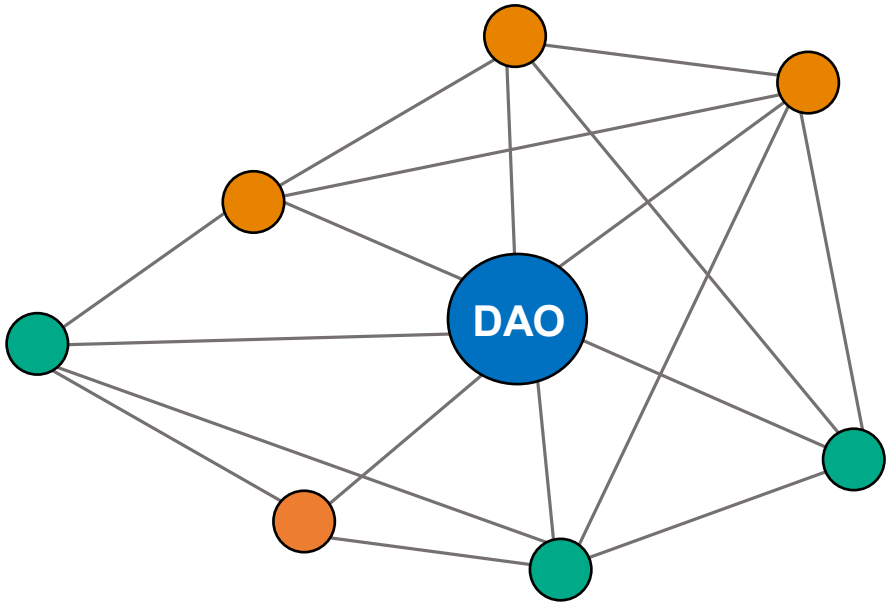
Understanding DAO Governance: Proposal Categorization and Its Impact on Online Voter Behavior

Ulaş Can Akyıldız • **Yvonne-Anne Pignolet** • **Stefan Schmid**



What is a DAO?

- A **Decentralized Autonomous Organization** is run by its community through on-chain rules and token-based voting
- Members submit and vote on proposals
- We study **32,819** proposals across four DAO platforms to see how proposal content shapes governance outcomes



DAO governance is more than voting mechanisms

1 Treasury allocation

Resource allocation and financial risk

2 Technical upgrade

Infrastructure changes and specialist knowledge

3 Community initiatives

Collective priorities and subjective preferences

Governance outcomes

Approval
Duration
Participation

Research focus **What is being voted on may be as important as how voting is organized.**

Research question and contributions

1) How can DAO proposals be effectively categorized?

2) How are these categories associated with governance dynamics?

1

Large-scale dataset

32,819 proposals

2

Categorization framework

Transformer-based

3

Governance analysis

Cross-platform

Dataset

PLATFORM	DAOs	PROPOSALS	SPAN	GOVERNANCE MODEL
Snapshot	**59**	**18,702**	2020-2025	Off-chain
SNS	**27**	**9,058**	2020-2025	On-chain, per DAO
OpenGov	**1**	**1,486**	2020-2025	On-chain, network wide
DAOstack	**57**	**3,573**	2019-2023	On-chain, reputation weighed

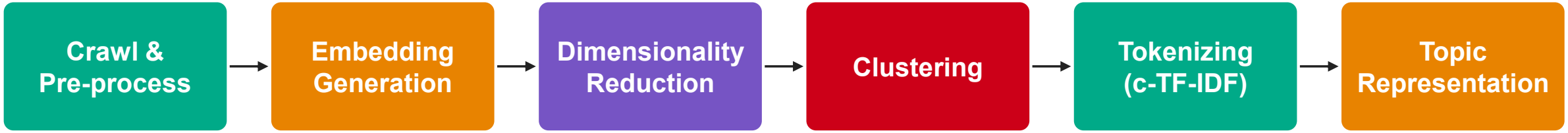
32,819

Total proposals

144 DAOs

2019–2025

Proposal categorization pipeline

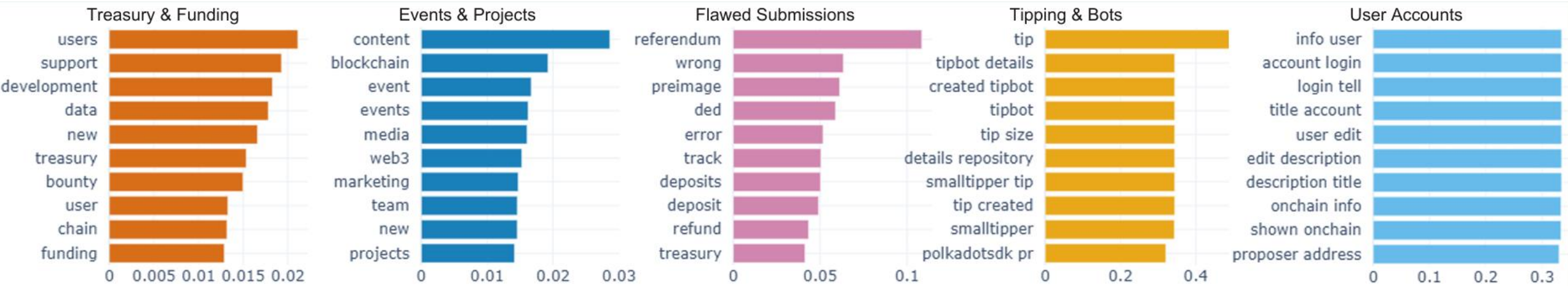


Why separate models?

A unified model mainly separated platform terminology, not governance themes.

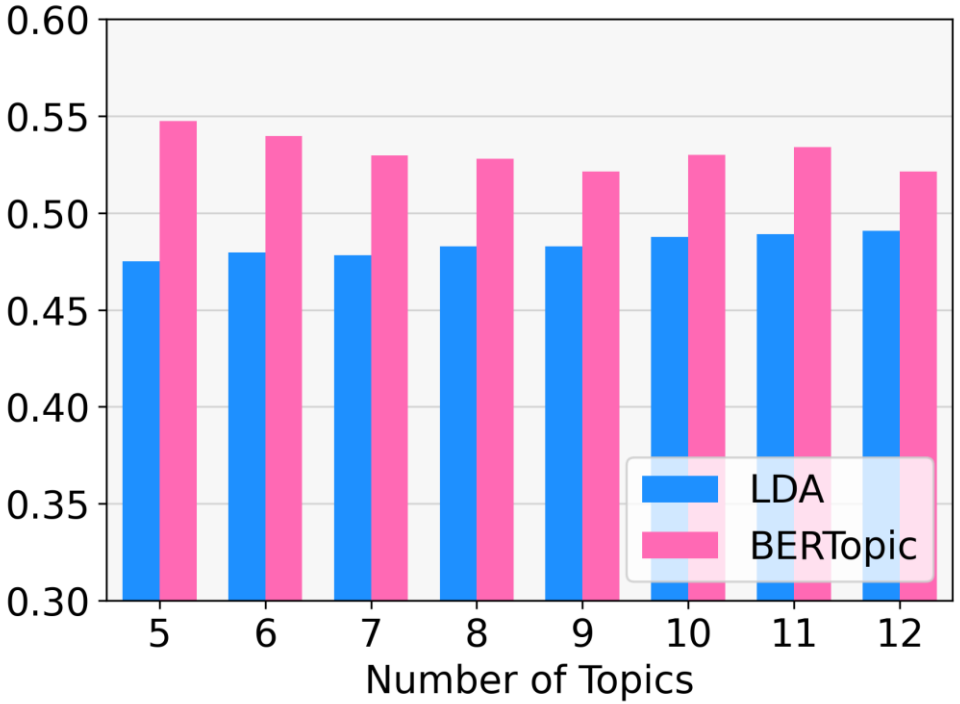
Labels support interpretation only; they do not affect clustering or statistical tests.

Example: OpenGov topic labels and most common words

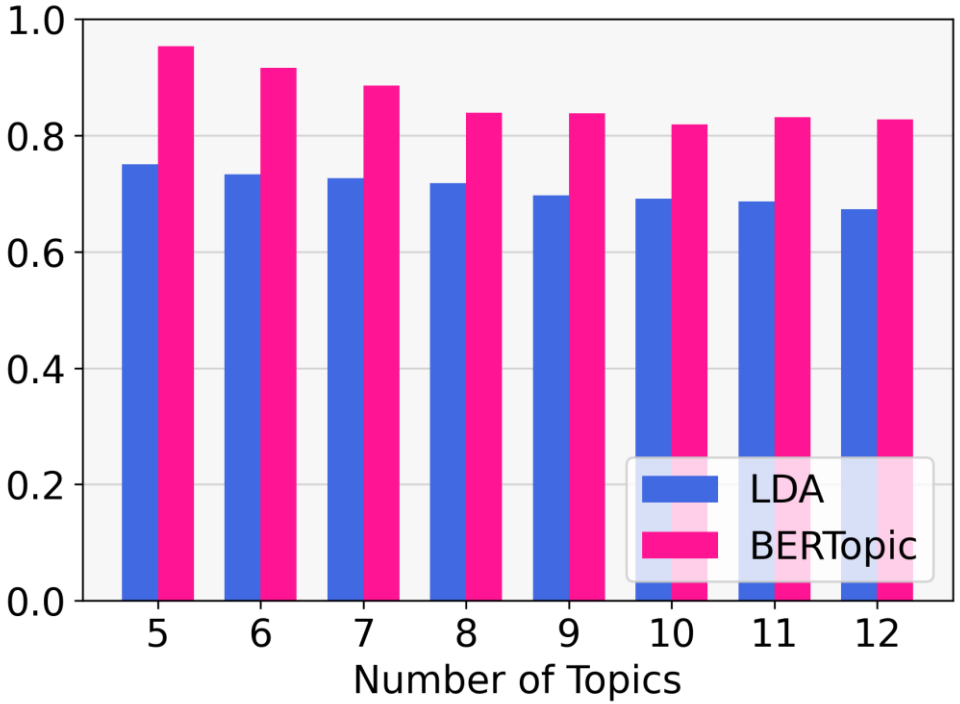


BERTopic beats the LDA baseline on both metrics

(a) Mean Topic Coherence Score (c_v)



(b) Mean Topic Diversity Score



Setup: LDA as the **baseline**
- for each of 5–12 topics, 25 models with different random seeds trained

Result: BERTopic performs **better** on both metrics, therefore chosen for the cross-platform analysis.

Financial decisions dominate, but priorities differ

OpenGov

~50%

Treasury & Funding

Network-level financing dominates

Snapshot

~45%

Liquidity & Treasury

More community, NFT and metaverse topics

SNS

~30%

Tokenomics & Treasury

Strong software and infrastructure activity. Football topic!

DAOstack

~40%

Trading & Treasury

Technical and contributor operations

Financial themes appear everywhere.

The non-financial agenda reveals how governance design and community purpose differ.

Is Proposal topic associated with approval?

Cramer's V

SNS	**0.20**	**Snapshot**	**0.25**
DAOstack	**0.27**	**OpenGov**	**0.56**

Association, not causality.

Platform rules, proposers, quorum, timing and quality also matter.

Proposal content relates to multiple governance dimensions

1

Decision time

- Financial proposals tend to take longest.
- Technical items are often resolved faster.

2

Proposer diversity

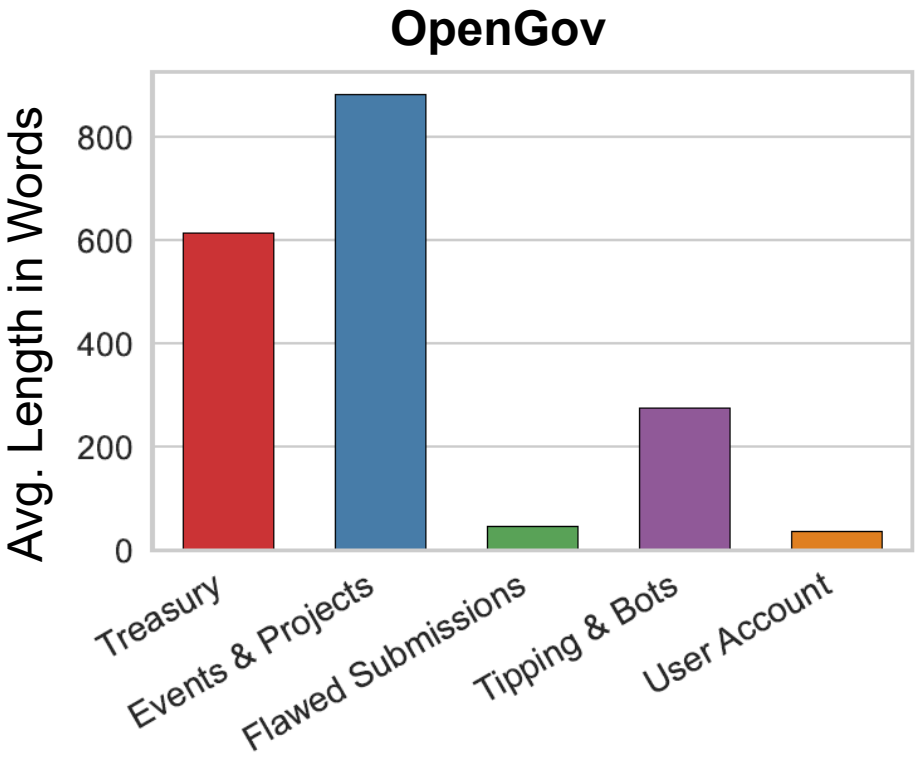
- OpenGov reaches 49-66% unique-proposer rates.
- SNS remains below ~10%

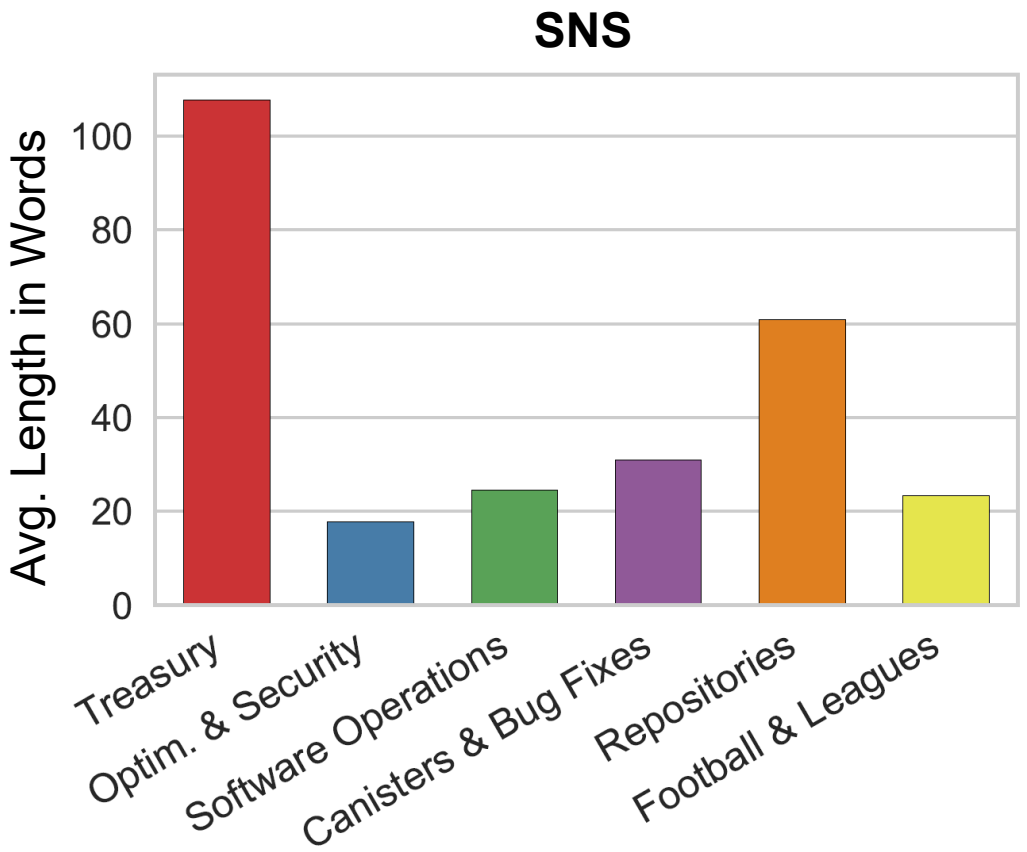
Aggregate participation can hide concentration inside specific decision domains.

Proposal content relates to multiple governance dimensions

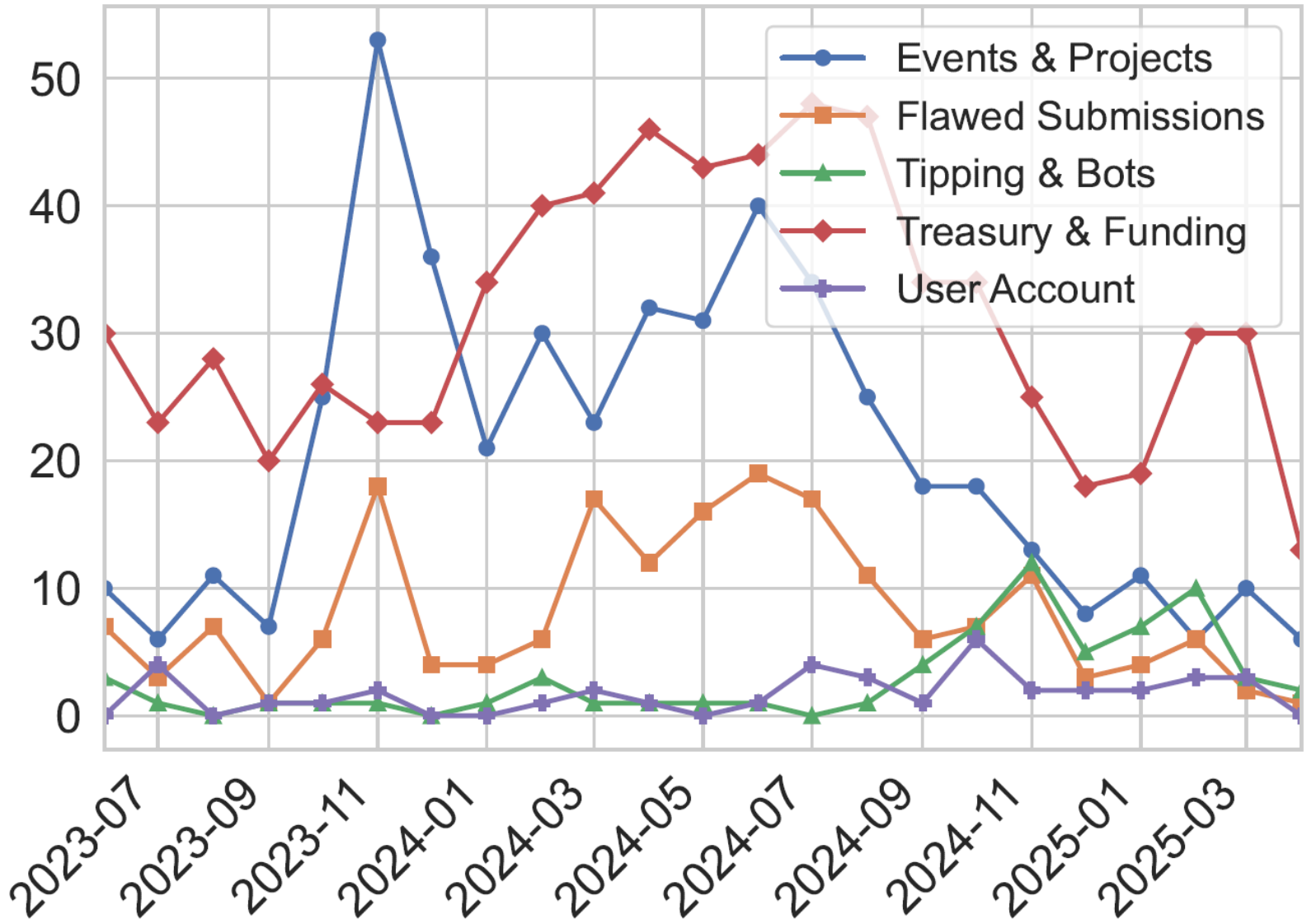
3 Proposal length

- Technical topics are generally shorter
- Financial proposals tend to be more detailed
- Proposals shouldn't be too detailed or too superficial





OpenGov activity: Governance priorities evolve over time



Topic activity reflects changing community priorities

- **Early peak:** Events & Projects surge at the platform's launch
- **New members:** more User Account proposals as the community grows
- **Ex.: Newcomer errors** Flawed Submissions rise as more users come

Implications for DAO governance

1. **Proposal interfaces** — Show categories and historical context to voters.
2. **Review processes** — Allow appropriate review processes for more important topics, such as financials.
3. **Governance dashboards** — Track delays, approval changes and proposer concentration.

Use categories as decision support, not deterministic predictions.

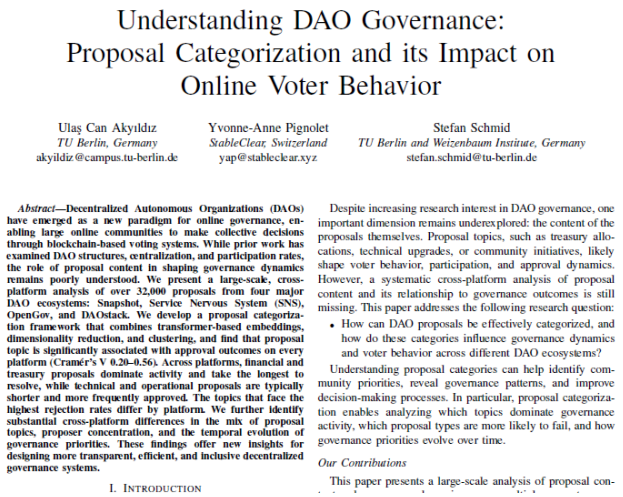
Conclusion

Finding	32,819 proposals across four DAO ecosystems.
Method	Transformer-based topic modeling with an LDA baseline.
Result	Proposal topic and attributes are associated with governance outcomes.

Message:

What is being voted on is as important as how voting is organized.

Thank you for your attention!



Understanding DAO Governance:
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Online Voter Behavior

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***Abstract*—Decentralized Autonomous Organizations (DAOs) have emerged as a new paradigm for online governance, enabling large online communities to make collective decisions through blockchain-based voting systems. While prior work has examined DAO structures, centralization, and participation rates, the role of proposal content in shaping governance dynamics remains poorly understood. We present a large-scale, cross-platform analysis of over 32,000 proposals from four major DAO ecosystems: Snapshot, Service Nervous System (SNS), OpenGov, and DAOstack. We develop a proposal categorization framework that combines transformer-based embeddings, dimensionality reduction, and clustering, and find that proposal topic is significantly associated with approval outcomes on every platform (Cramér's V 0.20–0.56). Across platforms, financial and treasury proposals dominate activity and take the longest to resolve, while technical and operational proposals are typically shorter and more frequently approved. The topics that face the highest rejection rates differ by platform. We further identify substantial cross-platform differences in the mix of proposal topics, proposer concentration, and the temporal evolution of governance priorities. These findings offer new insights for designing more transparent, efficient, and inclusive decentralized governance systems.**

I. Introduction

Despite increasing research interest in DAO governance, one important dimension remains underexplored: the content of the proposals themselves. Proposal topics, such as treasury allocations, technical upgrades, or community initiatives, likely shape voter behavior, participation, and approval dynamics. However, a systematic cross-platform analysis of proposal content and its relationship to governance outcomes is still missing. This paper addresses the following research question:

- How can DAO proposals be effectively categorized, and how do these categories influence governance dynamics and voter behavior across different DAO ecosystems?

Understanding proposal categories can help identify community priorities, reveal governance patterns, and improve decision-making processes. In particular, proposal categorization enables analyzing which topics dominate governance activity, which proposal types are more likely to fail, and how governance priorities evolve over time.

Our Contributions

This paper presents a large-scale analysis of proposal con-

Questions?

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Dataset: zenodo.org/records/17280115
Code: github.com/ulasakyildiz/dao-proposal-data-collection

Backup

Methodology • validation • statistics • reproducibility

Why k-means and separate models?

HDBSCAN

≈ one third outliers
70–100 clusters per platform

k-means

Controlled k = 5–12
Compact, interpretable topics

Unified model

Separated platform terminology
instead of governance themes

Selection

Coherence + diversity + interpretability
25 random seeds

SNS proposal topics and approval status



Rejected and not executed are different outcomes

To be executed, a proposal needs both:

Acceptance
majority of “Yes” votes

+

Participation
threshold met: 20% for critical, 3% for ordinary proposals

583 SNS proposals were not executed:

331
failed to get a “Yes” majority

252
had a “Yes” majority (≈93% Yes-votes on average) but missed the participation threshold

Takeaway: a high participation threshold can stop changes the community supports.

On SNS, longer proposals are more likely to be rejected

SNS: longer proposals are more likely to be rejected.

Proposal Type	Total	Rejected	Strongly Rejected
Short (0–40 words)	6,024	108 (1.8%)	62 (1.0%)
Medium (41–200)	2,612	179 (6.9%)	116 (4.4%)
Long (200+)	422	44 (10.4%)	24 (5.7%)

TABLE III: Number and percentage of proposals rejected (>50% "No" votes) and strongly rejected (>75% "No" votes), grouped by proposal length and platform.

Proposals shouldn't be too detailed or too superficial

Limitations

- Different platform rules and outcome mechanics
- Some missing SNS history, DAOstack discontinued
- Different data attributes, hard to compare

The results describe platform-specific governance patterns.

They do not claim that topic alone determines outcomes.

Reproducibility

- Embedding model: mixedbread-ai/mxbai-embed-large-v1
- Embedding dimension: 1024
- PCA: 6–8 components per platform
- Topic search: k = 5–12
- 25 random seeds per model and setting
- Unigrams + bigrams, c-TF-IDF top terms
- Data and code: Zenodo 17280115