FEDERATION ARCHITECT WHITEPAPER · v0.1 DRAFT

Mastermind City Federation Design

Legal Structures, Governance Economics, Treasury Mechanics & Inter-Node Protocols

This document is the design reference for Federation Architects — people working on the legal, governance, economic, and protocol structures that allow autonomous Mastermind City nodes to voluntarily confederate. It is a companion to the OS Builder Whitepaper, which addresses the software implementation. These two documents cover separate domains and should be read together by anyone designing both layers. This document presents multiple competing approaches for each major design decision, analyses their tradeoffs, and identifies recommended paths and critical open questions. Items marked [OPEN] require decisions before the first live federation can operate.

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Companion	OS Builder Whitepaper v0.1 (separate document)
Audience	Legal architects, governance designers, cooperative economists, DAO practitioners
Repository	github.com/Jabroni777/mastermind-city / branch: concept-build
Legal Disclaimer	This is a design document, not legal advice. Consult qualified counsel before forming any legal entity.

"A federation that you cannot leave is a prison. The only thing that makes voluntary federation valuable is that it remains voluntary."

— Design Principle, Mastermind City Charter

9. Open Questions

10. Appendix: Reference Models & Precedents

What a Federation Is — and Is Not

Definition

A Mastermind City federation is a voluntary association of autonomous nodes that share infrastructure, pool resources, and coordinate on standards — in exchange for measurable, compounding economic and strategic benefit. It is not a government, not a franchisor, and not a platform. It has no authority over any node's internal operations, culture, or decisions.

The federation's jurisdiction is strictly limited to: shared treasury governance, inter-node exchange protocols, the node admission and exit process, and amendments to the base OS protocol. Everything else belongs to the node.

> **THE SOVEREIGNTY AXIOM**
> A federation node retains complete sovereignty over its internal operations at all times. The federation governs the shared commons — the treasury, the protocols, the standards. It does not govern communities. If the federation ever governs communities, it has become something the design explicitly rejects.

What the Federation Provides

Legal infrastructure
A legal entity that can hold property, sign contracts, and provide liability protection for participating nodes — none of which individual nodes may be equipped to handle alone.

Treasury & capital access
A pooled treasury governed by contribution-weighted voting. Nodes that contribute earn access to matching funds, preferred loans, and emergency liquidity.

Immutable record preservation
The federation storage network maintains cycle records across its member nodes. If a node's local infrastructure is destroyed, its records survive in the distributed storage layer.

Reputation & credential rails
Verified contribution history — anchored on-chain — gives nodes and members a portable, tamper-evident reputation that carries weight outside the federation.

Standards & interoperability
The base OS protocol is maintained as a shared standard. Nodes using the same protocol can exchange labor, share knowledge, and communicate without friction.

Labor exchange network

A trusted internal market where nodes can request and offer member labor, skills, and services — with contribution ledger tracking and DAO-governed dispute resolution.

What the Federation Cannot Do

— Override any node's internal decisions, roles, or culture

— Prevent a node from exiting (exit rights are unconditional)

— Claim ownership of a node's assets, records, or intellectual property

— Amend the base OS protocol without a supermajority node vote

— Admit new nodes without an explicit admission process and vote

— Access a node's private records without that node's explicit cryptographic consent

— Issue binding directives to node members as individuals

THE COMPOUNDING IMPERATIVE

The federation's design challenge is not philosophical — it is economic. A node will only remain federated if the benefits compound faster than the costs. Every design decision in this document must be evaluated against this test: does this make federation membership materially better than independence? If not, it should not be implemented.

Federation Bootstrapping: From Zero to First Nodes

A federation cannot be designed in the abstract and then handed to nodes. It must be co-designed with the founding nodes — the people who will actually use it. This section describes the process of going from an idea to a live, operational federation with real nodes, real records, and real shared resources.

The Founding Problem

Every federation faces the same bootstrapping paradox: the governance rules need to be set before there are governed parties, but the governed parties need to consent to rules before they join. The resolution is a Founding Council — a small group of committed architects and pilot node founders who draft the initial rules together, ratify them explicitly, and then open the federation to new members under those rules.

The Founding Council's authority is temporary and limited. It exists only to produce the founding documents and the initial legal entity. Once the first three independent nodes are live and have ratified the charter, the Founding Council dissolves into the DAO governance structure and holds no special authority.

Bootstrapping Phases

Phase 0: Architecture (0–3 months)

The Federation Architect team works through this document and the OS Builder Whitepaper. Key decisions are made on legal entity, governance model, contribution token design, and treasury mechanics. Draft founding documents are produced. No nodes yet.

› Select legal jurisdiction and entity type (Section 3)

› Draft founding charter and DAO governance rules

› Finalise contribution weight formula (Section 5)

› Draft treasury mechanics and reserve policy (Section 6)

› Draft inter-node protocols: admission, exchange, exit (Section 7)

› Identify and brief 2–3 pilot node founders

Phase 1: Founding Cohort (3–6 months)

Two to four founding nodes go through the 90-Day Pilot Framework with the architect team present. They operate as a pre-federation — sharing records and learnings but without formal legal structure yet. The founding documents are stress-tested against real operations.

› Founding nodes complete Month 1 orientation together

› Draft charter reviewed and marked up by node founders

› Treasury mechanics simulated on paper (no real funds yet)

› Labor exchange protocol piloted informally

› Founding documents revised based on operational feedback

Phase 2: Legal Formation (6–9 months)

The legal entity is formed. The DAO smart contracts are deployed (starting with NodeRegistry and RecordAnchor only). Founding nodes ratify the charter and register their identities on-chain. The federation is legally and technically real.

› Legal entity formed and bank account / multisig established

› NodeRegistry.sol and RecordAnchor.sol deployed on Base testnet then mainnet

› Founding nodes register on-chain

› Private IPFS swarm key generated and distributed to founding nodes

› First formal DAO vote: ratification of the founding charter

› Treasury opens for voluntary initial contributions

Phase 3: Open Admission (9–18 months)

The federation opens to new node applications. The admission protocol runs for the first real applicants. The treasury begins receiving committed contributions. Distribution mechanics activate once the reserve threshold is met.

› First external node admission vote

› Treasury contribution commitment rate activated

› Capital access program pilot with first qualifying node

› Labor exchange protocol goes live

› First annual federation retrospective

› GovernanceToken.sol deployed when DAO vote reaches quorum on Phase 3 readiness

> **FOUNDING COUNCIL DISSOLUTION RULE**
> The Founding Council must include a hard dissolution clause in the founding documents: upon ratification by three independent nodes, all Founding Council special powers expire automatically. Founders become regular node representatives in the DAO. Any attempt to preserve special founding authority beyond this point is a red flag for the federation's long-term health.

Legal Entity Design

The Problem of Legal Personhood

A DAO without a legal wrapper is a general partnership by default in most jurisdictions. This means every participating node member may be personally liable for the actions and debts of the federation — an unacceptable risk for a decentralised network. A legal entity provides: liability protection for members, the ability to hold property and open bank accounts, the ability to sign contracts and employ people, and a jurisdiction's dispute resolution system as a backstop.

The entity wraps the federation DAO — it is the off-chain legal face of the on-chain governance system. The DAO governs; the legal entity executes. Four credible options exist.

Option L1 — Wyoming DAO LLC (United States)

Wyoming became the first US state to provide statutory recognition of DAOs as LLCs in 2021. A Wyoming DAO LLC can explicitly reference its smart contracts as its governing documents. Members are protected by LLC liability shield. No minimum capital requirement.

Factor	Assessment
Jurisdiction	US (Wyoming) — subject to US law and regulation
Formation cost	~$500 USD filing fee + legal fees ($3,000–$8,000)
Annual maintenance	Annual report filing, registered agent (~$100–200/year)
Tax treatment	Pass-through by default; complex for international members
DAO recognition	Explicit statutory recognition — smart contracts as governance docs
Banking	US bank account accessible; crypto-friendly banks available (Mercury, etc.)
Liability protection	Full LLC shield for members
Regulatory risk	US crypto/securities regulation is active and unpredictable
Ideal if	Founding nodes are primarily US-based; US contracts are primary use case

Option L2 — Swiss Foundation (Stiftung)

The Swiss Foundation is the preferred legal wrapper for many international blockchain projects (Ethereum Foundation, Cardano Foundation, Solana Foundation). It is a purpose-driven legal entity with no shareholders — assets belong to the foundation's purpose, not to founders. Highly credible internationally.

Factor	Assessment
Jurisdiction	Switzerland — stable, neutral, internationally respected

Formation cost	~CHF 50,000 minimum capital + ~CHF 15,000–30,000 legal fees
Annual maintenance	Annual audit required; board of trustees; ~CHF 10,000–20,000/year
Tax treatment	Potentially exempt if public-benefit purpose; counsel required
DAO recognition	No explicit DAO law; governed by existing foundation law
Banking	Swiss banking accessible; SEBA, Sygnum crypto-friendly
Liability protection	Foundation assets separate from founders/members
Regulatory risk	FINMA (Swiss regulator) has clear crypto guidance; more predictable
Ideal if	International federation; long-term institutional credibility is priority

Option L3 — Marshall Islands DAO LLC

The Republic of the Marshall Islands passed DAO-specific legislation in 2022, creating a purpose-built DAO LLC structure. Lower cost than Swiss Foundation, explicit DAO recognition, no minimum capital, and no US regulatory exposure. Used by several DeFi protocols. The limitation: less established banking relationships and less internationally recognisable than Swiss or US structures.

Factor	Assessment
Jurisdiction	Marshall Islands — small jurisdiction, limited case law
Formation cost	~$5,000–$10,000 USD total
Annual maintenance	~$1,000–2,000/year
Tax treatment	No corporate income tax; member tax depends on home jurisdiction
DAO recognition	Explicit — purpose-built DAO LLC statute
Banking	Challenging — requires crypto-native bank or Cayman correspondent
Liability protection	Full LLC shield
Regulatory risk	Low US exposure; emerging jurisdiction with thin legal precedent
Ideal if	International team, cost-sensitive, not seeking institutional investment

Option L4 — Unincorporated DAO (No Legal Wrapper)

> **NOT RECOMMENDED**
> Operating as an unincorporated DAO exposes all participating members to joint and several personal liability for federation actions and debts. In the US and most European jurisdictions this defaults to general partnership status. This is not a viable option for a federation handling real assets and real contracts. It may be acceptable for a pure pilot with no treasury and no external contracts.

L: Recommendation

RECOMMENDED: PHASED APPROACH

Phase 0–2 (Pilot, no external contracts): Operate informally as an unincorporated founding group. No legal entity needed until real assets are involved. Phase 2 (Legal formation): Wyoming DAO LLC if founding nodes are US-based and US contracts are the primary use case. Marshall Islands DAO LLC if the founding cohort is internationally distributed and wants to minimise cost and US regulatory exposure. Swiss Foundation if long-term institutional credibility and international grant fundraising are strategic priorities. The recommended default for a first federation is Wyoming DAO LLC. It is the most tested option with the clearest path to a US bank account and legal contracts.

Governance Architecture

Governance Principles

Federation governance must satisfy four simultaneous requirements that are in natural tension: it must be genuinely decentralised (no single party can capture it), operationally practical (decisions must actually get made), resistant to plutocracy (wealth cannot purchase control), and legible (nodes must understand how decisions are made without reading smart contract code).

Contribution over capital

Governance weight is earned through verified contribution — cycle completions, labor hours, capital committed — not purchased. Token transferability is prohibited.

Concentration cap

No single node may hold more than 15% of total governance weight. This is enforced at the smart contract level and cannot be overridden by DAO vote.

Supermajority for constitutional changes

Amendments to the founding charter, the concentration cap, or the exit rights provisions require a 75% supermajority. All other decisions require a simple majority of participating weight.

Mandatory quorum

A minimum of 30% of total governance weight must participate for a vote to be valid. Prevents a small active minority from governing a large passive majority.

Timelock on treasury actions

All treasury disbursements above a threshold have a 48-hour timelock between vote passage and execution, allowing nodes to review and object before funds move.

Option G1 — Full On-Chain Governor (OpenZeppelin)

All governance is encoded in smart contracts. Proposals are submitted, voted on, and executed entirely on-chain. Uses OpenZeppelin's Governor contract with a custom GovernanceToken (soulbound). Every governance action is permanently recorded.

Dimension	Assessment
Transparency	Maximum — every vote, every proposal, on-chain forever
Gas cost per vote	~$0.05–0.50 on Base L2 — manageable
Voter experience	Requires wallet; technical barrier for non-crypto members
Speed	Proposal → vote period (3–7 days) → timelock → execution
Resilience	No trusted party required — rules execute automatically

Complexity to deploy	High — audited contract suite required

Option G2 — Hybrid (Snapshot + Safe Multisig)

Governance votes are conducted off-chain via Snapshot — a gasless signing protocol where token holders sign votes with their wallets at no cost. Passed proposals are executed by a Safe multisig wallet controlled by elected node representatives. This is the most common real-world DAO governance model in use today.

Dimension	Assessment
Transparency	Snapshot votes are public; Safe execution is on-chain
Gas cost per vote	Zero — signed messages only
Voter experience	Requires wallet for signing, no gas; more accessible
Speed	Faster — no on-chain vote period gas costs
Resilience	Multisig signers are a trusted group — attack surface
Complexity to deploy	Low — Snapshot is free to use; Safe is well-documented

Option G3 — Consent-Based Human Council

Federation governance is handled by a rotating council of node representatives using the same consent-based protocol the OS uses at the node level. No on-chain voting. Decisions are recorded in signed documents and anchored via RecordAnchor.sol. The council meets monthly, in parallel with the node cycle Close phase.

This is the most philosophically consistent approach — it extends the OS's own governance protocol to the federation level. The tradeoff is that it requires the council to be trustworthy, and "the council decides" is harder to verify than "the smart contract executed".

Proposal & Voting Mechanics (Applicable to G1 and G2)

Every governance proposal must include:

› Plain-language summary (max 500 words)

› On-chain proposal ID and proposing node's identity

› Category tag: treasury | protocol | admission | amendment | other

› Proposed execution call (the exact action to be taken if passed)

› Estimated impact on treasury balance and/or governance weight

› Voting period: minimum 72 hours, maximum 14 days

› Quorum requirement: 30% of active governance weight must vote

› Passage threshold: simple majority (>50%) except constitutional matters (>75%)

G: Recommendation

RECOMMENDED: G3 PILOT → G2 → G1

Phase 1–2 (Pilot): G3 — consent-based human council. Consistent with the OS protocol. No blockchain required. Decisions recorded and anchored via RecordAnchor.sol. Phase 2–3: G2 — Snapshot + Safe multisig. Introduce token-weighted voting as the GovernanceToken is deployed. Keep the human council as an advisory body. The Safe multisig should require 3-of-5 signatures from elected node representatives. Phase 3+: G1 — full on-chain Governor, once the federation is large enough that the multisig trust model becomes a governance risk (typically 10+ nodes).

Contribution Economics & Token Design

The Fundamental Design Problem

Most DAO governance tokens fail for the same reason: they become tradeable assets. Once a governance token has market value, large holders buy influence. The people with the most capital gain the most governance weight. The original contributors are diluted. The DAO becomes a plutocracy wearing a democratic mask.

Mastermind City's answer is structural: governance weight must be non-transferable (soulbound), earned through verified contribution, and subject to a concentration cap. This section describes how contribution is measured and how weight is calculated.

Contribution Weight Formula

Governance weight W for a given node at time t is calculated as a weighted sum across three contribution dimensions, with a decay function applied to historical contributions to prevent legacy weight from dominating active contributors:

```
W(node, t) = decay(t) * [
alpha * CycleScore(node, t)
+ beta * LaborScore(node, t)
+ gamma * CapitalScore(node, t)
] capped at MAX_WEIGHT_FRACTION
```

Where:

CycleScore(node, t)

Cumulative count of complete, signed cycle records submitted to the federation. Each completed cycle = 1 point. Weighted most heavily because it measures sustained operational engagement.

LaborScore(node, t)

Total verified contribution-hours logged across all cycles, normalised to a 0–100 scale across the federation. Captures the intensity of contribution, not just presence.

CapitalScore(node, t)

Total capital contributed to the federation treasury as a fraction of the node's stated operating revenue. Percentage-of-revenue, not absolute amount, to avoid wealth bias.

decay(t)

An exponential decay function with half-life of 18 months applied to all historical contributions. Recent activity outweighs past activity. A node that goes dormant loses weight over time.

`alpha, beta, gamma`

Weighting coefficients set by DAO vote. Recommended starting values: alpha=0.5, beta=0.3, gamma=0.2. These represent the federation's values — a federation that prioritises engagement over capital sets alpha high.

`MAX_WEIGHT_FRACTION`

Hard cap of 15% of total federation governance weight per node. Enforced in smart contract. Cannot be overridden by DAO vote (constitutional protection).

Option T1 — Soulbound Governance Token (Non-Transferable)

A single ERC-20 variant token with all transfer functions overridden to revert. The token represents governance weight only — no economic claim. Minted by the treasury contract on verified contribution proof. Burned on node exit or dormancy. Cannot be bought, sold, or delegated.

Property	Value
Transferable	No — all transfer() and transferFrom() revert
Economic rights	None — governance only
Minting	By treasury contract on cycle close verification
Burning	On node exit; on 18-month dormancy; on concentration cap breach
Delegation	Not applicable — non-transferable
Speculative risk	Zero — no secondary market possible

> **WHY THIS MATTERS**
> Making the governance token soulbound is not a limitation — it is the most important design decision in the entire token architecture. It is the single change that prevents the federation from becoming a plutocracy. Implement this correctly before any other token design decision.

Option T2 — Dual Token (Governance + Economic)

Two separate tokens: a soulbound governance token (as above) and a transferable economic token that represents a claim on treasury distributions. The economic token is earned through contribution but can be traded. This separates voting rights from economic rights — a design used by some mature cooperative protocols.

Risks: The economic token will develop a market price. Once it has a price, it creates income tax obligations in most jurisdictions. It also creates incentives to game contribution metrics to earn more tokens. Recommend deferring this model until Phase 3 when legal and accounting infrastructure is established.

Option T3 — Pure Reputation (No Token)

Governance weight is a numeric score stored in the federation's state (on-chain or off-chain) but never tokenised. No smart contract token. Voting is recorded as signed messages weighted by the node's current score. Simpler to implement, no token regulatory questions, but harder to make trustless.

T: Recommendation

RECOMMENDED: T1 (SOULBOUND) — THEN T2 OPTIONALLY IN PHASE 3
Implement Option T1 (soulbound governance token) from Phase 2. Simple, clean, regulator-friendly (no transferable security), and prevents all plutocracy failure modes. Treasury distributions in Phase 2 are handled by the multisig without a separate economic token — distributions are calculated from contribution scores and paid in stablecoin (USDC) directly to node wallets. Revisit the dual-token model (T2) in Phase 3 only if the federation has legal counsel comfortable with the economic token's securities classification in its operating jurisdictions.

Treasury Architecture

Inflow Sources & Commitment Rates

The federation treasury has four inflow categories. Commitment rates for node contributions are set by DAO vote and can be adjusted, but may not be set below a constitutional floor of 1% of node revenue (prevents a race to zero).

Source	Mechanism	Recommended Rate	Notes
Node Revenue Contribution	Monthly auto-transfer or manual submission with proof	3–5% of node operating revenue	Percentage-of-revenue, not flat fee. DAO sets rate annually.
Training Program Revenue	Direct inflow from external-facing programs, retreats, certification	100% to treasury; nodes receive back via distributions	Shared programs generate shared revenue
External Grants & Partners	Aligned organisations, impact investors, grant bodies	Negotiated per partner; no equity granted	No equity in individual nodes; governance rights only
Network Services Fees	Fees for external use of OS, legal templates, credentials	100% to treasury	Passive income as the OS gains wider adoption
Initial Founding Contributions	One-time founding node contributions to seed reserve	Min. $1,000 USD equivalent per founding node	Required to activate treasury; proportional governance weight

Reserve Tranches

The treasury is divided into five reserve tranches with different governance rules for disbursement. This prevents the treasury from being depleted by a single large vote while maintaining operational flexibility.

Tranche	Size Target	Purpose	Disbursement Rule
Operating Reserve	20% of treasury	Infrastructure, OS development, legal costs	Simple majority DAO vote; no timelock
Distribution Pool	40% of treasury	Contribution reward distributions to nodes	Automatic on cycle close; weighted by contribution score
Capital Access Fund	20% of treasury	Preferred loans and matching funds for node projects	Application + 60% majority vote; loan terms governed by DAO
Resilience Buffer	10% of treasury	Emergency liquidity, legal defense, disaster recovery	Emergency: 3-of-5 multisig. Non-emergency: 75% supermajority
Growth Reserve	10% of treasury	Strategic investments, new program development	Quarterly DAO vote on allocation; 60% majority

Distribution Mechanics

Distribution from the Distribution Pool occurs monthly, triggered automatically by cycle close verifications recorded in RecordAnchor.sol. The distribution formula for a given cycle close period is:

```
NodeDistribution(node, period) =

(W(node, period) / SUM(W(all_nodes, period)))

* DistributionPool_balance * distribution_rate

Where distribution_rate = DAO-set fraction released per period (rec: 0.05 =
5%/month)

W(node, period) = governance weight from Section 5 formula
```

Distributions are paid in USDC (stablecoin) to each node's registered wallet. The OS reports the expected distribution to the Steward role at cycle close so nodes can account for it in their own resource planning.

> **DISTRIBUTION FLOOR**
> A minimum treasury balance threshold must be established before distributions begin. Recommended: distributions do not activate until the Distribution Pool holds at least 6 months of estimated operating costs. This prevents the federation from distributing itself into insolvency in its early phase.

Capital Access Programs

The Capital Access Fund provides two instruments to qualifying nodes:

Preferred Loans

› Available to nodes with 6+ completed cycle records

› Loan amount: up to 3x the node's total contributions to date

› Interest rate: 0–3% (set by DAO; below market by design)

› Repayment: deducted from future distributions over 24 months

› Purpose: must be stated and approved — node-level project only

› Default: unpaid balance deducted from governance weight; node may be suspended

Matching Grants

› Available to nodes developing shared-benefit projects (training programs, tooling)

› Federation matches up to 50% of project costs from Growth Reserve

› Requires proposal with deliverables and timeline

› Deliverables are anchored on-chain on completion

› Intellectual property of matched projects is co-owned by federation and node

Inter-Node Protocols

Inter-node protocols govern how nodes interact with each other through the federation. Each protocol is a defined process with clear steps, responsible parties, and escalation paths. They are the connective tissue of the federation.

7.1 Node Admission Protocol

The admission protocol sets the quality floor of the federation. Too loose and the network loses integrity; too strict and it fails to grow. The protocol has two components: a minimum standard threshold (objective) and a node vote (subjective).

Minimum Admission Standards

› The applicant node has completed at least 3 full 30-day cycles with signed records

› The node has a ratified charter, assigned roles, and a minimum of 4 active members

› The node has generated a cryptographic identity (Ed25519 keypair registered via DID)

› The node's founding members have individually reviewed and signed the federation charter

› The node has nominated a Connector who will represent them in inter-node communications

› The node has committed to a revenue contribution rate (minimum: 1% of operating revenue)

Admission Process

Application

Applicant node submits: 3 cycle records (signed), charter, member count, node type, and proposed contribution rate. Submitted to the federation via the Connector protocol.

Review Period

14-day review window during which any federation node can examine the application and raise questions or concerns. No vote during this period.

Sponsor Requirement

At least one existing federation node must formally sponsor the application. The sponsor vouches for the applicant and takes on a 90-day mentorship responsibility.

DAO Vote

7-day voting period. Simple majority of participating governance weight required. Quorum: 30% of total weight.

Onboarding

On approval: swarm key distributed to new node, NodeRegistry updated on-chain, new node assigned a Connector contact in the existing federation.

Probationary Period

90-day probation during which the new node's governance weight is 50% of calculated value. Full weight activates after the first 3 cycles as a federation member.

7.2 Labor Exchange Protocol

The labor exchange allows nodes to request and offer member skills across the federation. This is one of the most concrete benefits of federation membership — a node that needs a carpenter, a designer, or a specific technical skill for one cycle can find it in the network rather than the open market.

Request:

Node posts a labor request: skill required, duration, location (on-site/remote), compensation offer (from their treasury, in USDC or local currency equivalent), and timeline.

Matching:

The Connector role in the requesting node broadcasts the request to the federation network. Other Connectors identify potential matches in their own nodes.

Agreement:

Both nodes' Navigators consent to the arrangement. A simple exchange agreement is signed (digital signature of both node keypairs). Duration, compensation, and deliverables are recorded in the Chronicler's log on both sides.

Execution:

The exchanged member is logged in both nodes' contribution ledgers for the duration of the exchange — their home node records the outgoing labor; the receiving node records the incoming contribution.

Completion:

At exchange end, both Navigators sign a completion record. Compensation transfers. The exchange is recorded in both nodes' cycle records and anchored on-chain at cycle close.

Dispute:

If a dispute arises, see Section 7.3. The signed exchange agreement is the primary evidence.

7.3 Dispute Resolution Protocol

Disputes between nodes are an inevitable feature of any real network. The protocol must be fast enough to resolve real conflicts, structured enough to be fair, and final enough that decisions stick. The protocol has three tiers, each escalating only if the previous tier fails.

> **Tier 1: Direct Resolution (Days 1–14)**
> The two Connectors of the disputing nodes meet (synchronously or async) and attempt to resolve the dispute directly. Either party may submit a written position statement of no more than 500 words. If both Connectors reach an agreed resolution, it is signed by both Navigators and recorded. Resolution closes the dispute.

Tier 2: Mediation Council (Days 15–30)
If Tier 1 fails, a three-node Mediation Council is convened. Two council nodes are randomly selected from non-disputing federation members. The third is agreed upon by both disputing parties (or randomly selected if they cannot agree). The council reviews position statements and exchange records, may request additional evidence, and issues a non-binding recommendation within 10 days.

Tier 3: DAO Arbitration (Days 31–60)
If mediation fails or either party rejects the recommendation, the dispute is brought to a full DAO vote. All federation nodes vote on the resolution proposal. The DAO decision is binding and final within the federation. A node that refuses to comply with a DAO arbitration ruling is placed in suspension (governance weight frozen) until compliance or exit.

7.4 Exit Protocol

Exit rights are unconditional. A node may exit the federation at any time, for any reason, without requiring DAO approval. The exit protocol exists not to gatekeep exit but to ensure it is orderly — protecting both the exiting node and the remaining federation.

Exit Notice
Connector submits an exit notice to the federation. This begins the 30-day wind-down period. The notice is signed by the node's keypair and recorded on-chain.

Settlement
During the wind-down: outstanding loan balances are calculated and repayment terms agreed. Any pending labor exchange agreements are completed or cancelled with compensation. Pending distribution amounts are calculated and paid.

Record Portability
All cycle records, charter documents, and contribution history are exported to the exiting node in a standard format. Records remain in the federation storage network (they are not deleted — they are the node's own history) but the node receives its own complete archive.

Governance Wind-Down
Governance weight is reduced to zero over the 30-day period proportionally. Soulbound governance tokens are burned on exit confirmation. The node loses voting rights on day 30.

Identity Deregistration
On day 30, the node's registry entry is updated to "inactive" on NodeRegistry.sol. The node retains its cryptographic identity and records — it is no longer a federation member but it remains a valid node.

Federation Storage
The exiting node's records remain on the federation IPFS swarm for a minimum of 12 months after exit (a grace period for the node to set up independent storage). After 12 months, nodes are no longer required to pin the exited node's records.

NO PUNITIVE EXIT

Exit may never be made punitive. A node that leaves in good standing — settling debts and completing the wind-down — must be treated with the same respect as a node that stays. Federation design that makes exit difficult or costly is federation design that traps nodes. Trapped nodes become resentful nodes. Design for graceful exit from the start.

Federation Bootstrapping Checklist

A practical checklist for the Federation Architect team. Items are ordered by dependency — later items cannot be completed without earlier ones.

	PHASE 0 — ARCHITECTURE	
0.1	Read both whitepapers (this document + OS Builder)	Both architects
0.2	Select legal jurisdiction (Section 3)	Legal architect
0.3	Select governance model for pilot phase (G3 recommended)	Governance architect
0.4	Finalise contribution weight formula coefficients (alpha/beta/gamma)	Economics architect
0.5	Draft founding charter (10–15 pages: purpose, jurisdiction, governance rules, exit)	All architects
0.6	Draft inter-node protocol documents (admission, exchange, dispute, exit)	Protocol architect
0.7	Identify 2–4 pilot node founders; brief them on the design	Project lead
	PHASE 1 — FOUNDING COHORT	
1.1	Pilot nodes complete Month 1 orientation; review founding charter	Pilot nodes + architects
1.2	Simulate treasury mechanics on paper with real pilot node numbers	Economics architect
1.3	Run one informal labor exchange between two pilot nodes	Pilot nodes
1.4	Identify and resolve any charter conflicts raised by pilot nodes	All architects
1.5	Draft Founding Council dissolution clause and timeline	Legal architect
	PHASE 2 — LEGAL FORMATION	
2.1	Engage legal counsel for entity formation	Project lead
2.2	Form legal entity (Wyoming DAO LLC or chosen jurisdiction)	Legal architect
2.3	Open multisig treasury wallet (Safe, 3-of-5 signers)	Technical architect
2.4	Deploy NodeRegistry.sol and RecordAnchor.sol on Base testnet	OS Builder team
2.5	Test full cycle: node completes cycle → record anchored → verified on-chain	OS Builder + architect
2.6	Generate and distribute IPFS private swarm key to founding nodes	Technical architect
2.7	All founding nodes register on NodeRegistry.sol (mainnet)	All founding nodes
2.8	Founding Council ratification vote on charter (first DAO vote)	All founding nodes
2.9	Treasury opens; founding nodes submit initial contributions	Stewards of founding nodes
	PHASE 3 — OPEN ADMISSION	
3.1	Announce open admission; publish founding charter publicly	Project lead
3.2	Process first external node application (full admission protocol)	Connector network
3.3	Activate treasury distribution mechanics when reserve floor is met	Economics architect

3.4	Deploy GovernanceToken.sol after DAO vote confirms readiness	OS Builder team
3.5	Migrate from human council to Snapshot + Safe governance (G2)	Governance architect
3.6	Conduct first annual federation retrospective	All federation nodes

Open Questions

The following questions require deliberate decisions before or during each phase. They are the hardest design problems — the ones where reasonable architects will disagree. They are listed in priority order.

[OPEN-F01] Contribution Floor for Voting Eligibility

Should there be a minimum contribution threshold before a node gains any governance weight? A node that joins and contributes nothing for 6 months but votes on treasury decisions is a problem. Options: (a) weight is zero until first cycle close submitted — no minimum threshold needed; (b) explicit 90-day waiting period; (c) probationary 50% weight as described in admission protocol (recommended). Needs explicit policy before GovernanceToken.sol is deployed.

[OPEN-F02] Tax Treatment of USDC Distributions

Treasury distributions to node wallets in USDC will likely be treated as income in most jurisdictions. This has two implications: (1) the federation may have withholding obligations depending on its legal entity structure; (2) nodes receiving distributions need to account for them. This needs legal counsel guidance specific to the chosen jurisdiction and membership geography before distributions activate.

[OPEN-F03] Federation of Federations

Can a federation join another federation? As the network grows, multiple regional or thematic federations may want to confederate at a higher level. The current design does not address this. Options: (a) explicitly out of scope — each federation is sovereign and independent; (b) define a lightweight inter-federation protocol for resource sharing and record portability without governance merging.

[OPEN-F04] Minimum Federation Size

What is the minimum number of nodes required for the federation to be viable? The IPFS private swarm requires a minimum replication factor of 5 for record durability — this implies at least 5 always-online nodes. The DAO quorum requirement of 30% means at least 4 nodes must vote for a 12-node federation. The economic model becomes viable at a different threshold still. These constraints need to be reconciled into a stated minimum viable federation size.

[OPEN-F05] The Manual Interface Protocol

The Manual (companion project) interfaces with the federation through the Chronicler role. But what does that interface look like at the federation level? Does the federation have a role in preserving or transmitting Manual content across nodes? Should Manual content ever be stored in the federation record system, or is it strictly local? This requires a joint decision between the Mastermind City and Manual project teams.

[OPEN-F06] Node Size Variance Governance Weight

The contribution formula weights all nodes equally regardless of size (4 vs 8 members). An 8-member node generates more labor hours and more revenue than a 4-member node and will naturally earn more governance weight. Is this the intended outcome? Or should contribution scores be normalised per-member? This has significant implications for the power balance between large and small nodes.

[OPEN-F07] Founding Charter Amendment Procedure

The founding charter is the constitutional document of the federation. Amendments require 75% supermajority. But what if the founding charter is poorly designed and the 75% threshold makes it effectively unamendable? Consider: (a) a lower threshold for the first 2 years while the charter is being proven; (b) an explicit founding charter review at the 2-year mark with a facilitated amendment process.

SECTION 10

Appendix: Reference Models & Precedents

Mastermind City's federation design draws on and diverges from the following real-world models. Understanding these precedents — where they succeeded, where they failed, and why — is valuable context for any Federation Architect.

Mondragon Cooperative Corporation / Legal / Economic

The most successful worker cooperative federation in history. ~80,000 worker-owners across 100+ cooperatives in the Basque region of Spain. Key lessons: contribution-based ownership works at scale; internal capital accounts (each member's equity stake) create aligned incentives; the federation provides legal, financial, and educational infrastructure while cooperatives retain operational autonomy. Divergence: Mondragon is a traditional legal entity; MC uses a DAO structure.

The Iroquois Confederacy (Haudenosaunee) / Governance

A confederation of six sovereign nations with shared governance protocols dating to the 12th century. Key lessons: sovereignty of member nations is non-negotiable; the confederation governs shared matters only; unanimous consent required for constitutional matters; a "Great Law" (Gayanashagowa) serves as the founding document. The US Constitution's federal structure was partly inspired by this model. Divergence: Haudenosaunee uses consensus; MC uses consent-based majority governance.

MakerDAO / DAO Governance

One of the most mature and battle-tested DAOs in operation. Governs the DAI stablecoin protocol. Key lessons: on-chain governance is slow — major decisions take weeks; voter apathy is endemic (typical participation <5% of eligible weight); large token holders dominate despite caps; the DAO eventually introduced a "Core Units" structure (specialised working groups) to compensate for governance inefficiency. Divergence: MC's soulbound token and concentration cap address the plutocracy problem directly.

Gitcoin Grants / Quadratic Funding / Contribution Economics

Gitcoin pioneered quadratic funding — a mechanism where the number of individual contributors to a project matters more than the total amount contributed. Prevents large donors from dominating. Relevant to MC's contribution scoring: consider whether a square-root function on capital contribution scores would better align economic weight with participation breadth rather than depth.

Valve Corporation / Flat Governance

Valve (Steam, Half-Life) operates as a flat organisation with no managers and employee-driven project formation. Key lessons: flat structures work at small scale but face coordination challenges at growth; explicit role definitions (which MC provides through the OS) dramatically reduce the friction of flat governance. Divergence: Valve has no rotating roles; MC's rotation is the key structural enforcement mechanism.

Ethereum Foundation / Legal Wrapper

Swiss Foundation structure for a global crypto protocol. Provides institutional credibility, international grant access, and a clear legal personality without shareholders. The non-profit structure aligns well with public-good infrastructure. Relevant if MC's federation aspires to institutional partnerships or grant funding.

This document is a living design reference. Comments, corrections, and competing proposals should be filed as issues at github.com/Jabroni777/mastermind-city. The Federation Architect and OS Builder whitepapers are companion documents and should be read together.

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