Open Problems in DAOs

And… Why You Should Care.

Research Collaboration
Facilitated by Metagov

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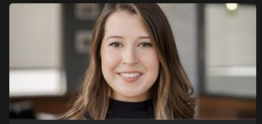

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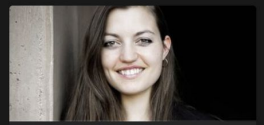

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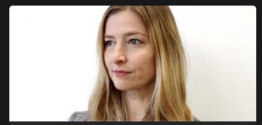

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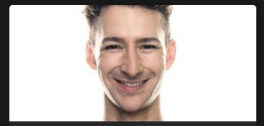

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Contents


Computer Science
Economics
Organizational_ Science
Law
Political Science
Ethics
Philosophy

Why Should You Care?

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Major Coordination Problems!

Sustaining Open-Source Software

— Addressing chronic underfunding and resource shortages in critical digital infrastructure, and unleashing the potential of collaborative production.

Democratic governance of artificial intelligence

— Developing bottom-up, decentralized approaches to AI governance (and training data governance) that are more responsive and representative

Regenerative Finance:

— Creating a sustainable and equitable planetary economy by aligning financial incentives with ecological restoration and social justice

(Section 8 of our paper)

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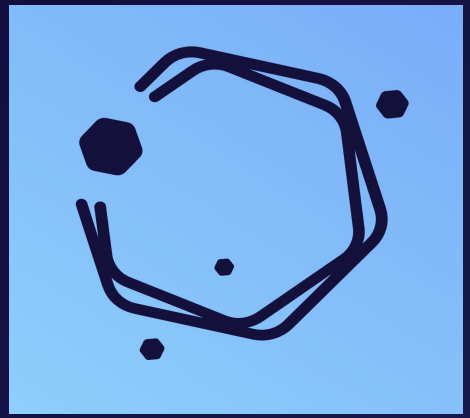
Who am I
&
My Perspective

Michael Zargham, PhD Electrical & Systems Engineering, UPenn 2014

Founder & Chief Engineer
(my day job)



BlockScience is a “digital” civil engineering firm.

Board Member & Research Director
(volunteer roles)

A laboratory for digital governance.

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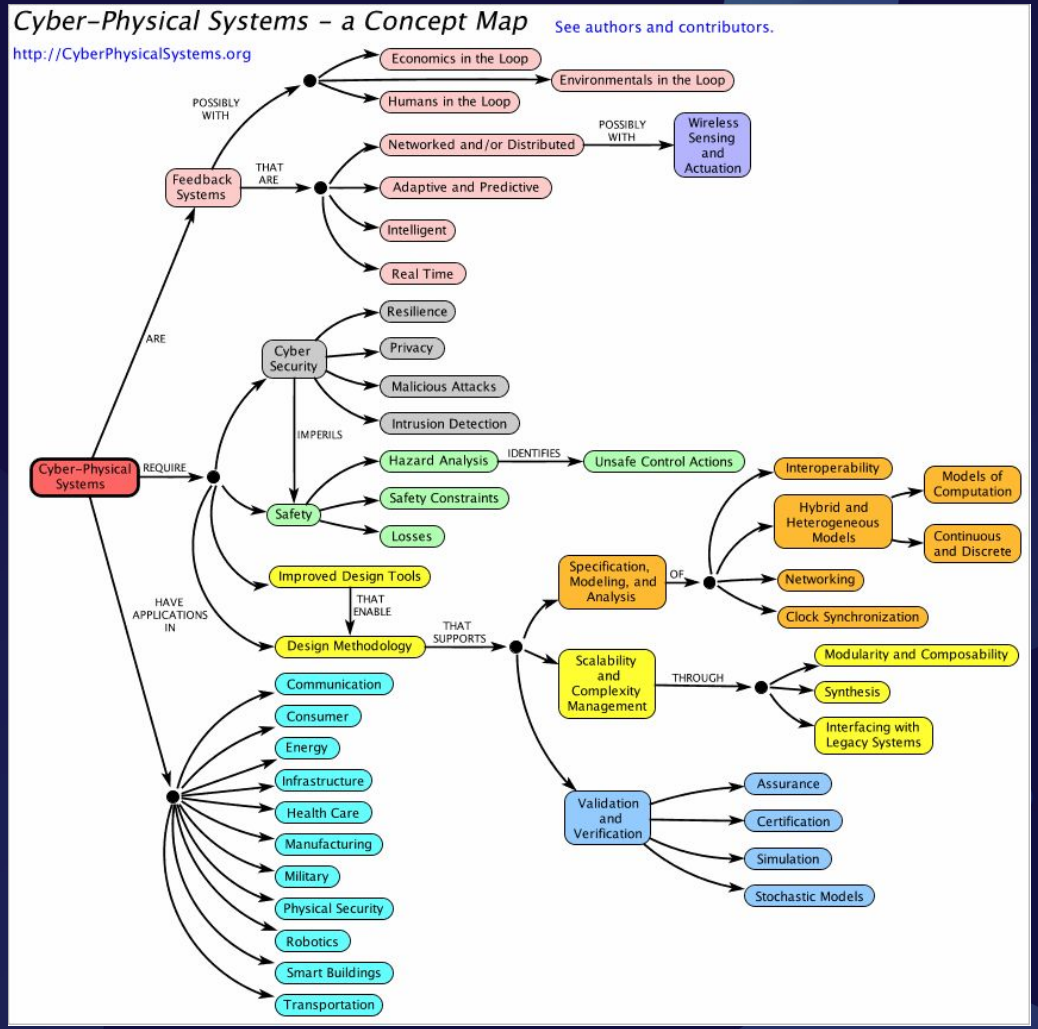
My Perspective: Blockchains & DAOs are Cyber-Physical Systems

A cyber-physical system (CPS) is a collection of mechanisms that is controlled and/or monitored by computer-based algorithms, tightly integrated with the Internet and its users.



https://ptolemy.berkeley.edu/projects/cps/

What are DAOs?

DAOs are organizations governed by a smart contract, typically deployed on a blockchain that autonomously enforces rules for interaction among the members. (Hassan & De Filippi, 2021)

DAOs also belong to a larger class of digitally-constituted organizations: organizations governed through computational artifacts such as software, hardware, and/or protocols.
(Tan et al, 2024)

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Meme Credit:
Litigating the Ledger:
Civil Liability for DAO Controllers
(Alston, 2024)

Digitally-Constituted? *"What Constitutes a Constitution?"*.

the function of a **constitution** *is to*

— delineate the boundaries of a particular organization or entity,

— entrenching elements of its composition relative to that organization's regular processes of decision-making,

— as well as against the broader array of legal, social, economic, and environmental forces that make up its context(s).

— operates to reinforce the coherence of that entity

— in the face of both internal and external pressures, …

— evolve through its interactions with both its members and its environment

— while nonetheless retaining its identity.

(Zargham M., Alston E., Nabben K., Ben-Meir I., 2023)

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Meme Credit: Metalex Whitepaper (Shapiro, 2024)

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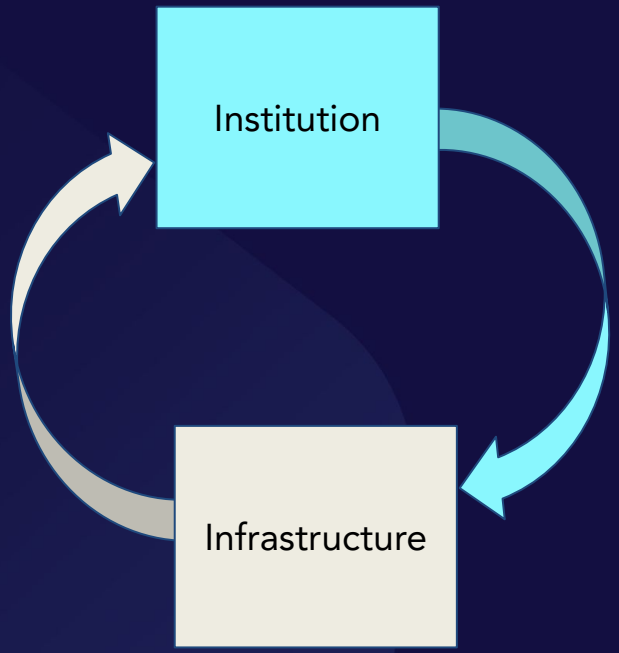
Decentralized Networks, DAOs,
Protocol-Guilds, BORGs, etc



Enables,
Facilitates,
Standardizes,
Automates,
Decentralizes

Uses,
Operates,
Monitors,
Maintains,
Governs

Blockchain Networks, Smart Contracts,
Oracles, Forums, etc

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Meme Credit: Algorithms as Policy (Zargham & Nabben, 2020)

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Constitutional Archetype from (Zargham & Nabben, 2022)

Table 1: Archetypes for Governance of Organizational Code

Archetype	**Immutable**	**Constitutional**	**Mutable**
Governance Surface	None	Small	Large
Variety	Low	Medium	High
Adaptive Capacity	None	Constrained	Unconstrained
Resilience	Low	High	High
Robustness	High	High	Low

Source

Aligning 'Decentralized Autonomous Organization' to Precedents in Cybernetics

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Meme Credit: The Human Side of DAOs (Case, 2023)

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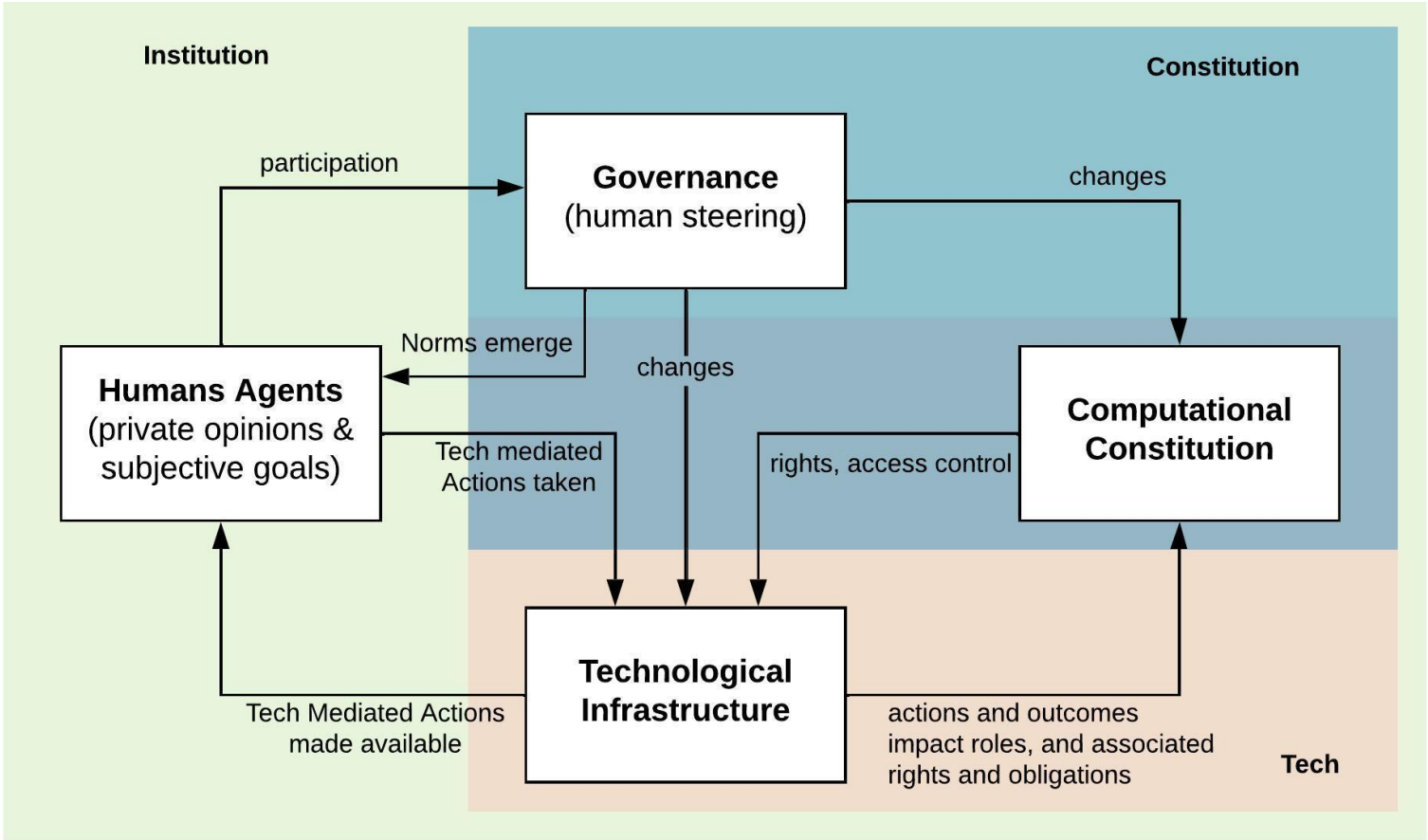
Adapted from (Voshmgir & Zargham, 2019)



Implicates the Topics Explored in the “Open Problems in DAOs” Paper

- **Computer Science:** Exploring Technical challenges faced in implementing operating DAOs; such as privacy, secure voting, standards, formal verification.
- **Economics:** Examining institutional dynamics, platform economics, labor economics, participation incentives, social choice and corporate governance.
- **Ethics:** Investigating moral agency, potential misuse, and ethical operation.
- **Law:** Addressing legal definitions, liability issues, and regulatory frameworks
- **Organizational Science**: Complex adaptive systems and their evolution, institutional evolution, and ethnographic methods.
- **Political Science:** Self-Governance and autonomy, political philosophy, empirical political economy, metrics and implications for global governance

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Get Involved with DAO Science

https://daoscience.org/