-20	100.000	1.000.000	1	45.818	172.800	None
Aave	ERC-20	80.000	320.000	7.200	19.200	86.400	EIP-1967
Dope Wars	ERC-721	50	500	13.091	45.818	60	None
Gitcoin	ERC-20	150.000	2.500.000	13.140	40.320	172.800	None
...		...	...	...	...	...	...

Dataset

<i>DAO Name</i>	<i>Category</i>	<i>Chain</i>	<i>Total Offer (T)</i>	<i>Treasury volume (\$)</i>	<i>Treasury menagement</i>
Uniswap	Protocol	Ethereum	899.318.420	1.062.003.690	Timelock
Arbitrum	Protocol	Arbitrum	10.000.000.00 0	358.525.287	FixedDelegateWallet
ENS	Protocol	Ethereum	100.000.000	67.729.999	Timelock
Aave	Protocol	Ethereum	16.000.000	150.900.000	Mixed
Dope Wars	Grant	Ethereum	8.000	19.125,89	Timelock
Gitcoin	Grant	Ethereum	100.000.000	1.758.677,00	Timelock
...		...	...	...	...

DAO Classification

- ▶ **Protocol:** management and governance of a Web3 protocol.
- ▶ **Investment:** They are similar to traditional Venture capital, and they collect funds from different sources and use them to launch Startups -> profit
- ▶ **Grant:** DAO that focuses on new projects and protocol innovations. -> impact
- ▶ **Social:** Consent to access a community of a niche that can be accessed only with a certain token or pay a quote and/or focus on social impact projects.

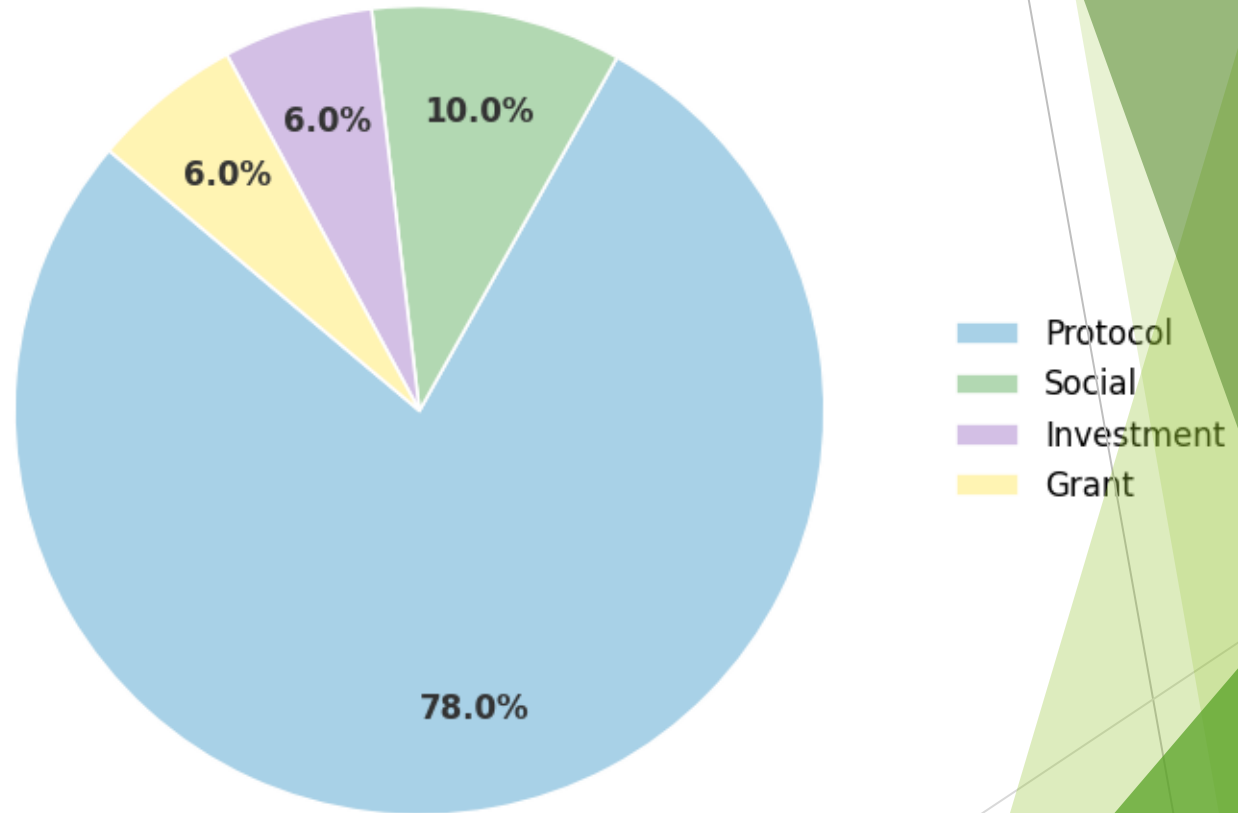
DAO Classification

	Mission type	Statement / Description
► Protocol: r	Collector	“Pool together capital and resources to buy valuable artifacts (mostly NFTs) and curate them as a community to generate profit.”
► Investment collect fun	Grants	“Pool together capital and resources for donations to promising projects to generate impact.”
	Investment	“Pool together capital and resources for investments in promising projects to generate profit.”
► Grant: DAC	Protocol	“Operate and govern a web3 protocol as a community.”
► Social: Cor accessed o social impa	Service	“Aggregate the talent of the community to provide services for other DAOs and entities.”
	Media	“Create media content as a community.”
	Social	“Operate a like-minded community and follow a social goal.”

*[2024] Impact of Decentralized Autonomous Organizations (DAO) on Society 5.0 ,
Amhaz, Rabih & Bobenrieth, Cédric & Marz, Marlene.*

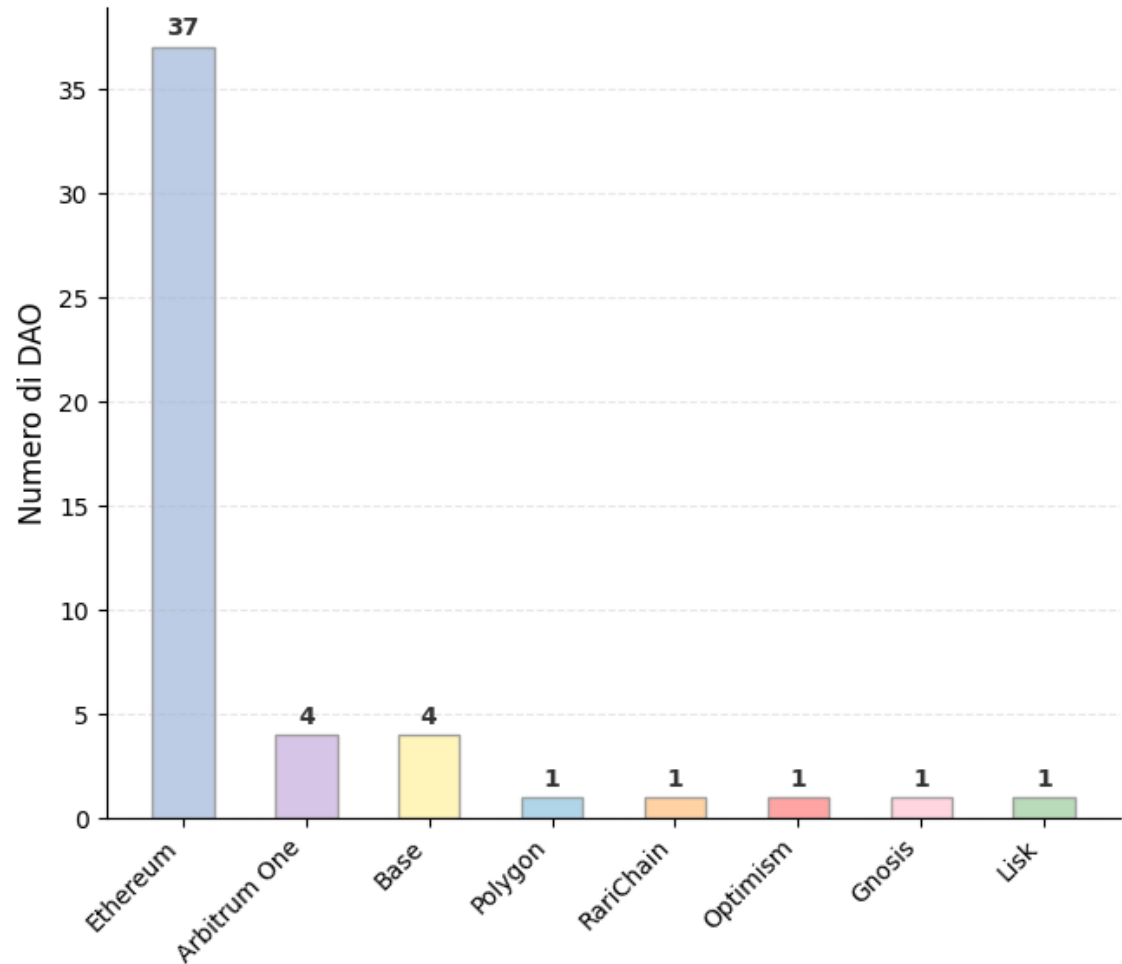
Category distribution

The sample of 50 DAOs consists of 78% of projects belonging to the Protocol category. The remaining organizations are divided between the Social category (10%), followed by Investment (6%) and Grant (6%).



Blockchain distribution

74% of the DAOs in the sample operate on the Ethereum network. The rest of the sample is distributed among various Layer 2 solutions and sidechains, among which Arbitrum One (8%) and Base (8%) stand out for frequency. There are also isolated occurrences on other networks such as Polygon, RariChain, Optimism, Gnosis, and Lisk (2% each).



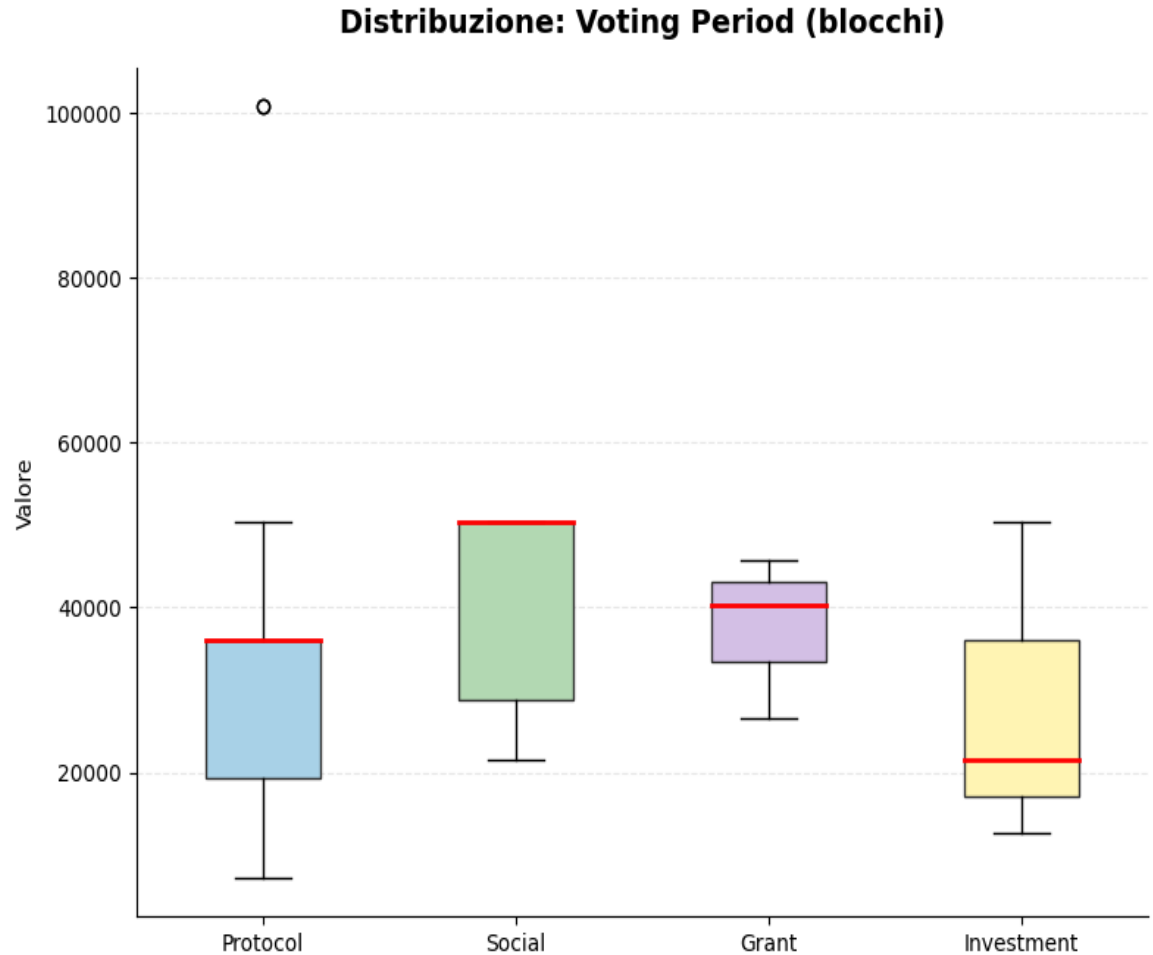
Mean vs Median

The most evident aspect is the huge gap between the mean and the median for Threshold and Quorum. In fact, the mean is heavily influenced by a few outliers present in the sample.

<i>Parameter</i>	<i>Mean</i>	<i>Median</i>	<i>Min</i>	<i>Max</i>
Threshold (t)	$9,17 \cdot 10^9$	40.000	0,5	$2,1 \cdot 10^{11}$
Quorum (t)	$3,6 \cdot 10^{10}$	2.500.000	18	$1,68 \cdot 10^{12}$
Voting Delay (blocks)	8.147,3	7.200	0	28.800
Voting Period (blocks)	33.853,7	36.000	7.200	100.800
Timelock (s)	200.681,3	172.800	0	777.600

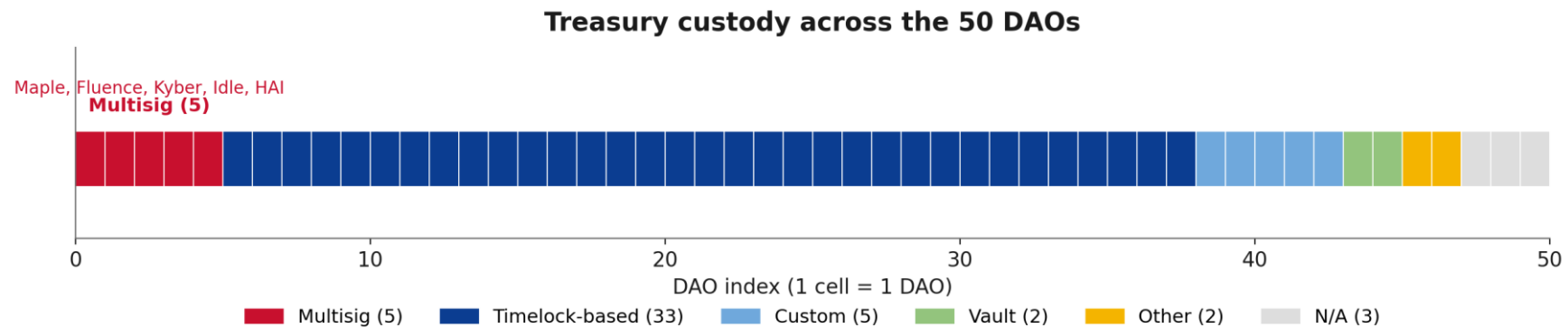
Voting period boxplot

The Social category records the longest median duration (50,400 blocks), well above the global mean (33,853 blocks). In second place we find Grant (40,320 blocks), followed by Protocol (36,000 blocks). Finally, the Investment category reports the shortest voting window, with a median of 21,600 blocks.



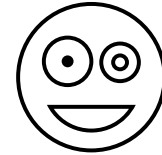
Treasury: 1 in 10 DAOs lets a multisig override the vote

Mechanism	n	share
Governance (Timelock)	33	66%
Multisig	5	10%
Custom	5	10%
Vault-based	2	4%
Other	2	4%
N/A	3	6%

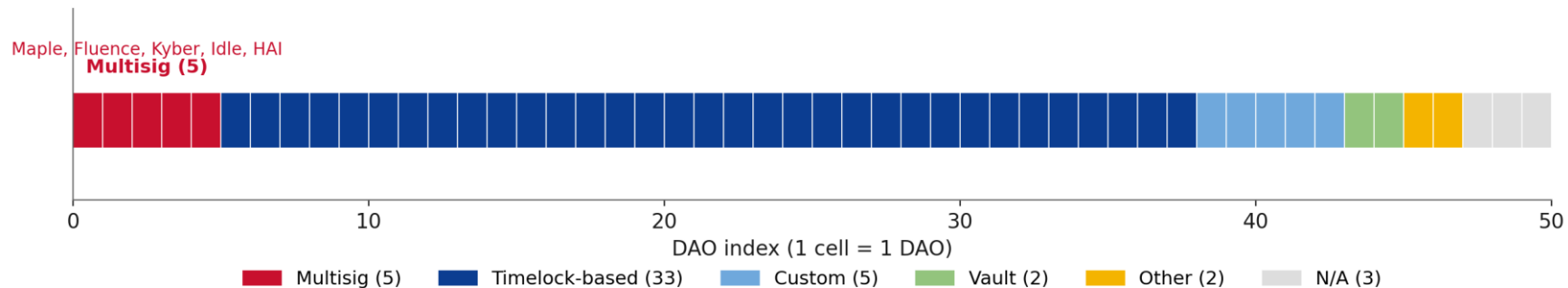


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Treasury custody across the 50 DAOs



Discussion

The "paradox": decentralized code, centralized power.

The data indicates that the goal of a distributed governance is still far away.

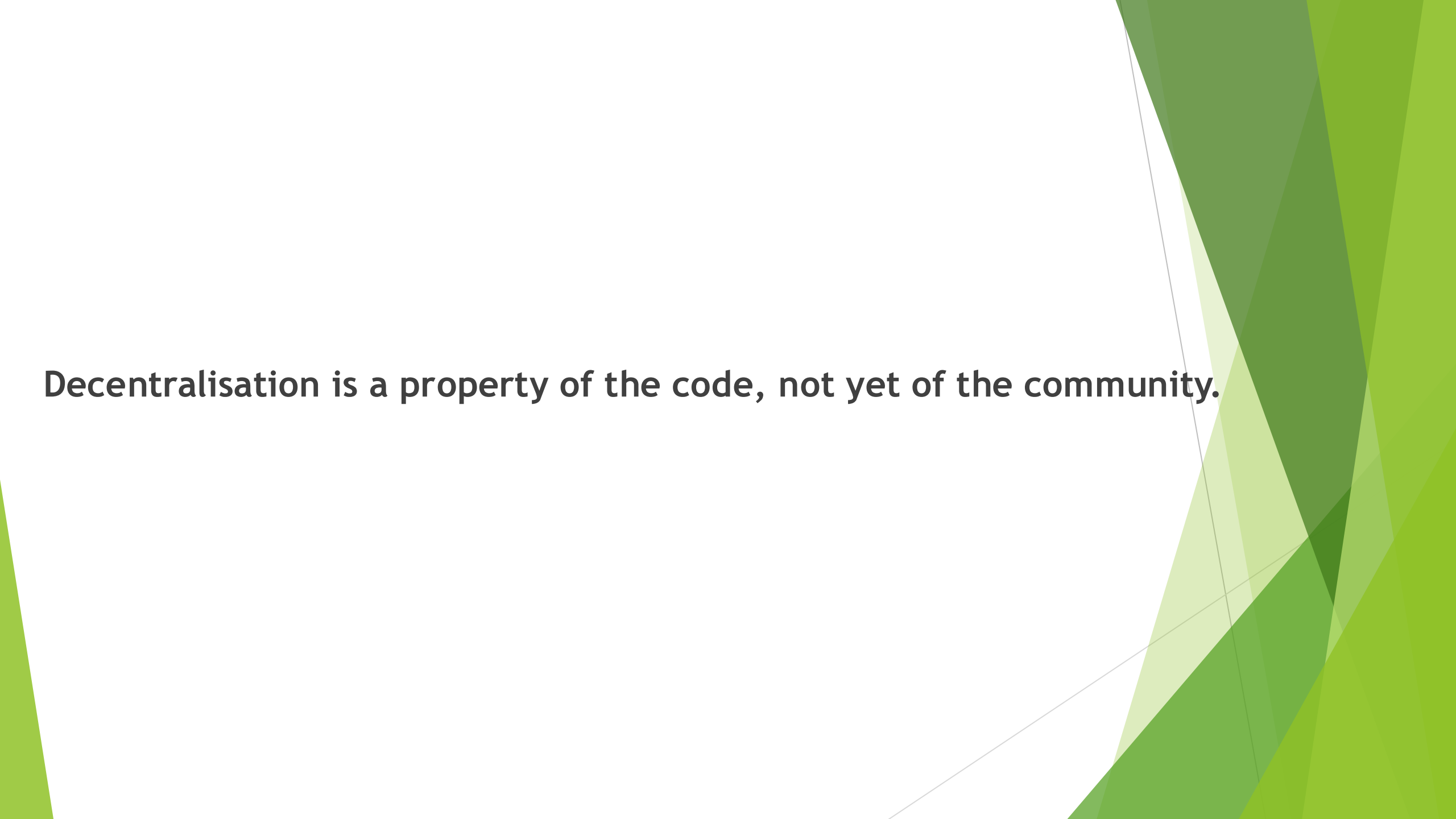
DAOs, instead of dismantling old paradigms, tend to reproduce the power asymmetries and capital concentrations typical of conventional financial markets.

Limitations

- ▶ Sample size: 50 DAOs.
- ▶ Exclusion of off-chain data: the focus was placed exclusively on on-chain data.
- ▶ Temporal snapshot: instantaneous snapshot of the current situation.
- ▶ Technological perimeter: Ethereum ecosystem and EVM-compatible networks.

Future developments

- ▶ Extension to non-EVM chains: e.g., Solana, Cosmos, or Polkadot.
- ▶ Calculation of advanced decentralisation metrics: Gini/Nakamoto coefficients.
- ▶ Longitudinal extension: studying the change of parameters over time.
- ▶ Off-chain data analysis: completing the picture of participation

The background of the slide features abstract, overlapping green geometric shapes, primarily triangles and polygons, in various shades of green, ranging from light lime to dark forest green. These shapes are concentrated on the right side of the slide, creating a modern, layered effect.

Decentralisation is a property of the code, not yet of the community.