# CA-10 Capture in open systems: Wikipedia, open source and the DAOs

The digital commons of the late twentieth and early twenty-first centuries served as an unprecedented, planetary-scale laboratory for human self-governance. For a brief historical window, human populations interacting across global telecommunication networks attempted to build highly complex, cooperative institutional structures devoid of traditional state monopolies on violence, unconstrained by physical geography, and entirely reliant on voluntary association. These digital ecosystems—spanning peer-production knowledge bases, open-source software repositories, and cryptographically secured Decentralized Autonomous Organizations (DAOs)—experimented with transparent rulesets, algorithmic consensus, and the complete visibility of human action.

For the purposes of reconstructing functional self-governance post-collapse, this era provides a highly documented, accelerated fossil record of how human organizations evolve, how they ossify into bureaucracies, and how they ultimately fall to capture. The underlying inquiry of this report is to determine which principles of self-governance hold true across extreme technological shifts, specifically focusing on the vulnerabilities these systems displayed when targeted by actors exhibiting dark-triad psychological traits (narcissism, Machiavellianism, and psychopathy).

Two foundational sociological theories govern this historical analysis. The first is the "Iron Law of Oligarchy," formulated by the German-born Italian sociologist Robert Michels in his 1911 empirical study of European socialist parties, *Political Parties: A Sociological Study of the Oligarchical Tendencies of Modern Democracy*[1]. Michels demonstrated that the technical necessity of leadership, the demand for operational efficiency, and the general psychological apathy of the masses inevitably concentrate power among a minority, regardless of a group's democratic or egalitarian origins[1]. He famously asserted that whoever says organization, says oligarchy[1]. The second foundational theory is "The Tyranny of Structurelessness," articulated by the American feminist scholar Jo Freeman (writing under the pseudonym Joreen) in 1970 and formally published in 1972[5]. Analyzing the radical feminist collectives of the era, Freeman argued that abandoning formal governance structures does not eliminate hierarchy; it merely masks it. A structureless group replaces accountable, visible power with unaccountable, informal cliques, creating an environment highly susceptible to manipulation and capture by charismatic or dominating personalities[8].

This report examines three primary domains of the digital commons—Wikipedia, open-source software infrastructure, and DAOs—to extract functional parameters for governance after the permanent loss of industrial supply chains. It quantifies the thresholds at which democratic participation fails, maps the vulnerabilities of these open systems to dark-triad capture, and evaluates the structural ledgers of their scalability across human organizational rungs.

## Open Peer Production: The Wikipedia Laboratory

Launched in January 2001, Wikipedia stands as the paramount historical example of open-peer

production. Originally conceptualized as a radical, planetary-scale democratization of knowledge, its governance evolved rapidly from a flat, charismatic authority led by its founders into a labyrinthine bureaucracy managed by an entrenched administrative class. The project sought to prove that an open system, where any individual could alter the historical and informational record at any time, could organically produce a coherent and accurate encyclopedia.

## The Ethnographic and Historical Record

In the system's infancy, conflict resolution relied on informal consensus and the direct, charismatic intervention of its founder, Jimmy Wales. However, as the user base expanded geometrically, the community was forced to formalize power to manage internal disputes and external vandalism. This led to the creation of Administrators (sysops) and the Arbitration Committee (ArbCom), the latter functioning as the project's supreme court. Administrators were granted exclusive technical rights to delete records, protect pages from being edited, and ban users from the platform[10]. Access to this elite administrative class was gated through a highly public, grueling vetting process known as Requests for Adminship (RfA)[11].

The empirical record demonstrates a stark transition from an open, rapidly expanding frontier to a closed, defensive oligarchy. In their 2013 empirical study, *The Rise and Decline of an Open Collaboration Community*, Aaron Halfaker, R. Stuart Geiger, Jonathan T. Morgan, and John Riedl analyzed the lifecycle of the English Wikipedia. They identified that the platform's active contributor base peaked in 2007 and subsequently entered a prolonged, structural decline[13]. Crucially, this decline was not driven by a lack of interest from the general public, but rather by the systemic rejection of newcomers by the established community. The implementation of algorithmic quality control systems (automated bots) and the establishment of highly rigid bureaucratic norms led to the immediate reversion of newcomer contributions. This hostile environment drove away desirable new participants and permanently solidified the power of the 2005–2008 cohort of editors[10].

The administrative class itself heavily contracted as the bureaucratic barriers to entry became insurmountable for average participants. Statistics regarding the English Wikipedia indicate that while there were over 3,500 total administrators across all language editions, active administrator inflow dropped precipitously after 2015[10]. The vast majority of active administrators on the largest wikis belonged to cohorts that began editing between 2007 and 2015. Very few successful RfAs occurred in the project's later years due to the hostile and exhaustive nature of the community vetting process, leaving the project with a declining, aging core of active monthly administrators[10].

To understand this phenomenon systemically, Aaron Shaw and Benjamin M. Hill conducted a massive empirical analysis in their 2014 study, *Laboratories of Oligarchy? How the Iron Law Extends to Peer Production*, published in the Journal of Communication. They quantified this organizational ossification across a sample size of 1,837 distinct, minimally successful wiki communities drawn from a larger dataset of 5,216 wikis[17]. Shaw and Hill sought to determine if Robert Michels's Iron Law of Oligarchy held true in digital environments where communication and coordination costs were effectively zero. Their findings were definitive: as communities grew in population size, they consistently abandoned decentralized, egalitarian

decision-making in favor of entrenched, oligarchic core groups. The study proved that even under optimal technological conditions, successful peer production communities inevitably concentrate power to achieve their operational goals[17].

## The Three Perspectives on Peer Production Governance

The governance of Wikipedia must be separated into what the participants believed they were doing, what the historical data proves they were doing, and how modern scholarship interprets these actions. The community's explicit ideology asserted that "anyone can edit," framing the project as an egalitarian, anti-elitist meritocracy. In this idealized view, authority derived strictly from the quality of one's contributions, and rules were viewed as descriptive norms rather than prescriptive laws. The participants believed they had transcended traditional hierarchy through pure transparency.

However, the empirical record shows a vastly different reality. The project peaked in active participation in 2007, after which an administrative oligarchy heavily restricted entry and consolidated control[13]. A permanent, semi-active administrative class consisting almost entirely of early adopters formalized complex policies that automated the rejection of newcomers. This reduced administrator inflow to a trickle, relying heavily on automated bots for the maintenance of the commons[10]. The system operated as a strict technocratic bureaucracy, not an egalitarian commons.

Modern scholarship infers that this ossification was not born of malice, but was a necessary defensive mechanism. Scholars like Halfaker infer that the rigid bureaucracy was required to protect the digital commons from the relentless entropy of vandalism and bad-faith actors[13]. Conversely, scholars like Shaw and Hill infer that this defensive posture fundamentally transformed the project, proving that the Iron Law of Oligarchy is an inescapable feature of human organization, even in systems explicitly designed to prevent it[17]. The necessity of defending the commons inevitably created a ruling class.

## Capture Test: The Wiki Bureaucracy

| Capture Mechanism | Historical Evidence | Resistance/Reversal Features |
|---|---|---|
| **Machiavellian Rule Lawyering:** A highly organized faction or individual uses the extensive bureaucracy to exhaust opponents. By mastering intricate rules (e.g., civility policies, verifiability standards), a dark-triad actor aggressively harasses rivals | Coordinated factions frequently captured specific ideological, political, or historical pages. The complexity of the Arbitration Committee (ArbCom) process heavily favored those with the excessive free time and Machiavellian disposition required to craft elaborate, | Absolute transparency of the edit history. Every action, reversion, and comment is permanently recorded and timestamped. When a faction becomes too overt, the broader community or ArbCom can audit the timestamped evidence to reveal coordination and bad faith. |

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| while technically remaining within the bounds of policy. They bait genuine, productive contributors into emotional outbursts, weaponizing the bureaucracy to result in the banishment of their targets. | policy-laden dossiers against their enemies, rather than focusing on knowledge production. | However, executing this defense requires massive, exhausting expenditures of community energy. |

## Scale Ledger: Peer Production Governance

| Rung | Scale | Applicability and Failure Modes |
|---|---|---|
| Household | 4 to 10 people | **Fails.** The bureaucratic overhead of formal policies, voting, and arbitration is lethal to small groups, which rely on informal, interpersonal trust to function efficiently. |
| Hamlet/Band | 30 to 50 people | **Fails.** Peer production at this scale lacks the critical mass required to generate enough diverse contributions to offset the "freerider" problem and the constant need for maintenance. |
| Village | 150 to 500 people | **Operates.** This represents the functional "core group" of highly active administrators on specialized wikis. Trust begins to transition from purely interpersonal to institutional and |

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| | | policy-based. |
| Parish/District | 1,500 to 5,000 people | **Works well.** This matches the peak active administrative and highly-invested editor count of major wikis. Reputation systems are highly functional; members recognize pseudonyms but rely on recorded histories to verify claims. |
| Town/Watershed | 15,000 to 50,000 people | **Works optimally.** This represents the peak active contributor base of the English Wikipedia. Oligarchy is deeply entrenched at this level, but it effectively manages the output of a town-sized labor force through algorithmic assistance (bots). |
| Region/Bioregion | 0.5 to 5 million people | **Never tried / Fails.** The active, governance-participating population never reached this scale. Only consumers and passive readers exist at this rung, not active governors. |
| Nation/Continent | 50 to 500 million people | **Fails.** Direct peer-governance collapses entirely; the divide between the governing oligarchy and the consumer base becomes absolute and unbridgeable. |

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| Planet | 8 billion people | **Fails.** Epistemic fragmentation, cultural divides, and language barriers prevent a unified, planetary-scale governance structure from operating a single commons. |

# Open Source Software: Benevolent Dictators and Constitutional Meritocracies

The development of the fundamental software infrastructure of the digital age—operating systems, programming languages, compression libraries, and web servers—relied on a different governance paradigm entirely: the open-source model. Unlike the bureaucratic consensus of wikis, the open-source model oscillated violently between two structural poles: charismatic autocracy and highly complex constitutional democracy.

## The Ethnographic and Historical Record

The Linux operating system kernel and the Python programming language established the archetype of the "Benevolent Dictator for Life" (BDFL). Linus Torvalds (Linux) and Guido van Rossum (Python) maintained absolute, unappealable executive authority over the final inclusion of contributions to their respective projects[25]. This autocratic system bypassed the bureaucratic gridlock seen in peer-production wikis, prioritizing technical excellence, ideological cohesion, and speed. However, this structure concentrated the entirety of the system's stress onto single individuals, making the ecosystem highly fragile.

This fragility was exposed on July 12, 2018, when Guido van Rossum abruptly stepped down as Python's BDFL[25]. His resignation was triggered by deep emotional exhaustion and severe community hostility surrounding Python Enhancement Proposal (PEP) 572, which debated the introduction of "assignment expressions" (commonly known as the walrus operator)[28]. The intense community backlash highlighted the ultimate vulnerability of autocracies: they are entirely subject to the psychological burnout of the autocrat[30]. Recognizing the danger of falling into Jo Freeman's "Tyranny of Structurelessness," the Python community deliberately chose not to devolve into an informal collective. Instead, they instituted a formal Steering Council model, codified in PEP 8016 in December 2018. This pivotal constitutional document transferred executive authority from the sole founder to an elected, five-person committee, distributing the psychological load and formalizing the transfer of power[29].

Conversely, the Debian Project, a foundational Linux distribution, opted for constitutional democracy from its inception. The Debian Constitution, formally ratified in 1998, relies heavily on General Resolutions and the annual democratic election of a Debian Project Leader (DPL)[34]. To prevent strategic voting, factionalism, and majoritarian tyranny, Debian utilizes the Schulze method—a highly complex, Condorcet-compliant ranked-choice voting system. The Schulze

method calculates path strengths between pairwise defeats in a directed graph, aiming to identify a candidate who would win in a head-to-head matchup against all other alternatives, iteratively dropping the weakest defeats to find the minimal "winner's circle" (the Schwartz set)[36]. Despite this sophisticated application of cryptographic and mathematical fairness designed to ensure perfect democratic representation, empirical data reveals systemic and intractable voter apathy. Voter turnout among Debian's approximately 1,000 certified and eligible developers consistently hovers between 33 percent and 44 percent. Official tallies show a turnout of 33.5 percent in 2020, 44.6 percent in 2021, and 35.4 percent in 2022[35]. The mathematical perfection of the voting system could not overcome the sociological reality of political fatigue.

The ultimate and most devastating vulnerability of the open-source meritocracy was exposed by the XZ Utils backdoor incident (designated CVE-2024-3094), which was discovered entirely by accident in March 2024[39]. XZ Utils, a critical data compression library used globally in almost every Linux distribution, suffered from a "bus factor" of one. It was maintained by a single, unpaid volunteer, Lasse Collin, who was publicly suffering from severe mental health struggles and burnout[31]. An advanced persistent threat actor utilizing the pseudonym "Jia Tan" executed a flawless, patient, multi-year social engineering campaign starting in 2021[31].

By providing genuinely helpful, high-quality code contributions over three years, Jia Tan earned Collin's trust and was gradually granted co-maintainer status[41]. Concurrently, the attacker utilized a network of sockpuppet accounts to generate artificial community pressure, harassing Collin with demands for faster updates and feature integration. This coordinated psychological warfare exacerbated Collin's burnout, forcing him to hand over final release control to Jia Tan to alleviate his own stress[31]. In early 2024, Jia Tan injected a sophisticated, multi-stage obfuscated backdoor into versions 5.6.0 and 5.6.1 of the software. The backdoor utilized IFUNC resolvers to replace OpenSSH's RSA public decrypt function at runtime, granting the attacker silent, authenticated remote code execution across the global internet infrastructure[31]. The attack was only thwarted when Andres Freund, a Microsoft engineer, decided to investigate a microscopic 500-millisecond latency delay during SSH logins[31]. The governance model had failed entirely; the system was saved only by extreme technical paranoia.

## The Three Perspectives on Open Source Governance

The participants within the open-source community explicitly viewed their domain as a pure meritocracy. The prevailing ideology dictated that "given enough eyeballs, all bugs are shallow," asserting that code quality was the sole determinant of status, and that decentralized, transparent collaboration would inherently route around malice, incompetence, and failure. Governance was seen as a secondary, often annoying, byproduct of technical work.

However, the historical record shows that the ecosystem was fundamentally fragile, highly centralized around single points of failure (BDFLs or isolated, exhausted maintainers). The system relied entirely on unpaid, unacknowledged labor, resulting in severe maintainer burnout that left critical global infrastructure undefended[31]. Furthermore, when complex democratic voting mechanisms were applied, such as in Debian, they suffered from persistent, structural low turnout, proving that technical contributors have little desire to engage in administrative

governance[35].
Modern scholarship infers that structureless or purely meritocratic communities are highly vulnerable to social engineering precisely because they lack formal institutional defenses. Trust is treated by these communities as an infinite, renewable resource, but sociological analysis reveals it is structurally fragile. The lack of institutional support, human resources, and formal succession planning turns open-source infrastructure into a highly lucrative soft target for dark-triad actors and state-sponsored advanced persistent threats[31].

## Capture Test: Open Source Repositories

| Capture Mechanism | Historical Evidence | Resistance/Reversal Features |
|---|---|---|
| **Psychopathic Exploitation of Empathy and Burnout:** A malicious actor identifies an exhausted, isolated leader maintaining a critical systemic node. By masquerading as a selfless, helpful volunteer and utilizing proxy identities to generate artificial community pressure and guilt, the actor isolates the target. The attacker extracts the technical keys to the system not through force, but by weaponizing the target's own fatigue and desire for relief. | The 2021–2024 XZ Utils backdoor campaign orchestrated by the pseudonym "Jia Tan." This was a flawless execution of long-term social engineering, exploiting the mental health and fatigue of a sole maintainer (Lasse Collin) to achieve a near-catastrophic global supply chain compromise[31]. | Broad organizational review and algorithmic anomaly detection. Notably, the XZ backdoor was caught not by any governance or vetting mechanism, but by extreme technical observation (noticing a 500ms processing delay)[31]. Systemic mitigation requires enforcing the rotation of power, eliminating single points of failure (increasing the "bus factor"), and formally funding maintenance labor. |

## Scale Ledger: Open Source Governance

| Rung | Scale | Applicability and Failure Modes |
|---|---|---|
| Household | 4 to 10 people | **Operates.** The Benevolent Dictator for Life (BDFL) model works perfectly here. A single patriarch or |

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| | | matriarch makes swift, unappealable decisions based on deep technical and practical understanding of the environment. |
| Hamlet/Band | 30 to 50 people | **Works optimally.** This represents a highly functional core development team. The steering council model (analogous to Python's PEP 8016) thrives at this scale, preventing the psychological burnout of a single leader while maintaining organizational agility and trust[29]. |
| Village | 150 to 500 people | **Operates.** This represents a large open-source project. It functions only by imposing a structured hierarchy of commit rights, separating contributors from core reviewers. |
| Parish/District | 1,500 to 5,000 people | **Operates with high friction.** This encompasses the Debian developer base (approximately 1,000+ eligible voters). At this scale, the system requires highly complex voting algorithms (like the Schulze method) to prevent factionalism and strategic voting, but it struggles massively with democratic apathy (turnout below 45%)[35]. |

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| Town/Watershed | 15,000 to 50,000 people | **Fails as a cohesive governing body.** At this scale, the project ceases to be a governed community and fractures into an aggregate of isolated consumers and disconnected sub-projects. |
| Region/Bioregion | 0.5 to 5 million people | **Never tried / Fails.** |
| Nation/Continent | 50 to 500 million people | **Never tried / Fails.** |
| Planet | 8 billion people | **Never tried / Fails.** |

# Decentralized Autonomous Organizations: Plutocracy by Algorithm

With the advent of blockchain technology, the digital commons attempted to solve the frailties of human trust, the burnout of maintainers, and the corruption of administrators by replacing legal and social enforcement with cryptography and immutable code. Decentralized Autonomous Organizations (DAOs) deployed Turing-complete smart contracts to govern communal treasuries, direct investments, and alter protocol parameters without any central human management.

## The Ethnographic and Historical Record

The foundational premise of DAOs—often summarized by the maxim "code is law"—was catastrophically tested in the summer of 2016 with the launch of a project simply named "The DAO." Operating as a decentralized venture capital fund on the Ethereum network and developed by the firm Slock.it, The DAO raised an unprecedented 11 million Ether from approximately 18,000 investors[44]. The system was designed so that token holders could vote on funding proposals, with the smart contract automatically releasing funds upon a successful vote.

On June 17, 2016, an attacker identified and exploited a recursive call vulnerability (a reentrancy bug) within the smart contract. The attacker's script repeatedly requested withdrawals from the main treasury into a child DAO before the contract could update its internal ledger of user balances[45]. Through this recursive loop, the attacker successfully siphoned approximately 3.6 million Ether, valued at roughly $50 million at the time, paralyzing the ecosystem[45]. Prior to the attack, prominent figures like Peter Vessenes had warned of recursive call bugs, while others like Stephan Tual had publicly assured investors the funds were safe[49].

The incident triggered an existential philosophical crisis regarding governance. If "code is law," the hack was a legitimate, albeit highly malicious, execution of the contract's written

parameters; the machine had operated exactly as programmed. However, the social consensus of the community—facing catastrophic financial loss—refused to accept the outcome. A highly controversial hard fork was proposed to rewrite the blockchain's history and refund the investors. With a voter turnout of only 5.5 percent, roughly 80 percent of participating miners and token holders supported the intervention[48]. On July 20, 2016, at block 1,920,000, the hard fork was executed[44]. The dominant faction rewrote reality to recover the funds, retaining the name Ethereum (ETH). A minority, adhering strictly to the immutability principle and the "code is law" ethos, rejected the fork and maintained the original chain, which became Ethereum Classic (ETC)[45]. This event proved definitively that at the absolute base layer of human organization, social consensus always overrides algorithmic absolutism.

As DAOs matured in the following years, they universally adopted token-weighted voting mechanisms, wherein one token equals one vote. This architecture explicitly codified plutocracy. MakerDAO, the issuer of the DAI stablecoin and a foundational protocol of decentralized finance, provides a critical case study in the vulnerability of algorithmic finance to environmental shock. MakerDAO utilizes an overcollateralization model, requiring users to lock up assets (like Ethereum) exceeding 150% of the value of the DAI they generate. On March 12, 2020, an event known as "Black Thursday," global market panic induced by the COVID-19 pandemic caused Ethereum prices to plummet over 50 percent in a 24-hour period[51].

This massive price drop triggered a cascade of automated liquidations within the Maker protocol. Simultaneously, extreme network congestion caused transaction fees (gas prices) to spike to 200 Gwei. This congestion prevented price oracles from updating the blockchain with accurate market data and blocked automated "keeper" bots from participating in the liquidation auctions[51]. In the absence of competition, opportunistic actors submitted liquidation bids of zero DAI. The smart contracts executed flawlessly according to their logic, awarding $8.32 million in Ethereum collateral to the attackers for free, and leaving the Maker protocol with 5.67 million DAI in uncollateralized bad debt[51]. The protocol was forced to hold emergency debt auctions, minting and selling its own governance token (MKR) to recapitalize the system. The founder, Rune Christensen, subsequently initiated the "Endgame" plan, a massive restructuring designed to break the DAO into smaller sub-DAOs to manage risk and complexity[53].

Governance failures in DAOs are fundamentally failures of democratic engagement. Empirical studies of DAO voting behavior reveal alarming and systemic disenfranchisement. Across more than 4,936 voting activities spanning numerous protocols, the average participation rate sits at a dismal 1.77 percent[54]. Even in major protocols like Compound and Uniswap, average turnout rarely exceeds 17 to 28 percent for the most highly contested decisions[55]. The median DAO voter across a comprehensive four-year study was found to cast exactly one vote during their entire tenure[58].

Recognizing this systemic failure, Ethereum founder Vitalik Buterin published a seminal critique in August 2021 titled *Moving beyond coin voting governance*[59]. Buterin systematically dismantled the token-weighted model, arguing that it inevitably leads to plutocratic capture. In this system, massive token holders ("whales") unilaterally dictate policy. Furthermore, attackers utilize "flash loans"—borrowing massive amounts of capital for a single transaction block—to

temporarily buy enough votes to pass malicious governance proposals before instantly returning the borrowed funds. To counter this, Buterin advocated for "soulbound" (permanently non-transferable) tokens and quadratic voting mechanisms designed to heavily discount the voting power of concentrated wealth[59]. This represented a profound admission that the pure financialization of governance is an evolutionary dead end.

## The Three Perspectives on Algorithmic Governance

The participants in the DAO ecosystem explicitly argued that cryptographic governance removes human error, backroom corruption, and the friction of traditional legal systems. They championed the ideology that "code is law," believing that transparent, decentralized ledgers guarantee perfect property rights, eliminate the need for interpersonal trust, and ensure perfect democratic outcomes based on staked capital.

The historical record, however, demonstrates that code is highly brittle and incapable of contextual judgment. The DAO hack of 2016[45] and the MakerDAO Black Thursday crisis of 2020[51] proved that unexpected edge cases, malicious logic loops, or environmental stress (such as severe network congestion) lead to catastrophic systemic failure. In every major crisis, the algorithmic system failed and required emergency human intervention via hard forks or centralized foundation overrides to survive. Furthermore, voter turnout in these systems is functionally nonexistent, averaging under 2 percent[54].

Modern scholarship infers that token-weighted voting is not a technological leap forward, but rather a sociological regression to 18th-century property-franchise systems, where only landowners held the right to vote[59]. Without robust mechanisms to securely bind digital voting power to biological identity and historical reputation, DAOs are entirely vulnerable to rapid, capital-intensive capture by anonymous actors.

## Capture Test: Decentralized Autonomous Organizations

| Capture Mechanism | Historical Evidence | Resistance/Reversal Features |
|---|---|---|
| **Narcissistic/Machiavellian Plutocratic Capture:** An actor uses extreme wealth (or temporary, algorithmic wealth via flash loans) to entirely bypass community consensus. The attacker votes through proposals that either drain the communal treasury directly into their own wallets or fundamentally alter the | The execution of flash loan governance attacks across various decentralized finance protocols, and the theoretical vectors outlined by Vitalik Buterin[59]. The 2016 DAO reentrancy hack, while technical rather than electoral, represents the pure exploitation of the "code is law" framework to capture common funds[45]. | Hard forks and time-locks. The only true defense against catastrophic technical or plutocratic capture in a blockchain system is a social layer "override"—the human community collectively agreeing to abandon the captured system and start a new ledger (e.g., the Ethereum fork at block |

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| protocol's mechanics to enrich themselves at the expense of the minority. | | 1,920,000)[44]. Time-lock delays on the execution of successful votes provide the necessary window for the community to organize these forks. |

## Scale Ledger: DAO Governance

| Rung | Scale | Applicability and Failure Modes |
|---|---|---|
| Household | 4 to 10 people | **Fails.** Imposing rigid cryptographic voting, tokenization, and financialized incentives on intimate familial relationships destroys the necessary psychological bonds of unconditional trust and flexibility. |
| Hamlet/Band | 30 to 50 people | **Fails.** The group is too small for token economics to function efficiently; interpersonal conflict and social dynamics easily override smart contract logic. |
| Village | 150 to 500 people | **Operates.** Functions effectively as an investment club, a syndication vehicle, or a specialized cooperative where members possess high domain knowledge and strict financial alignment. |
| Parish/District | 1,500 to 5,000 people | **Works optimally.** Major DAOs (such as MakerDAO |

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| | | and Uniswap) possess active, highly engaged voting populations hovering around this scale. It represents the upper limit of a functional plutocracy before mass apathy sets in[55]. |
| Town/Watershed | 15,000 to 50,000 people | **Fails.** Voter turnout collapses well below 2 percent. The masses hold tokens for financial speculation but abdicate all governance responsibilities to a handful of whales and professional delegates[56]. |
| Region/Bioregion | 0.5 to 5 million people | **Never tried / Fails.** |
| Nation/Continent | 50 to 500 million people | **Never tried / Fails.** |
| Planet | 8 billion people | **Never tried / Fails.** |

## The Strongest Case Against Open Systems

The most devastating critique of the digital commons comes not from traditional institutionalists, but from the fundamental structural contradictions of the systems themselves, which were predicted decades earlier by political sociologists and feminist scholars.

The core argument against open systems is that they inevitably produce unaccountable, hidden aristocracies that shield themselves behind the public rhetoric of equality and transparency. Jo Freeman's *The Tyranny of Structurelessness* correctly diagnosed that when a community explicitly rejects formal leadership and constitutional boundaries—as early open-source projects, radical collectives, and wikis did—it does not destroy power dynamics; it merely makes power informal, implicit, and undetectable to outsiders[5]. Because there are no formal, transparent rules for how the elite are chosen, there are no mechanisms to audit or remove them. The oligarchy becomes a self-replicating social club based on proximity and hidden influence.

Robert Michels's Iron Law of Oligarchy is empirically validated by Shaw and Hill's extensive research, which definitively proved that advanced communication technology does absolutely nothing to mitigate the centralization of power[1]. The critics of "meritocracy" (such as Tarleton Gillespie regarding platform moderation, or general sociological critics of tech culture) point

out that "merit" is always defined subjectively by those who have already seized power. In Wikipedia, merit ceased to be about knowledge and became the ability to navigate Byzantine bureaucracy; in open source, merit became the psychological ability to endure endless, unpaid labor without burning out (a system that inherently filters for highly specific psychological profiles and heavily privileges those with immense free time); in DAOs, merit was simply obliterated and replaced directly by capital accumulation.

Finally, critics like Vitalik Buterin highlight that pure transparency and open access actually accelerate capture by dark-triad actors[59]. When every vote, wallet balance, structural vulnerability, and protocol rule is perfectly visible to the public, a Machiavellian actor possesses perfect information to model and execute their attack. Whether it is a technical exploit (The DAO hack)[45], an economic exploit (Black Thursday zero-bids)[51], or a psychological exploit (Jia Tan's XZ backdoor)[31], perfect transparency without high-friction human vetting guarantees that the system will be captured by its most relentlessly predatory participants.

# Recommended Essential Reading

To fully comprehend the mechanics of capture and the sociological underpinnings of open systems, it is necessary to engage directly with the foundational texts and primary empirical studies that define this domain. The fundamental theoretical framework is established by Robert Michels in his 1911 masterwork, *Political Parties: A Sociological Study of the Oligarchical Tendencies of Modern Democracy*[1], which remains the definitive text on the inevitable concentration of power. This must be paired with Jo Freeman's 1972 essay, *The Tyranny of Structurelessness*[5], which exposes the dangers of informal power in theoretically egalitarian collectives. To bridge these sociological theories into the digital era, Aaron Shaw and Benjamin M. Hill's 2014 paper, *Laboratories of Oligarchy? How the Iron Law Extends to Peer Production*[17], provides the empirical proof that technology cannot solve human organizational dynamics. The lifecycle of commons-based peer production is best detailed in Aaron Halfaker et al.'s 2013 study, *The Rise and Decline of an Open Collaboration Community*[13]. For an understanding of algorithmic governance failure, Vitalik Buterin's 2021 treatise, *Moving beyond coin voting governance*[59], serves as a primary source critique from the architect of the system itself. Finally, the structural evolution of open-source executive power is codified in the *Python Enhancement Proposal (PEP) 8016: The Steering Council Model* (2018)[25], and the mathematical attempt at perfect democracy is enshrined in *The Debian Constitution* (1998, as amended)[34].

# Implementability after the Fall

The digital era proves definitively that complex algorithms cannot replace social trust, and that pure structurelessness invariably invites tyranny. Translating these findings into a post-collapse, low-energy environment requires mapping the mechanics of digital governance onto harsh physical realities where there is no state, no electrical grid, and no internet.

**Household (4 to 10 people)** The minimum viable version for a household relies on the Benevolent Dictator for Life (BDFL) model observed in early open-source projects. A single patriarch or matriarch holds executive veto power, directing resources and labor with total authority to ensure biological survival. However, this leader must continually maintain the

consent of the governed through competence and empathy, or face familial fracture. To start, this requires nothing but biological and deep social bonds. The first failure to expect is the succession crisis: upon the sudden death or cognitive decline of the leader, the household will fracture if a clear, respected successor has not been informally groomed.

**Village (150 to 300 people)** The village scales beyond familial trust and requires the implementation of the Steering Council model (analogous to Python's PEP 8016). The village is governed by a council of five elders, elected annually. Voting requires physical presence to entirely mitigate the DAO apathy problem. Decisions, laws, and property demarcations must be logged in a public, immutable ledger—a heavy, securely bound book kept in the physical center of the village. To start, this requires basic literacy among the council, a central ledger book, ink, a designated meeting space recognized as the neutral "commons," and a shared solar/lunar calendar to track election cycles. The first failure to expect is the "XZ Utils" vector: a highly specialized, vital task (e.g., maintaining the only water mill or managing the seed vault) is relegated to a single individual who eventually burns out. A charismatic, Machiavellian outsider arrives, offers to relieve the burden, gains absolute trust over years, and subtly sabotages or captures the critical resource to subjugate the village.

**District (1,500 to 3,000 people)** At the district level, governance must transition to representative constitutionalism with rigorous vetting. This operates as a decentralized network of approximately ten villages relying on a representative Arbitration Committee (ArbCom) to settle inter-village disputes and manage district-wide resources. The system utilizes a physical analog of the Schulze method to prevent extreme factions from dominating: representatives rank choices by dropping colored pebbles into sorted clay jars, calculating pairwise preferences physically. To start, this requires standardized physical tokens, dedicated couriers for conveying sealed counts between villages, and a codified, written constitution of dispute resolution. The first failure to expect is the manifestation of Michels's Iron Law. The couriers, ballot-counters, and ArbCom representatives will realize they understand the complex mechanics of the voting system far better than the agrarian laborers. They will slowly alter the voting rules and constitutional interpretations under the guise of "administrative efficiency," ultimately entrenching themselves as a permanent, specialized oligarchy that extracts tribute from the producing class.

# Principles

| Governance Principle | Testable Sentence |
| --- | --- |
| **The Iron Law of Complexity** | Any organization that survives its founding generation will naturally concentrate executive power into a minority class to manage operational complexity. |
| **The Tyranny of Structurelessness** | Groups that explicitly refuse to formally define their leadership structures will inevitably develop unaccountable, informal, |

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|---|---|
| | and hidden hierarchies. |
| **The Bureaucratic Death Spiral** | As an open system scales, its early adopters will construct defensive bureaucratic mechanisms that successfully repel hostile actors but simultaneously destroy the retention of desirable newcomers. |
| **The Vulnerability of Exhaustion** | Systems that rely on the infinite goodwill and unpaid labor of highly specialized individuals are maximally vulnerable to long-term social engineering and capture by psychopathic actors. |
| **The Failure of Algorithmic Governance** | Any governance system that bases voting power purely on quantifiable financial metrics without tying it to human identity will inevitably devolve into a plutocracy subject to rapid economic capture. |
| **The Supremacy of Social Consensus** | When an immutable rule or law produces a catastrophic systemic outcome, the underlying social consensus will always override the established law, forcing a hard fork in reality to preserve the community. |

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