Engineering Management

Open-Sourcing the Institution

~~Working Paper~~ — Draft

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Summary

Organizations rely on opacity — implicit systems of credit, funding, access, and decision-making understood by insiders but invisible to outsiders and unaccountable to anyone. Machine intelligence is ending this arrangement. AI systems already reconstruct what institutions are actually doing regardless of what those institutions claim. This paper argues that organizations face a choice: adopt structured transparency on their own terms, or have it imposed from outside. We describe an architecture for *open-sourcing the institution itself* — governance, resource flows, decision history, and credit assignment — using version-controlled repositories, automated integrity checks, and machine-readable organizational state. Management becomes engineering: both positive reinforcement (recognition, credit, visibility) and negative reinforcement (integrity checks, conflict detection, staleness warnings) are code in the repository, auditable by anyone. We present the design of a research lab built on these principles and discuss its applicability to any organization that manages resources and produces work products.

Revision History

Revision	Date	Author(s)	Description
v0.1	31/01/2026	—	Initial working draft
v0.2	31/01/2026	—	Added Related Work, Limitations, Conclusion; trimmed recognition section; addressed reviewer feedback

Contents

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1 Introduction

We need a research lab where the lab itself is open source. Not just the research outputs — the organizational structure, decision-making processes, resource allocation, and governance are all visible, forkable, and improvable by anyone. Forkability is central: if someone disagrees with how the organization operates, they can copy the entire institutional structure — governance rules, resource tracking templates, integrity checks, project management configuration — and run it differently. Organizational design becomes subject to the same evolutionary pressure as open-source software.

Management becomes engineering. Not because management gets reduced to well-defined correctness criteria — engineering doesn't have those either. Engineering is about tradeoffs, and so is management. The difference is that engineering tradeoffs are made explicit: documented, versioned, debatable, auditable. Management tradeoffs currently live in the discretion of whoever holds a management title, invisible to the people affected by them. Making them explicit infrastructure — resource allocation rules, credit assignment criteria, accountability mechanisms as code in a repo — doesn't eliminate the tradeoffs. It makes them visible so the people affected can participate in deciding them. Both positive reinforcement (recognition, credit, visibility) and negative reinforcement (integrity checks, conflict detection, staleness warnings) become auditable systems rather than unaccountable discretion.

The lab is managed through changes to a public management project on GitHub. The rest of this paper is organized as follows. Section 2 positions this work relative to prior approaches to transparent governance. Section 3 argues that organizational opacity is becoming unsustainable. Section 4 quantifies the economic cost of opaque institutions. Section 5 describes what it means to open-source an institution. Section 6 presents the concrete architecture. Section 7 addresses the relationship to existing institutions. Section 8 discusses limitations. Section 9 concludes.

2 Related Work

move to end

The idea of making organizational governance explicit and transparent has a substantial history. This section positions the present work relative to prior approaches and identifies what is genuinely new.

Commons governance. Ostrom [1] established eight design principles for self-governing institutions managing shared resources: clearly defined boundaries, proportional costs and benefits, collective choice arrangements, monitoring, graduated sanctions, conflict resolution mechanisms, minimal recognition of rights to organize, and nested enterprises. The architecture described in this paper instantiates several of these principles — integrity checks as monitoring, governance-as-code as collective choice arrangements, the recursive tech tree as nested enterprises — in a version-controlled, machine-readable form. Ostrom's framework provides the theoretical grounding; we provide a concrete implementation using modern software infrastructure.

Self-management frameworks. Holacracy [2] encodes governance rules explicitly, replacing traditional management hierarchy with a constitution that defines roles, accountabilities, and decision-making processes. Laloux [3] surveys organizations operating with radical transparency, including Buurtzorg and Morning Star. Our approach shares the goal of making governance rules explicit but differs in two ways: the rules are stored in Git (not a proprietary constitution), making them forkable and diffable; and machine intelligence is used to check organizational state against the rules, rather than relying solely on human process adherence. Holacracy's adoption difficulties — Zappos being the most prominent case — also illustrate that rigid governance frameworks can fail when they don't accommodate organizational ambiguity. Our approach is deliberately flexible: governance documents are prose, not a fixed schema.

Decentralized Autonomous Organizations (DAOs). DAOs encode governance in smart contracts on a blockchain, making institutional rules machine-readable and forkable [4]. The goals overlap significantly with ours. The key differences are infrastructural: our approach uses Git, which is universally understood by developers, does not require tokens or chain infrastructure, and integrates with existing development tools. DAOs also have a well-documented history of governance failures — including the 2016 DAO exploit, where transparent machine-readable rules were used against the organization, and persistent voter apathy in token-based governance. We take these as evidence that governance transparency is necessary but not sufficient; the integrity checks and recognition system described in Section 6 are designed to address some of these failure modes.

Open-source governance. The open-source software movement provides decades of evidence on transparent organizational structures [5]. Research on open-source governance shows both the power of open contribution models and their failure modes: hidden hierarchies, burnout among maintainers, and difficulty with accountability when no one is formally in charge. Buffer's radical transparency experiment (public salaries and open financials since 2013) provides real-world data on organizational transparency in a corporate setting. Valve's nominally flat structure produced documented problems with clique-based resource allocation despite apparent openness — a cautionary tale that motivates our integrity checks, which are designed precisely to surface hidden power structures that persist even under nominal transparency.

The transparency paradox. Bernstein [6] found that factory workers were more productive when given privacy from management observation, showing that transparency can reduce performance by inducing hiding behavior. This is an important counterpoint, but the mechanism matters: Bernstein's workers had no control over the transparency system and no ability to use it themselves. The transparency was asymmetric — management watched workers, not the reverse. This project is specifically an attempt at solving that problem by making transparency symmetric: machine intelligence gives every member the same ability to read and audit organizational state that was previously reserved for management. The remaining risk — that even symmetric transparency produces chilling effects on exploratory work — is addressed in Section 8.

Algorithmic management. Kellogg et al. [7] provide a systematic review of algorithmic management in the workplace, documenting how automated systems can reproduce or amplify existing power asymmetries. The automated recognition system described in Section 6.3 is an instance of algorithmic management and inherits these risks. We address this by making the recognition infrastructure itself open and auditable — the criteria are code, not black-box algorithms — but acknowledge that this does not eliminate all risks (see Section 8).

3 The End of Organizational Opacity

Machine intelligence is making organizational opacity increasingly difficult to maintain. AI systems can aggregate public filings, leaked documents, employment records, financial data, and published research into coherent pictures of what organizations are actually doing — regardless of what those organizations say they're doing. The trend is toward increasing institutional legibility: not that all institutions are already fully transparent to machines, but that the cost of piercing opacity is dropping rapidly for anyone motivated to do so.

Organizations that don't open up voluntarily will have their opacity pierced by others. Companies are deploying blockchain-based supply chain verification because they can't verify what opaque suppliers claim about sourcing and labor practices — a market projected to grow from $2.9 billion to $44.3 billion by 2034 [8]. The era of "trust us, it works" is ending across investment — venture investors now conduct spot-checks by contacting claimed customers directly and demanding bank statements behind reported revenue, because they can no longer take institutional self-reporting at face value [9]. Self-insured employers are building internal claims analytics because they can't trust insurer-reported numbers — medical billing errors account for an estimated $68 billion in unnecessary healthcare costs annually, and half of those who dispute denied claims get them reversed, suggesting the denials were wrong in the first place [10].

This is parallel construction at organizational scale — building an independent picture of an institution's internals from external data, analogous to the law enforcement technique of reconstructing evidence from public sources to avoid revealing classified intelligence methods. When institutions are opaque, anyone with resources builds their own apparatus to see through them. But it's not only the powerful who gain this capability. The same AI tools that let investors reconstruct an institution's internals are available to employees, researchers, and the public. An individual can now aggregate an organization's public filings, job postings, Glassdoor reviews, published outputs, and financial records into a picture that used to require a dedicated analyst team. The opacity that once protected mismanagement from scrutiny above also protected it from scrutiny below. Both protections are ending at the same time.

The result is a world where the people running opaque organizations are the last to know what everyone else — funders, competitors, and their own staff — already sees. The question is not whether your organization will become transparent. It is whether you will be the one who decides how.

4 The Cost of Opaque Institutions

The economic costs of organizational opacity are substantial, though precise measurement is difficult. The estimates below draw from a mix of peer-reviewed research, industry surveys, and trade publications of varying methodological rigor. Table 2 summarizes the sources and their limitations.

By one estimate, excess management and bureaucracy cost the U.S. economy more than $3 trillion per year — roughly 17% of GDP [11]. The Fortune 500 alone may account for $480 billion in back-office inefficiencies [12]. The average firm spends between 1.3% and

3.3% of its total wage bill on regulatory compliance, with aggregate compliance costs ranging from $103 billion to $289 billion annually [13]. In one Australian study, non-administrative staff reported spending 6.4 hours per week — 16% of a standard work week — complying with internal regulation, and the cost of self-imposed internal rules exceeded the cost of government regulation by more than two to one [14].

Nepotism and favoritism compound these costs. Nearly 75% of employees report having worked in a toxic workplace, with poor leadership — including favoritism and lack of accountability — cited as the top cause by 79% of them [15]. Toxic culture is 10 times more important than compensation in predicting turnover; by one estimate (originally from SHRM, cited in [16]), toxic culture cost U.S. employers nearly $50 billion per year before the Great Resignation. When unqualified hires hold leadership roles through connections rather than competence, the remaining staff pick up the slack, leading to burnout and further turnover. The organizational knowledge needed to actually run the institution is never written down — it lives in the heads of whoever happens to be politically connected enough to stay.

The same patterns appear in public institutions. Researchers receiving federal grants spend over 44% of their time on administrative tasks rather than research — a figure that has remained stubbornly consistent across FDP surveys in 2005, 2012, and 2018 [17]. Universities absorb $6.8 billion per year in unreimbursed overhead costs [18]. Nepotism in public institutions creates wasteful overstaffing where unneeded positions are created to employ relatives — documented across municipalities as a drag on economic development [19]. Perceived nepotism is negatively associated with educational investment across countries, as measured by PISA scores [20]. Funding decisions happen behind closed doors. Credit assignment is political. Access to resources depends on who you know, not what you contribute.

Table 2: Summary of cost estimates cited in this section. Estimates vary in methodology, geography, and recency. They are presented to indicate the scale of the problem, not as precise measurements.

Estimate	**Source**	**Type**	**Notes**
$3T excess mgmt.	Hamel (2016)	HBR opinion	Extrapolation from exemplar cos.
$480B back-office	SSO Network	Trade pub.	Fortune 500 only
$103–289B compliance	NBER/Cato	Working paper	U.S. firms, wage-bill method
6.4 hrs/wk internal rules	Deloitte AU	Consulting	Australian data
$50B toxic culture	SHRM (2019)	Industry survey	Via Sull et al.
44% admin time (grants)	FDP (2018)	Survey	$n = 13{,}000+$ U.S. PIs
$6.8B overhead	AAU	Advocacy org.	U.S. universities

5 Open-Sourcing the Institution

Most “open science” initiatives open-source the outputs (papers, data, code) but keep the institution opaque. This lab open-sources the institution itself: governance, resource flows, decision history, credit assignment. The structure is the product.

This isn’t all-or-nothing. An organization doesn’t have to go from political hell to fully open overnight. The move can be done gradually. Start by making governance documents public.

Then resource tracking. Then decision rationale. Each step is independently useful and each step makes the next one easier. The tools described here support any point on that spectrum.

6 Architecture

Here is what it looks like when an organization has no secrets from itself. Higher-level units (the lab itself, divisions within it) have two repos: a project management repo (managed by `pm`) and an organization repo. Individual research projects below them may only have a pm repo and their code repo. The two-repo structure is for organizational layers that need to track more than just a tech tree.

6.1 The Organization Repo

A GitHub repo that is the public record of the organization. This is where things live that don't belong in any individual project but need to be tracked: documents, small scripts, spreadsheets, test programs, analyses, meeting notes, governance decisions, and anything else that should be visible and version-controlled but doesn't need wide release as a standalone project.

It also includes pointers to all the other repos in the organization — the pm repo, the individual project repos, external dependencies — in `docs/` so it can act as a central dispatch.

```
org-repo/
|-- docs/                           # golden copy of project state
|   |-- governance/                 # decision-making processes,
    roles
|   |-- research-agenda/            # what the lab works on and why
|   |-- resources/                  # grant tracking, allocation
    records
|   `-- onboarding/                 # how to join, how things work
|-- members/
|   |-- alice/                      # Alice's working directory
|   |   |-- notes/                  # her meeting notes, scratch work
|   |   |-- scripts/                # one-off analysis scripts
|   |   `-- proposals/              # drafts she's working on
|   |-- bob/
|   |   |-- notes/
|   |   |-- data/                   # small datasets, spreadsheets
|   |   `-- experiments/            # test programs, prototypes
|   `-- ...
|-- checks/                         # integrity checks (see below)
`-- archive/                        # completed work, historical
    records
```

Member directories. Every member gets their own directory — their workspace within the org. They can put anything there: notes, scripts, Excel sheets, draft proposals, experimental code. Their work is visible to the rest of the organization without requiring them to publish it anywhere else.

When a member wants to promote something to the project-wide golden copy, they open a PR moving or copying it into `docs/`. The PR is a request for the organization to recognize and adopt the work. Other members review it, and the merge is the organization saying "yes, this is now part of our shared state."

The `docs/` directory. The golden copy — the authoritative state of the project. Nothing gets into `docs/` without a PR. The PR history in `docs/` is the lab's institutional memory.

The `checks/` directory. Automated integrity checks that project managers create and maintain. These run against the repo (via CI or on-demand) and surface issues that humans should look at.

6.2 Integrity Checks

Integrity checks are to organizational state what tests are to code. When AI agents produce code, tests check that the code does what it claims. When an organization produces documents, decisions, and resource allocations, integrity checks do the same thing: they verify organizational state against the organization's own stated rules and surface inconsistencies for human judgment.

This applies to any organization that manages resources — public or private, academic or corporate. The checks maintain a history of both automated and human-assisted audits. Every check run is logged. When a human reviews an issue surfaced by a check and makes a judgment call, that judgment is recorded too. Over time this builds an audit trail showing not just the current state but how the organization has responded to issues as they were discovered — an accountability mechanism that persists regardless of personnel changes.

Examples:

- **Consistency**: does the resource allocation in `docs/resources/` add up? Do budget numbers match grant amounts recorded in governance decisions?
- **Staleness**: are there proposals sitting for months with no PR to `docs/`? Governance documents referencing people who are no longer active?
- **Completeness**: does every active grant have an allocation record? Does every research project in the agenda have a corresponding pm instance?
- **Conflict**: contradictory statements across governance documents? Two proposals allocating the same funds differently?
- **Attribution**: does every work product have clear attribution? Documents referencing work without crediting the contributor?

These checks can be simple scripts, LLM-powered analyses, or structured validators. They're not gates — they surface issues for human judgment, same as a test suite surfaces failures for a developer to evaluate. The checks themselves are in the repo, subject to the same review process as everything else.

6.3 Automated Recognition

The same infrastructure that detects problems also recognizes achievements. In traditional organizations, recognition flows through managers, shaped by who is visible, who is in the right social circle, who shares the manager's background. Automated recognition replaces this with a read operation on organizational state that's already being maintained.

Examples: milestone completion across a tech tree; a new member's first PR to `docs/`; sustained contribution over time; a PR that unblocks several downstream projects; a grant's deliverables all completed with the full funding-to-output chain visible.

Because everything in the org repo and pm repo is readable text and structured data, anyone can ask an LLM to assess contributions holistically — reading a member's directory, their PRs, the projects they've touched, the discussions they've participated in. This is closer to what a thoughtful colleague would say if they'd been paying attention to everything, which no human can do at organizational scale.

This avoids the problems of fixed metrics. Lines of code, commit frequency, and citation counts reward the metric instead of the work. LLM-based assessment introduces its own risks — LLMs have predictable biases toward verbose, confident, and recently-active contributors, and their evaluation can be anticipated and gamed. The game doesn't disappear; it becomes a meta-game. But because the recognition criteria, prompts, and outputs are all in the repo, anyone can see how the game is being played. The meta-game itself is auditable — if someone is optimizing for the evaluator rather than doing useful work, that pattern is visible in the same data the evaluator reads. You can write integrity checks against the meta-game the same way you write them against the organization's primary state.

The point is that the organization notices what its members accomplish without requiring self-promotion or managerial attention. The system does the noticing. People decide what to do with it. This is not a tool for optimizing productivity — it will surface what looks like inefficiency but is actually useful exploration, and the organization should understand that distinction.

6.4 The Project Management Repo

what is pm? We need to link to

Separate from the org repo. Managed by `pm`. Contains `project.yaml`, `plans/`, and the tech tree. This is where work planning happens: what needs to be built, in what order, who's working on what. it. We also need a demo for setting up an org

The pm repo integrates with a recursive tech tree system. The lab's top-level tree connects the organizational layer to all the research projects below it. In *prescriptive* mode, a parent tree suggests work to child projects (the child opts in and can accept or decline). In *descriptive* mode, a parent tree observes child projects without directing them — a read-only aggregation that requires no coordination. with the goal at that link.

The org repo and pm repo are separate concerns: the org repo is the record of what the organization is and has done; the pm repo is the plan for what it's doing next. The pm repo will expose what looks like inefficiency — blocked work, stalled plans, idle projects. Some of that is real inefficiency. Some of it is useful exploration. The visibility lets the organization have honest conversations about what's happening.

7 Relationship to Existing Institutions

The lab is additive, not exclusionary. Researchers can participate while holding positions at existing institutions. Grants can come from traditional funders and flow through traditional fiscal sponsors. The transparency is about what happens with the resources, not about requiring new channels.

As long as existing power structures persist, people will interface with governments through existing institutions for taxes, employment law, visa sponsorship, and compliance. A researcher receiving a stipend still files taxes through their employer. A grant still goes through a fiscal sponsor. The open layer sits on top of these structures, making decisions and flows visible without pretending the underlying structures don't exist.

This also matters for funders. All else equal, an organization where a machine intelligence can read and verify what's actually happening is less risky to fund than an opaque one. As this kind of transparency becomes feasible, it will increasingly be expected — not because anyone mandates it, but because the alternative becomes an obviously worse bet.

8 Limitations and Open Questions

The transparency paradox. Bernstein [6] demonstrated that factory workers were more productive when given privacy from management observation. This is a genuine finding, but the mechanism matters: Bernstein's workers had no control over the observation system and no ability to use it themselves. Transparency was asymmetric — management watched workers, not the reverse. In that configuration, transparency is surveillance, and surveillance induces hiding behavior. This project is specifically an attempt at solving the problem Bernstein identified, by making transparency symmetric. When every member has the same machine-intelligence-assisted access to organizational state that executives and project managers have, the power asymmetry that drives hiding behavior is substantially reduced. A tech worker with AI tools can read governance documents, audit resource flows, and assess organizational health with nearly the same capability as the people nominally in charge. The mechanism described here is more symmetric than prior transparency systems precisely because machine intelligence makes organizational legibility available to everyone, not just to those with management titles. Nevertheless, the risk of chilling effects on exploratory work remains real. Members might avoid speculative projects that could look unproductive. The member directories are designed to mitigate this — they are personal workspaces where incomplete and exploratory work is expected — but the tension between organizational legibility and individual creative freedom requires ongoing attention.

Legitimate uses of opacity. Not all organizational opacity is pathological. Trade secrets, negotiating positions, personnel matters, and shielding individuals from external pressure are cases where some degree of opacity serves legitimate purposes. The architecture described here does not require total transparency — the org can choose what is world-readable and what is member-only. But the paper's argument is strongest for governance, resource allocation, and credit assignment, where opacity more often enables abuse than serves legitimate ends.

LLM gaming and bias. The automated recognition system inherits the risks of algorithmic management documented by Kellogg et al. [7]. LLMs have predictable biases and their assessments can be gamed by those who understand the model's preferences. Making the recognition infrastructure open and auditable means the meta-game — gaming the evaluator rather than doing the work — is itself visible and auditable. This does not eliminate strategic behavior, but it makes each layer of strategy legible to anyone who cares to look. Formal analysis of these recursive gaming surfaces is future work.

No empirical validation. This paper describes an architecture, not empirical results. The claims about cost reduction, improved fairness, and organizational health are predictions, not measurements. A pilot deployment (even at small scale: 5–10 people for 3–6 months) measuring administrative overhead, perceived fairness, and contribution distribution would substantially strengthen the argument. Formal modeling — agent-based simulation of organizational dynamics under transparent vs. opaque regimes, game-theoretic analysis of strategic behavior, principal-agent models adapted to symmetric transparency — is also future work. This is a design proposal; the empirical and theoretical validation comes next.

Cost figures. The economic estimates in Section 4 draw from sources of varying rigor (see Table 2). They indicate the scale of the problem but should not be treated as precise measurements. In particular, the $3 trillion figure from Hamel [11] is based on extrapolation from exemplar companies, not a comprehensive economic study.

9 Conclusion

Organizational opacity is becoming unsustainable. Machine intelligence is making institutional internals legible to outsiders whether institutions cooperate or not. The costs of the opaque institutions we have — excess management, bureaucratic overhead, nepotism, lost productivity — are measured in trillions.

This paper proposes an alternative: open-source the institution itself. Not just the research outputs, but the governance, resource flows, decision history, and credit assignment. The concrete architecture — an organization repo with integrity checks, an automated recognition system, and a recursive project management layer — is implementable with existing tools. The key insight is that integrity checks are to organizational state what tests are to code: they hold the institution accountable to its own stated rules.

Management becomes engineering. The structure is the product. The first organization to fully open-source itself will make every opaque institution around it look like a liability.

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