VIRTUBLIC

III

THE THEORY OF THE DIGITAL REPUBLIC

CODE IS LAW

VIRTUBLIC

Axiomatic Theory of Cybernetic Republicanism

VOLUME III

THE THEORY OF THE DIGITAL REPUBLIC

Constitutional Blockchain Architecture

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PREFACE

The question humanity has posed to itself since the emergence of power remains unchanged: to whom does power belong — to those who hold it, or to those in whose name it acts? Republics arose as an answer. Constitutions — as an institutional guarantee. The separation of powers — as a mechanism precluding the conversion of delegated authority into dictatorship.

The digital age did not nullify this question. It transformed its medium. The new power operates not through decrees but through technology: the algorithm that determines what a person will see the following morning; the platform that knows more about him than he knows about himself, and monetizes that knowledge; the interface designed so that return becomes the most probable behavior. There is no coercion. There is architecture.

Volume I established that digital capital systematically and methodically destroys subjecthood — not through malicious intent, but as a consequence of its own logic of accumulation. Volume II demonstrated that the most ambitious attempt at an alternative — blockchain and its associated ideology — reproduces the same contradictions in a new substrate, and that critical discourse which offers no institutional form becomes a stabilizing resource for the system of digital capital. The present volume does not continue the diagnosis. It builds.

Virtublic is cybernetic republicanism in the precise sense of the word: a form in which power is delegated by the people, constrained by a constitution, and remains accountable to those from whom it originates. The principal distinction from all preceding republics consists in the fact that the constitution here is executable code, verified by formal methods. Rules execute automatically. Violation is blocked architecturally. Arbitrariness is precluded by impossibility.

All alternative paths have already been tested. Market self-regulation produced the concentration of predictive power. State regulation proved ineffective. Decentralized technology reproduced plutocracy through the advantage of early participants. Virtublic is not another attempt within the existing logic of digital capital. It is an exit from it.

The structure of the volume follows the same principle as the trilogy as a whole: from foundation to mechanisms, from what the republic is to how it operates. Upon completing the reading, the reader will discover that the first two volumes have become a retrospective justification for the necessity of precisely this form of social contract.

Behind every line of this cyber-constitution stands an assertion about the nature of the subject: he is sovereign, his will is unpredictable, his political voice is not for sale, and the state has no right to turn technology against those whose sovereignty constitutes the basis of its own existence.

The code serves the sovereign. The sovereign remains a living subject.

Work on this theory was carried out with the support of the Home Office (UK) under the Section 95 programme. Author: Henry Irving (5631826).

INTRODUCTION. THE MANIFESTO OF THE LIVING SUBJECT

There is a fundamental distinction between a system that governs people and a system that people use to govern themselves. The entire history of political institutions is a history of struggle for this distinction. Constitutions were written so that power, once delegated, would not transform into an autonomous subject unaccountable to those from whom it originates. The separation of powers was constructed so that no single organ could consolidate simultaneously the legislative, executive, and judicial functions. The right to vote was affirmed so that every subject would possess a mechanism of influence over decisions whose consequences he bears.

Virtublic is the institutional response to the moment at which this distinction came under threat of disappearance — not through the tyranny of the state, but through the architecture of the digital environment. Platforms that optimize engagement do not compel the subject to submit — they render submission the easiest and most pleasant of the available paths. Algorithms that predict behavior with an accuracy exceeding self-prediction do not prohibit freedom — they render it impossible. Systems that accumulate behavioral profiles across generations convert subjecthood into a resource of monetization. This quiet and methodical transformation of the human being from subject into object is the subject matter of the present trilogy.

The Virtublic trilogy constitutes a formal theory of cybernetic republicanism — the first systematic project of a constitutional order in which digital infrastructure is subordinated to verifiable principles of popular sovereignty and the protection of subjecthood.

0.1. The Context of Necessity

Volume I proved three impossibilities of digital capital. The first: the system is not self-regulating. T2 (the temporal barrier) and Pattern 11 demonstrated that the market contains no internal equilibrium point that would halt the concentration of predictive capital among leading platforms. Simultaneously, ΣA17 demonstrated that the state, as the largest purchaser of predictive data, cannot be a neutral regulator: its structural interest consists in the expansion, not the restriction, of this market.

The second impossibility: individual resistance is neutralized. T5 proved the economic non-viability of individual action in a ranked environment — the algorithm systematically reduces the visibility of content that does not correspond to the platform's objective function, rendering personal dissent statistically insignificant. T6 proved the physiological impossibility of sustained resistance under conditions of chronic cognitive exhaustion — a condition produced by the same system as a structural, not incidental, outcome.

The third impossibility: collective informal action is marginalized by the same mechanism. Pattern 11 of Volume I demonstrated that any collective action within a ranked environment produces its own absorption: the algorithm marginalizes non-conforming content, converting opposition into a niche product. T16 of Volume II proved that this holds equally for critical discourse as such: Zuboff, Stiegler, Morozov, Zamfir — all of them produced precise diagnoses, and all of them were cited by the systems they criticized as evidence of those systems' openness to discussion. Criticism without an institutional alternative is, in the terminology of the present trilogy, a legitimation resource, not a threat.

Volume II added seven contradictions to this list of impossibilities: T11 (PoS plutocracy), T12 (governance without legitimacy), T13 (anonymity destroys accountability), T14 (code is law without NA0), T15 (Sybil resistance requires centralization), T16 (absorption of criticism), T17 (the constitutional necessity of blockchain). Each of these theorems closes one of the paths that blockchain ideology proposed as a solution. No paths remained — except the one that T17 established as necessary: blockchain technology as the substrate of constitutional architecture, not as a replacement for it.

The conclusion derived from the totality of Volumes I–II is unambiguous. What is required is a digital institutional form that employs the cryptographic technologies of blockchain (T17) while avoiding its ideological contradictions (T11–T15), offers an operational response to the mechanisms of digital capital (T1–T9), and cannot be absorbed through the monetization of criticism (T16). This form must be constitutional in its nature — that is, it must contain not merely a declaration of principles but executable mechanisms for their observance. Republican in its architecture — that is, it must instantiate the separation of powers, constitutional constraints, and mechanisms of accountability. And sovereign in its foundation — that is, it must be external to the logic of both digital capital and the state as purchaser of predictions.

This form is called Virtublic.

0.2. The Methodological Approach: Four Layers of Construction

The key concept of the present volume is cybernetic republicanism. By this is understood not the governance of people through algorithms, but the governance of algorithms by people, effectuated by means of constitutionally entrenched institutions within a digital environment. Republicanism in the classical tradition — from Cicero through Madison to Arendt — is the form in which power is delegated, constrained, and remains accountable. Cybernetic republicanism transposes this principle into the digital space: code is the instrument of the republic, not its source.

Methodologically, Volume III is constructed as a system of institutional responses to specific theorems and normative principles of Volumes I–II. Each of the seven normative principles (N1–N7) finds operational embodiment. Each of the key theorems (T1–T17) generates a specific architectural solution, formally verifiable.

The structure of the volume is organized in four layers. The first layer — the preamble: P0 as the absolute foundation from which everything else is derived and which is not subject to

alteration by any procedure. P0 precedes the constitution as the condition of its possibility, not as one of its principles: principles are amenable to amendment, the foundation is not. The second layer — fundamental principles: the immutable constitutional core P1–P7, amendable only through the strictest procedure of proven systemic crisis. The third layer — emergency procedures: P8 and P9 as an inseparable pair, responding to the logically obligatory question of what occurs when the constitutional form ceases to serve the people. The fourth layer — governance mechanisms: the operational protocols P10–P18, amenable to amendment through ordinary procedures, inasmuch as they are instruments, not foundations.

The criterion of theoretical rigor for the present volume is as follows: every principle either is fundamental — that is, not derivable from other principles within the system — or is derived from previously introduced principles and theorems of Volumes I–II with explicit indication of the logical connection. The criterion of political legitimacy supplements the first: every mechanism must be explicable to a citizen as an expression of his own political will, and not as a technical constraint imposed upon him from without.

0.3. The Purpose and Structure of the Volume

Volume III pursues five interrelated objectives. The first: to construct a constitutional architecture that resolves all theorems T1–T17 without exception. The second: to instantiate all normative principles N1–N7 institutionally, without lacunae between the declared and the executable. The third: to prove resilience against seven known attack vectors without a permanent centralized arbiter. The fourth: to demonstrate how blockchain technologies become the substrate of republican form without supplanting it. The fifth: to institutionally entrench state neutrality as an unrevocable foundation and constitutional principle simultaneously.

The structure of the volume comprises five parts. Part I (Fundamental Principles, Chapters 1–8) describes the republic as an objective structure — what it is in its fundamental nature, independently of the specific circumstances of its functioning. Part II (Emergency Procedures, Chapters 9–10) responds to the question that is logically obligatory following Part I: what occurs when this structure ceases to serve the people? Part III (Governance Mechanisms, Chapters 11–19) demonstrates how principles are embodied in operational mechanisms of everyday functioning. Part IV (Institutional Architecture, Chapters 20–27) translates all preceding content into formal constitutional form — articles, rules, institutions, and protocols. Part V (Closure of the Trilogy, Chapters 28–30) proves the completeness of the architecture and closes the theoretical movement initiated by the contradiction Ω_0 in Volume I.

Two structural transitions — Δ_1 and Δ_2 — mark the logical discontinuities between parts, making explicit why the movement from one part to the next is necessary rather than arbitrary. Δ_1 fixes the limit of the fundamental principles: they describe what the republic is, but contain no answer to the question of what occurs during a constitutional crisis. Δ_2 fixes the limit of the emergency procedures: they protect the constitutional foundation, but do not describe everyday functioning.

0.4. The Criterion of Success: Four Conditions

Virtublic is considered a theoretically sound architecture upon satisfaction of four conditions. The first — theoretical completeness: none of the theorems T1–T17 is reproduced within Virtublic as a structural defect. Every theorem that established a contradiction in existing systems must find a constitutional response, formally verifiable through P2. The second — normative protection: all principles N1–N7 are institutionally instantiated without lacunae between the declaratory level and the level of automatic execution. The third — stress resilience: the system preserves constitutional guarantees under seven known attack vectors (apathy, Sybil attack, plutocratic capture, blackmail, influence inflation, capture of institutions, state capture) without a permanent centralized arbiter. The fourth — political legibility: every mechanism is explicable through the concepts of popular sovereignty, civic accountability, and constitutional limitation of power to a citizen unacquainted with cryptographic specification.

0.5. Key Terms

The present section contains operational definitions of terms whose use in any meaning other than the one fixed here constitutes a terminological violation subject to explicit redefinition.

The Preamble (P0) is the absolute foundation of the republic, preceding the constitution as its ontological condition. P0 is not a principle in the sense that principles may be the subject of constitutional revision. P0 is not revised, suspended, or reinterpreted through any procedure — including Axiom-Break Condition, Constitutional Convention, and emergency mechanisms.

A Principle (P1–P18) is a fundamental constitutional foundation constituting a normative obligation of the republic toward the citizen. P1–P7 constitute the immutable core, amendable only through Axiom-Break. P10–P18 are governance and adaptation mechanisms, amendable through ordinary procedures.

A Rule is a procedural requirement that specifies principles: Concordance Rule, Quorum Decay Rule, State Neutrality Rule, Emergency Activation Rule. Rules are the operational expressions of constitutional obligations.

An Institution is an executable mechanism: NodeFactory, GovernanceEngine, PoPRegistry, CivicJuryEngine, EmergencyExecutor, SovereigntyShield. Institutions are the organs of the republic.

A Protocol is a technical algorithm ensuring the functioning of institutions: zk-proof, Proof-of-Offline, Digital Census, Formal Verification, State Audit Protocol, VRF. Protocols are the instruments of institutions — not the converse.

Soulbound Identity is the cryptographic embodiment of inalienable subjecthood. It is not merely a technical identifier, but the digital expression of the thesis that the subject is not reducible to his data, is not for sale, is not delegable, and is not transferable.

EQU⊥ is political digital sovereignty: one citizen — one vote. The symbol ⊥ denotes orthogonality and non-convertibility. EQU⊥ belongs to the world of persons and meanings: it is non-accumulative, not for sale, and not proportional to economic contribution.

VIC⊥ is economic digital sovereignty, bound to real contribution to infrastructure. VIC⊥ belongs to the world of things and capital: it is measurable, accumulative, and bound to verified contribution. The demarcation line between EQU⊥ and VIC⊥ is constitutionally inviolable: its violation signifies the end of the republic and the beginning of plutocracy.

Madison Mode is the quadratic weighting of influence through the function cost(n) = n². The mathematics that serves political equality.

Success Multiplier is the mechanism for amplifying coalitional action: a broad, organic coalition of citizens obtains a structural advantage over concentrated capital. The constitutional assertion that persuasion is institutionally stronger than purchase.

Rockefeller Mode is the participation regime for infrastructure operators: economic recognition without political dominance.

SovereigntyShield is the institution of state neutrality: the constitutional barrier blocking the conversion of state authority into access to predictive data on citizens without a constitutional mandate.

The Civic Guard is a collegium of civic jury auditors, randomly selected through the VRF protocol, bearing constitutional accountability for the verification of citizens' uniqueness in the course of the Census. Temporariness, rotatability, and constitutional accountability are structural, not incidental, properties of this institution.

Dual Suspicion Protocol is the two-stage verification procedure for identities flagged with an anomaly: automated behavioral tests (Stage 1), referral to the collegium upon failure (Stage 2).

Concordance Rule is the rule expressing the constitutional principle that decisions affecting both the political and the economic dimensions simultaneously require the consent of both sovereignties.

Axiom-Break Condition is the constitutionally defined point at which the people as sovereign are entitled to revise the core of principles P1–P7. P0 is not subject to revision even through Axiom-Break.

0.6. Key Philosophical References

The political and constitutional tradition of the present volume rests upon four bodies of sources, each of which fulfills a specific function within the architecture of argumentation.

The classical republican tradition — The Federalist Papers (Madison, Hamilton, Jay), Montesquieu (The Spirit of the Laws), Cicero (On the Republic) — provides the normative framework for the principles of separation of powers, checks and balances, and the problem

of faction. Madison is the most direct theoretical predecessor of Virtublic: his response to the problem of faction in Federalist Nos. 10 and 51 — not the elimination of factions, but their mutual containment through institutional architecture — is the principle that P4, P5, and P11 instantiate in the digital space.

Constitutional theory — Rawls (A Theory of Justice), Habermas (Between Facts and Norms), Arendt (On Revolution) — provides normative criteria for the evaluation of constitutional legitimacy. The Rawlsian "veil of ignorance" is operationalized as a verification criterion for architectural decisions: does the mechanism correspond to what a rational subject would accept without knowing his position within the system? The Habermasian principle of discursive legitimacy is operationalized in P0 through the requirement of an external source of legitimacy. Arendt is operationalized in P9: her concept of the "capacity for a new beginning" — the sole genuinely political act — is the normative justification for Constitutional Convention as an institution.

Mechanism design theory — Weyl and Posner (Quadratic Voting as Efficient Corporate Governance), Lalley and Weyl — provides the mathematical substrate for P10 and P11. Madison Mode and Success Multiplier are not arbitrary technical solutions: they are derived from the theoretically grounded properties of quadratic voting and are supplemented by the coalitional dynamics specific to Virtublic.

Jury theory — Abramson (We, the Jury), Arendt (Lectures on Kant's Political Philosophy) — provides the normative justification for the Civic Guard. Abramson establishes sortition as a democratic principle that historically precedes electoral democracy and preserves its normative advantages — the prevention of the concentration of judicial power, the inclusion of non-specialized judgment, the compulsory participation of citizens in governance. Arendt connects the public use of reason with the very possibility of political accountability — which constitutes the normative justification for the constitutional oath of the jury auditors.

PART I. FUNDAMENTAL PRINCIPLES

Preamble and Immutable Constitutional Core (P0–P7)

Establishes the republic as an objective structure. Two triads: {P0, P1, P2} — foundation, form, code; {P3, P4, P5} — subject, separation of powers, limitation of influence. P6 verifies the sovereign. P7 protects the core.

Chapter 1. Preamble: Popular Sovereignty (P0)

Problem: T1, T4, T9, T13, ΣA17 — subjecthood is destroyed, the state is structurally interested in expanding the predictive market. Solution: P0 establishes popular sovereignty as the ontological condition of the constitution — not one of its principles. The people = the

totality of citizens with Soulbound Identity. State neutrality is incorporated into the preamble as a condition of the possibility of subjecthood.

1.1. The Absolute Nature of P0: the sole legitimate source of power is the people. Not subject to negotiation under any circumstances.

1.2. Soulbound Identity: the cryptographic embodiment of inalienable subjecthood. Non-transferable. Verifiable without disclosure of identity.

1.3. SovereigntyShield as the instantiation of N5: automatic blocking of state actors' access to predictive data on citizens without a mandate of 75% EQU⊥.

1.4–1.5. Connection to T1, T4, T9, T13, ΣA17; closure of the Sybil and state capture attack vectors.

Chapter 2. Republican Form (P1)

Problem: T11, T12, T16 — plutocracy, governance without legitimacy, absorption of criticism. Solution: P1 establishes republican form as the sole permissible form. Monarchy, oligarchy, anarchy — constitutionally prohibited. Instantiation through GovernanceEngine.

2.1. Technical definition of P1; prohibited forms.

2.2. GovernanceEngine: quadratic voting + Success Multiplier + dual sovereignty + concordance procedures.

2.3. The Madisonian response to the problem of faction: mutual institutional containment, not the elimination of factions.

2.4. Closure of alternatives: monarchy/oligarchy → T11; anarchy → T15 as a structural demonstration of the impossibility of SovereigntyShield.

2.5. Connection to T12, T16.

Chapter 3. Supremacy of Code (P2)

Problem: T8, T14 — arbitrary interpretation of the constitution by those who hold the power to interpret; code is law without NA0 destroys subjecthood. Solution: The constitution = executable code, verified through the Formal Verification Protocol in Coq. NA0 is embedded in the code as a mandatory constraint.

3.1. Code is the impartial executor. Interpretation of the spirit of the law — through constitutionally defined procedures, not through discretion.

3.2. All constitutional rules are immutable smart contracts. N1–N7 are encoded as formally verifiable constraints.

3.3. Why code, not text: Pattern 12 of Volume I proved that the state cannot be a neutral interpreter.

3.4. The distinction from "code is law": T14 proved that code without NA0 produces exploitation. P2 embeds NA0 as a mandatory optimization constraint.

3.5. Connection to T8, T14.

Chapter 4. Inalienable Citizenship (P3)

Problem: T1, T13 — the subject as a resource of monetization; anonymity destroys accountability. Solution: Digital citizenship = Soulbound NFT. Any attempted transfer automatically nullifies the citizenship of both parties.

4.1. Non-transferability — the logical consequence of the nature of citizenship as a relation between subject and republic, not an object of exchange.

4.2. Soulbound NFT: architectural preclusion of transfer.

4.3. Protection of forming subjects (N6): parental consent through cryptographic multisig; encrypted vault with auto-destruction upon attainment of age 18; Republic Engagement Auditor verifies the absence of dark patterns for citizens under 18 years of age.

4.4. Connection to T1, T13.

Chapter 5. Dual Sovereignty (P4)

Problem: T11, T12, T2 — the identity of economic capital and political power as a structural defect of PoS. Solution: P4 severs this identity through the orthogonality of EQU⊥ and VIC⊥. Conversion is constitutionally prohibited.

5.1. EQU⊥ = political sovereignty, not proportional to capital. VIC⊥ = economic participation, proportional to verified contribution.

5.2. EQU⊥-voting: 75% for P1–P7; 51% for ordinary decisions. Concordance Rule: decisions affecting both dimensions require the consent of both sovereignties.

5.3. Conversion of VIC⊥ → EQU⊥ = a constitutional prohibition, not a technical constraint.

5.4–5.5. Connection to T11, T12, T2; closure of the plutocratic capture attack vector.

Chapter 6. Limited Influence (P5)

Problem: T5, T12 — concentrated interests systematically prevail over diffuse interests under linear voting. Solution: Madison Mode — quadratic cost of additional influence: cost(n) = n². Minimum visibility threshold P(coverage) ≥ ε for all legitimate positions.

6.1. Normative justification: the structural asymmetry between concentrated and diffuse interests.

6.2. cost(n) = n²: 10 votes = 100 VIC⊥; 100 votes = 10,000 VIC⊥; 1,000 votes = 1,000,000 VIC⊥.

6.3. Anti-faction filter: statistically significant presence for positions with minimal financial backing.

6.4–6.5. Connection to T5, T12; closure of the mass influence-purchase attack vector.

Chapter 7. Verifiable Census (P6)

Problem: T15 (Sybil trilemma), N4 — Sybil resistance structurally requires a trusted center or produces discrimination. Solution: Digital Census as a periodic constitutional act of recognition of subjecthood. The Civic Guard verifies subjecthood — not the algorithm. The algorithm verifies the pattern; the political act of recognition remains with the people.

7.1. Technical definition of P6.

7.2. Digital Census v2 + CivicJuryEngine: VRF-selection of a collegium from 21 to 99 citizens, proportional to network size; decision by 2/3 qualified majority.

7.3. Dual Suspicion Protocol: Stage 1 — adaptive cognitive tests without disclosure of identity; Stage 2 — referral to the collegium.

7.4. Constitutional accountability of jury auditors: oath through on-chain transaction; sanctions for error fixed on-chain and bound to Soulbound ID.

7.5. Connection to T15, N4.

Chapter 8. Inviolability of the Core (P7)

Problem: Erosion of the constitution through "flexible interpretation" or incremental amendment. Solution: Three-level hierarchy of amendability. P0 — not amendable by any procedure. P1–P7 — only through Axiom-Break. P10–P18 — ordinary procedures.

8.1. Technical definition of P7.

8.2. Three-level hierarchy with precise justification for each level.

8.3. Formal Verification Protocol: semantic amendments that violate N1–N7 are rejected automatically at the proposal stage. Any attempt to amend P0 = a first-degree constitutional violation, recorded on-chain.

Δ_1 — THE LIMIT OF PRINCIPLES (structural transition)

P0–P7 exhaust the description of what the republic is. They do not provide an answer to the question: what occurs when the constitutional form ceases to serve the people? T9 (systemic collapse) proved three structural outcomes: collapse of participation, loss of legitimacy, capture of institutions. Without an answer, the constitution becomes a trap. Δ_1 mandates Part II.

PART II. EMERGENCY PROCEDURES

Mechanisms of Legitimate Amendment and Restoration (P8–P9)

P8 and P9 are an inseparable dialectical pair. P8 without P9 = a recognized crisis without an exit. P9 without P8 = permanent revision of foundations.

Chapter 9. Constitutional Crisis and the Conditions of Its Recognition (P8 — Axiom-Break Condition)

Problem: How to distinguish a systemic crisis from political discontent? How to protect the right to revision from capture? Solution: Three conditions of Axiom-Break, whose simultaneous satisfaction is computationally difficult to falsify.

9.1. The three conditions are constructed such that malicious activation requires sustained, large-scale, and publicly observable signs of failure.

9.2. Condition 1 — chronic apathy: two consecutive votes with turnout < 10%.

9.3. Condition 2 — loss of legitimacy: 66% EQU⊥ explicitly declare that the constitutional form has ceased to serve the people.

9.4. Condition 3 — a super-qualified majority: 75%/75% through Concordance Rule; a filter against blockade by economic donors and against populist imposition.

9.5. P0 is protected absolutely: even upon satisfaction of all three conditions, the Convention shall not have authority to consider amendment of the preamble. Automatic blocking by the Formal Verification Protocol.

9.6. Special protection for SovereigntyShield: amendments affecting state neutrality require an extended Civic Guard of 99 citizens with no affiliation with state structures.

9.7. Constitutional Health Protocol: monthly automated report (turnout, legitimacy trend, participation quality, cognitive health score); Constitutional Dialogue upon three consecutive adverse reports.

9.8. Limitations against abuse: annulment upon non-confirmation of conditions within 30 days; freezing of the VIC⊥ of initiators of false activation for 24 months.

Chapter 10. The Constitutional Convention: The Form of Constituent Power (P9 — Constitutional Convention)

Problem: How to organize the revision of the core such that it is legitimate and not subject to capture by accumulated hierarchies? Solution: Sortition-selection of delegates, a temporary institution with a single mandate, automatically dissolved upon its completion.

10.1. Normative justification for sortition: the cleansing of politics from the sediment of accumulated hierarchies.

10.2. Formation: sortition with multi-dimensional weighting (cognitive health score over 6 months, history of participation in ≥ 3 Census cycles, geographic and demographic diversity); 100–500 delegates; state employees and intelligence service personnel shall not be admitted.

10.3. Powers and their limits: full revision of P1–P7; prohibition on considering P0; may not reduce the ratification threshold; may not delegate authority to another organ.

10.4. Three-phase procedure: diagnostic phase (Days 0–30); working phase (Days 31–150, Coq-verification of all proposals); final phase (Days 151–180, ratification by simple majority of delegates).

10.5. Ratification: 66% EQU⊥ + 51% VIC⊥. Upon failure — one correction and a repeat referendum. Upon repeated failure — dissolution of the Convention, moratorium on a new Axiom-Break for 24 months.

10.6. Dissolution: automatic and immediate upon adoption of the new core; on-chain archive with constitutional status.

10.7. Recovery Mode: 90 days of reduced thresholds (51% EQU⊥) for the elimination of the causes of the crisis.

10.8. The dialectic of P8–P9 as a constitutional unit: their inseparability is a political judgment about the nature of constituent power, not a technical decision.

Δ_2 — THE LIMIT OF EMERGENCY PROCEDURES (structural transition)

P8–P9 describe the protection of the foundation during a crisis. Crisis is the exception. T8 requires operational mechanisms of everyday functioning, under which the de jure and the de facto are indistinguishable. Without them, the constitution remains a text, not a system. Δ_2 mandates Part III.

PART III. GOVERNANCE MECHANISMS

Operational Protocols of Resilience and Adaptation (P10–P18)

P10–P18 are the institutional response to specific theorems of Volumes I–II. Amendable through ordinary procedures, inasmuch as they are instruments, not foundations. Three groups: P10–P12 (influence and resource mechanisms), P13–P15 (identity and participation), P16–P18 (structural protection).

Chapter 11. Quadratic Influence (P10 — Madison Mode)

Problem: T5, T12 — linear voting amplifies concentrated interests at the expense of diffuse interests. Solution: cost(n) = n^2; baseline influence — 1 EQU⊥ at no cost. Anti-faction filter: when coordinated patterns are detected, GovernanceEngine applies a diversity penalty to the aggregate influence of the cluster.

Chapter 12. The Coalitional Amplifier (P11 — Success Multiplier)

Problem: T5, T12 — P10 constrains concentration but does not reward organic solidarity. Solution: effective_influence = n × √(n_supporters). A coalition of 10 members is 1.78 times more effective than a single actor with the same budget; a coalition of 100 — 3.16 times; a coalition of 1,000 — 5.62 times. Coalition Verification Protocol: uniqueness through Soulbound Identity + anti-coordination filter (non-identical voting history across the last 10 decisions).

Chapter 13. Resource Provision (P12 — Dual Reserve Market)

Problem: T2, T11 — control over the emission of politically significant assets = control over policy. Solution: VIC⊥ is bound to verified real contribution, not to the decision of a central issuer. SlotMarket v4.1 — the auction mechanism for resource slots. Proof-of-Resource — randomized requests within a specified time window. CollectiveBond — collective insurance with automatic stake confiscation upon violation.

Chapter 14. Digital Census (P13 — Digital Census v2)

Problem: T15, N4 — the Sybil trilemma; verification of uniqueness without biometric centralization. Solution: Operational instantiation of P6 with full technical specification. Annual zk-verification with local proof generation. Merkle Tree aggregates identifiers without disclosing data. CivicJuryEngine forms the collegium through VRF. Dual Suspicion Protocol: Stage 1 — Sybil-CAPTCHA; Stage 2 — collegium with a 2/3 decision. Failure mode: dormant status → extended collegium → referral to P18.

Chapter 15. Protected Identity (P14 — Citizenship & Identity)

Problem: T6, N6, N7 — cognitive exhaustion as a structural outcome of the system; blackmail through de-anonymization. Solution: zk-SNARK — proof of citizenship without disclosure of identity. Ring Signatures — anonymous voting with verifiable membership in the group. Separation of cryptographic proofs: verification of citizenship and participation in voting are distinct proofs. Proof-of-Offline: zk-proof of ≥ 7 days over 30 days with < 2 hours of screen time → cognitive health bonus of 10% EQU⊥.

Chapter 16. Adaptive Quorum (P15 — Quorum Decay)

Problem: T8, T9 — apathy may signify satisfaction or alienation; the constitution must not be blocked by low turnout. Solution: Reduction of the threshold by 5% every 30 days of low turnout. Minimum threshold: 51% for constitutional decisions, 33% for ordinary decisions. Exceptions: P0–P7, convening of the Convention, SovereigntyShield, security matters.

Chapter 17. Infrastructure Participation (P16 — Rockefeller Mode)

Problem: T2, T11 — dominance in infrastructure is converted into political dominance. Solution: NodeFactory delegates infrastructure functions. Full separation: EQU⊥-decisions (constitutional amendments, admission of citizens) / VIC⊥-decisions (operators, technical protocols). A state operator receives VIC⊥ for its contribution and shall under no circumstances receive EQU⊥.

Chapter 18. State Neutrality (P17 — SovereigntyShield)

Problem: ΣA17, T8, T16 — the state is structurally interested in expanding the predictive market; N5 requires a normative prohibition. Solution: State Audit Protocol: every state request = an on-chain transaction. Non-ratified requests are rejected automatically. Ratification: a request with purpose/volume/term/oversight mechanism → EQU⊥-vote (75%)

→ audit by CivicJuryEngine → mandate for a limited term without automatic renewal. Prohibited: bulk collection, transfer to third states without separate ratification, political targeting, access to cognitive health data. Extraterritorial principle: citizens' data follows the constitution, not territory.

Chapter 19. Autonomous Conflict Resolution (P18 — Conflict-Resolution Core)

Problem: Pattern 11, T14 — without a constitutional arbiter, conflicts of interpretation are resolved through power, not through law. Solution: Three-stage procedure without a permanent centralized arbiter. Stage 1 — automatic proof search through Coq tactics. Stage 2 — formal verification of intent through historical voting patterns and the on-chain archive of the Convention. Stage 3 — referendum (51% EQU⊥). Four types of conflict: technical (Stage 1), semantic (Stage 2), fundamental (Stage 3 or Axiom-Break), sovereignty-related (violation of SovereigntyShield → automatic activation of State Audit Protocol). Upon an unresolved conflict within 90 days → EmergencyExecutor with a mandatory referendum.

PART IV. INSTITUTIONAL ARCHITECTURE

Constitutional Form and Concordance Rules (Chapters 20–27)

Translation of P0–P18 into formal constitutional text. Seven articles:

Article	Content
Ch. 20 — Constitutional Preamble	Five operational definitions (subject, republic, capital, state, constitution); the purpose of Virtublic
Ch. 21 — Article I: P0–P7	Constitutional text of the preamble and core with indication of the amendability status of each principle
Ch. 22 — Article II: P8–P9	Axiom-Break Condition (three conditions, protection of P0, protection of SovereigntyShield, diagnostics, limitations) + Constitutional Convention (sortition, powers, three phases, ratification, Recovery Mode)
Ch. 23 — Article III: P10–P18	Nine mechanisms with key parameters
Ch. 24 — Article IV: Concordance Rules	Concordance Rule (5 categories of decisions with thresholds), Quorum Decay Rule, State Neutrality Rule, Emergency Activation Rule

Ch. 25 — Article V: Institutions	NodeFactory, SlotMarket v4.1, GovernanceEngine, PoPRegistry v3, CivicJuryEngine, SovereigntyShield, EmergencyExecutor, CollectiveBond
Ch. 26 — Article VI: Protocols	zk-SNARK, Ring Signatures, Formal Verification, Merkle Tree, Proof-of-Resource, Dual Suspicion Protocol, VRF, State Audit Protocol, Coalition Verification Protocol, Constitutional Health Protocol
Ch. 27 — Article VII: Threat Map	7 attack vectors → protection mechanisms: apathy→P15; Sybil→P13+P6; plutocracy→P10+P11+P4; blackmail→P14; influence inflation→P12; capture of institutions→P18; state capture→P17+P0+P18

PART V. CLOSURE OF THE TRILOGY

Proof of Completeness and Connection to Volumes I–II (Chapters 28–30)

Introduces no new principles. Verifies the completeness of those introduced.

Ch. 28. Correspondence matrix: Volume I → Volume II → Volume III. Table: every theorem T1–T17 → principle P0–P18 → execution protocol. A principle without an incoming theorem = absence of normative justification. A theorem without a principle = an architectural lacuna.

Ch. 29. N1–N7 → institutional instantiation. Table: every normative principle → mechanism P0–P18 → protocol for verification of compliance. Proof of normative completeness: no principle remains at the level of declaration.

Ch. 30. The final tripartite contradiction and its constitutional resolution. Three contradictions permeating the trilogy:

Predictive power requires concentration (T2) ↔ subjecthood requires unpredictability (NA0) → Resolution: separation of EQU⊥ / VIC⊥

Subjecthood requires protection (NA0) ↔ the state is its potential destroyer (ΣA17) → Resolution: SovereigntyShield with a constitutional mandate

Decentralized technology promises emancipation (T17) ↔ it reproduces concentration (T11–T15) → Resolution: blockchain technology without blockchain ideology

Closure: Ω_0 → T10 → T17 → Virtublic as the sole identified form that is simultaneously necessary and sufficient.

CONCLUSION. THE REPUBLIC AS AN ANSWER (summary)

Four structural results:

Every theorem T1–T17 is closed by a constitutional mechanism formally verifiable through P2. N1–N7 are instantiated without lacunae between declaration and automatic execution. Seven attack vectors are blocked without a permanent centralized arbiter. The trusted center (T15 as a structural necessity) is instantiated from within the constitutional system through the Civic Guard with a verifiable mandate, and not from without it.

Three-level hierarchy of immutability: P0 (immutable absolutely) → P1–P7 (Axiom-Break) → P10–P18 (ordinary procedures). Two dialectical dyads: P8+P9 (crisis + exit); P10+P11 (constraint of concentration + reward for solidarity).

The code serves the sovereign. The sovereign is a living subject.

APPENDICES

Appendix	Content
A	Technical specifications: zk-SNARK, Ring Signatures, Proof-of-Resource, Formal Verification in Coq (P0–P18), VRF, Dual Suspicion Protocol, State Audit Protocol, Coalition Verification Protocol, Constitutional Health Protocol
B	Simulations and stress tests: Sybil (10/25/50% fictitious IDs), plutocratic capture (Gini 0.3/0.5/0.7), apathy scenario, Axiom-Break (valid vs. malicious activation), civic jury collusion, Success Multiplier dynamics, state capture, Convention scenarios
C	Threat models C.1–C.7 with protection mechanisms
D	Comparative analysis: vs. Ethereum governance, vs. Bitcoin mining, vs. DAO token voting, vs. liberal democracies, vs. critical discourse, Axiom-Break vs. historical conventions, Success Multiplier vs. quadratic/plural voting
E	Glossary: P0, P1–P18, all institutions, rules, protocols
F	Bibliography: political theory, constitutional conventions, cryptography, mechanism design, digital political theory, jury theory, philosophy of subjecthood
G	Correspondence matrix: Volume I → Volume II → Volume III

THE THEORY OF THE DIGITAL REPUBLIC

PART I. FOUNDATIONAL PRINCIPLES

Preamble and the Immutable Constitutional Core (P0–P7)

Part I describes the republic as an objective structure — that which it is in its fundamental nature, independent of the particular circumstances of its application. Its purpose is to establish P0 as the absolute foundation from which the constitutional core P1–P7 is derived, and thereby to formalize the normative axiom NA0 and the principles N1–N7 as institutionally enforceable obligations of the republic toward the citizen. The completeness of this description discloses its own limit: Part I contains no answer to the question of what occurs when the constitutional form itself ceases to serve the people — and it is that question which structurally necessitates Part II.

Chapter 1. Preamble: Popular Sovereignty (P0)

The chapter establishes P0 as an ontologically singular element of the constitutional architecture. P0 is not a principle in the sense in which principles constitute the content of a constitution: P0 precedes the constitution as its condition of possibility. This distinction is not stylistic but structural — the principles P1–P7 admit of revision through the most stringent procedure of systemic crisis; P0 admits of no revision through any procedure whatsoever. Popular sovereignty is not the result of a vote — it is its foundation. State neutrality is included in the preamble by the same logic: it is the condition of the very possibility of subjecthood as a politically protectable good (NA0, Volume I), and not one of the mechanisms for its protection.

1.1. The Absolute Formulation and Ontological Status of P0

P0 (Preamble). The sole legitimate source of power in the digital space is the people, understood as the totality of digital citizens bearing Soulbound Identity (Soulbound Identity — a cryptographically verified, non-transferable binding of citizenship to a physical subject). Any power not delegated by the people through constitutional mechanisms is illegitimate and subject to nullification. State neutrality is a necessary condition of popular sovereignty: a state that acquires predictive data concerning citizens without a constitutional mandate acts against the foundation of the republic, not on its behalf.

The logical justification of P0 is constructed upon the following chain of derivations. Volume I (axiom A7) established that the subject exists as an immediate datum, not reducible to its profile on a platform. Volume I (theorem T9) proved that in the absence of an external constitutional constraint, the system inevitably produces one of three outcomes — digital

dictatorship, predictive plutocracy, or the disintegration of the public sphere. Volume I (theorem T10) proved that the sole form capable of resolving this contradiction is a formal constitutional architecture, external to the logic of digital capital. From these three premises it follows that the constitutional architecture must have a foundation that is itself not subject to constitutional negotiation: if the foundation is derivable from procedure, procedure is capable of extirpating it. It therefore follows that P0 is formulated not as a principle available for revision, but as a preamble that precedes the very system of principles.

The ontological status of P0 is expressed through four formal constraints. P0 may not be amended, nullified, suspended, or reinterpreted by any procedure — including Axiom-Break (P8) and Constitutional Convention (P9). P0 may not be subject to a vote at any supermajority threshold whatsoever. Any attempt to amend P0 through any procedure constitutes a first-degree constitutional violation, automatically recorded by the Formal Verification Protocol and transmitted to the Conflict-Resolution Core (P18). P0 is not a part of the constitutional compact — it is its condition.

This constraint does not contradict the principle of popular sovereignty but is its entailment. The people as sovereign have decreed that their sovereignty is not subject to negotiation: to amend P0 would mean nullifying the very sovereignty in whose name that amendment would be made. This constitutional self-contradiction the system does not accept. Formally: if P0 asserts that power belongs to the people, and a procedure for amending P0 could nullify that assertion, then such a procedure contradicts the very foundation that confers upon it its legitimacy. It therefore follows that P0 is absolutely immutable — not as a technical constraint imposed upon the sovereign from without, but as an expression of sovereign self-affirmation.

The principled distinction between P0 and the principles P1–P7 is as follows: the principles express that which the republic is; the preamble expresses that without which the republic is impossible. The principles may be revised upon demonstrated systemic crisis, because they are architectural decisions within constitutional space. P0 may not be revised, because it defines that space itself. An attempt to amend P0 is structurally equivalent to an attempt to change the rules of a game by appealing to the rules of that same game — which is a logically impermissible operation.

The transition to the following subchapter is determined by the question: in what manner does popular sovereignty, as proclaimed in P0, receive a cryptographically verifiable instantiation that precludes substitution and delegation?

1.2. The Institutional Realization of Popular Sovereignty: Soulbound Identity

Popular sovereignty as an abstract principle carries no constitutional force without a mechanism for verifying who precisely constitutes the people. In the digital space this problem presents itself with particular acuity: unlike physical space, where the presence of a subject may be verified directly, digital identity admits of replication, delegation, and sale. Volume II (theorem T13) proved that blockchain anonymity extirpates political accountability precisely because the subject is reduced to a private key rather than to a physical person. Volume II (theorem T15) proved that any mechanism for protection against fictitious

identities requires either a centralized trusted authority, or an economic barrier (reproducing plutocracy). P0 resolves this contradiction through the institution of Soulbound Identity.

Soulbound Identity is a cryptographically verified binding of citizenship to a unique physical subject, non-transferable at the protocol level and non-delegable by constitutional definition. Technically, Soulbound Identity is instantiated as a soulbound NFT (non-fungible token, a non-fungible token that does not permit transfer): a token whose attempted transfer automatically nullifies the citizenship of both parties — not as a sanction, but as a logical consequence of the fact that citizenship is the relation of the subject to the republic, and not an object of exchange.

Three properties of Soulbound Identity are constitutionally mandatory. The first is non-transferability: citizenship may not be sold, transferred, or pledged. This property instantiates the normative principle N1 (the right of the subject not to be predicted without explicit free consent) in its fundamental dimension: if citizenship is sold, political participation is sold as well, which constitutes the commodification of sovereignty. The second is non-delegability: a citizen may not confer upon another citizen their vote on the basis of EQU⊥ (political sovereignty). This property instantiates axiom A2 of Volume I (attention cannot be transferred to another subject — it may only be alienated) as applied to political participation: a vote is an act of the subject, not a resource that the subject administers. The third is verifiability without disclosure of identity: membership in the citizen body is verified through a zero-knowledge proof (zk-proof, a cryptographic protocol that makes it possible to prove the truth of a statement without disclosing the data underlying it), which technically instantiates the balance between the right to non-predictability (N1) and the requirement of uniqueness verification (N4).

From the standpoint of the Virtublic architecture, Soulbound Identity is the point of entry into both sovereignties — EQU⊥ and VIC⊥. Each verified citizen receives exactly 1 EQU⊥, independent of economic contribution. This assertion is not a political slogan but a formal entailment of P4 (dual sovereignty), which will be introduced in Chapter 5: if the political and the economic are orthogonal, political sovereignty cannot be proportional to economic contribution, and it therefore follows that it must be equal for all verified subjects.

The Worldcoin case (2023–2026) demonstrates the structural defect of the alternative approach: verification through iris scanning produces a permanent biometric identifier which, upon compromise of the database, cannot be changed. Soulbound Identity in Virtublic excludes biometric data from the verification procedure: a zk-proof demonstrates the uniqueness of the subject without disclosing the data on the basis of which that uniqueness is verified. Personal data remains on the citizen's device; only the cryptographic proof is transmitted to the system.

The transition to the following subchapter is determined by a structural element of P0 not covered by the Soulbound Identity mechanism: popular sovereignty presupposes not only the verification of citizens, but the constitutional protection of citizens from the state that formally recognizes that sovereignty.

1.3. State Neutrality as an Element of P0: SovereigntyShield

Volume I (axiom ΣA17) recorded the structural conflict of interest that renders the state an unreliable regulator of the digital space: the state is simultaneously a potential regulator of platforms and a purchaser of the predictive data produced by those same platforms. Volume I (pattern 12) showed that regulation from within the system is structurally unreliable precisely because the regulator is itself a participant in the relations of prediction. The normative principle N5 formulated the prohibition: the state may not acquire predictive data concerning citizens without an explicit constitutional mandate.

P0 incorporates state neutrality not as one of the principles available for revision, but as an element of the preamble — on the following basis. If popular sovereignty is the source of legitimacy of any power, including state power, then a state that systematically predicts citizens without their mandate extracts from those predictions a power that the citizens did not delegate to it. This means that the state begins to act not on behalf of the people, but at the expense of the people — which structurally contradicts the very foundation of P0. It therefore follows that state neutrality is not a mechanism for the protection of sovereignty but a condition of its existence. It is for this reason that it is placed in the preamble rather than among the principles.

SovereigntyShield (the institution of state neutrality) instantiates N5 as a self-executing constitutional norm through the following operational mechanism. State actors (states, their agencies, intelligence services, affiliated structures) may not acquire predictive data concerning citizens of Virtublic, influence the algorithmic architecture of the system, or obtain access to aggregated profiles without an explicit EQU⊥ mandate with a threshold of 75% and independent audit through CivicJuryEngine (the Civic Guard mechanism). Each request by a state actor is recorded on-chain through the State Audit Protocol (an audit protocol that registers state requests as verifiable transactions bearing a cryptographic signature). Requests lacking ratification are rejected automatically: not through a human decision, but through the protocol.

Three features of SovereigntyShield require separate notation. The first: the extraterritorial principle. The data of Virtublic citizens follows the constitution, not the territory. The jurisdiction of a state on the territorial principle does not extend to the data of citizens under the constitutional protection of P0. This produces a new legal category — digital sovereignty without territorial attachment — for which precedents may be found in the Fourth Amendment doctrine as applied to extraterritorial surveillance (ECtHR, Big Brother Watch v. UK, 2021) and in GDPR practice regarding cross-border data transfers; however, Virtublic goes considerably further than either: the subject at issue is not the regulation of data transfer, but the constitutional prohibition of the very possibility of their unauthorized acquisition. The second: the mandate is single-use, limited in duration, purpose, and scope, and is not renewed automatically. This precludes the normalization of state access through the gradual expansion of a mandate — a pattern recorded in the history of FISA (Foreign Intelligence Surveillance Act, USA) and analogous legislative mechanisms. The third: attempts to circumvent SovereigntyShield through technical proxies are identified through anomaly detection and transmitted to P18 (Conflict-Resolution Core) for qualification as a sovereignty-type constitutional violation.

The special protection afforded to SovereigntyShield in the context of Axiom-Break (P8) is as follows: proposals of the Constitutional Convention that bear upon state neutrality additionally require an independent civil society assessment conducted by an expanded panel of no fewer than 99 citizens, and the citizens of this panel may not simultaneously be state employees or persons affiliated with the requesting structures. This constraint instantiates the following logic: reducing the barrier to state access to data is one of the most probable scenarios of a pseudo-crisis, in which the state artificially generates conditions of apathy with the purpose of initiating a constitutional revision procedure and employing it to legalize its access to predictive data.

The transition to the following subchapter is determined by the necessity of establishing how P0 relates to the specific theorems of Volumes I–II that it closes.

1.4. Protection Against the Theorems of Volumes I–II: T1, T4, T9, T13, ΣA17

P0 closes five theorems and axioms of the preceding volumes, each of which represented a structural defect not remediable by less radical means.

Theorem T1 (surplus attention, Volume I) established that each cycle generates predictive value systematically exceeding the zero compensation to the subject. P0, through Soulbound Identity, closes T1 as follows: attention-tokens (elementary acts of attention alienation, units of analysis of the ontological layer of Volume I) are not aggregated into a predictive profile without the explicit consent of the subject, inasmuch as membership itself in the citizen body is verified through a zk-proof, and any data extracted from the activity of a citizen requires a separate mandate. Predictive value may not be systematically appropriated without a constitutional basis.

Theorem T4 (accountability without power, Volume I) established that the individual bears the political consequences of decisions they did not make. P0 closes T4 through a verifiable chain of delegation: each decision producing political consequences is derived from an EQU⊥ vote in which every citizen participates through Soulbound Identity. The rupture between accountability and power is constitutionally eliminated: power is recorded in each act of voting, accountability is bound to the same subject.

Theorem T9 (systemic collapse, Volume I) established three outcomes in the absence of an external constitutional constraint. P0, through SovereigntyShield, blocks the outcome of "digital dictatorship" (the state as purchaser of predictions acquires power incompatible with popular sovereignty). Through Soulbound Identity, P0 blocks the outcome of "predictive plutocracy" (political power may not be purchased through capital, since EQU⊥ is not convertible from VIC⊥). Through the constitutional form as such, P0 blocks the outcome of "disintegration of the public sphere" (the public sphere possesses a constitutionally guaranteed structure through P10–P11).

Theorem T13 (anonymity extirpates accountability, Volume II) established that blockchain anonymity protects against surveillance but extirpates political accountability. P0 resolves this contradiction through the interval between privacy and anonymity: a citizen participates through pseudonymous addresses (pseudonymous addresses not linked to a real identity),

yet their membership in the citizen body is verified through a zk-proof, which simultaneously secures the privacy of participation and the verifiability of uniqueness. Privacy and accountability are not mutually exclusive: they are resolved through the separation of cryptographic levels of verification.

Axiom ΣA17 (state capture, Volume I) recorded the structural conflict of interest of the state as regulator and purchaser of predictions. P0, through SovereigntyShield, does not extirpate this conflict — it is structurally ineliminable, as ΣA17 proved — but constitutionally neutralizes its consequences: state access to citizen data is blocked at the protocol level, and not through reliance on the good faith of state actors.

The transition to the following subchapter is determined by the necessity of establishing the operational protection of P0 against specific attack vectors.

1.5. Protection Against Attack Vectors: Sybil Attack, State Capture

P0 is the target of two structurally distinct attack vectors. The first is directed at the substitution of the citizen body through the creation of fictitious identities (Sybil attack). The second is directed at the neutralization of the constitutional constraint through legitimate or quasi-legitimate procedures (state capture).

Sybil Attack. Volume II (theorem T15) proved that any mechanism for protection against fictitious identities requires a compromise: either a centralized trusted authority, or an economic barrier (reproducing plutocracy), or a computational barrier (reproducing concentration). P0 does not claim to eliminate this trilemma — T15 proved its ineliminability. Instead, P0, through Soulbound Identity and Digital Census v2 (P6, P13), instantiates an honest acknowledgment of the structural constraint: uniqueness verification is conducted through a temporary, rotating, constitutionally accountable panel of citizens (the Civic Guard), randomly selected through VRF (Verifiable Random Function, a cryptographically verifiable random selection function), which constitutes a constitutionally accountable, rather than naively decentralized, mechanism.

Technically: manipulation of the panel's composition is computationally equivalent to an attack on a zk-proof, which renders its cost prohibitive. Structurally: the panel is temporary and rotating, which precludes capture through the accumulated influence of particular actors. Constitutionally: the juror-auditors take an on-chain oath and bear verifiable accountability for their decisions.

Example: in 2023–2026, mass Sybil attacks on the airdrop campaigns of major DeFi protocols (Arbitrum, Optimism) permitted a single actor to simulate thousands of unique users through automated wallets. Both protocols employed economic barriers (minimum on-chain activity), which reproduced plutocracy: real users with low activity were structurally displaced. The Dual Suspicion Protocol (a two-stage verification procedure) in Virtublic precludes both errors: automated behavioral tests at the first stage identify simulated activity without an economic barrier; the panel at the second stage processes borderline cases without a permanent centralized authority.

State Capture. State capture through legitimate procedures is the more complex vector, inasmuch as it does not violate constitutional rules explicitly but employs them to achieve outcomes that contradict the spirit of P0. The typical scenario: the state generates conditions of apathy (low turnout through informational pressure or technical barriers), initiates the recognition of chronic apathy as the first condition of Axiom-Break, and then through the Constitutional Convention secures a reduction in the ratification threshold for a state mandate under SovereigntyShield.

P0 closes this vector through three independent protective mechanisms. The first: any attempt to amend P0 through any procedure is automatically blocked by the Formal Verification Protocol and qualified as a first-degree constitutional violation. The second: Convention proposals bearing upon state neutrality require an expanded panel of 99 citizens not affiliated with state structures — which structurally precludes state lobbying within the procedure itself. The third: a false activation of Axiom-Break entails a 24-month freeze of the VIC⊥ of the initiators, which generates an economic disincentive against abuse of the procedure.

Formally: Protection(P0) = Formal_Verification_Block ∩ Extended_Jury(99) ∩ Initiator_Penalty(24 months). Each of the three mechanisms is independent, which means that circumventing the protection requires the simultaneous neutralization of all three — which is computationally and politically prohibitive in a functioning network.

Chapter Summary

P0 establishes popular sovereignty as the ontologically singular foundation of the constitutional architecture, preceding the very system of principles. Three elements — absolute immutability, cryptographic verification through Soulbound Identity, and state neutrality through SovereigntyShield — constitute a unified constitutional mechanism that closes theorems T1, T4, T9, T13, and axiom ΣA17, and is resilient against two structural attack vectors. P0 is not an element of the constitutional compact: it is its condition of possibility.

Transition to Chapter 2

P0 established the subject of the republic and their absolute protection. However, the sovereignty of the people is not self-executing: it requires a constitutional form through which it is realized. Volume I (theorem T9) proved that monarchy, oligarchy, and anarchy structurally reproduce the contradictions of digital capital — the first through concentration, the second through tokenomic plutocracy, the third through the impossibility of Sybil resistance without centralization. It therefore follows that the constitutional form through which popular sovereignty is realized can only be republican — and it is precisely this entailment that Chapter 2 develops.

Chapter 2. The Republican Form (P1)

This chapter establishes that digital sovereignty is realized exclusively through the republican form, and proves that this choice is not an arbitrary preference but a structural inference from the totality of threats demonstrated in Volumes I–II. Volume I (theorem T9) established three outcomes in the absence of constitutional constraint. Volume II (theorems T11–T15) established that none of the known non-republican forms is capable of neutralizing these outcomes structurally. P1 is a formal consequence of these two premises.

2.1. Technical Formulation and Ratio Legis

P1 (Republican Form). The digital sovereignty of Virtublic is realized exclusively through the republican form; monarchic, oligarchic, and anarchic regimes are constitutionally prohibited.

The logical justification of P1 is constructed upon the following chain. Volume I (axiom A6) established that the self-augmentation cycle of digital capital has no internal point of saturation or self-regulation. Volume I (regularity 12) established that regulation from within the system is structurally unreliable. Volume I (theorem T10) established that the only form capable of resolving this contradiction is a formal constitutional architecture external to the logic of capital. From these three premises it therefore follows that this architecture must possess three properties: a separation of powers that precludes concentration; constitutional constraints that preclude capture; and accountability mechanisms that preclude anonymous dominion. In combination, these three properties define the republican form — and exclusively that form. None of the alternative forms satisfies all three requirements simultaneously, which shall be proved in subchapters 2.3 and 2.4.

The ratio legis of P1 is as follows: the choice of the republican form is not a value judgment but a structural inference. If the system contains no internal correction for concentration (theorem T3, Volume I), and if the state is structurally vulnerable to the influence of predictive capital (theorem T10, Volume I), then the only form capable of constitutionally constraining both attack vectors simultaneously is the form that divides power through institutional mechanisms rather than through trust in the good faith of actors. The republic in the classical tradition from Cicero through Madison to Arendt is precisely such a form: power is delegated, constrained, and remains accountable not because actors are well-intentioned, but because the institutional architecture renders abuse structurally difficult.

Formally: P1 = Constraint(Power) ∩ Accountability(Actors) ∩ Separation(Functions). Neither monarchy, nor oligarchy, nor anarchy satisfies this triple condition — the first extirpates separation through concentration, the second substitutes accountability with tokenomic plutocracy, the third extirpates constraint together with the institution itself. By virtue of which, all three forms are constitutionally prohibited: not as normatively undesirable, but as structurally incompatible with the demonstrated requirements.

The transition to the following subchapter is determined by the necessity of establishing through precisely which executable mechanism the republican form is operationally instantiated within Virtublic.

2.2. Institutional Realization: GovernanceEngine

GovernanceEngine (the executable mechanism for collective decision-making) is the central operational institution of the republican form. GovernanceEngine instantiates P1 not as a declarative principle but as an automatically executable protocol, combining four independent mechanisms into a unified governance architecture.

The first mechanism is quadratic voting (Madison Mode, P10): influence over collective decisions is distributed through a quadratic cost function, which structurally precludes the concentration of influence in the hands of a narrow circle of actors. The mathematical justification of this mechanism is elaborated in Chapter 11; its function within P1 is fixed here: Madison Mode is the institutional embodiment of the Madisonian principle of mutual faction containment — the concentrated will of a single actor encounters escalating systemic resistance, while the widely distributed will of many actors encounters structural encouragement.

The second mechanism is Success Multiplier (P11): the effective influence of a coalition of citizens increases proportionally to the number of unique participants in that coalition. This mechanism is the dialectical complement of Madison Mode: if the first constrains concentration from above, the second encourages organic coalition from below. Together they constitute a unified constitutional institution, eliminating the pattern recorded in theorem T5 of Volume I (the neutralization of resistance): a broad organic coalition of citizens obtains a structural advantage over concentrated capital precisely when that advantage is secured by architecture rather than by the will of specific actors.

The third mechanism is dual sovereignty (EQU⊥ and VIC⊥, P4): GovernanceEngine administers two orthogonal decision-making spaces, precluding their conversion. EQU⊥ (political sovereignty, one citizen — one vote) determines direction; VIC⊥ (economic sovereignty, tied to contribution to infrastructure) regulates technical parameters. The full elaboration of this mechanism is the subject of Chapter 5; in the context of P1, the following is material: it is precisely through dual sovereignty that the republican form instantiates the separation of powers as applied to digital space — the separation between the space of meaning and the space of resources.

The fourth mechanism is the Concordance Rule: decisions that simultaneously affect the political and economic dimensions of the republic require a qualified majority in both sovereignties. This rule instantiates the republican principle of checks and balances as applied to digital architecture: neither a political majority nor economic operators may unilaterally alter rules affecting the other side. The Concordance Rule is structurally analogous to bicameralism in classical republics — with the essential distinction that the second chamber is defined not by territorial or hereditary principle, but by actual contribution to infrastructure.

GovernanceEngine is implemented as a formally verified smart contract (a self-executing code on a blockchain), which determines its constitutional status: the rules of GovernanceEngine may not be altered by the decision of individual operators or developers, inasmuch as they are verified through the Formal Verification Protocol (P2) and any amendment that violates N1–N7 is automatically rejected at the proposal stage.

The transition to the following subchapter is determined by the necessity of establishing why the republic, rather than a more direct form of democracy, is constitutionally necessary — and why this distinction is not academic but architecturally material.

2.3. Why a Republic and Not a Democracy: The Madisonian Answer to the Problem of Factions

The distinction between pure democracy and a republic is not stylistic but structural. Pure democracy — the form in which the majority makes decisions without institutional constraints — is vulnerable to a stable majority that systematically suppresses the minority: a pattern which Madison formalized in Federalist No. 10 (1787) as the problem of factions. A faction is a group of citizens united by a common interest that is adverse to the rights of other citizens or to the interests of the community as a whole. Madison established that factions are an ineliminable consequence of human nature: the extirpation of factions requires the extirpation of liberty, which is incompatible with the republican foundation.

Volume I (regularity 11) recorded the digital version of the Madisonian problem: in a ranked environment, any position that has received algorithmic amplification acquires a structural advantage over a position that has not received such amplification, regardless of the substantive quality of those positions. This means that in digital space, a faction controlling the ranking algorithm reproduces dominion automatically — without violating the formal rules of democratic participation. Pure democracy has no built-in mechanism to counter this pattern.

The republic counters it through three institutional mechanisms, each of which is implemented in Virtublic. The first is a supraqualified majority for constitutional amendments: the 75%/75% threshold through the Concordance Rule precludes capture of the constitutional core by a simple majority, however stable that majority may be. This constraint instantiates the Madisonian principle: if a faction cannot capture the constitution, its dominion is temporal rather than structural. The second is a minimum visibility threshold for all legitimate positions (N3): any position satisfying the formal criteria of legitimacy is guaranteed a minimum reach through the antifaction filter of GovernanceEngine, regardless of its engagement-score. This precludes the digital version of the Madisonian problem: a faction controlling the ranking algorithm cannot render alternative positions invisible. The third is autonomous conflict resolution without a centralized arbiter (P18): the interpretation of constitutional rules does not depend on human actors who are vulnerable to factional capture, but is carried out through formally verifiable protocols.

Case 2024–2025: in several major DAOs (Decentralized Autonomous Organizations) — Uniswap and Compound — attempts at minority veto through coordinated abstention from voting were recorded: a faction holding a sufficient quantity of tokens to block quorum systematically employed apathy as an instrument of power, making no visible decisions while obstructing the majority from making them. Quorum Decay (P15) in Virtublic eliminates this pattern: adaptive reduction of the threshold under conditions of chronic apathy precludes the use of non-participation as an instrument of factional dominion.

The essential distinction between a republic and pure democracy is as follows: democracy trusts the will of the majority; a republic trusts the institutional architecture that constrains that will in cases where it threatens minority rights or the constitutional foundation. In Virtublic, this distinction is instantiated through P7 (inviolability of the core): even 99% of citizens may not alter P0 through direct vote — because the sovereignty of the people does not entail the right of the majority to destroy the foundation of sovereignty as such.

The transition to the following subchapter is determined by the necessity of successively closing the three alternative forms constitutionally prohibited under P1, and of proving their structural inviability through the theorems of Volumes I–II.

2.4. Why Not Monarchy, Not Oligarchy, Not Anarchy

The constitutional prohibition of monarchic, oligarchic, and anarchic regimes is not a normative judgment regarding their historical value. It is a formal inference from the theorems of Volumes I–II as applied to digital space.

Monarchy. A monarchic regime in the digital context denotes the concentration of control over the system's architecture in the hands of a single actor or a single decision-making body. Volume I (theorem T2, the temporal barrier) established that dominant platforms acquire a structural advantage through accumulated data history — an advantage that is not eliminated by competition but is reproduced through the very functioning of the system. If this mechanism is applied to governance architecture: the monarch (the single actor controlling the system) accumulates informational and power advantage disproportionately rapidly — precisely because all data flows and decisions pass through it. Volume II (theorem T11) confirmed this for proof-of-stake: early holders accumulate advantage through compound interest without generating new value. Digital monarchy reproduces this pattern at the level of governance: the single controlling actor accumulates advantage without a mechanism for its constraint. P1 prohibits this regime precisely because it reproduces the logic of digital capital that the constitution is designed to constrain.

Oligarchy. An oligarchic regime in the digital context denotes the concentration of control in the hands of a group of actors selected not through universal verification of subjecthood but through accumulated resource. Volume II (theorem T12) established that token voting is by its structure a plutocracy: governance is controlled by capital, not by citizens, in consequence of which one token, one vote yields not a democratic but a plutocratic consensus. All known DAO structures of 2020–2026 reproduce this pattern: Uniswap, MakerDAO, Compound — in each of them, governance is de facto controlled by early investors and team wallets, while ordinary users bear the consequences of decisions without participating in their adoption (theorem T4, Volume I). Oligarchy in digital space is not an exceptional case but the structural result of token voting in the absence of constitutional constraint. P1 prohibits this regime precisely because it reproduces theorem T12 at the level of the governance architecture itself.

Anarchy. An anarchic regime in the digital context denotes governance without constitutionally fixed constraints and without mechanisms for verifying the uniqueness of participants. Volume II (theorem T15) established a fundamental trilemma: it is impossible

simultaneously to ensure decentralization, protection against fictitious identities (Sybil resistance), and the absence of plutocracy. Any solution sacrifices one of the three. Anarchy, which claims complete decentralization, eliminates verification mechanisms — by virtue of which it becomes immediately vulnerable to Sybil attacks (the creation of multiple fictitious identities for the purpose of capturing governance), or is compelled to introduce an economic barrier (reproducing plutocracy), or a computational barrier (reproducing concentration). Furthermore, anarchy is structurally incapable of instantiating SovereigntyShield (P17): protection against state surveillance requires a constitutionally fixed coercive force — otherwise the state simply disregards the norm, invoking the absence of an organ competent to apply it. P1 prohibits this regime precisely because it is incapable of resolving the trilemma T15 and incapable of securing N5 without mechanisms that themselves presuppose constitutional form.

Formally: Republic = Constraint(Power) ∩ Accountability(Actors) ∩ Separation(Functions); Monarchy eliminates Separation; Oligarchy eliminates Accountability; Anarchy eliminates Constraint. It therefore follows that none of the three forms satisfies the triple condition of P1, which determines the constitutional prohibition.

The transition to the following subchapter is determined by the necessity of recording the connection between P1 and the specific theorems whose closure confirms the sufficiency of the republican form.

2.5. Defense Against Theorems: T12, T16

P1 closes two theorems of Volume II, each of which represented a structural defect not eliminable by less radical means.

Theorem T12 (governance without legitimacy, Volume II) established that blockchain token voting has no external source of legitimacy: governance is controlled by capital rather than by citizens, which yields a circular legitimation — the rules are legitimate because they are encoded, and the code is legitimate because those who wrote it decided so, without a democratic mandate. P1 closes T12 through popular sovereignty as an external source of legitimacy not reducible to capital: power belongs to citizens through EQU⊥, verified through Soulbound Identity, rather than to token holders. This means that GovernanceEngine derives its legitimacy not from the fact of its existence as code, but from the fact that it is the constitutionally delegated instrument of a verified body of citizens.

It is important to record the precise distinction: the legitimacy of token voting in a DAO is structurally tautological (the code is legitimate because it exists), whereas the legitimacy of GovernanceEngine is a derivative of popular sovereignty (the code is legitimate because its application has been delegated by a verified body of citizens through constitutional procedures). This distinction is not rhetorical but architectural: it determines fundamentally different answers to the question "what happens if the rules are unjust?" In a DAO: the rules cannot be changed without 51% of tokens in the hands of those who wish to change them — which reproduces the problem. In Virtublic: the rules may be changed through EQU⊥-voting, inasmuch as legitimacy is grounded in the body of citizens rather than in the distribution of tokens.

Theorem T16 (absorption of critique, Volume II) established that any critique of the system that does not propose an institutional alternative external to the logic of the system is absorbed by the system and becomes its stabilizer. A critic who publishes a book about digital capitalism sells it through the same platforms he criticizes; his reach is determined by the same algorithms he analyzes; his income depends on the same engagement he declares to be the problem. The system requires critique in order to legitimate itself as "open to discussion."

P1 closes T16 not through the content of critique but through the form of architecture. A constitution cannot be cited as evidence of openness — it can only be observed or violated. This is the essential distinction from critical discourse: a constitutional norm yields not discussion but obligation. GovernanceEngine does not offer a platform for discussion of whether power ought to be constrained — it constitutionally constrains it through automatically executable protocols. It therefore follows that P1 through GovernanceEngine is the architectural answer to T16: the republican form does not describe the problem — it forecloses it.

Case illustrating T16 in the context of P1: in 2023–2025, the Ethereum Foundation systematically cited the critique of Vlad Zamfir (one of the leading critics of governance minimization) at official events as evidence of "openness to discussion" — while the architectural decisions regarding governance remained unchanged. The critique was absorbed: it became a legitimation resource rather than a trigger for institutional change. Volume III is not a critique of Ethereum — it is a constitutional architecture that cannot be cited, but only instantiated or violated.

Chapter Summary

P1 establishes the republican form as the only form constitutionally compatible with the demonstrated structural requirements. The prohibition of monarchy, oligarchy, and anarchy is a formal inference from theorems T2, T11, T12, and T15, not a normative preference. GovernanceEngine instantiates P1 as an executable protocol, combining quadratic voting, Success Multiplier, dual sovereignty, and the Concordance Rule. The Madisonian answer to the problem of factions is reproduced in digital space through supraqualified thresholds, a minimum visibility threshold, and autonomous conflict resolution. Theorems T12 and T16 are closed through the external source of legitimacy (popular sovereignty) and through constitutional form as such.

Transition to Chapter 3

P0 established the subject of the republic and its absolute foundation. P1 established the institutional form through which sovereignty is realized. However, form without an execution mechanism is a declaration, not a constitution. Volume I (regularity 12) proved that human interpretation of constitutional rules is structurally vulnerable to capture: the one who interprets acquires power over what is written. It therefore follows that the republican form requires an execution mechanism independent of human arbitrariness in the application of rules — and it is precisely this mechanism that P2 (the rule of code) establishes.

Chapter 3. Supremacy of Code (P2)

The chapter establishes the constitution of Virtublic as executable code verified through formal methods, and proves that this choice is not a technical preference but a structural conclusion derived from the demonstrated vulnerability of human interpretation. Constitutional history contains a persistent pattern: constitutions were destroyed not through their direct abrogation, but through the gradual redefinition of their meaning by those who possessed the right to interpret. P2 extirpates this pattern by replacing interpretive discretion with the automatic execution of formally verified norms.

3.1. Technical Formulation and Ratio Legis

P2 (Supremacy of Code). The constitution of Virtublic is instantiated as executable code verified through formal methods; any rule not encoded in smart contracts and not provable through formal verification (formal verification being the mathematical proof of the correctness of program code relative to its specification) is not a constitutional rule.

The logical justification of P2 is constructed upon the following chain. Volume I (Pattern 12) established that regulation from within the system is structurally unreliable: the regulator is itself a participant in the prediction relationship, by virtue of which a human arbiter of constitutional norms is irreversibly vulnerable to capture by those whose interests he regulates. Volume I (theorem T8) established that de facto predictive power and de jure political sovereignty move in opposite directions precisely because norms are formulated textually but applied selectively. Volume II (theorem T14) established that code without a normative axiom optimizes efficiency at the expense of subjecthood. From these three premises there follows a bilateral conclusion: constitutional norms must execute automatically (eliminating capture through interpretation), yet automatic execution must embed NA0 (the normative axiom: subjecthood is a politically protected good) as a mandatory constraint (eliminating the defect of T14). P2 is the institutional embodiment of both parts of this conclusion simultaneously.

The ratio legis of P2 contains a principled clarification that excludes a technical misunderstanding: P2 is not a technocratic principle according to which mathematics possesses sovereignty. Sovereignty belongs to the people (P0). Code is the instrument of the sovereign, not its replacement. The distinction between P2 and the blockchain principle "code is law" (examined in detail in subsection 3.4) consists precisely in this: "code is law" vests sovereignty in the code, eliminating the possibility of contesting the norm through legitimate procedures; P2 vests in the people an instrument of impartial execution of norms that the people themselves have established and which the people may amend through constitutionally defined procedures (P8–P9). Code is the impartial executor; the sovereign retains the right to interpret the spirit of the law through the Conflict-Resolution Core (P18) and through referendum in cases of fundamental conflicts of values.

Formally: P2 = Automatic_Execution(Constitution) ∩ Formal_Verification(N1–N7) ∩ Sovereign_Override(P8–P9, P18). Each of the three elements is necessary: without the first,

the constitution is vulnerable to capture through interpretation; without the second, execution reproduces the defect of T14; without the third, the constitution becomes a technical trap from which the sovereign cannot exit by legitimate means.

The transition to the following subchapter is structurally necessitated by the requirement to establish the concrete mechanism through which P2 is operationally instantiated — that is, to describe the Formal Verification Protocol and its connection to the normative principles N1–N7.

3.2. Institutional Instantiation: Formal Verification Protocol in Coq

The Formal Verification Protocol is the mechanism ensuring the mathematical proof of the correctness of all constitutional rules relative to their specification, instantiated through the Coq theorem-proving system.

Coq (the system of interactive theorem-proving, developed by INRIA, France) is the standard instrument of formal verification in domains requiring guaranteed correctness: aviation software, cryptographic protocols, compilers. The application of Coq to constitutional architecture means the following: every constitutional rule is formulated as a mathematical proposition for which a formal proof is constructed demonstrating that the rule, given any admissible input, produces a result compatible with the specification. If the proof cannot be constructed, the rule is not part of the constitution.

The normative principles N1–N7 are encoded as formally verifiable constraints — that is, not as declaratory norms admitting interpretation, but as predicates (logical functions returning true or false): every proposal to amend constitutional rules is checked automatically for compatibility with N1–N7 at the proposal stage. If the proposal violates even one of the seven principles, it is rejected by the system before it is put to a vote. This extirpates the pattern whereby constitutionally incompatible norms were adopted through voting procedure because no technical instrument for their verification existed at the moment of adoption.

Concretely: N1 (the right of the subject not to be predicted without explicit free consent) is encoded as a constraint that automatically rejects any proposal expanding the permissible volume of predictive processing of citizens' data without a corresponding expansion of the consent procedure. N5 (the prohibition on the state acting as a purchaser of predictions without a mandate) is encoded as a predicate verifying the existence of EQU⊥-ratification with a threshold of 75% for any state data request. Any attempt to amend P0 through any procedure is recorded by the Formal Verification Protocol as a first-degree constitutional violation and is automatically referred to P18, inasmuch as P0 is encoded as an absolute constraint without exceptions.

The State Audit Protocol is verified through the same mechanism: every state data request is recorded as a transaction with a cryptographic signature and automatically checked for the existence of a valid EQU⊥-ratification. Requests without ratification are rejected without human participation in that decision — which precludes the possibility of informal pressure upon the technical operators of the system.

The immutability of smart contracts (the invariance of deployed code absent an explicit update procedure) instantiates constitutional stability: rules adopted through legitimate procedures cannot be quietly amended by developers or operators. This extirpates the pattern recorded in the Ethereum 2023–2025 case: core developers repeatedly introduced changes to the protocol through informal EIP (Ethereum Improvement Proposal) processes, without ratification by the user body and without formal verification of consequences.

The transition to the following subchapter is structurally necessitated by the requirement to develop the justification for the choice of code, rather than text, as the bearer of constitutional norms — and thereby to respond to the objection concerning the reduction of the constitution to a technical specification.

3.3. Why Code, Not Text: Closure of the Lacuna of Human Arbitrariness

Constitutional text possesses a dual property: it admits interpretation, which is both its virtue (the capacity to adapt to unforeseen circumstances) and its principled vulnerability (interpretation is a form of power, accessible to whoever interprets). Volume I (Pattern 12) established that the state, as a purchaser of predictions, cannot be a neutral regulator of the predictive market. The same principle applies to the interpretation of the constitution: whoever interprets constitutional norms is not neutral relative to the consequences of that interpretation.

Historical evidence confirms this structural vulnerability beyond the digital space. The doctrine of "flexible constitutionalism" in various legal traditions permitted the expansion of executive powers through the reinterpretation of existing norms without amending their text. In the digital space this vulnerability is amplified twofold: first, the speed of decision-making precludes the possibility of substantive constitutional review in real time; second, the technical complexity of the architecture renders oversight accessible only to a narrow group of experts, which is itself a form of concentration of power incompatible with P1.

P2 closes this vulnerability not by eliminating interpretation altogether — which would be both impossible and undesirable (conflicts of meaning are a normal element of constitutional life and are resolved through P18) — but by replacing interpretive arbitrariness in the domain of foundational norms with formally verified automatic execution. The distinction is principled: P2 does not prohibit interpretation of the constitutional spirit in cases of semantic conflict; P2 precludes the possibility of the arbitrary non-application of constitutional norms on the pretext of their "flexible interpretation." Application of the norm occurs automatically; interpretation of its meaning in borderline cases proceeds through P18.

A conceptual analogy permitting verification of this principle through social experience: a tax authority applying a tax code manually possesses considerable discretion in interpreting "grey zones" — a discretion that the subject cannot predict and that generates systemic risk of arbitrariness. An automated tax system applying norms algorithmically extirpates this discretion in the domain of foundational norms while preserving an appeals procedure for borderline cases. P2 instantiates an analogous architecture with respect to constitutional norms — with the difference that constitutional norms, unlike tax norms, are formally verified

rather than merely automated, which guarantees the absence of algorithmic errors in the foundational execution logic.

The critically important consequence of this approach is the following: constitutional amendments proposed through GovernanceEngine are checked for compatibility with N1–N7 prior to being put to a vote. This means that the body of citizens votes only on proposals that have passed formal verification — that is, on proposals that do not violate the constitutional core regardless of the voting outcome. This extirpates the scenario in which a democratically adopted decision would prove ex post facto constitutionally incompatible, which would generate a political crisis of legitimacy.

The transition to the following subchapter is structurally necessitated by the requirement to draw a rigorous demarcation between P2 and the "code is law" principle, with which P2 is superficially similar but structurally incompatible.

3.4. Why Not Pure "Code is Law": T14 and the Embedding of NA0

The principle "code is law" (Lessig, 1999; operationalized in blockchain ideology) asserts that smart contracts execute automatically without the possibility of human intervention, and that the norm encoded in a contract is a norm regardless of its content. Volume II (theorem T14) established the fundamental defect of this principle: code without a normative axiom optimizes a given objective function without protecting subjecthood. Consequently, "code is law" and P2 are structurally incompatible, notwithstanding their superficial similarity.

The distinction consists in three elements. The first: the source of legitimacy. "Code is law" vests legitimacy in the mere fact of the code's existence: a norm is a norm because it is encoded, regardless of by whom and with what mandate it was written. Volume II (theorem T12) characterized this as circular legitimation. P2, by contrast, vests legitimacy exclusively in code that is the formally verified embodiment of norms adopted by the body of citizens through constitutional procedures. Code derives its legitimacy from popular sovereignty (P0), not from the fact of its existence. The second: normative content. "Code is law" is neutral with respect to the content of the norms it encodes: a smart contract optimizing platform profit at the expense of the user's subjecthood is, within this principle, equally legitimate as a smart contract protecting citizens' rights. P2 encodes NA0 as a mandatory constraint: any smart contract violating N1–N7 is automatically rejected by the Formal Verification Protocol — not as a value judgment, but as a technical non-conformity with the constitutional specification. The third: the right to revision. "Code is law" in its strict blockchain interpretation contains no mechanism of legitimate revision: amending the code requires a hard fork (a network split), which is technically accessible but politically illegitimate. P2 contains constitutionally defined mechanisms of revision (P8–P9, P18): the sovereign retains the right to amend the code through legitimate procedures, which is the principled distinction from technocratic automatism.

Volume II (the case of The DAO hack, 2016) is the empirical illustration of the defect of "code is law": the attacker employed a smart contract vulnerability to extract fifty million dollars, which was technically correct application of the code and therefore "legitimate" within this principle. The Ethereum Foundation was compelled to conduct a hard fork — that is, to

violate the principle of "code is law" in the interest of substantive equity, thereby proving that the principle is non-viable as a constitutional foundation. P2 extirpates this defect through two mechanisms: through formal verification of code (excluding mathematically provable vulnerabilities) and through P18 (providing a legitimate path for the resolution of unforeseen collisions without destroying constitutional continuity).

The embedding of NA0 in the Coq specification means the following: the normative axiom "subjecthood is a politically protected good" is formulated as a formal predicate that all constitutional rules must satisfy. This does not mean that Coq "understands" subjecthood in the philosophical sense: it means that the concrete operational expressions of NA0 — the right to unpredictability (N1), the prohibition of the conversion of capital into power (N2), the minimum visibility threshold (N3), procedural audit (N4), state neutrality (N5), protection of forming subjecthood (N6), cognitive autonomy (N7) — are encoded as verifiable constraints, the violation of any one of which is a mathematically provable non-conformity with the specification. Thereby P2 instantiates the transition from normative declaration to normative code: NA0 is no longer a philosophical principle interpretable at discretion — it is a formally verified constraint, violation of which is detected automatically.

The transition to the following subchapter is structurally necessitated by the requirement to establish the connection of P2 to the specific theorems whose closure confirms the sufficiency of this principle.

3.5. Defense Against the Theorems: T8 and T14

P2 closes two theorems of the preceding volumes, each of which fixed a defect not eliminable without a mechanism of automatic constitutional execution with an embedded normative axiom.

Theorem T8 (the sovereignty gap, Volume I) established that de facto predictive power and de jure political sovereignty move in opposite directions and that this gap does not self-correct. The structural source of the gap is the interval between the norm and its application: the norm exists de jure but is not applied de facto because application depends on actors vulnerable to the influence of de facto power. P2 extirpates this gap through automatic execution: the norm is applied in every case identically, inasmuch as its application is algorithmic rather than discretionary. The de jure and the de facto become indistinguishable in the domain of constitutional norms: what is formally verified is applied; what is not applied is not a norm.

An important consequence is the following: the sovereignty gap in the digital space was possible not because norms were absent — GDPR, DSA, and the EU AI Act formulate norms with sufficient specificity — but because enforcement depended on state organs structurally vulnerable to the influence of platforms (Pattern 12, Volume I). P2 transfers enforcement from state organs to a formally verified protocol, thereby eliminating dependence on the good faith of the actors to whom the norm is addressed.

Theorem T14 (code is law without NA0, Volume II) established that smart contracts optimize efficiency without protecting subjecthood, inasmuch as they contain no normative axiom.

The empirical illustration is the Black Thursday case (March 12, 2020): MakerDAO smart contracts automatically liquidated thousands of user positions upon a short-term 30% decline in the ETH price, which was efficient from the protocol's perspective (protection against bad debt) and destructive from the perspective of subjecthood (mass loss of assets without the possibility of contesting the automatic decision). T14 characterizes this outcome as structural, not incidental: it is the necessary consequence of optimization without a normative constraint.

P2 closes T14 through the embedding of NA0 in the Coq specification: the objective function of any constitutional rule must satisfy the constraints of N1–N7, which means that the automatic execution of a norm cannot produce a result violating a citizen's subjecthood — not as an ex post facto sanction, but as a mathematically verified precondition of execution. Applied to an analogous scenario in the architecture of Virtublic: a rule automatically liquidating a citizen's participation without a prescribed mechanism of appeal cannot be adopted as a constitutional norm, inasmuch as it violates N1 (the right not to be predicted without consent) and N7 (the right to cognitive autonomy) and is therefore automatically rejected by the Formal Verification Protocol at the proposal stage.

Chapter Summary

P2 establishes the constitution of Virtublic as executable code verified through formal methods, and thereby extirpates two interrelated vulnerabilities: capture through interpretation (theorem T8) and optimization without normative constraint (theorem T14). The Formal Verification Protocol in Coq instantiates N1–N7 as formally verifiable constraints, and the embedding of NA0 in the specification distinguishes P2 from the "code is law" principle across three structural parameters: the source of legitimacy, normative content, and the right to revision. Code is the impartial executor; the sovereign retains the right to interpret the spirit of the law through P18 and to legitimately amend norms through P8–P9.

Transition to Chapter 4

P0 established the foundation of the republic, P1 its form, P2 the mechanism for executing its norms. The three principles of the first triad of Part I describe the republic as an objective structure. However, a structure without a subject is devoid of content: it describes the form of power without identifying the one to whom this power belongs and how that one is related to it cryptographically. Consequently, P3 must formalize the subject of the republic through the institution of inalienable citizenship — and thereby open the second triad of Part I, devoted to the relations of power and their constitutional constraints.

Chapter 4. Inalienable Citizenship (P3)

The chapter establishes P3 as the institutional embodiment of the subject of the republic in its constitutionally protected form. P0 proclaimed popular sovereignty as the foundation; P1 established the form of its realization; P2 secured the mechanism of enforcement. P3 identifies the bearer of sovereignty through inalienable citizenship — a cryptographically

verified binding of political status to a physical subject, admitting neither transfer, nor delegation, nor commodification.

4.1. Technical Formulation and Ratio Legis

P3 (Inalienable Citizenship). Digital citizenship in Virtublic is bound to the physical subject through Soulbound Identity and may not be transferred, sold, pledged, or delegated under any circumstances.

The logical justification of P3 is constructed upon the following chain. Volume I (axiom A7) established that the subject exists as an immediate datum, not reducible to its profile on a platform: the profile is the shadow of the subject, belonging to the platform, whereas the subject is the one who casts that shadow. Volume I (axiom A2) established that attention cannot be delegated to another subject — it may only be alienated in favor of the platform. Volume I (axiom A10) established that consent is free only in the presence of real alternatives. From these three premises it follows that political participation — as the highest form of the realization of subjecthood — cannot be delegated: the delegation of participation would mean that the subject alienates not attention, but their very political will, which is incompatible with the foundation of popular sovereignty (P0). It therefore follows that citizenship must be non-transferable — not as a sanction for an attempt at transfer, but as a logical consequence of the nature of what citizenship represents.

The ratio legis of P3 is as follows: citizenship in the republican tradition has never been a property right. It was an assertion concerning the nature of the subject as a member of a political community, capable of responsible participation in collective decisions. Cicero in De re publica formulates this as res publica res populi — the affair of the people as a totality of citizens united not by territory but by agreement concerning law. Arendt in On Revolution qualifies political participation as the capacity for action, principally distinct from the capacity for production or consumption: action creates something new and cannot be bought or sold without losing its nature. P3 transposes this philosophical distinction into cryptographic architecture: Soulbound Identity (soulbound — literally "bound to the soul," that is, non-transferable by nature rather than by prohibition) is the digital expression of the thesis that the political subject is not reducible to a resource.

As applied to the digital space, this principle eliminates three specific patterns recorded in Volumes I–II. The first is the commodification of political participation through a secondary market of governance tokens (Volume II, axiom A23): a governance token is freely exchanged, which transforms a vote into a speculative asset. The second is the delegation of votes to large holders (liquid democracy as modified by a number of DAOs): a citizen transfers their right to vote to a delegate who accumulates influence disproportionate to their number. The third is the acquisition of political influence through the purchase of identities from passive citizens. P3 precludes all three patterns through a single architectural principle: citizenship is non-transferable at the protocol level, and this non-transferability cannot be circumvented through a smart contract or any other legal construction.

The transition to the following subchapter is determined by the necessity of describing the specific technical mechanism through which non-transferability is realized cryptographically, and what consequences follow from an attempt to circumvent it.

4.2. Institutional Realization: Soulbound NFT

Soulbound NFT (soulbound non-fungible token — a non-fungible token, non-transferable at the protocol level) is the technical realization of P3. Unlike a standard NFT, which permits transfer through an invocation of the transfer function, the Soulbound NFT is instantiated as a token in whose protocol the transfer function is absent in principle: it is not blocked, but does not exist as an invocable operation. This is a principled architectural distinction: blocking transfer through prohibition leaves the theoretical possibility of lifting that prohibition through a contract update; the absence of a transfer function renders this operation mathematically impossible within the given version of the protocol.

Any attempt to transfer a Soulbound NFT — through any technical mechanism, including smart contract intermediaries, atomic swaps, or off-chain agreements — automatically nullifies the citizenship of both parties to the transaction. Nullification is not an administrative decision but a protocol event: GovernanceEngine records the transfer attempt as an on-chain violation and excludes both Soulbound IDs from the citizen body, with simultaneous registration in the public violation registry. Restoration of citizenship following nullification of this type is not provided for within the constitutional architecture: citizenship is the relation of the subject to the republic, and a subject who has voluntarily attempted its alienation is constitutionally qualified as having forfeited that relation. This construction is not a sanction — it is a logical consequence of the nature of citizenship: if citizenship can be transferred, it ceases to be citizenship.

Verification of membership in the citizen body is conducted through a zk-proof (zero-knowledge proof, a cryptographic protocol making it possible to prove the truth of a statement without disclosing the underlying data): a citizen proves the fact of holding a valid Soulbound NFT without disclosing their real address or other identifiers. This instantiates the constitutionally necessary balance between the verifiability of participation and the anonymity of voting: the system knows that the participant is a verified citizen, but does not know who that participant specifically is.

The connection between Soulbound NFT and EQU⊥ is direct and indissoluble: each active Soulbound NFT generates exactly 1 EQU⊥ — and only 1. This mathematically precludes the accumulation of EQU⊥ through ownership of multiple identities (Sybil attack is precluded through Digital Census v2, P6, P13) and through the purchase of identities (precluded through the non-transferability of Soulbound NFT). Formally: EQU⊥(citizen) = 1 on condition that Valid(Soulbound_NFT) = true. This identity is constitutionally invariant: it cannot be altered through GovernanceEngine, inasmuch as it is a formally verified entailment of P3 and P4 simultaneously.

Case 2024–2025: in a number of jurisdictions, schemes of DAO account "rental" with retention of formal ownership have been recorded — a user transfers control of an account to a third party for compensation without formally executing a token transfer. In Virtublic this

scheme is precluded through two mechanisms. The first is the Dual Suspicion Protocol (two-stage verification upon anomalies): a sharp change in the behavioral voting patterns of a specific Soulbound ID (for example, a change in activity time zones, a change in the subject matter of votes, inconsistency with the cognitive profile) is flagged as an anomaly and initiates an inspection. The second is on-chain binding to the cognitive health score through Proof-of-Offline: a pattern of activity incompatible with the offline-period data of a specific citizen is a technically detectable deviation.

The transition to the following subchapter is determined by the necessity of establishing a special citizenship regime for subjects whose capacity for autonomous participation has not yet been formed — that is, for developing subjects (citizens under 18 years of age).

4.3. Protection of Developing Subjects (N6): Parental Consent, Encrypted Vault, Republic Engagement Auditor

N6 (Protection of Developing Subjecthood). A subject whose capacity for autonomous choice has not yet been formed has the right to additional protection from mechanisms that structurally destroy the conditions of subjecthood formation.

The logical justification of N6 is constructed upon the following chain. Volume I (axiom A8) established that platform architecture systematically employs dark patterns (dark interface patterns — architectural decisions that exploit cognitive vulnerabilities to manipulate choice without explicit coercion), resulting in measurable cognitive exhaustion. Volume I (pattern 7) established that the effect of cognitive exhaustion is amplified in children and adolescents: the developing prefrontal cortex is particularly vulnerable to mechanisms that exploit the incompleteness of impulse control. Volume I (axiom A10) established that consent is free only in the presence of real alternatives: a subject whose prefrontal cortex (the prefrontal cortex, responsible for impulse control and long-term planning) has not completed its development is structurally incapable of giving free consent in the sense of A10. From these three premises it follows that developing subjects require an additional level of constitutional protection — not paternalistic guardianship, but the architectural exclusion of mechanisms incompatible with the conditions of subjecthood formation.

The age threshold of 18 years is not arbitrary but a verifiable neurocognitive reference point: data from Nature Neuroscience 2023–2025 record the completion of basic prefrontal cortex formation at approximately 25 years of age; however, the constitutional threshold is set at 18 years as the most widely established legal threshold of legal capacity, on condition that additional protection continues to obtain until that age is reached. This choice is conservative in favor of the protection of subjecthood: N6 protects developing subjects not because they are incapable of any participation, but because systems optimized for engagement are structurally directed against the interests of subjects with incomplete impulse control.

The institutional realization of N6 comprises three independent mechanisms. The first is parental consent through cryptographic multisig (multisignature — a cryptographic mechanism requiring the signatures of multiple parties for an operation to be executed): activation of a Soulbound NFT for a citizen under 18 years of age requires the cryptographic signature of both the citizen and their legal guardian. This instantiates the following

constitutional logic: the consent of the parent is a necessary but not sufficient condition of participation — the citizen also signs the transaction, which preserves their subjecthood and precludes the situation in which a parent administers a child's citizenship as a resource. The second is an encrypted vault with automatic destruction upon reaching 18 years of age: data concerning the activity of a citizen under 18 years of age is stored in an encrypted repository, inaccessible to platforms, third parties, and state authorities, and is automatically destroyed upon the citizen reaching majority. The data may not be employed to construct a predictive profile subsequently applied to the adult citizen: this instantiates the right to non-predictability (N1) as applied to that period of life in which the subject is most vulnerable to the long-term consequences of profiling. The third is the Republic Engagement Auditor (the constitutional engagement auditor): a specialized GovernanceEngine protocol that verifies that the mechanisms available to citizens under 18 years of age within Virtublic do not employ the dark patterns described in axiom A8 of Volume I.

The Republic Engagement Auditor functions as follows. Each mechanism of participation available to developing subjects undergoes preliminary formal verification for conformity with the catalogue of prohibited practices: variable ratio reinforcement (unpredictable reward — a mechanism analogous to slot machines), FOMO mechanics (Fear Of Missing Out — the fear of missing a limited offer), endless progression without organic completion points, and guilt-tripping upon session exit. Formal verification is not a substantive assessment but a mathematical check of the code against the list of prohibited patterns encoded in the Coq specification through P2. A mechanism that does not pass verification cannot be activated for the given age group — automatically, without any administrative decision.

The following entailment of N6 carries separate constitutional significance: cognitive monitoring data (cognitive health score through Proof-of-Offline) for citizens under 18 years of age is applied according to enhanced standards — the minimum permissible level of offline periods is higher than for adult citizens, which structurally necessitates a higher cognitive health bonus upon compliance with those standards and an earlier warning upon their violation.

Case FTC v. Epic Games (2022–2025): the Federal Trade Commission established that Fortnite systematically employed dark patterns to obtain unauthorized payments from children — through concealed purchase buttons and through mechanics provoking clicks on payment interfaces in the midst of gameplay. The settlement amounted to 520 million dollars. The Republic Engagement Auditor in Virtublic precludes this pattern at the protocol level: a mechanic that provokes a transaction through the cognitive overload of gameplay does not pass verification and is not activated for developing subjects.

The transition to the following subchapter is determined by the necessity of establishing the connection between P3 and the specific theorems of Volumes I–II whose closure confirms the sufficiency of this principle for the identification of the subject of the republic.

4.4. Protection Against Theorems: T1 and T13

P3 closes two theorems of the preceding volumes, each of which recorded a defect not remediable without a mechanism of inalienable cryptographic binding of citizenship to a physical subject.

Theorem T1 (surplus attention, Volume I) established that each cycle generates predictive value systematically exceeding zero compensation to the individual — that is, that the activity of the subject on a platform produces value for the platform without a corresponding transfer of that value to the subject. P3 closes T1 through the following mechanism: Soulbound NFT is a constitutionally verified identifier to which the citizen's right of explicit consent (N1) regarding the use of their data is bound. Since Soulbound NFT is non-transferable, the predictive profile cannot be alienated together with citizenship: the profile belongs to the subject, not to their token. This means that attention-tokens (elementary acts of attention alienation) are not aggregated into the predictive mass of the platform without the constitutionally verified consent of the subject identified through Soulbound NFT. It therefore follows that the asymmetry recorded by T1 is not reproduced within the constitutional architecture of Virtublic: the predictive value of a citizen's activity cannot be appropriated without their explicit mandate.

An important entailment is that this protection is not declaratory. It is technically instantiated through a formally verified constraint in Coq (P2): any mechanism of Virtublic that aggregates citizen activity data without the explicit EQU⊥ consent of the specific citizen does not pass verification and cannot be deployed. A violation of this constraint is a mathematically provable non-conformity with the specification — not an administrative violation requiring investigation, but an algorithmically detectable event.

Theorem T13 (anonymity extirpates accountability, Volume II) established that blockchain anonymity protects against surveillance but extirpates political accountability: if the subject is a key rather than a person, who bears accountability for actions? P3 resolves this contradiction through the architectural separation of two levels of verification that T13 erroneously conflated. The first level is uniqueness verification: Soulbound NFT verifies that behind the given participation stands a unique physical subject who has undergone Digital Census v2 (P6, P13). This level secures political accountability in the constitutional sense: every vote belongs to a verified subject. The second level is the anonymity of participation: the specific vote of a citizen is disclosed to no one — neither to other citizens, nor to operators, nor to the state — through a zk-proof at the point of voting. This level secures the right to the privacy of political participation, without which voting under duress is structurally possible.

The two levels of verification employ fundamentally distinct cryptographic protocols (zk-SNARK for uniqueness verification; Ring Signatures — ring signatures, making it possible to verify that a signature belongs to a group of citizens without identifying the specific author — for anonymous voting), which secures their independence. The compromise of one level does not disclose the other: knowledge that a specific address is a verified citizen does not make it possible to establish how that citizen voted. T13 recorded a contradiction on the basis of the assumption that anonymity and the absence of accountability are inseparable. P3 proves that these two properties are separable through

the distinction of levels of verification — in consequence of which T13 is closed not through the elimination of anonymity, but through its constitutionally correct delimitation.

Chapter Summary

P3 establishes inalienable citizenship as the constitutional embodiment of the subject of the republic: Soulbound NFT instantiates non-transferability at the protocol level rather than through prohibition; encrypted vault and Republic Engagement Auditor instantiate additional protection for developing subjects in accordance with N6; the separation of levels of verification closes theorem T13 while simultaneously preserving political accountability and the anonymity of participation. Theorem T1 is closed through the constitutionally verified requirement of explicit consent for the aggregation of predictive data.

Transition to Chapter 5

P3 identified the subject of the republic. The existence of a verified subject structurally necessitates the following question: in what manner does the power belonging to this subject relate to economic contribution to the infrastructure of the republic? Volume II (theorem T11) proved that proof-of-stake reproduces plutocracy precisely because economic and political sovereignties are not separated. P4 (dual sovereignty) establishes the constitutional orthogonality of the two spaces of power — and thereby opens the second triad of Part I.

Chapter 5. Dual Sovereignty (P4)

This chapter establishes the constitutional orthogonality of EQU⊥ and VIC⊥ — two spaces of power that are fundamentally irreducible to one another. The first space is defined by subjecthood: each verified citizen possesses equal political weight regardless of economic contribution. The second is defined by infrastructural participation: the weight of an operator in technical decisions is proportional to his verified contribution to the system. The constitutional prohibition of conversion between these two dimensions is not a technical constraint but an ontological assertion regarding the nature of two incommensurable forms of power.

5.1. Technical Formulation and Ratio Legis

P4 (Dual Sovereignty). In Virtublic there exist two constitutionally orthogonal sovereignties: EQU⊥ (political sovereignty — one verified citizen, one vote) and VIC⊥ (infrastructural sovereignty — proportional to verified contribution to the infrastructure of the republic); conversion between them is prohibited at the protocol level.

The logical justification of P4 is constructed upon the following chain. Volume II (theorem T11, proof-of-stake plutocracy) established that any governance system in which political weight is determined by the size of an economic position structurally reproduces plutocracy: early holders accumulate compound advantage and begin to govern the system in the interest of preserving that advantage rather than in the interest of the broad body of participants. Volume II (theorem T12, governance without legitimacy) established that token

voting is by its nature a plutocracy — one token, one vote yields not a democratic but a proprietary consensus. Volume I (theorem T2, the temporal barrier) established that accumulated historical advantage in data is reproduced automatically without a mechanism for its constraint. From the conjunction of T2, T11, and T12 a single conclusion follows: the political and economic dimensions of power must be constitutionally separated through an impassable demarcation line, inasmuch as their conflation is not an accidental defect of specific protocols but the structural consequence of their architectural identity.

The ratio legis of P4 is as follows: political power and economic capital are ontologically distinct phenomena that do not admit of mutual conversion without the destruction of the nature of both. Normative axiom NA0 established that subjecthood is a politically protected good; normative principle N2 specified this as the prohibition of the conversion of economic capital into political power. P4 instantiates N2 as a constitutionally executable architectural separation: not as a norm that declares a prohibition while leaving its application to the discretion of an arbiter, but as a protocol-level impossibility, verified through the Formal Verification Protocol (P2).

The symbol ⊥ in the designations EQU⊥ and VIC⊥ is not decorative but substantive: it denotes mathematical orthogonality — two vectors between which there is no projection. As applied to sovereignties, this means: no unit of VIC⊥ may produce any unit of EQU⊥, and vice versa. This is not a constraint imposed upon both sovereignties from without — it is the property that makes each of them what it is. EQU⊥ is the sovereignty of the subject precisely because, and only because, it is not convertible from resources; VIC⊥ is the sovereignty of the operator precisely because, and only because, it does not substitute for the citizen's vote.

The transition to the following subchapter is determined by the necessity of describing the specific institutional mechanisms through which the two sovereignties function separately and interact through the Concordance Rule in cases affecting both dimensions.

5.2. Institutional Realization: EQU⊥-Voting, VIC⊥-Voting, Concordance Rule

Dual sovereignty is instantiated through three independent operational mechanisms, each of which serves a strictly defined class of decisions.

EQU⊥-voting is the primary mechanism of political participation for the body of citizens. Each verified citizen (Soulbound NFT, P3) holds exactly 1 EQU⊥ regardless of any other parameter — the volume of VIC⊥, the duration of citizenship, cognitive rating, geography. This identity is constitutionally invariant: EQU⊥(citizen) = 1 for all admissible values of the remaining variables. Differentiation of citizen influence within EQU⊥-voting is achieved not through a difference in vote weight but through the quadratic cost of influence (Madison Mode, P10) and Success Multiplier (P11) — mechanisms elaborated in Chapters 11 and 12.

The thresholds for EQU⊥-voting are differentiated by class of decision. For amendments affecting the constitutional core P1–P7 (upon satisfaction of the Axiom-Break Condition, P8), 75% EQU⊥ is required — a threshold that precludes capture by any coalition representing less than three-quarters of the body of citizens. For ordinary operational decisions within the

scope of P10–P18, the threshold is 51% EQU⊥. For ratification of a state mandate under SovereigntyShield (P17), the threshold is 75% EQU⊥, which structurally equates state access to citizen data with amendment of the constitutional core — thereby instantiating N5 not as a declaration but as a mathematically equivalent protection. For all votes affecting exclusively P0, EQU⊥-voting is impermissible: P0 is absolutely unamendable (Chapter 1).

VIC⊥-voting is the mechanism for technical participation by infrastructure operators. VIC⊥ (infrastructural sovereignty, proportional to verified contribution to infrastructure through Proof-of-Resource) is used exclusively for decisions of a technical character: network parameters, resource allocation, technical node standards, protocol specifications. VIC⊥ is not used for political decisions that determine the direction of the republic. A state that is an infrastructure operator receives VIC⊥ but not EQU⊥ — which constitutes a constitutional assertion: the state is an operator, not a citizen (Chapter 17, Rockefeller Mode, P16).

The distribution of VIC⊥ is tied to the Dual Reserve Market (P12): VIC⊥ is generated through verified contribution to infrastructure (computational resources, bandwidth, data storage), not through financial transactions. This severs the cycle recorded in theorem T11: in proof-of-stake, early holders accumulate governance influence through compound staking without generating new value; in Virtublic, VIC⊥ is generated only through current verified contribution — accumulated history is not automatically converted into additional VIC⊥.

The Concordance Rule is the mechanism regulating the class of decisions that simultaneously affect both sovereignties. Decisions of this class require a qualified majority in both sovereignties: the specific thresholds are determined by the category of decision through the Formal Verification Protocol. A representative example of a decision in this class is the amendment of technical network parameters that affects the accessibility of participation for citizens with low computational resources. Such a decision is technical (VIC⊥-relevant) and simultaneously political (EQU⊥-relevant), inasmuch as it affects equal access to participation. The Concordance Rule precludes the possibility whereby technical operators (the VIC⊥-majority) unilaterally adopt decisions that narrow political participation by citizens (EQU⊥-consequences), as well as the converse possibility — whereby the EQU⊥-majority establishes technical parameters without regard for the constraints of infrastructural reality.

The Concordance Rule is the digital analogue of bicameralism in classical republics — with the essential distinction that the second "chamber" (VIC⊥) is defined not by territorial representation but by real verified contribution to the functioning of the system. This analogy is not illustrative but structural: as bicameralism precludes the tyranny of a majority of one chamber, so the Concordance Rule precludes the tyranny of either sovereignty in the domain affecting both.

Case 2024: Uniswap DAO proposed an amendment to the fee structure that de facto displaced small liquidity providers by raising the minimum participation threshold. The decision was adopted through token voting (a pure VIC⊥-equivalent) without the participation of the broad body of users (EQU⊥-equivalent). It passed: large holders voted in favor of the economically advantageous amendment, which structurally narrowed access. The Concordance Rule, in an analogous scenario, would have required a separate

EQU⊥-vote by the body of citizens, and, upon failure to reach the threshold, rejection of the proposal.

The transition to the following subchapter is determined by the necessity of elaborating the normative justification for the demarcation line — why the orthogonality of sovereignties is not a technical constraint but a constitutional expression of the nature of political equality.

5.3. The Demarcation Line: The Sacred Orthogonality of Two Worlds

The constitutional prohibition of the conversion of VIC⊥ into EQU⊥ is not an arbitrary technical constraint. It is a consequence of normative axiom NA0 and principle N2, applied to a specific architectural problem: how to preserve the political equality of subjects in a system that must simultaneously reward economic contribution to infrastructure?

Normative axiom NA0 asserts: subjecthood is a politically protected good, and its systematic destruction is a political evil regardless of economic efficiency. N2 specifies this as applied to power: the conversion of economic capital into political power is a form of the destruction of subjecthood, inasmuch as it produces a situation in which one subject possesses greater political weight than another exclusively by virtue of his economic position — that is, by virtue of a factor bearing no relation to the nature of the subject as a political participant.

This conclusion is not a value judgment but a formal consequence of NA0: if subjecthood is a politically protected good, then political power must be tied to subjecthood rather than to economic capital. A tie to capital would mean that the political protection of subjecthood is in direct dependence upon the economic position of the subject — that is, that subjects with greater capital are politically protected more strongly. This tautologically nullifies NA0: the protection of subjecthood becomes a function of the very mechanism that destroys it for subjects with lesser capital.

The demarcation line between EQU⊥ and VIC⊥ instantiates the ontological distinction between two types of power. The first type is the power of the subject as a member of the political community: it is equal for all precisely because it is grounded in subjecthood rather than in resources. The second type is the power of the operator as a participant in the infrastructural market: it is proportional to verified contribution precisely because infrastructural decisions require technical competence and real investment of resources. The conflation of the two types destroys both: an operator who receives EQU⊥ through VIC⊥ uses political sovereignty to protect his infrastructural position; a citizen who loses political equality due to low VIC⊥ ceases to be a subject in the full sense of NA0.

Formally: EQU⊥ ∩ VIC⊥ = ∅. The empty intersection is not a technical characteristic of two tokens but a constitutional assertion regarding the nature of two forms of power. Any operation that violates this identity is automatically rejected by the Formal Verification Protocol as inconsistent with constitutional specification N2.

An important entailment is the following: this prohibition also protects operators from political pressure. Inasmuch as EQU⊥ is not convertible into VIC⊥, a political majority may not use its weight to expropriate infrastructural positions from operators or to alter technical

parameters to the detriment of infrastructural efficiency without passing through the Concordance Rule. The orthogonality is mutual: both sovereignties are protected from the expansion of the other.

The transition to the following subchapter is determined by the necessity of recording the connection between P4 and the specific theorems of Volumes I–II whose closure confirms the sufficiency of this principle.

5.4. Defense Against Theorems: T11, T12, T2

P4 closes three theorems from the preceding volumes, each of which recorded a defect not eliminable without the constitutional separation of sovereignties.

Theorem T11 (PoS-plutocracy, Volume II) established that in proof-of-stake systems early holders accumulate governance influence through compound staking rewards without generating new value: the top 100 addresses control more than 40% of ETH, in consequence of which governance reproduces plutocracy structurally rather than as an accidental deviation. P4 closes T11 through three mechanisms simultaneously. The first: EQU⊥ = 1 for each citizen regardless of the size of the position — compound accumulation does not yield additional political weight. The second: VIC⊥ is tied to current verified contribution through Proof-of-Resource rather than to accumulated history — which eliminates the compound advantage as applied to infrastructural sovereignty. The third: the orthogonality of EQU⊥/VIC⊥ precludes the conversion of accumulated VIC⊥ into EQU⊥ — by virtue of which even dominance in infrastructural sovereignty does not yield political dominance.

Theorem T12 (governance without legitimacy, Volume II) established that token voting is a structural plutocracy: the legitimacy of governance is determined by the distribution of tokens rather than by the will of the broad body of participants. P4 closes T12 through the following inference: EQU⊥-voting is not token voting, inasmuch as EQU⊥ = 1 for each citizen and cannot be accumulated. It therefore follows that the legitimacy of EQU⊥-decisions is determined by the will of the verified body of citizens rather than by the distribution of tokens. VIC⊥-voting is analogous to token voting only in the domain of technical decisions — a domain in which proportionality to contribution is justified. The delineation between these domains through the Concordance Rule precludes the situation recorded in T12: the VIC⊥-majority may not determine political decisions through a mechanism that is formally analogous to token voting.

Theorem T2 (the temporal barrier, Volume I) established that accumulated data history creates a structural advantage not eliminable by competition: early platforms dominate not through the quality of current service but through the incomparable volume of historical data. P4 closes T2 as applied to sovereignty through Proof-of-Resource: VIC⊥ is determined by current verified contribution rather than by accumulated history of participation. This does not eliminate the temporal barrier in the informational space (T2 retains force as applied to the data market), but it precludes its reproduction in the space of sovereignty: early operators do not receive additional VIC⊥ for their history of participation; their weight is determined by current contribution at each moment of verification.

The transition to the following subchapter is determined by the necessity of establishing the operational defense of P4 against a specific attack vector — plutocratic capture through indirect conversion of sovereignties.

5.5. Defense Against the Attack Vector: Plutocratic Capture

Plutocratic capture in the context of P4 denotes an attempt to de facto convert economic resource into political influence through mechanisms that formally do not violate the prohibition of direct conversion of VIC⊥ into EQU⊥. This attack vector is the most probable means of circumventing P4, inasmuch as direct conversion is blocked at the protocol level, while indirect conversion requires architectural pattern recognition.

Two primary scenarios of indirect capture and their architectural closure are defined as follows. The first scenario: mass acquisition of citizenship through proxy citizens. An actor with sufficient resources could finance the creation of multiple fictitious Soulbound Identity records with the aim of accumulating EQU⊥ through quantity rather than through conversion. This scenario is closed through Digital Census v2 (P6, P13) and the Dual Suspicion Protocol: verification of citizen uniqueness through CivicJuryEngine precludes the creation of fictitious identities, while behavioral monitoring detects the coordinated voting characteristic of proxy citizens. Formally: Manipulation_Cost(EQU⊥ via proxy) ≥ Cost(CivicJury_Override) + Cost(anomaly_detection_bypass), which, under a functioning system, is prohibitive. The second scenario: use of VIC⊥-dominance to block decisions through the Concordance Rule. An operator controlling a majority of VIC⊥ could systematically block politically significant decisions requiring the consent of both sovereignties — thereby de facto acquiring political influence without conversion into EQU⊥. This scenario is closed through two norms. The first: the Concordance Rule requires the consent of both sovereignties only for decisions affecting both dimensions — the scope of such decisions is constitutionally defined and verifiable. The second: systematic blocking by the VIC⊥-majority is classifiable as a constitutional violation of the sovereignty type and is referred to the Conflict-Resolution Core (P18) for automatic resolution.

The Lido Finance case (2023–2025) illustrates the structural risk: by mid-2024, Lido controlled more than 32% of staked ETH, which de facto vested a single protocol with disproportionate influence over Ethereum's validator set. Ethereum's governance had no constitutional mechanism for constraining this concentration. Within the architecture of Virtublic: control of 32% VIC⊥ does not yield a corresponding share of EQU⊥ — by virtue of the orthogonality of sovereignties — and constitutes a flag for anomaly within the Dual Reserve Market (P12), initiating a review of VIC⊥ distribution through Proof-of-Resource verification.

An additional safeguard is Madison Mode (P10): the quadratic cost of influence is applied also to coordinated EQU⊥-coalitions, detected through the Coalition Verification Protocol. An organic coalition of citizens sharing a position is structurally distinct from a coordinated coalition constituted through external financing — and this distinction is algorithmically verifiable.

Chapter Summary

P4 establishes the orthogonality of EQU⊥ and VIC⊥ as the constitutionally inviolable demarcation line between two forms of power that are irreducible to one another by virtue of their ontological distinctness. Three theorems — T11 (PoS-plutocracy), T12 (governance without legitimacy), T2 (the temporal barrier) — are closed through a single architectural principle: the constitutional impossibility of converting economic resource into political sovereignty. The Concordance Rule ensures the functional interaction of the two sovereignties in the domain of their intersection without violating their orthogonality. The vector of plutocratic capture is closed through Digital Census v2, the Dual Suspicion Protocol, and algorithmic verification of concentration anomalies.

Transition to Chapter 6

P4 established the structure of the sovereignties and their orthogonality. However, orthogonality is not a self-sufficient protection against concentration: formally equal citizen votes may be de facto neutralized through the accumulation of influence by those capable of coordinating voting at a scale inaccessible to the individual citizen. Volume I (theorem T5) proved that individual resistance is economically neutralized by concentrated capital. It therefore follows that the constitutional architecture requires a mechanism that structurally constrains the concentration of influence within EQU⊥-space — not through the prohibition of participation, but through an escalating cost of influence. This mechanism is established by P5 (limited influence).

Chapter 6. Limited Influence (P5)

The chapter establishes the quadratic cost of influence as the constitutional mechanism neutralizing the structural advantage of concentrated interests over diffuse interests. P5 is not an instrument of capital redistribution — it is the constitutional prohibition on the conversion of capital into political power through the accumulation of influence, which is structurally necessitated by theorems T5 and T12 of Volumes I–II as the sole architecturally possible response to the demonstrated impossibility of individual resistance to concentrated capital.

6.1. Technical Formulation and Ratio Legis

P5 (Limited Influence). The cost of additional influence over collective decisions in Virtublic is a quadratic function of the volume of influence requested: cost(n) = n², where n is the number of influence units acquired in excess of the baseline EQU⊥.

The logical justification of P5 is constructed upon the following chain. Volume I (theorem T5) established that individual resistance to concentrated capital is economically neutralized: the costs of organizing a diffuse majority against a concentrated minority structurally exceed the resources available to that majority. This means that under a linear cost of influence, an actor with sufficient capital is always capable of acquiring political dominance by accumulating influence proportionally to his resources. Volume I (theorem T12, also cited in Volume II) established that governance without a constitutional constraint on concentration

structurally reproduces plutocracy. Volume I (normative principle N3) established that every legitimate position must have a minimum guaranteed coverage that precludes its algorithmic invisibility. From the totality of T5, T12, and N3 it follows that the constitutional architecture must simultaneously resolve two tasks: to render the accumulation of influence structurally costly (eliminating T5) and to guarantee minimum coverage for every legitimate position (instantiating N3). The quadratic cost function resolves the first task; the anti-faction filter resolves the second.

The ratio legis of P5 is as follows. The problem of concentrated and diffuse interests is one of the most persistent structural asymmetries in public choice theory: a concentrated interest (a small group with high stakes) invariably exceeds a diffuse interest (a large number of subjects with low individual stakes) in mobilization efficiency, inasmuch as the coordination costs of a small group are incomparably lower. In the digital space this asymmetry is amplified through the mechanisms of A6 of Volume I (the self-compounding cycle) and Pattern 11 of Volume I (the algorithmic amplification of positions with greater engagement): the concentrated interest obtains not only an organizational but an algorithmic advantage. P5 constitutionally extirpates this asymmetry, not by prohibiting concentrated participation as such, but by rendering it progressively costly: the accumulation of influence beyond the baseline level becomes increasingly expensive, which generates a structural incentive in favor of broad organic coalitions over concentrated narrow interests.

The following demarcation is of principled importance: P5 does not restrict the citizen's right to participate — it restricts the possibility of converting resources into disproportionate influence. Every citizen possesses the baseline EQU⊥ = 1 at no cost (Chapter 5, P4); the quadratic cost applies only to influence requested in excess of this baseline level. By virtue of which a citizen without additional resources retains full constitutional participation; a citizen or coalition with resources may acquire additional influence, but at a progressively increasing cost that extirpates the economic profitability of unlimited accumulation.

The transition to the following subchapter is structurally necessitated by the requirement to establish the concrete numerical parameters of the quadratic function and their operational consequences for the distribution of influence within the system.

6.2. Institutional Instantiation: Quadratic Function cost(n) = n²

Madison Mode (the quadratic influence mechanism instantiating P5) functions through the following baseline algorithm. Every verified citizen possesses the baseline EQU⊥ = 1 at no cost. For the acquisition of additional units of influence n in excess of the baseline, the function cost(n) = n², expressed in VIC⊥, applies. Consequently: the acquisition of 10 additional units of influence costs 100 VIC⊥; the acquisition of 100 units costs 10,000 VIC⊥; the acquisition of 1,000 units costs 1,000,000 VIC⊥. The progressively increasing cost renders the accumulation of influence exponentially expensive as it grows, which produces the following structural effect: the concentration of 1,000 units of influence in the hands of a single actor costs 1,000 times more than the distribution of the same resources across 1,000 citizens each acquiring 1 unit. By virtue of this, the VIC⊥-rational actor confronts diminishing returns from the accumulation of influence: each successive unit of

influence costs more than the preceding one, whereas the political value of each additional unit diminishes as their total number in the system grows.

Mathematically, the quadratic function is optimal for this task on the following grounds. A linear function (cost = n × c) does not extirpate the problem: an actor with k times greater resources acquires k times greater influence, which reproduces the linear conversion of capital into power. An exponential function (cost = c^n) extirpates accumulation entirely, but also extirpates the possibility of any additional participation — which violates N3 (minimum visibility threshold) for actors with resources. The quadratic function provides the balance: it renders concentration structurally costly while preserving the possibility of legitimate additional participation for actors with resources and projects requiring broad support.

VIC⊥ expended through Madison Mode is neither destroyed nor redistributed arbitrarily: it is directed into CollectiveBond (the constitutional reserve fund financing infrastructure projects with maximum citizen coverage). This mechanism produces an additional constitutional effect: resources expended on the concentration of influence are structurally directed toward financing diffuse public goods, which is the operational embodiment of normative principle N2 (the prohibition on the conversion of capital into political power through the redirection of resources into public goods).

The anti-faction filter is applied through a diversity penalty (a penalty for coordination homogeneity): coordinated voting in which a group of actors with identical voting patterns acquires additional influence simultaneously is identified as potential factional activity and is assessed an additional quadratic cost. The technical instantiation of the diversity penalty is based on correlation analysis of voting patterns: if N actors vote identically on K consecutive questions with a probability statistically incompatible with random coincidence, their aggregate additional influence is calculated as cost(N × n) = (N × n)², rather than as N × cost(n) = N × n². This norm is critically important: without it, the quadratic mechanism could be circumvented through the distribution of accumulated influence across multiple affiliated actors, each of whom formally acquires a small number of additional units at low quadratic cost.

The transition to the following subchapter is structurally necessitated by the requirement to establish how P5 guarantees minimum coverage for diffuse positions — that is, instantiates normative principle N3, which constitutes the second part of the constitutional mandate of this principle.

6.3. Minimum Visibility Threshold: P(coverage) ≥ ε for All Legitimate Positions

N3 (Minimum Visibility Threshold). Every legitimate position in the public space of Virtublic is guaranteed a minimum statistically significant coverage P(coverage) ≥ ε, independently of its financial backing.

The logical justification of N3 is constructed upon the following chain. Volume I (Pattern 11) established that the ranking algorithm converts an engagement advantage into a visibility advantage: a position with high engagement receives algorithmic amplification that additionally increases its engagement, reproducing the cycle A6 as applied to the

information space. Volume I (theorem T3) established that this cycle has no internal saturation point. Consequently, in the absence of a constitutional constraint, the ranking algorithm produces an information monopoly: positions with maximum engagement receive virtually all coverage, while positions with minimum engagement become algorithmically invisible — which is the functional equivalent of censorship instantiated through architecture rather than through prohibition.

N3 extirpates this pattern through the constitutional algorithm of minimum distribution: GovernanceEngine reserves a share ε of the system's aggregate coverage for distribution among all legitimate positions, independently of their engagement score (the engagement score being the metric aggregating user interactions with content). The legitimacy of a position is defined formally: a position is legitimate if it is verified as conforming to constitutional standards through the Formal Verification Protocol (absence of incitement to hatred, absence of identifiable disinformation, conformity to minimum standards of argumentation). The threshold ε is a constitutionally fixed parameter, the amendment of which requires EQU⊥-voting with a threshold of 51%.

The mechanism of instantiation of N3 through GovernanceEngine functions as follows. The aggregate information flow in the system is divided into two components: organic (determined by engagement and Success Multiplier) and the constitutional reserve (ε, distributed equally among all verified legitimate positions proportionally to their number, not their engagement). This produces the following structural effect: a position with zero financial backing and minimum organic engagement nonetheless receives a share of the constitutional reserve ensuring its statistically significant presence in the information space. This mechanism is the direct operational embodiment of N1 in the information dimension: the right to unpredictability is not real without a minimum guarantee that alternative positions will be visible.

A conceptual analogy through social experience: in traditional elections, the legislation of many jurisdictions guarantees minimum broadcast time to minor parties — not in order to make them winners, but so that their position is heard by the body of citizens. N3 instantiates the equivalent principle as applied to the digital information space: not a guarantee of victory, but a guarantee of minimum presence, without which participation in public discourse is nominal.

The case of 2023–2024: TikTok's recommendation algorithm during the Ukrainian conflict exhibited statistically significant ranking of content corresponding to a high engagement profile, regardless of its actual veracity. Alternative viewpoints with low engagement, including verified sources with limited audiences, received systematically reduced coverage. N3 in the architecture of Virtublic precludes this pattern: algorithmic ranking processes only the organic component, whereas the constitutional reserve ε is distributed independently of ranking.

The transition to the following subchapter is structurally necessitated by the requirement to establish the connection of P5 to specific theorems of Volumes I–II, whose closure confirms the architectural sufficiency of this principle.

6.4. Defense Against the Theorems: T5 and T12

P5 closes two theorems of the preceding volumes, each of which fixed a defect not eliminable without a mechanism of structural constraint on the accumulation of influence.

Theorem T5 (neutralization of resistance, Volume I) established that individual resistance to concentrated capital is economically neutralized: the costs of organizing a diffuse majority structurally exceed the resources of that majority, by virtue of which the concentrated interest prevails under a linear cost of influence. P5 closes T5 through the inversion of this cost relationship: under quadratic cost, the concentration of influence becomes exponentially expensive, whereas a broad organic coalition of citizens, each of whom employs the baseline EQU⊥ = 1, obtains aggregate influence at no additional cost. Formally: the concentration of 1,000 units of influence in the hands of a single actor costs 1,000,000 VIC⊥; the distribution of the same 1,000 units of influence across 1,000 citizens with baseline EQU⊥ costs 0 VIC⊥. The structural advantage transfers from the concentrated interest to the diffuse interest — not as a political preference, but as a mathematical consequence of the quadratic function.

An important consequence is that P5 does not redistribute resources: it redistributes the cost of influence. An actor with greater capital retains his resources but loses the ability to linearly convert them into political dominance. T5 was possible precisely because the cost of influence was linear — capital produced influence proportionally to its volume. The quadratic function severs this proportion.

Theorem T12 (governance without legitimacy, Volume II) established that token voting produces governance in which decisions reflect the interests of token holders, not the broad body of participants. P5 closes T12 in the part concerning additional influence: the quadratic cost precludes the possibility of a single actor using token-equivalent resources to acquire governance dominance. VIC⊥ expended through Madison Mode does not produce proportional influence — it produces diminishing returns. By virtue of this, the governance of Virtublic reflects the distribution of positions in the broad body of citizens more accurately than any system with linear or proportional influence: an actor with resources exceeding the median level by a factor of 100 obtains influence exceeding the median not by a factor of 100 but by a factor of 10 (the square root of 100 = 10) — which is a considerably less distorting distribution.

The Compound Finance case (2023–2024): large holders of COMP (the governance token of Compound) systematically advanced proposals advantageous for yield strategies with large capital and disadvantageous for ordinary users with small positions. Analysis of on-chain data demonstrates that the top 10 addresses provided more than 60% of the voted weight while constituting less than 0.5% of voting participants. Madison Mode in an analogous scenario produces the following effect: the top 10 addresses may participate in voting, but their aggregate acquired influence is constrained by the quadratic function, whereas a coalition of ordinary citizens coordinating through organic engagement obtains Success Multiplier (P11), which structurally amplifies its aggregate influence.

The transition to the following subchapter is structurally necessitated by the requirement to establish the operational defense of P5 against a specific attack vector — the mass purchase of influence through distributed affiliated structures.

6.5. Defense Against the Attack Vector: Mass Purchase of Influence

Mass purchase of influence denotes an attempt to de facto circumvent the quadratic constraint by distributing VIC⊥ across multiple affiliated actors, each of whom acquires relatively small additional influence at low quadratic cost, while their coordinated actions produce the effect of concentration. This attack vector is the most technically sophisticated method of circumventing P5 and requires multi-level architectural protection.

The first level of protection: the diversity penalty (the penalty for coordination homogeneity, described in subsection 6.2). Coordinated voting patterns statistically incompatible with random coincidence are identified as a potential faction and assessed the aggregate quadratic cost. This mechanism is effective against overt coordination, in which affiliated actors vote identically on all questions. However, it is less effective against more sophisticated coordination, in which affiliated actors deliberately diversify their voting patterns, coordinating only on strategically key questions.

The second level of protection: Coalition Verification Protocol in conjunction with Success Multiplier (P11). A coalition claiming Success Multiplier passes verification of organicity through analysis of the independent participation history of its members: if the members of the coalition do not demonstrate an independent voting history on questions unrelated to the interests of the coordinator, their coalition does not receive the multiplier. This mechanism is structural, inasmuch as it does not require proof of the fact of coordination — it requires proof of independence, which is a considerably more robust criterion.

The third level of protection: monitoring of VIC⊥ flows through Dual Reserve Market (P12). The concentrated distribution of VIC⊥ from a single source to multiple affiliated actors within a short-term period is an identifiable on-chain pattern, flagged as an anomaly. GovernanceEngine does not block this transaction automatically (which would constitute a violation of the right to dispose of VIC⊥), but transmits the flag to CivicJuryEngine for evaluation: whether this pattern is legitimate (for example, an infrastructure operator distributing VIC⊥ among independent contractors) or factional (an actor financing a network of dependent voters).

The three levels of protection are independent: circumventing the first does not eliminate the second and third. For a successful mass purchase of influence, the attacker must simultaneously conceal the coordination of voting patterns, ensure an independent participation history for each affiliated actor, and mask VIC⊥ flows from monitoring — which is computationally and organizationally prohibitive within a functioning verification system.

Chapter Summary

P5 establishes the quadratic cost of additional influence as the constitutional mechanism neutralizing the structural advantage of concentrated interests over diffuse interests.

Theorems T5 and T12 are closed through the inversion of the cost relationship: the concentration of influence becomes exponentially expensive, whereas a broad organic coalition obtains a structural advantage at no additional cost. The minimum visibility threshold N3 is instantiated through the constitutional reserve ε in GovernanceEngine. The mass influence-purchase attack vector is closed through three independent levels of protection: diversity penalty, Coalition Verification Protocol, and monitoring of VIC⊥ flows.

Transition to Chapter 7

P5 established the mechanism for constraining the concentration of influence within an already-verified body of citizens. However, the body of citizens itself remains vulnerable if its verification is insufficiently robust: influence constrained for each citizen may be de facto multiplied through the creation of fictitious identities, each of which contributes the baseline EQU⊥ = 1. Volume II (theorem T15) proved the structural trilemma of uniqueness verification. Consequently, the constitutional architecture requires a mechanism that resolves T15 through constitutionally accountable, rather than naïve, decentralization — and it is precisely this that P6 (verifiable census) establishes.

Chapter 7. Verifiable Census (P6)

The chapter establishes the Digital Census as a periodic constitutional act of the recognition of subjecthood, fundamentally distinct from the technical operation of updating a registry. The Census in Virtublic is the moment at which the republic as a political community addresses each of its members and verifies their membership in that community — not as a data check, but as a political act of recognition conducted through the institution of constitutionally accountable citizen-auditors. Volume II (theorem T15) proved the ineliminability of the verification trilemma; P6 does not eliminate this trilemma but resolves it through the selection of a constitutionally accountable panel in place of a permanent centralized authority or an economic barrier.

7.1. Technical Formulation and Ratio Legis

P6 (Verifiable Census). Digital Census v2 is a periodic constitutional act through which the republic verifies the uniqueness and subjecthood of each member of the citizen body; verification is conducted through a two-stage protocol comprising automated first-stage tests and a constitutionally accountable panel of citizen-auditors at the second stage.

The logical justification of P6 is constructed upon the following chain. Volume I (theorem T1) established that each cycle generates predictive value at the expense of the subject: this value can be protected only in the presence of a verified subject to whom the right of explicit consent (N1) is bound. Volume II (theorem T15) established the fundamental trilemma: it is impossible to simultaneously secure decentralization, Sybil resistance (protection against fictitious identities), and the absence of plutocracy. Every solution sacrifices one of the three elements: Worldcoin sacrifices decentralization through biometric centralization; Bitcoin PoW sacrifices the absence of plutocracy through concentration in mining pools; early DAOs

sacrificed Sybil resistance by relying on the good faith of participants. Volume I (normative principle N4) established that uniqueness verification must be conducted through a procedural audit rather than through a permanent centralized authority. From the conjunction of T1, T15, and N4 it follows that P6 must resolve the trilemma of T15 through a fourth form — a constitutionally accountable temporary panel — which is neither permanent centralization (precluding capture), nor an economic barrier (precluding plutocracy), nor naïve decentralization (securing Sybil resistance).

The ratio legis of P6 rests upon the distinction between the verification of a pattern and the act of political recognition. An algorithm verifies a pattern — behavioral indicators compatible with the presence of a living subject. A political community recognizes the subject — performs an act of inclusion in the citizen body, the constitutional consequences of which exceed the bounds of technical verification. This distinction is not philosophical but architectural: if the Census is exclusively a technical operation, its results may be delegated to an algorithm, which reproduces centralization in the form of the algorithmic authority of the system's developers. If the Census is a constitutional act, it requires a constitutionally accountable subject — that is, a citizen who has taken an oath and bears verifiable accountability for their decision.

The periodicity of the Census is constitutionally defined: every 365 days, without the possibility of extension through an ordinary decision of GovernanceEngine. The suspension of the Census is a constitutional violation, identified by the Formal Verification Protocol and transmitted to the Conflict-Resolution Core (P18) as a technical conflict of the first type. This norm closes the scenario in which a controlling actor defers the Census in order to preserve an outdated and potentially compromised citizen body in their own interest.

The transition to the following subchapter is determined by the necessity of establishing the specific operational mechanism through which P6 is realized — that is, of describing Digital Census v2, CivicJuryEngine, and the panel selection system.

7.2. Institutional Realization: Digital Census v2, CivicJuryEngine, VRF

Digital Census v2 is the constitutional protocol of periodic verification of the citizen body, instantiated through a two-stage procedure with cryptographic verification at each stage.

The technical architecture of Census v2 is based on a Merkle Tree (a data structure providing verification of the integrity of a dataset through cryptographic hashing without disclosure of its contents): each verified Soulbound ID is included in the Merkle Tree of the citizen body through a zk-proof of uniqueness that does not disclose the identifiers on the basis of which uniqueness is proved. This instantiates the constitutional requirement: the republic knows that the set of citizens is verified, but does not know which specific data of each citizen confirms that verification. This property is not a technical convenience but a constitutional norm: it closes the scenario in which the state employs the Census as an instrument for collecting data on citizens while formally complying with the constitution (SovereigntyShield, P17).

CivicJuryEngine (the Civic Guard mechanism) is the constitutional institution governing the selection, functioning, and accountability of the panel of citizen-auditors of the Census. The panel is selected through VRF (Verifiable Random Function — a cryptographically verifiable random selection function: an algorithm producing a random result whose verifiability is mathematically demonstrable and which cannot be predicted or manipulated by the operator). The verifiability of VRF selection is constitutionally necessary: any citizen may independently verify that the composition of the panel was determined randomly without intervention — which eliminates the possibility of prior collusion regarding the panel's composition.

The size of the panel scales proportionally to the size of the network: for a citizen body of up to 10,000 — a minimum of 21 auditors; for 10,000–100,000 — 37 auditors; for 100,000–1,000,000 — 63 auditors; for more than 1,000,000 citizens — 99 auditors. The lower bound of 21 is mathematically grounded: at a 2/3 quorum for decision-making, the minimum majority is 14 auditors, which renders collusion economically costly but technically possible only upon the coordination of a significant portion of the panel. The upper bound of 99 limits the operational cost of the panel as the network scales.

Decisions of the panel are made by a qualified majority of 2/3: exclusion of a citizen from the body requires the assent of no fewer than 2/3 of the auditors. This threshold instantiates the following constitutional logic: the erroneous inclusion of a fictitious identity in the body is less dangerous than the erroneous exclusion of a real citizen — inasmuch as exclusion violates the right to political participation (NA0), whereas the inclusion of a fictitious identity is constrained by the mechanisms of P5 and P10. It therefore follows that the standard of proof for exclusion is higher, which is reflected in the threshold of 2/3.

Case 2024: in several major DeFi airdrops, uniqueness verification was conducted through on-chain activity as a proxy for identity — the result was a systematic error of two types. The first type: false positives — automated bots with sufficient on-chain history successfully passed verification. The second type: false negatives — real users with low on-chain activity were filtered out. CivicJuryEngine eliminates both error types through the separation of stages: automated first-stage tests identify overt bots; the second-stage panel processes borderline cases with constitutional accountability for each decision.

The transition to the following subchapter is determined by the necessity of describing the specific two-stage verification protocol — the Dual Suspicion Protocol — as the operational core of Digital Census v2.

7.3. Dual Suspicion Protocol: Stage 1 and Stage 2

The Dual Suspicion Protocol (a two-stage verification protocol with a separation of the automated and collegial stages) is the operational mechanism through which P6 realizes uniqueness verification without a permanent centralized authority and without an economic barrier.

Stage 1: automated adaptive cognitive tests. Each citizen undergoing the Census interacts with an adaptive series of tests verifying the indicators of a living cognitive subject without

disclosure of identity. The tests adapt in complexity and type according to response patterns: if a citizen demonstrates a pattern compatible with an automated response (temporal constancy, insensitivity to stimulus order, absence of micro-variations in reaction), the test advances to more complex verifiers. The adaptation of the testing algorithm is publicly auditable through the Formal Verification Protocol: the parameters of adaptation are recorded on-chain, which precludes the introduction of concealed changes to the verification criteria.

Three classes of first-stage tests are constitutionally defined. The first class is cognitive-contextual tasks: the citizen is presented with situations requiring contextual understanding uncharacteristic of automated responses as of 2023–2026. The second class is temporally variable tasks: a series of interactions with temporal patterns statistically incompatible with an algorithmic response without specialized calibration for the specific test. The third class is biometric patterns without biometric data: analysis of micro-variations in interaction (temporal delays, movement deviation) producing the statistical signature of a living subject without the retention of biometric data as such — the data is destroyed upon completion of the session; only the verification result is recorded on-chain.

A citizen who successfully passes stage 1 receives an updated status in the Merkle Tree without any interaction with the panel. A citizen who does not pass stage 1 for any reason — including technical failure, connection unavailability, or an atypical cognitive profile — is automatically transmitted to stage 2. It is principally important that failure at stage 1 is not a ground for exclusion from the citizen body, but a ground for collegial verification. This norm instantiates the presumption of subjecthood: the system does not presuppose that the citizen is a fictitious identity — the system presupposes that they are a subject requiring more detailed verification.

Stage 2: collegial verification. A citizen transmitted to stage 2 interacts with the panel through an asynchronous procedure structurally analogous to a jury proceeding. The panel does not know the real identity of the citizen: interaction is conducted through a zk-identifier bound to the Soulbound ID but not disclosing the identity. The panel evaluates the totality: the results of stage 1 (transmitted through a zk-proof without disclosure of the test content), the participation history of the given Soulbound ID within the system, the presence of anomalies in voting patterns, and Dual Reserve Market (P12) flags where applicable.

The panel has three possible outcomes at its disposal: confirmation of citizen status (2/3 majority), referral for a repeat stage 1 with an expanded protocol (simple majority), and exclusion from the citizen body with registration in the public violation registry (2/3 majority). All three decisions are recorded on-chain with binding to the Soulbound ID of each auditor who participated in the vote. This registration is constitutionally mandatory: it instantiates the principle of panel accountability as the key element distinguishing the Civic Guard from an anonymous algorithmic decision.

The transition to the following subchapter is determined by the necessity of establishing in detail the constitutional accountability of the auditors — the mechanism without which the Civic Guard is a declaratory rather than a real institution.

7.4. Civic Accountability of Juror-Auditors: Oath, Sanctions, Registration of Violations

The Civic Guard is a constitutionally accountable institution, not a technical body. The accountability of auditors is the element that constitutionally distinguishes P6 from naïve decentralization: the latter presupposes that participants act in good faith by virtue of economic incentives; P6 presupposes that participants act in good faith by virtue of a constitutional obligation, the violation of which entails verifiable consequences.

The constitutional oath is a mandatory condition for admission to the panel. The oath is taken through an on-chain transaction bearing the auditor's Soulbound ID: the citizen cryptographically confirms that they have assumed the constitutional obligation to act impartially, guided exclusively by the criteria for the verification of subjecthood, and that they are cognizant of the constitutional sanctions for violation of that obligation. The oath is not a declaration of intent — it is a constitutional obligation with verifiable consequences, which distinguishes it from an ordinary user agreement with terms of service that entails no real accountability.

The sanctions system distinguishes three types of violation, each entailing commensurate constitutional consequences. The first type is a procedural violation (failure to appear at a collegial session without valid cause, refusal to vote without justification): the sanction is a temporary suspension of the right to participate in the next panel, recorded on-chain. The second type is unintentional error (the auditor made a decision subsequently refuted by additional data, in the absence of indicators of intent): no sanctions obtain; however, the error is recorded in the auditor's on-chain history as part of their verifiable track record. The third type is intentional violation (established collusion with the citizen under review, systematic voting against reliable data in established interests of third parties): the sanction is the nullification of the auditor's Soulbound ID as a constitutional violation, qualified under the same category as an attempt to transfer citizenship (Chapter 4, P3). This symmetry is architecturally grounded: in both cases the subject violates the nature of citizenship as a political obligation by employing it as a resource in the interests of third parties.

Public on-chain registration of all panel decisions with binding to the Soulbound IDs of the auditors is constitutionally mandatory. This registration instantiates the following constitutional logic: the anonymity of political participation is a right of the citizen (P3, zk-proof voting); the accountability of a collegial decision is a constitutional obligation of the auditor. These two principles do not contradict one another: the citizen participating in the Census as a subject under review remains anonymous through zk-proof; the auditor making a decision as an official of the republic bears public accountability for that decision. The demarcation of roles determines the demarcation of standards: the subject is protected; the official is accountable.

Rotation of the panel is mandatory: an auditor who has served on a panel may not be re-selected by VRF for 180 days. This norm eliminates the accumulation of institutional influence through repeated participation: the Civic Guard is a temporary panel, not a permanent body. This is the principled distinction from traditional regulatory bodies, which are vulnerable to capture through the long-term dominance of particular actors — a pattern recorded as applied to digital regulation in Volume I, pattern 12.

Case Worldcoin Identity Protocol (2023–2025) illustrates the structural defect of the alternative approach: biometric verification through Orb devices produces a permanent biometric database with a single centralized operator and without a mechanism of constitutional accountability of operators for inclusion or exclusion decisions. The compromise of the database in 2024 (the leak of iris-code hashes of users in several jurisdictions) confirmed the structural risk recorded in T15: centralized verification is a single point of failure. CivicJuryEngine in Virtublic has no single point of failure: the selection of the panel through VRF is distributed, its decisions are publicly recorded, and no auditor has permanent access to the system.

The transition to the following subchapter is determined by the necessity of establishing the connection between P6 and theorem T15 and normative principle N4 as the theoretical foundations of this architectural choice.

7.5. Connection with Theorem T15 and Normative Principle N4

P6 closes theorem T15 and instantiates N4 through a single architectural construction, proving their compatibility.

Theorem T15 (the verification trilemma, Volume II) established that simultaneously securing decentralization, Sybil resistance, and the absence of plutocracy is impossible: each pair of the three properties is achievable, but their conjunction excludes the third. Worldcoin: decentralized participation + Sybil resistance → centralized biometrics (eliminates decentralization). Ethereum PoS: decentralization + Sybil resistance → staking barrier (reproduces plutocracy). Early DAOs: decentralization + absence of barriers → vulnerability to Sybil attacks.

P6 does not eliminate the trilemma of T15 — it is ineliminable. P6 resolves it through a fourth form that is none of the three degenerate solutions. The Civic Guard is a temporarily centralized body (the panel exists for the duration of the Census cycle), by virtue of which it secures Sybil resistance without permanent centralization. The panel is selected randomly from the citizen body, by virtue of which it is decentralized relative to permanent control. Access to the panel is determined by random VRF selection rather than by economic contribution, by virtue of which the barrier is not proprietary. It therefore follows that: Temporary_Centralization(Census) + Random_Selection(VRF) = Sybil_Resistance ∩ Decentralization ∩ Non-Plutocracy. The trilemma of T15 is resolved through the introduction of the parameter of temporality, which was not considered in the original formulation of the theorem as applied to blockchain protocols with permanent mechanisms.

The following is principally significant: P6 honestly acknowledges that some form of centralized judgment is necessary for the verification of subjecthood. This acknowledgment is not a weakness of the constitutional architecture but its normative strength: rather than claiming complete decentralization (and reproducing T15 in concealed form), P6 constitutionalizes temporary centralization through mechanisms that render it accountable, limited, and resistant to capture.

Normative principle N4 (procedural audit through zk-proof) establishes that the verification of the uniqueness of subjects must be conducted through an auditable procedure that does not disclose the identity of those being verified. P6 instantiates N4 through architectural separation: the Soulbound ID verifies uniqueness through zk-proof (the identity is disclosed neither to the panel nor to the system); the decisions of the panel are recorded on-chain with binding to the Soulbound IDs of the auditors (the accountability of the auditors is public). This separation instantiates N4 operationally: the audit is verifiable (all decisions on-chain) and procedural (through a formally verified protocol), while not violating the anonymity of the citizens being reviewed.

The connection between N4 and the Formal Verification Protocol (P2) is direct: the parameters of the Dual Suspicion Protocol are encoded in the Coq specification as formally verifiable constraints. An attempt to alter the verification criteria of the first stage (for example, to lower the standards in order to facilitate the passage of automated agents) is identified by the Formal Verification Protocol as a violation of N4 and is automatically rejected without requiring any human decision. This property closes the attack vector in which a controlling actor manipulates Census parameters through technical protocol changes while formally complying with the constitution.

Chapter Summary

P6 establishes Digital Census v2 as a constitutional act of the recognition of subjecthood, instantiating it through the Dual Suspicion Protocol with two independent verification stages and through CivicJuryEngine with VRF selection and a constitutionally accountable panel. Theorem T15 is resolved through the introduction of the temporality of centralization, which was not considered in the original formulation of the trilemma: the Civic Guard is a temporarily centralized, randomly selected, constitutionally accountable body that reproduces none of the three defective outcomes of T15. Normative principle N4 is instantiated through the architectural separation of the anonymity of those being reviewed (zk-proof) and the public accountability of the auditors (on-chain registration).

Transition to Chapter 8

P6 completes the second triad of Part I: P3 established the subject, P4–P5 established the structure and constraints of the relations of power, P6 instantiated the verification of the citizen body itself. The constitutional core P0–P6 describes the republic fully as an objective structure. However, the completeness of this description discloses its own limit: none of the principles P0–P6 contains a mechanism for the protection of the core itself against amendment. P7 instantiates this mechanism — the inviolability of the constitutional core as the protection of the system against its own erosion.

Σ-STATUS I — VERIFICATION: Constitutional Core (P0–P7)

Part I established the republic as an objective structure through eight principles forming two interrelated triads: the first (P0–P2) defines the foundation, the form, and the mechanism of

enforcement; the second (P3–P6) defines the subject, the relations of power, and the verification of the citizen body; P7 closes the core, protecting it against amendment through ordinary procedures. The logical completeness of Part I structurally necessitates its limit: the principles P0–P7 exhaust the description of that which the republic is, but contain no answer to the question of what occurs when the constitutional form ceases to serve the people — which mandates Part II.

Chapter 8. Inviolability of the Core (P7)

This chapter establishes the three-tier hierarchy of amendability as the constitutional expression of the distinction between that which determines the conditions of politics and that which constitutes its content. This hierarchy is not a technical decision regarding the rigidity of the constitution — it is a normative judgment regarding the nature of each of the three tiers: P0 precedes any constitutional act as its ontological condition; P1–P7 determine the form in which politics is possible; P10–P18 are the instruments through which politics is conducted.

8.1. Technical Formulation and Ratio Legis

P7 (Inviolability of the Core). Principles P1–P7 constitute the inviolable constitutional core, the amendment of which is permissible exclusively through the Axiom-Break Condition procedure (P8) upon the simultaneous satisfaction of all three of its conditions; any attempt to amend P1–P7 through the ordinary procedures of GovernanceEngine is automatically rejected by the Formal Verification Protocol.

The logical justification of P7 is constructed upon the following chain. Volume I (theorem T9) established three outcomes in the absence of constitutional constraint. Volume I (theorem T10) established that the only form capable of precluding these outcomes is a constitutional architecture external to the logic of capital. Volume II (theorem T16) established that critique without an institutional alternative becomes a stabilizer of the system. From these premises a structural requirement follows: the constitutional architecture must protect itself from erosion, inasmuch as any system controlling infrastructure will direct resources toward the gradual weakening of the norms that constrain it. A constitution not protected against its own erosion is not a compact but a temporary obstacle.

The ratio legis of P7 is as follows: principles P1–P7 are not political decisions adopted under particular circumstances and therefore amendable upon the alteration of those circumstances — they are the formal conditions under which any political decisions possess constitutional legitimacy. The distinction between the tiers of amendability expresses this normative judgment with precision: P0 is never amended, because it defines the legitimacy of the constitution itself; P1–P7 are not amended through ordinary procedures, because they define the form of legitimate amendment; P10–P18 are amended through ordinary procedures, because they are applications of constitutional principles to particular conditions that change.

The conceptual analogy through social experience is as follows: in constitutional democracies there exists a delineation between ordinary statutes (amendable by a simple parliamentary majority) and constitutional norms (amendable only through special procedures). This delineation expresses a judgment regarding the nature of content: an ordinary statute is a political decision; a constitutional norm is a condition of politics. P7 instantiates an equivalent delineation as applied to Virtublic, adding a third tier — P0 — as the condition of the constitution itself.

The transition to the following subchapter is determined by the necessity of elaborating the three-tier hierarchy of amendability with a precise description of each tier and the grounds for its assignment to a particular tier.

8.2. The Hierarchy of Amendability: P0 / P1–P7 / P10–P18

The three-tier hierarchy is a unified constitutional construction in which each tier expresses a particular political judgment regarding the nature of the content it encompasses. Examination of the tiers in isolation, without apprehension of their dialectical relation, would produce the false impression of an arbitrary administrative division.

The first tier: P0 — absolutely unamendable. P0 precedes the constitution as its ontological condition (Chapter 1, subchapter 1.1): popular sovereign authority is not the result of a constitutional act — it is its foundation. The absolute unamendability of P0 is a consequence of this ontological status: a procedure for amending P0 would require an appeal to some higher norm that would confer legitimacy upon that procedure — but P0 is itself that higher norm. An attempt to amend it through any procedure is self-contradictory in the precise sense: the procedure derives its legitimacy from P0, by virtue of which it cannot destroy that from which it derives its legitimacy. The Formal Verification Protocol classifies this attempt as a constitutional violation of the first degree and refers it to P18 (Conflict-Resolution Core) for processing as a sovereignty conflict.

The second tier: P1–P7 — amendable only through the Axiom-Break Condition. Principles P1–P7 define the form of the republic (P1), the mechanism for the execution of its norms (P2), the subject of sovereignty (P3), the structure of power (P4), the constraint of its concentration (P5), the verification of the body of citizens (P6), and the protection of the core (P7). These principles are not instrumental decisions but constitutional conditions: they define the manner in which the republic functions as a republic. The amendment of any of them without a demonstrated systemic crisis signifies not adaptation to new conditions but the alteration of the very nature of the republic. By virtue of this, P1–P7 are amendable only through the Axiom-Break Condition (P8) upon the simultaneous satisfaction of all three conditions: chronic apathy (turnout below 10% twice within 180 days), loss of legitimacy (66% EQU⊥), and a supraqualified majority (75%/75%). This threefold protection is not a procedural redundancy but an architectural expression of the following judgment: amendment of the constitutional core must be impossible under normal system functioning and possible only upon a demonstrated systemic crisis that renders the preservation of the current core more destructive than its revision.

An important entailment is that P7 protects itself as well: P7 is an element of P1–P7 and is therefore amendable only through the Axiom-Break Condition. This eliminates an obvious attack vector: the reduction of the amendability threshold through a prior amendment of P7 via an ordinary procedure. Such an attempt is identified by the Formal Verification Protocol as a violation of P7 and rejected automatically.

The third tier: P10–P18 — amendable through the ordinary procedures of GovernanceEngine. Principles P10–P18 are the operational mechanisms through which the constitutional principles P0–P7 are given effect under particular conditions. Madison Mode (P10), Success Multiplier (P11), Dual Reserve Market (P12), Digital Census v2 (P13), protected identity (P14), Quorum Decay (P15), Rockefeller Mode (P16), SovereigntyShield (P17), and Conflict-Resolution Core (P18) are institutional responses to specific theorems and threats — responses that may require adaptation as technological and social conditions change. Their amendment through EQU⊥-voting with an ordinary threshold (51%) is constitutionally permissible, provided that the proposed amendment passes the Formal Verification Protocol and does not violate N1–N7. This condition instantiates the following logic: P10–P18 may adapt, but may not be adapted in a direction that contradicts principles P0–P7.

Formally: Immutability(P0) > Immutability(P1–P7) > Mutability(P10–P18), subject to the constraint Mutability(P10–P18) ⊆ {changes | FVP(change) = true}. This hierarchy is not merely a technical standard of amendability but the constitutional expression of three tiers of normative content.

The transition to the following subchapter is determined by the necessity of describing the specific technical mechanism through which the hierarchy of amendability is protected from erosion — that is, the Formal Verification Protocol as the operational embodiment of P7.

8.3. Protection from Erosion Through the Formal Verification Protocol

The erosion of the constitutional core in historical experience has rarely been accomplished through the direct repeal of principles: it has been accomplished through the gradual redefinition of their content, the removal of the mechanisms that sustain them, and the reduction of the thresholds for their application. P7 closes this attack vector through the Formal Verification Protocol (P2), which verifies not only the literal conformity of a proposal with constitutional norms but also its semantic compatibility with N1–N7 as verifiable constraints.

Specifically: a proposal that formally does not amend the text of P3 (inalienable citizenship) but introduces a mechanism of temporary vote delegation under certain conditions is identified by the Formal Verification Protocol as a semantic violation of P3 and automatically rejected at the proposal stage — before it is submitted to EQU⊥-voting. A proposal that reduces the Census threshold for a particular category of citizens is identified as a violation of P6 and rejected analogously. A proposal introducing partial convertibility between EQU⊥ and VIC⊥ through a technical mechanism is identified as a violation of P4 regardless of how it is formulated in the text.

Semantic verification is instantiated through the following mechanism. Each principle P1–P7 has a formal specification in Coq, encompassing not only the literal rule but also the set of its invariants — properties that must be preserved under any permissible amendment of P10–P18. A proposal is checked for compatibility with this set of invariants: if even one invariant is violated, the proposal is rejected. The invariants are publicly verifiable: any citizen may verify which specific invariant a given proposal violates, which eliminates the possibility of non-transparent rejection of proposals.

Two scenarios of particular importance require separate recording. The first: an attempt to amend P0 through the Constitutional Convention (P9). Even upon satisfaction of all conditions of the Axiom-Break Condition (P8), the Convention does not possess the authority to consider proposals affecting P0. The Formal Verification Protocol blocks such proposals automatically at the stage of admission for consideration, without referring them to a Convention vote. This block is a mathematically demonstrable constraint in the Coq specification, requiring no human decision for its application. The second: an attempt to amend state neutrality (an element of P0) through amendment of SovereigntyShield (P17, which belongs to P10–P18 and is therefore formally amendable). Any proposal to amend P17 that reduces the barrier to state access to predictive data is identified as a semantic violation of P0 through violation of its invariant "the state is not a purchaser of predictions without a mandate." This invariant is part of the Coq specification of P0, not of P17, by virtue of which its violation is classified as a constitutional violation of the first degree regardless of the fact that it is formally P17 that is being amended.

Case 2024–2025: a number of EU jurisdictions successively expanded the authority of state bodies to access platform data through technical regulations, without formally amending constitutional norms on privacy. The pattern is persistent: each individual expansion is minor and therefore does not trigger constitutional review; the aggregate of expansions over several years produces de facto repeal of a constitutional norm without its de jure amendment. The Formal Verification Protocol in Virtublic precludes this pattern through the verification of each proposal against the invariants of P0: not the cumulative effect, but each individual step is checked for compatibility with constitutional invariants, which precludes the possibility of cumulative erosion.

An additional protective mechanism is the Constitutional Health Protocol: GovernanceEngine periodically verifies the current state of all active P10–P18 for drift relative to the Coq specification of P1–P7. Drift may arise not through malicious amendments but through the accumulation of technical updates, each of which is individually correct but collectively produces a semantic deviation. The Constitutional Health Protocol conducts regular verification of the aggregate state of the system, not only of individual amendments, which closes this attack vector.

Chapter Summary

P7 establishes the inviolability of the constitutional core P1–P7 through a three-tier hierarchy of amendability that expresses a normative judgment regarding the nature of each tier: P0 as the absolutely unamendable ontological condition, P1–P7 as the constitutional conditions of politics, P10–P18 as operational instruments. The Formal Verification Protocol instantiates

the protection of the core from erosion through semantic verification of proposals against the invariants of P1–P7, encoded in the Coq specification — by virtue of which the gradual redefinition of the content of principles is identified and automatically rejected at the proposal stage. The Constitutional Health Protocol closes the vector of cumulative erosion through periodic verification of the aggregate state of the system.

Transition to Δ_1

P7 concludes Part I: all eight principles P0–P7 are established, the architecture of the core is specified, and the mechanism for its protection is fixed. The logical completeness of Part I discloses its limit. Principles P0–P7 describe the republic exhaustively as an objective structure — what it is under normal functioning. They contain no answer to the question that is the logically necessary entailment of their reading: what happens when the constitutional form itself ceases to express the will of the people? This limit determines the necessity of Part II.

Δ_1 — THE LIMIT OF PRINCIPLES

Structural Transition

Principles P0–P7 exhaust the description of what the republic is as an objective structure. P0 establishes the source of legitimacy: the people. P1 establishes the form: republican. P2 establishes the mechanism of execution: formally verified code. P3 establishes the subject: the verified citizen with an inalienable Soulbound NFT. P4 establishes the structure of power: orthogonal sovereignties. P5 establishes the constraint of the concentration of power: the quadratic cost of influence. P6 establishes the verification of the body of citizens: the constitutional act of the census. P7 establishes the protection of the core: hierarchical inviolability. The conjunction of these eight principles is necessary and sufficient for the description of the republic as an objective structure under the condition of normal system functioning.

This completeness discloses a structural limit that is not a defect of the architecture but a logical necessity. P0–P7 establish what the republic is. They do not answer the question: what happens when the republic continues to formally conform to principles P0–P7 but ceases to serve that for the sake of which these principles were established? Volume I (theorem T9) proved that this question is not rhetorical: systemic collapse yields three structural outcomes — chronic collapse of participation (turnout tends toward zero as the structural response to the system's incapacity to produce meaningful decisions), loss of legitimacy (a 66% EQU⊥-majority qualifies the constitutional order as illegitimate through formal assertion), and capture of institutions (the execution of principles P0–P7 de facto passes to actors not authorized by the people, while formal conformity with the letter of the constitution is maintained). Each of the three outcomes signifies the end of the republic: not through its formal repeal, but through the loss of its substantive meaning.

Without an answer to this question, the constitution is transformed from a compact between the people and the republican form into a trap: a system capable of protecting its form from amendment even when it has ceased to express the will of those in whose name it acts. P7 establishes the inviolability of the core — but it is precisely for this reason that a mechanism is necessary that permits the people, upon reaching a systemic crisis, to legitimately revise this core without the destruction of constitutional continuity. This mechanism is not contained in P0–P7 — it is contained in P8 and P9, which constitute Part II.

Δ_1 is not a rupture in the architecture but its necessary continuation: the logic of P0–P7 itself generates the requirement of Part II. A constitution that contains no mechanism for its own legitimate revision under systemic crisis violates the very principle of popular sovereign authority that it affirms: if the people cannot amend the constitution even when it has ceased to serve them, sovereignty is nominal.

PART II. EMERGENCY PROCEDURES

Mechanisms of Legitimate Amendment and Restoration (P8–P9)

Part II identifies the people as constituent power — the power that precedes the constitution and is capable of revising it upon systemic crisis — and proves that this act must take a strictly defined institutional form, otherwise the right to revision becomes an instrument of capture. P8 and P9 constitute an inseparable dialectical pair: P8 establishes the conditions of crisis, P9 defines the form of exit from it. P8 without P9 is the recognition of a crisis without a legitimate exit — a state of indeterminacy in which constituent power is activated but not institutionally formed, which is structurally advantageous for actors with pre-prepared alternative proposals. P9 without P8 is the institutionalization of permanent revision, destroying constitutional stability by converting the Convention into a regular instrument of policy. The completeness of Part II structurally necessitates its own limit: P8–P9 exhaust the description of how the republic protects its foundation under systemic crisis, but contain no answer to the question of the operational mechanisms of everyday governance — which mandates Part III.

Chapter 9. Constitutional Crisis and the Conditions of Its Recognition (P8 — Axiom-Break Condition)

The chapter establishes constitutional crisis as a recognized but strictly constrained possibility — not a pathology requiring elimination, but an institutionally defined exception to the normal functioning of the system. Recognition of crisis is a constitutionally necessary element of constitutional integrity: a constitution containing no mechanism for its own legitimate revision misrepresents the nature of its foundation. However, recognition of crisis is accompanied by a condition: only a proven structural failure is a sufficient ground for the

activation of constituent power. The distinction between discontent with the system and crisis of the system is constitutionally material.

9.1. Technical Formulation and Ratio Legis

P8 (Axiom-Break Condition). Revision of the constitutional core P1–P7 is permissible exclusively upon the simultaneous satisfaction of three conditions: chronic apathy (turnout below 10% twice within 180 days), loss of legitimacy (explicit affirmation by 66% EQU⊥), and a super-qualified majority (75% EQU⊥ and 75% VIC⊥ through Concordance Rule); the satisfaction of any two conditions without the third is insufficient for the activation of the procedure.

The logical justification of P8 is constructed upon the following chain. Δ_1 established the structural limit of P0–P7: the description of the republic as an objective structure contains no answer to the question of what occurs during a systemic crisis. Volume I (theorem T9) proved that systemic crisis has three outcomes, each of which signifies the end of the republic in the absence of a legitimate exit mechanism. Normative principle N1 (the right to unpredictability) and popular sovereignty (P0) jointly structurally necessitate that the people cannot be forcibly retained within a constitutional form that has ceased to serve them: this would violate P0 — the people are the source of legitimacy, consequently they must retain the capacity to withdraw legitimacy from the form they themselves established. From these premises it follows that P8 is a constitutionally necessary element of constitutional architecture. The question is not whether P8 must exist, but how its conditions must be constructed so as to preclude malicious or accidental activation.

The ratio legis of P8 is as follows: the three conditions of Axiom-Break are constructed such that their simultaneous satisfaction is a computationally complex and politically large-scale task, requiring sustained, publicly observable, and independently verifiable signs of systemic failure. None of the three conditions can be satisfied through short-term manipulation or resource pressure: the first condition requires sustained apathy over 180 days not explicable by technical failures; the second requires an explicit political affirmation from two thirds of the body of citizens; the third requires an extraordinary majority in both sovereignties. The totality of the three conditions constitutes protection against three distinct scenarios of abuse, each of which would be satisfied by two of the three conditions without the third — as will be established in detail in subsections 9.2–9.4.

Formally: Axiom-Break = Condition_1(chronic_apathy) ∩ Condition_2(legitimacy_loss) ∩ Condition_3(supermajority). The satisfaction of any subset of two conditions is necessary but not sufficient; the satisfaction of all three is necessary and sufficient for the activation of the Constitutional Convention procedure (P9).

The transition to the following subchapter is structurally necessitated by the requirement to develop each of the three conditions with precise description of its diagnostic significance, architectural function, and protection against abuse.

9.2. First Condition: Chronic Apathy

First Condition of Axiom-Break. Turnout (participation of verified citizens in voting) falls below 10% on two consecutive occasions within 180 days.

The logical justification of the first condition is constructed upon the following chain. Volume I (theorem T8) established that the gap between de facto predictive power and de jure political sovereignty does not self-correct: at a sufficient gap, citizens cease to participate inasmuch as participation produces no significant results. Volume I (theorem T4) established that the subject bears the consequences of decisions he did not make: chronic apathy is the structural indicator that this mechanism has reached a terminal level — participation has become so irrelevant that citizens systematically withdraw from it. From these premises it follows that chronic apathy is a verifiable signal of structural dysfunction in the system.

However, this signal is a necessary but not sufficient condition — on the following grounds. Apathy is a structurally ambiguous signal: it may signify satisfaction with the system (citizens do not participate because the system functions acceptably without their active intervention), cognitive alienation (citizens do not participate because they are physically or cognitively unavailable — the vector recorded in Volume I, axiom A8 and Pattern 7), or structural failure (citizens do not participate because the system has ceased to produce significant results). The first meaning is a signal of normal functioning; the second is a signal of a technical problem, resolvable through P10–P18; the third is a signal of systemic crisis requiring Axiom-Break.

By virtue of this ambiguity, the first condition is constitutionally supplemented by the second and third: the totality of apathy, an explicit political affirmation of loss of legitimacy, and a super-qualified majority produces an unambiguous signal of systemic crisis that cannot be explained by satisfaction or technical problems. Constitutional Health Protocol (described in subsection 9.7) additionally produces data on the quality of participation, cognitive health score, and participation quality, which permit differentiation of the nature of apathy prior to the activation of Axiom-Break.

The parameter of "180 days" is constitutionally fixed: it is sufficiently large to preclude short-term turnout collapses (caused by seasonal factors, technical failures, or the absence of significant questions on the ballot), and sufficiently small to avoid preserving a dysfunctional state of the system for an indeterminate period. The parameter of "twice consecutively" precludes a single turnout collapse as a signal: two consecutive collapses within 180 days constitute a sustained pattern, not a statistical outlier.

The transition to the following subchapter is structurally necessitated by the fact that the first condition records apathy as a potential symptom of crisis, but does not establish its political characterization — which is the task of the second condition.

9.3. Second Condition: Loss of Legitimacy

Second Condition of Axiom-Break. Not less than 66% of the verified body of citizens, through EQU⊥-voting, explicitly affirms that the constitutional form as such has ceased to serve the people.

The logical justification of the second condition is constructed upon the following chain. Normative principle N2 (the prohibition on the conversion of capital into political power) and P0 (popular sovereignty) jointly structurally necessitate that the legitimacy of the constitutional order is founded on the consent of the people — not passive consent through the absence of organized resistance, but active consent through a constitutionally verified political affirmation. Volume I (theorem T10) established that constitutional architecture is the constitutionally necessary external form for constraining the logic of digital capital: if the people characterize this form as illegitimate, that characterization is a politically significant affirmation that the form has ceased to fulfill its function.

Of principled importance is the demarcation between two kinds of political affirmations. The first: discontent with a specific decision or group of decisions. This affirmation is the normal content of political life and is resolved through ordinary GovernanceEngine procedures within P10–P18. The second: the affirmation that the constitutional form as such has ceased to serve the people — that is, not that specific decisions are defective, but that the very structure producing these decisions is incompatible with popular sovereignty. This affirmation is a constituent political act, not an ordinary political decision. The second condition of Axiom-Break requires precisely the second kind of affirmation: the question put to a vote is formulated as "is the constitutional form P1–P7 in its current state incompatible with popular sovereignty?" and not as "are you satisfied with the current functioning of the system?"

The threshold of 66% EQU⊥ is constitutionally significant on the following grounds. A simple majority (51%) is insufficient: it permits the activation of Axiom-Break through a temporary coalition not reflecting a sustained loss of legitimacy. A super-qualified majority of 75% is excessive at this stage: the second condition is a diagnostic signal, not a final decision — the final decision requires 75%/75% in the third condition. The threshold of 66% produces the following structural effect: only a sustained two-thirds majority of citizens explicitly affirming the systemic character of the crisis is sufficient for this signal to be inexplicable by conjunctural discontent or temporary factors.

The case of 2024–2025: in several cryptocurrency communities (Stacks, Cardano) mass campaigns discrediting governance were recorded, organized by discontented early investors. These campaigns produced the appearance of systemic crisis through social media without a real two-thirds majority among verified participants. In the architecture of Virtublic this scenario is precluded: the second condition requires an explicit on-chain affirmation from 66% of Soulbound IDs verified through Digital Census v2 — media activity without a corresponding EQU⊥-vote is irrelevant for constitutional purposes.

The transition to the following subchapter is structurally necessitated by the requirement to establish the third condition, which closes two symmetrical scenarios of abuse: the economic blockade of popular will and populist capture through a temporary majority.

9.4. Third Condition: Super-Qualified Majority (75%/75%)

Third Condition of Axiom-Break. Activation of Constitutional Convention requires 75% EQU⊥ and 75% VIC⊥ through Concordance Rule (the concordance rule requiring a qualified majority in both sovereignties).

The logical justification of the third condition is constructed upon the following chain. P4 (dual sovereignty) established that EQU⊥ and VIC⊥ are constitutionally orthogonal: neither sovereignty may unilaterally determine decisions affecting both dimensions. Revision of the constitutional core P1–P7 affects both dimensions to the greatest possible degree: it alters both the political form (EQU⊥-relevant) and the infrastructure rules (VIC⊥-relevant). By virtue of this, Concordance Rule is constitutionally obligatory for Axiom-Break: activation of the Convention without 75% VIC⊥ would mean that the constitutional core could be revised without the participation of infrastructure operators — that is, that the de facto functioning of the system could be destabilized by a political act without regard for its technical consequences.

The third condition closes two symmetrical scenarios of abuse. The first scenario — economic blockade: under the first two conditions without the third, concentrated VIC⊥-operators could preclude the convening of the Convention by withholding VIC⊥-voting even in the presence of an explicit popular will. The third condition precludes this scenario by establishing that 75% VIC⊥ is necessary but not the sole condition: blockade of the Convention through a VIC⊥-minority is technically possible only when 75% is not attained, but simultaneous chronic apathy and a 66% EQU⊥-affirmation of loss of legitimacy generates constitutional pressure that the Formal Verification Protocol records as a potential sovereignty conflict, referred to P18 for analysis. The second scenario — populist capture: under the first two conditions without the third, a temporary populist coalition could impose revision of the constitutional core through short-term emotional resonance. The 75% EQU⊥ in the third condition precludes this scenario: temporary coalitions rarely attain a sustained three-quarters majority, inasmuch as a three-quarters majority by definition includes a substantial portion of citizens with differing political positions, the coordination of whom requires substantive, not conjunctural, consensus.

The totality of the three conditions produces the following structural effect: the sole scenario in which Axiom-Break is activated is the scenario in which the system simultaneously exhibits sustained apathy (a structural symptom), an explicit political characterization of crisis by two thirds of citizens (a constituent political act), and a three-quarters majority in both sovereignties (an extraordinary consensus). This totality is practically impossible during normal functioning of the system and practically inevitable during a genuine systemic crisis — which is the constitutionally correct distribution of thresholds.

The transition to the following subchapter is structurally necessitated by the requirement to establish the special protection of P0 in the context of Axiom-Break: even upon the satisfaction of all three conditions, there exist elements not subject to revision under any circumstances.

9.5. Absolute Protection of P0 in the Context of Axiom-Break

The satisfaction of all three conditions of Axiom-Break activates Constitutional Convention with authority to revise P1–P7. These powers are broad but not unlimited: the Convention shall not have authority to consider proposals affecting P0, and any such proposal is automatically blocked by the Formal Verification Protocol before it is put to deliberation.

The logical foundation of this limitation was established in Chapter 1 (subsection 1.1) and is restated here in the context of Axiom-Break to preclude a possible misunderstanding. The Convention is an organ created by the people through a constituent political act; the people are sovereign by virtue of P0; consequently, the Convention derives its powers from P0. By virtue of this, the Convention cannot destroy that from which it derives its powers: a Convention that abrogates P0 commits a self-contradiction — it employs popular sovereignty as a foundation for the destruction of popular sovereignty.

This limitation is instantiated through the following technical mechanism. The Formal Verification Protocol contains in the Coq specification a predicate "does this proposal affect P0?", encompassing not only the literal amendment of P0's text but also semantic amendments that violate its invariants: popular sovereignty as the sole source of legitimacy and state neutrality as the condition of sovereignty. If the predicate returns true, the proposal is automatically precluded from consideration by the Convention without any human decision. This block is a mathematically provable constraint requiring no interpretation.

A practical example of a formulation that would be blocked: "Constitutional Convention proposes to introduce a mechanism for the delegation of a portion of EQU⊥ to state organs for purposes of administrative efficiency subject to the temporary character of the delegation." Notwithstanding the formal absence of amendments to the text of P0, this proposal violates the invariant "the state is not a citizen and does not possess EQU⊥" and the invariant "popular sovereignty is not delegable." The Formal Verification Protocol identifies both violations and blocks the proposal.

The transition to the following subchapter is structurally necessitated by the requirement to establish the special protection regime for SovereigntyShield — the element most vulnerable to revision attempts through the Convention on the pretext of operational necessity.

9.6. Special Protection of SovereigntyShield in the Context of Axiom-Break

State neutrality, instantiated through SovereigntyShield (P17), occupies a special position in the constitutional architecture: it is an element of P0 (as its invariant) and is simultaneously operationalized through P17 (which is an amendable P10–P18 mechanism). This duality generates a specific attack vector: the formal amendment of P17 at the Convention could de facto neutralize the invariant of P0 without its literal amendment. P8 closes this vector through a special review regime for proposals affecting state neutrality.

The special regime consists in the following. Any Convention proposal identified by the Formal Verification Protocol as affecting SovereigntyShield or its invariants is referred for independent evaluation to an extended Civic Guard of 99 citizens. This collegium is formed through VRF with an additional condition: none of the 99 citizens may be a state employee, a person affiliated with state structures, or a person with verified financial or other connections with state organs during the preceding 36 months. This condition instantiates the following constitutional logic: the evaluation of a proposal to reduce protection against state influence may not be carried out by subjects potentially interested in that reduction.

The collegium of 99 citizens produces its evaluation on a single criterion: is the given proposal compatible with the invariant of P0 "the state is not a purchaser of predictions without an explicit constitutional mandate"? The evaluation is not political but constitutional-verificational: the collegium does not vote for or against the proposal on the merits, but verifies its constitutional compatibility. Upon a finding of incompatibility (a 2/3 majority of the collegium), the proposal is not admitted to the Convention vote. Upon a finding of compatibility, the proposal is admitted to the ordinary Convention procedure with the subsequent 75%/75% ratification vote.

The United Kingdom case (Online Safety Act 2023, extensions 2024–2025) illustrates the attack vector that this mechanism closes: legislation expanding state access to encrypted communications was adopted on the pretext of protecting children from harmful content — a justification formally compatible with N6 (protection of forming subjecthood), in practice neutralizing N1 (the right to unpredictability) and N5 (state neutrality). The collegium of 99 citizens in an analogous scenario would verify: is the proposed mechanism compatible with the invariant of P0, or does it constitute its semantic abrogation under a different pretext.

The transition to the following subchapter is structurally necessitated by the requirement to establish the mechanism of crisis diagnostics prior to its activation — a system of early identification of Axiom-Break conditions.

9.7. Diagnostics and Verification of Crisis: Constitutional Health Protocol, Constitutional Dialogue

The crisis diagnostics mechanism is an integral element of P8: without a system of early identification, Axiom-Break is activated reactively, after a sustained systemic failure has accumulated, whereas preventive diagnostics produces data that permit differentiation of the nature of the crisis and intervention at early stages through the mechanisms of P10–P18.

Constitutional Health Protocol is the automatic monthly report produced by GovernanceEngine on the basis of verifiable on-chain data. The report contains four metrics. The first — turnout trend: not merely the current turnout but the trend over the preceding 6 months, permitting prediction of the attainment of the 10% threshold prior to its actual attainment. The second — legitimacy trend: an aggregated indicator based on survey data collected through EQU⊥-verified anonymous interactions, measuring the share of citizens characterizing the constitutional order as illegitimate — not through official voting but through periodic constitutionally verified soundings. The third — participation quality: the share of citizens whose participation is accompanied by cognitive indicators of informed choice, as distinct from mechanical or compelled participation, verifiable through anonymous behavioral patterns without disclosure of the content of decisions. The fourth — cognitive health score (the aggregated cognitive health indicator of the body of citizens): verifiable on the basis of Proof-of-Offline data (P14), reflecting the degree of cognitive exhaustion of the body as a structural factor of apathy.

Constitutional Health Protocol is a public document: every monthly report is recorded on-chain and accessible to any verified citizen for independent analysis. This property is not

merely transparency but a constitutional norm: a citizen possessing access to systemic diagnostics is a more informed participant in the event of the activation of Axiom-Break.

Constitutional Dialogue (the open constitutional forum) is activated upon three consecutive adverse reports by Constitutional Health Protocol. A report is characterized as adverse when not less than two of the four metrics cross warning thresholds. Constitutional Dialogue is a constitutionally guaranteed forum: it receives the minimum visibility threshold ε (N3, P5, Chapter 6) independently of its organic engagement, which precludes algorithmic suppression of constitutional discussions. Participation in Constitutional Dialogue is open to all verified citizens; moderation is conducted through the Formal Verification Protocol (inadmissibility of violations of N1–N7), but not through political filtering.

The MakerDAO case (2024–2025) illustrates the consequences of the absence of a diagnostic system: a decline in turnout at governance votes from 15% to 3% over 18 months was not accompanied by any constitutional diagnosis — the system continued to function, producing decisions with no real political representativeness. In Virtublic, an analogous trend would have been identified by Constitutional Health Protocol within 3–4 months, which would have activated Constitutional Dialogue and permitted the application of P10–P18 mechanisms prior to the attainment of Axiom-Break thresholds.

The transition to the following subchapter is structurally necessitated by the requirement to establish the protective mechanisms against abuse of the Axiom-Break procedure itself.

9.8. Limitations Against Abuse: Annulment and Freezing of VIC⊥ of Initiators

P8 establishes not only the conditions of activation of Axiom-Break, but also the consequences of false activation — that is, the situation in which initiators declare the satisfaction of conditions that do not correspond to the actual state of the system, or deliberately generate conditions of apathy with the aim of artificially triggering the procedure.

Annulment upon non-confirmation of conditions. Following the declaration by initiators of the satisfaction of Axiom-Break conditions, Constitutional Health Protocol conducts independent verification of each of the three conditions through on-chain data. Verification is conducted within 30 days. If even one of the three conditions is not confirmed by independent verification — that is, if the actual on-chain data does not correspond to the claims of the initiators — the procedure is automatically nullified through the Formal Verification Protocol without referral to P18 or any other instance. Automatic annulment is constitutionally significant: it precludes the possibility of employing the P18 instance or political pressure to "regularize" discrepancies.

Freezing of VIC⊥ of false-activation initiators. Initiators of false activation — citizens and operators who made an official constitutional affirmation of the satisfaction of Axiom-Break conditions subsequently refuted by independent verification — shall bear the following sanction: their VIC⊥ is frozen for 24 months. During this period, the frozen VIC⊥ continues to be counted for the calculation of the participation share in the infrastructure, but may not be used for voting or for the acquisition of additional influence through Madison Mode. This sanction is not an administrative penalty but a constitutional consequence: an initiator who

abused the constituent procedure is temporarily suspended from the very part of the political process he attempted to employ for capture.

This construction produces the following structural effect: an economically rational actor, prior to initiating Axiom-Break, must verify that all three conditions are genuinely satisfied, inasmuch as false activation entails prohibitively severe consequences for his infrastructure participation. Simultaneously, this construction does not penalize good-faith initiators who acted on the basis of information available to them that subsequently proved incomplete: false activation entails sanction only upon the conscious provision of incorrect data, verifiable through a material discrepancy between the claims of the initiators and the on-chain data.

Chapter Summary

P8 establishes constitutional crisis as a recognized but strictly constrained possibility through three simultaneously satisfied conditions, each of which closes a distinct scenario of abuse. Chronic apathy is a constitutionally necessary symptom but not a sufficient ground; the explicit political characterization of crisis by two thirds of citizens is a constituent act but requires confirmation by an extraordinary consensus; the 75%/75% Concordance Rule closes both the scenario of economic blockade of popular will and the scenario of populist capture. P0 is absolutely protected from the Convention through the Formal Verification Protocol; SovereigntyShield requires the additional evaluation of a collegium of 99 citizens without state affiliation. Constitutional Health Protocol provides early diagnostics; Constitutional Dialogue guarantees the visibility of constitutional discussion; annulment and freezing of VIC⊥ preclude abuse of the procedure.

Transition to Chapter 10

P8 established the conditions of crisis — when the activation of constituent power is constitutionally permissible. However, recognition of crisis is a necessary but not sufficient condition for exit from it: constituent power recognized through P8 must take a strictly defined institutional form, otherwise it becomes a point of indeterminacy that actors with pre-prepared seizure proposals will exploit. P9 (Constitutional Convention) establishes this form: who, in what composition, and by what rules effectuates the revision of the constitutional core under systemic crisis.

Chapter 10. The Constitutional Assembly: The Form of Constituent Power (P9 — Constitutional Convention)

The chapter establishes the Constitutional Convention as the sole constitutionally legitimate form of constituent power in the event of systemic crisis — a temporary institution with a single task and a mechanism of automatic self-dissolution upon its completion. P9 is a necessary entailment of P8: the recognition of a crisis without a constitutionally defined form of resolution produces a point of indeterminacy in which constituent power is captured by those who possess ready-made proposals and the organizational resources to advance

them. Sortition as the mechanism for the selection of delegates instantiates the condition established by the normative axiom NA0: the Convention must represent the citizen body as bearers of subjecthood, not as bearers of accumulated political positions.

10.1. Technical Formulation and Ratio Legis

P9 (Constitutional Convention). Upon the fulfillment of all three conditions of P8, a Constitutional Convention is convened — a temporary organ of constituent power, constituted through sortition from the verified citizen body, vested with authority to revise P1–P7, and automatically dissolved upon the ratification of a new constitutional core or the expiration of its mandate.

The logical justification of P9 is constructed upon the following chain. P0 (popular sovereignty) established that the sole legitimate source of power is the people through the verified citizen body. Axiom-Break (P8) established the conditions under which that power is activated in constituent form — that is, the form that precedes constitutional principles and is capable of revising them. Volume I (theorem T9) established that systemic crisis produces three destructive outcomes in the absence of a legitimate mechanism of resolution. From these premises it follows that constituent power must assume an institutional form satisfying the following requirements: representativeness (the citizen body in its real diversity), independence from accumulated hierarchies (the condition of genuine constituent work), limitation in time and task (the preclusion of permanent constitutional revision), and procedural verifiability (every decision of the Convention is publicly auditable). Convention through sortition is the sole form satisfying all four requirements simultaneously.

The ratio legis of P9 rests upon the following normative judgment: the Convention is neither a parliament, nor a referendum, nor an expert body, but the embodiment of the constituent power of the people in its purest form. A parliament is an organ of current governance, constituted through elections with accumulated factions; a referendum is a direct vote on a specific question without space for the development and coordination of positions; an expert body is an organ of technical verification without political legitimacy. The Convention through sortition eliminates all three limitations: delegates bear no electoral obligations, no disposable factions, and no technical monopoly on interpretation.

The conceptual analogy through social experience: the jury trial is an institution in which randomly selected citizens make decisions with legally binding force — not because they are experts, but because they are representatives of the community in whose name the decision is rendered. The Convention through sortition reproduces this principle as applied to constitutional constituent power: delegates are not experts in constitutional law, but representatives of the people as sovereign.

The transition to the following subchapter is determined by the necessity of establishing the specific mechanism of Convention formation — sortition with multidimensional weighting — and of justifying each element of that mechanism through the theorems of Volumes I–II.

10.2. Formation of the Convention: Sortition, Multidimensional Weighting, Compositional Constraints

Sortition (random selection through VRF — a cryptographically verifiable random selection function) is the constitutionally mandatory mechanism for the formation of the Convention on the following basis. Volume I (theorem T5) established that concentrated interest systematically surpasses diffuse interest in mobilizational efficiency: the election of delegates through any process of active nomination structurally reproduces this asymmetry, producing a Convention that represents a politically active minority rather than the citizen body in its real diversity. Sortition eliminates this asymmetry: selection does not require the citizen to possess mobilizational resources, and consequently does not reward their possession.

Selection through pure sortition is a necessary but not sufficient condition of representativeness: pure random selection with a small number of delegates may produce a statistically unbalanced composition with respect to cognitive health, constitutional engagement, and demographic diversity. In consequence of this, sortition in the Convention is instantiated with multidimensional weighting that adjusts the probability of selection according to three parameters.

The first parameter is the cognitive health score (an aggregated indicator of cognitive health over the preceding 6 months, verified through Proof-of-Offline, P14): citizens with a higher cognitive health score receive elevated weight in the sortition. This parameter instantiates the following constitutional logic: Volume I (axiom A8 and pattern 7) established that cognitive exhaustion is a structural result of prolonged exposure to dark patterns; a citizen who systematically protects their cognitive autonomy through offline periods is more likely capable of an informed constituent decision, which is the condition of quality Convention work.

The second parameter is a history of constitutional participation spanning no fewer than three Census cycles: citizens verified in the citizen body over no fewer than three Digital Census v2 cycles receive elevated weight. This parameter instantiates the following constitutional logic: constitutional participation over three cycles is a verifiable indicator of stable membership in the political community, in distinction from short-term citizenship potentially initiated for the purpose of subsequent participation in the Convention.

The third parameter is geographic and demographic diversity: the sortition algorithm adjusts selection to secure minimum representation of various geographic zones, age groups, and cognitive profiles. This parameter instantiates the normative principle N3 (the minimum visibility threshold for all legitimate positions) as applied to the composition of the Convention: a position structurally underrepresented under pure sortition must be sufficiently represented in the Convention for its perspective to be heard during the drafting of the new constitutional core.

The number of delegates is determined proportionally to the size of the network: a minimum of 100 for a citizen body of up to 100,000; a maximum of 500 for a citizen body exceeding 1,000,000. This range produces the following structural effect: the Convention is sufficiently small for functional work (more than 500 delegates produces managerial inefficiency) and sufficiently large for representativeness (fewer than 100 delegates are statistically unstable under multidimensional weighting).

State employees and intelligence service personnel are not admitted to participation in the Convention. This constraint is the constitutional entailment of P0 (state neutrality): the Convention is an organ of the constituent power of the people, determining the conditions of its political existence; the state is an operator, but not a citizen in the constitutional sense (Chapter 17, Rockefeller Mode, P16), and it therefore follows that state employees acting in that capacity cannot represent the people as sovereign in the Convention. Upon transition to the status of a private citizen (no fewer than 36 months after the termination of state service) this constraint is lifted.

The transition to the following subchapter is determined by the necessity of establishing what the Convention is authorized to do — and, in particular, what the Convention is not authorized to do under any circumstances.

10.3. The Powers of the Convention and Their Constitutional Limits

The Convention possesses broad authority with respect to P1–P7, subject to three absolute constraints, each of which is a mathematically provable condition in the Coq specification.

The positive powers of the Convention include full revision of the principles P1–P7: the Convention may amend the republican form (P1) if it finds that this form in its current instantiation does not correspond to the conditions of the network; may amend the mechanism of formal verification (P2) if the Coq tooling has become obsolete; may revise the parameters of the Soulbound NFT (P3), the structure of sovereignties (P4), the quadratic influence function (P5), the Census procedure (P6), and the amendability hierarchy (P7). These powers are maximally broad on the following basis: historical experience shows that a Constitutional Convention with limited powers systematically produces cosmetic changes in the event of a genuine systemic crisis — which is the worst possible outcome, inasmuch as it perpetuates the illusion of renewal without real revision.

The first absolute constraint: the Convention may not consider any amendment to P0. This constraint was established in Chapter 1 (subchapter 1.1) and Chapter 8 (subchapter 9.5) and is reiterated here as constitutionally invariant: the Convention derives its authority from P0 and cannot extirpate the source of its authority without self-negation. The Formal Verification Protocol blocks any proposal touching upon the invariants of P0 at the stage of admission for consideration — automatically, without the participation of presiding officers or any other Convention actors.

The second absolute constraint: the Convention may not reduce the ratification threshold for the new constitutional core. The ratification referendum requires 66% EQU⊥ and 51% VIC⊥ (subchapter 10.5); these thresholds are constitutionally fixed and cannot be reduced by a decision of the Convention. The architectural logic of this constraint is as follows: a Convention possessing the authority to reduce the ratification threshold possesses the authority to adopt any constitutional core by a simple majority of delegates — which is equivalent to the nullification of popular sovereignty as the requirement of ratification by the people.

The third absolute constraint: the Convention may not delegate its powers to any other body. Constituent power is the personal political act of delegates as representatives of the people; the delegation of these powers to an expert committee, technical body, or other structure would mean that the people, who entrusted the Convention with the revision of the constitutional core, in effect entrusted that decision to a substructure not verified through sortition.

The transition to the following subchapter is determined by the necessity of establishing the three-phase procedure of Convention work — the operational order through which broad powers are exercised systematically rather than chaotically.

10.4. The Three-Phase Procedure of Convention Work

The Convention functions over 180 days in three successive phases, each with constitutionally defined tasks and products.

The diagnostic phase (days 0–30). Task: to establish the factual state of the system through independent analysis of the Constitutional Health Protocol and direct citizen hearings. During the first 30 days the Convention studies the Constitutional Health Report for the preceding 12 months, organizes public citizen hearings with constitutionally guaranteed visibility through N3 (the minimum coverage threshold, P5), and forms the agenda — the list of principles P1–P7 requiring revision, with justification through Constitutional Health Protocol data. The fixed product of the diagnostic phase is a public Diagnostic Report, on-chain verified and accessible to the entire citizen body, containing: the list of identified systemic defects with precise citations to the theorems of Volumes I–II, the list of principles proposed for revision with justification, and an assessment of the impact of the systemic crisis on N1–N7. This product is not declaratory but constitutionally binding: the working phase may not extend beyond the agenda established in the diagnostic phase without open justification through an additional delegate vote.

The working phase (days 31–150). Task: to develop concrete proposals for the revision of the principles P1–P7 identified in the diagnostic phase. Each proposal must satisfy three mandatory formal requirements. The first is Coq verification — the proposal must be formulated as a formally verifiable amendment to the constitutional specification that does not violate the invariants of P0 and does not reduce the ratification threshold. The second is binding to theorems — each proposal must explicitly identify which theorems of Volumes I–II it closes or which new theorems it generates, which structurally necessitates that delegates work not as political actors but as constitutional architects. The third is an assessment of impact on N1–N7 — each proposal must contain a formally verified assessment of its consequences for each of the seven normative principles; a proposal that violates even one of N1–N7 is not admitted to the final phase. All three requirements are verified through the Formal Verification Protocol automatically: a proposal that does not pass verification is returned to delegates for revision without transmission to the final phase.

The final phase (days 151–180). Task: to consolidate the verified proposals into a single text of the new constitutional core, conduct public deliberation, and adopt it by a delegate vote. Consolidation is conducted through a concordance procedure: proposals that have passed

Coq verification are compiled into a single document with verification of their mutual compatibility — that is, with verification that the totality of all proposals does not produce internal contradictions. Adoption of the consolidated text is by a simple majority of delegates (51%): this threshold is intentionally low within the Convention, inasmuch as final legitimization occurs through the ratification referendum by the people, not through the internal vote of the delegates.

The transition to the following subchapter is determined by the necessity of describing the ratification referendum as the moment at which constituent power returns from the Convention to the people.

10.5. Ratification: 66% EQU⊥ and 51% VIC⊥

The ratification referendum is the constitutionally mandatory final act of the Convention: the new constitutional core does not enter into force through the decision of the delegates, but exclusively through explicit confirmation by the citizen body through dual sovereignty.

The ratification threshold is 66% EQU⊥ and simultaneously 51% VIC⊥. This threshold is asymmetric on the following basis. The EQU⊥ threshold of 66% is higher because the ratification of a new constitutional core is a constituent political act requiring a stable majority of citizens — greater than a simple majority, but less than the 75% required for the activation of Axiom-Break (which would produce a logical inconsistency: activation of the Convention requires 75%, yet ratification of its result requires an even larger majority). The VIC⊥ threshold of 51% is the minimum majority sufficient to confirm that the infrastructure operators recognize the technical feasibility of the new core and are prepared to sustain its execution.

Upon the failure of the first referendum — that is, upon the failure to reach 66% EQU⊥ or 51% VIC⊥ — the Convention receives the right to one revision and a repeat referendum within 30 days. The revision is limited: the Convention may amend the specific provisions that did not pass ratification, but may not extend the agenda beyond the diagnostic phase and may not reduce the ratification threshold. Upon a second referendum failure, the Convention is automatically dissolved: the existing constitutional core P1–P7 is preserved unchanged, and a new Axiom-Break may not be initiated for 24 months.

This construction instantiates the following constitutional logic: a twofold failure of ratification means that the Convention was unable to produce a constitutional text acceptable to a stable majority of the citizen body — that is, despite the systemic crisis, the Convention did not find its resolution. In this case the least destructive outcome is the preservation of the existing core with the blocking of new revision attempts for 24 months: this moratorium generates pressure on the mechanisms P10–P18 to resolve the crisis through operational changes rather than through revision of the foundations.

The transition to the following subchapter is determined by the necessity of establishing the mechanism of automatic Convention self-dissolution and the constitutional status of its materials following dissolution.

10.6. Dissolution and Continuity

The Convention is a temporary institution: its existence is constitutionally justified exclusively for the duration of the performance of its single task. Immediate automatic dissolution occurs upon one of three events: the adoption of a new constitutional core through the ratification referendum, the expiration of the 180-day mandate without the adoption of a new core, or a twofold failure of the ratification referendum.

Dissolution is automatic — that is, it is executed through the GovernanceEngine protocol without the possibility of extension through a delegate vote or any other decision. This automaticity is constitutionally material: a Convention possessing the ability to extend its own mandate is a permanent body with constituent powers — which is incompatible with P1 (the republican form, precluding the concentration of power in a single body without a limiting mechanism) and with P0 (popular sovereignty as the sole source of power).

The on-chain archive of Convention materials is created automatically at the moment of dissolution and receives constitutional status: it forms part of the constitutional documentation of Virtublic and is accessible to P18 (Conflict-Resolution Core) for the resolution of semantic conflicts arising in the interpretation of the new constitutional core. The constitutional status of the archive means the following: in the event of a semantic conflict (type 2 by the P18 classification), the Conflict-Resolution Core may appeal to Convention materials to establish the intent of the delegates in formulating a disputed provision. This construction is the digital analog of travaux préparatoires (preparatory works) in international law, employed for the interpretation of treaties.

The transition to the following subchapter is determined by the necessity of describing Recovery Mode — the special operational regime of the system during the 90 days following the adoption of the new constitutional core.

10.7. Recovery Mode: 90 Days of Reduced Thresholds

Recovery Mode (the constitutional recovery regime) is activated automatically at the moment the new constitutional core enters into force and continues for 90 days. During this period the operational EQU⊥ voting thresholds for the mechanisms P10–P18 are reduced to 51% in place of their ordinary values.

The logical justification of Recovery Mode is constructed upon the following chain. The adoption of a new constitutional core means a systemic change to the rules of the republic's functioning: citizens, operators, and the mechanisms P10–P18 require a period of adaptation during which the operational decisions necessary to address the causes of the crisis are made with a reduced threshold. Without Recovery Mode the following structural defect arises: the crisis has been recognized and the constitutional core updated, yet the operational mechanisms P10–P18 continue to function according to the old parameters, which decelerates the realization of the changes and potentially reproduces the conditions of the next crisis.

Recovery Mode does not apply to votes touching upon P0, SovereigntyShield, or decisions requiring the Concordance Rule under the Formal Verification Protocol. These exceptions instantiate the following logic: Recovery Mode is a mechanism for accelerating operational changes, not for reducing constitutional barriers to decisions with long-term consequences.

Upon the expiration of the 90-day Recovery Mode, all operational thresholds automatically return to their constitutional values through GovernanceEngine without requiring a separate decision: the return is a protocol event, not a political act.

The transition to the following subchapter is determined by the necessity of developing the dialectic of P8–P9 as a constitutional unit — the central philosophical thesis of Part II.

10.8. The Dialectic of P8–P9 as a Constitutional Unit

P8 and P9 are not two separate principles applied in sequence: they are two aspects of a single constitutional mechanism, the separation of which destroys the nature of both. This assertion is not a methodological observation but a structural conclusion from the nature of constituent power.

P8 without P9 establishes the conditions of crisis without establishing the form of its resolution. This state is constitutionally dangerous on the following basis: constituent power, activated through the fulfillment of the conditions of P8, is destructive by its nature — it suspends the legitimacy of the existing constitutional order without immediately producing a new one. In the state of activated but unformalized constituent power, political space is open to actors who possess ready-made capture proposals and the organizational resources to impose them. Volume I (theorem T5) established that in such conditions concentrated interest systematically surpasses diffuse interest, by virtue of which an "open" crisis resolution process without a constitutionally defined form is structurally advantageous for actors who have already accumulated political resources.

P9 without P8 institutionalizes the Convention as a regular organ of permanent constitutional core revision. This state destroys constitutional stability through the following mechanism: if the Convention is convened without a proved systemic crisis, every conjunctural political cycle produces a stimulus for initiating revision, which renders the constitutional core functionally unstable — it ceases to perform the function of external constraint in relation to the logic of capital (Volume I, theorem T10), inasmuch as it is itself the object of current politics.

The conjunction of P8–P9 as a constitutional unit produces the following normative equilibrium: the constituent power of the people is recognized and constitutionally formalized, but is activated exclusively upon a proved systemic crisis and realized exclusively through a strictly defined form with three absolute constraints. This equilibrium instantiates the constitutional principle formulated in the ratio legis of Part II: the right of revision is a necessary element of popular sovereignty, but this right must assume a form that precludes its transformation into an instrument of capture.

The case of the Chilean Constitutional Convention (2021–2022) illustrates the consequences of the disruption of this equilibrium: the Convention was convened upon a real social crisis (the P8 analog), yet possessed no constitutionally limited powers (the P9 analog was absent), which produced a Convention that exceeded what the population was prepared to ratify. The result was a twofold referendum failure and political instability reproducing the conditions of the crisis with which the process began. In the Virtublic architecture this outcome is precluded through the three-phase procedure with mandatory Coq verification of each proposal, the limitation of Convention powers by the invariants of P0, and the two-stage ratification process.

Chapter Summary

P9 establishes the Constitutional Convention as the sole constitutionally legitimate form of constituent power in the event of systemic crisis: sortition with multidimensional weighting secures representativeness without mobilizational asymmetry; three absolute constraints preclude the use of the Convention to nullify P0 or reduce ratification thresholds; the three-phase procedure produces constitutionally verified proposals through mandatory Coq verification, binding to theorems, and assessment of impact on N1–N7; Recovery Mode secures operational flexibility during the 90-day transitional period. The dialectic of P8–P9 as an inseparable constitutional unit is not a methodological judgment but a structural conclusion from the nature of constituent power: the separation of the two principles destroys the nature of both.

Transition to Δ_2

P8–P9 exhaust the description of how the republic protects its foundation during systemic crisis and restores it through a legitimate constituent procedure. This description is complete in its analytical layer — and it is precisely this completeness that discloses its limit. A constitution describing only its foundation in stability and its survival in crisis remains an uninhabited architecture: it describes neither the everyday participation of citizens in decisions, nor the mechanism of resource provision for the infrastructure, nor the autonomous resolution of interpretive conflicts without a permanent external arbiter. Δ_2 mandates Part III.

Δ_2 — THE LIMIT OF EMERGENCY PROCEDURES

Structural Transition

P8–P9 exhaust the description of how the republic protects its foundation in the event of systemic crisis. The principles constitute a complete constitutional construction: P8 diagnoses the crisis and establishes the conditions for the activation of constituent power; P9 formalizes that power into a legitimate procedure with three absolute constraints and automatic self-dissolution. The conjunction P0–P9 is necessary and sufficient for the description of the republic as an objective structure in its two states: normal functioning and systemic crisis.

This completeness discloses the second structural limit — symmetrical to Δ_1, but principally distinct in nature. Δ_1 disclosed the limit of the description of the republic as a static structure: P0–P7 describe what it is, but do not answer the question of what occurs in the event of crisis. Δ_2 discloses the limit of the description of the two exceptional states (stability and crisis): P0–P9 do not describe how the republic functions in ordinary time — that is, how citizens participate in specific decisions, how infrastructure is provisioned with resources, how interpretive conflicts are resolved without recourse to Axiom-Break.

Volume I (theorem T8) established that the rupture between de facto predictive power and de jure political sovereignty is produced precisely at the operational level: norms exist de jure, but their de facto application depends on mechanisms vulnerable to capture. A constitution containing principles P0–P9 without the operational mechanisms P10–P18 is a system in which de jure and de facto maximally diverge: the principles set the direction, but do not secure its realization in everyday functioning. It therefore follows that the description of the republic is incomplete without the operational mechanisms securing the functional identity of de jure and de facto. Δ_2 mandates Part III.

Σ-STATUS II — VERIFICATION: Mechanisms of Legitimate Change (P8–P9)

Part II established the people as constituent power through the dialectical pair P8–P9: P8 formalizes the conditions of crisis, P9 institutionalizes the form of resolution, and only their conjunction produces a constitutionally safe mechanism for the revision of the core. The logical completeness of Part II structurally necessitates the transition to Part III: the principles P0–P9 describe the republic in stability and crisis, but do not contain the operational mechanisms of everyday functioning, without which de jure and de facto irreversibly diverge in contradiction with theorem T8.

PART III. GOVERNANCE MECHANISMS

Operational protocols of resilience and adaptation (P10–P18)

The task of Part III is to demonstrate how the constitutional principles P0–P7 and the crisis procedures P8–P9 are given effect in the resilient operational mechanisms of the republic's day-to-day functioning. Parts I and II described the republic as an objective structure and established the mechanisms for its protection under systemic crisis; Part III establishes the manner in which this structure operates under normal conditions. Each of the nine mechanisms P10–P18 is an institutional response to a specific theorem of Volumes I–II: not an abstract principle, but an executable protocol, encoded in GovernanceEngine and verified through the Formal Verification Protocol (P2).

P10–P18 are amendable through the ordinary procedures of EQU⊥-voting with a 51% threshold — precisely because they are instruments, not foundations. A republic incapable of adapting its operational instruments to changing technological and social conditions is condemned to institutional ossification: the form is preserved, the content degrades. The

amendability of P10–P18 is not a weakness of the architecture but its deliberate constitutional property, constrained by a single condition: any amendment passes verification for compatibility with the invariants of P0–P7 through the Formal Verification Protocol and may not be directed against the constitutional core. For navigation within Part III, three functional groups are identified: P10–P12 encompass the mechanisms of influence and resources, P13–P15 the mechanisms of identity and participation, P16–P18 the mechanisms of structural protection. This delineation serves exclusively navigational purposes and is not an autonomous constitutional division: P10–P18 constitute a unified operational layer in which each mechanism presupposes the functioning of the others.

Chapter 11. Quadratic influence (P10 — Madison Mode)

This chapter establishes Madison Mode as the operational mechanism that transforms the constitutional principle of limited influence (P5) into an executable protocol for day-to-day governance. P5 formulated the prohibition on the conversion of capital into political power through the accumulation of influence; P10 instantiates this prohibition through a specific mathematical function applied to each act of political participation beyond the base EQU⊥. The distinction between P5 and P10 is the distinction between a constitutional principle and its operational embodiment: P5 defines what is prohibited, P10 defines how that prohibition is executed in real time without a human arbiter.

11.1. Technical definition of P10 and normative justification

P10 (Madison Mode). The base political influence of each verified citizen is 1 EQU⊥ at no additional cost; the acquisition of n units of influence above the base costs cost(n) = n² units of VIC⊥, which yields an escalating cost of concentration and a structural advantage of broad organic coalitions over concentrated interests.

The logical justification of P10 is constructed upon the following chain. Volume I (theorem T5) established that individual resistance to concentrated capital is economically neutralized at a linear cost of influence: an actor with resources exceeding the median level by a factor of k acquires k times greater influence, which reproduces the proportionality of capital and power formally prohibited through N2. Volume I (theorem T9) established that in the absence of constitutional constraint on concentration, the system yields one of three outcomes, including the plutocracy of predictions. Volume II (theorem T12) established that token voting is a structural plutocracy precisely because it is linear: one token — one unit of influence, by virtue of which the holder of 1,000 tokens possesses 1,000 times greater influence than the holder of one. From the conjunction of T5, T9, and T12 it follows that a constitutionally correct mechanism of influence must: preserve the possibility of intensive participation (eliminating paternalism); render such participation structurally costly as it concentrates (eliminating T5); yield a structural advantage for broad organic coalitions over narrow concentrated ones (eliminating T12). The quadratic function is the only function satisfying all three conditions simultaneously, as established in the detailed proof in Chapter 6 (subchapter 6.1), reproduced here only in the part relevant to the operational realization of P10.

The normative justification of P10 derives from the Madisonian problem of factions (Federalist No. 10, 1787), actualized as applied to digital space. Madison identified concentrated interest as structurally dangerous to the republic: a group of citizens with high stakes in a particular matter systematically mobilizes resources more effectively than a diffuse majority with low individual stakes. In digital space, Volume I (regularity 11) amplified this pattern: algorithmic ranking yields an informational advantage for positions with high engagement, which is the digital equivalent of Madisonian factional mobilization. P10 is the Madisonian answer, operationalized through mathematics: not the elimination of intensive participation (which would be the elimination of freedom), but the creation of a structural counterweight through the escalating cost of concentration.

The transition to the following subchapter is determined by the necessity of establishing the specific parameters of the operational realization — the mechanism through which base influence and additional influence function within the real architecture of GovernanceEngine.

11.2. Institutional realization: base influence and cost(n) = n²

Base influence is 1 EQU⊥ for each verified citizen at no cost whatsoever. This identity is constitutionally invariant (established in P4, Chapter 5): EQU⊥(citizen) = 1 for all admissible values of the remaining variables. Base influence may not be amended through GovernanceEngine, inasmuch as it is a consequence of P4, which is amendable only through the Axiom-Break Condition (P8). This means that a citizen without any VIC⊥-resources possesses full constitutional participation in any vote: his vote is counted with weight 1 regardless of whether he acquires additional influence or not. This norm is the operational embodiment of NA0: subjecthood as a politically protected good means that each subject retains a minimum guaranteed political weight independent of his economic position.

Additional influence is acquired through Madison Mode in GovernanceEngine according to the function cost(n) = n², expressed in VIC⊥. The parameter n is the number of units of influence acquired above the base EQU⊥ = 1 in a specific vote. The cost is vote-specific, not cumulative: a citizen who acquired additional influence in previous votes bears no accumulated obligations in the next. Each vote is independent with respect to the cost of additional influence, which eliminates the pattern of "influence subscription": an actor cannot purchase permanent dominance in a single transaction — he must pay for it anew in each vote, which structurally increases his transaction costs.

A numerical illustration of the operational significance of the function: actor A holds VIC⊥-resources 1,000 times the median level. At linear cost, A would acquire influence 1,000 times greater than the median citizen. At cost(n) = n²: to acquire 1,000 units of additional influence, A expends 1,000,000 VIC⊥. To acquire 100 units — 10,000 VIC⊥. To acquire 10 units — 100 VIC⊥. The same resource of 1,000,000 VIC⊥, distributed across 1,000 citizens each acquiring 1 additional unit of influence, yields 1,000 units of aggregate influence at a cost of 1,000 × 1 = 1,000 VIC⊥ — that is, 1,000 times cheaper. A broad organic coalition yields the same aggregate influence at incomparably lower cost, which is a structural advantage embedded in the mathematics rather than in a political decision.

The VIC⊥ expended through Madison Mode is directed into CollectiveBond (the constitutional reserve fund financing infrastructure projects with maximum citizen reach): resources expended on the concentration of influence are constitutionally redirected toward the financing of public goods. This mechanism is the operational embodiment of N2 (the prohibition of the conversion of capital into political power): not only is the conversion blocked through escalating cost, but the attempt at conversion yields the inverse effect — the strengthening of diffuse public goods at the expense of the resources of concentrated interest.

The parameters for the calculation of influence in GovernanceEngine are verified through the Formal Verification Protocol (P2) and encoded in the Coq specification: amendment of the function cost(n) requires EQU⊥-voting with a 51% threshold and passage of verification for compatibility with N2 and P5. An attempt to substitute the quadratic function with a linear one is identified by the Formal Verification Protocol as a violation of P5-invariants and automatically rejected at the proposal stage — by virtue of which the degradation of P10 to linear token voting is protocol-level impossible without amendment of the constitutional core through the Axiom-Break Condition.

The transition to the following subchapter is determined by the necessity of establishing the antifaction filter — the mechanism closing the attack vector of circumventing P10 through the distribution of influence across affiliated actors with subsequent coordinated voting.

11.3. The antifaction filter: diversity penalty

The antifaction filter is a built-in mechanism of GovernanceEngine that identifies coordinated voting patterns and applies to them an aggregate quadratic cost. This mechanism is constitutionally material: without it, the quadratic function can be circumvented by distributing VIC⊥ across N affiliated actors, each of whom acquires a small amount of additional influence at a low quadratic cost, while their coordinated actions yield the effect of concentration.

The diversity penalty (the penalty for the homogeneity of coordination) is calculated as follows. GovernanceEngine, through correlational analysis of on-chain data, identifies clusters of actors voting identically across K consecutive questions with a probability statistically incompatible with random coincidence. The statistical criterion is as follows: if the probability of the observed coincidence pattern under the hypothesis of independent voting is less than $p = 0.001$, the cluster is classified as coordinated. Upon such classification, the aggregate additional influence of the cluster is calculated as $\text{cost}(N \times n) = (N \times n)^2$, rather than as $N \times \text{cost}(n) = N \times n^2$. The difference is material: 100 actors each acquiring 10 units of influence pay $100 \times 100 = 10{,}000$ VIC⊥ under independent voting; upon classification as a coordinated cluster they pay $(100 \times 10)^2 = 1{,}000^2 = 1{,}000{,}000$ VIC⊥ — that is, 100 times more.

The following delineation is of fundamental importance: the diversity penalty is not censorship of a position but the constitutional prohibition of the architectural amplification of a single faction. Citizens sharing a political position retain the right to vote identically: their base EQU⊥ votes are counted in full regardless of the correlation of their votes. The

diversity penalty applies exclusively to additional influence acquired for VIC⊥: a coordinated faction may not acquire additional influence at individual prices while engaging in collective coordination. This delineation instantiates the following constitutional logic: political conviction is not penalizable; coordination with the aim of circumventing the quadratic function is a violation of the constitutional order.

The antifaction filter is not infallible: correlation of voting patterns may be produced both by conscious coordination and by the independent sharing of a political position by citizens with similar interests. GovernanceEngine differentiates between these two cases through the Coalition Verification Protocol (verification of the organicity of the coalition): a coalition claiming Success Multiplier (P11) passes verification of the independent participation history of its members. This verification is structurally the inverse of the diversity penalty: the former searches for evidence of dependence, the latter searches for evidence of independence. The conjunction of the two mechanisms yields the following result: organic coalitions of citizens sharing a position by virtue of independent convictions receive Success Multiplier; coordinated factions employing coordination to circumvent the quadratic function receive the diversity penalty. The architectural delineation between the two phenomena is mathematically verifiable rather than politically evaluated.

Case 2025: in a number of DAO structures that applied experimental quadratic voting mechanisms without an antifaction filter (in particular, Gitcoin Grants Rounds 19–20), coordinated clusters were recorded that systematically distributed funds across multiple "leads" with subsequent unified voting — a pattern identified by researchers as sybil coordination through social ties. GovernanceEngine of Virtublic, through the diversity penalty, would have identified this pattern as a coordinated cluster and applied the aggregate quadratic cost to its additional influence.

The transition to the following subchapter is determined by the necessity of recording the connection between P10 and theorems T5 and T12, the closure of which confirms the architectural sufficiency of this mechanism.

11.4. Defense against theorems: T5 and T12

P10 closes two theorems from the preceding volumes, each of which recorded a defect not eliminable without a mechanism of nonlinear cost of influence.

Theorem T5 (neutralization of resistance, Volume I) established that at a linear cost of influence, concentrated interest systematically defeats diffuse interest regardless of the distribution of positions: the coordination costs of a small group with high stakes are incomparably lower than the coordination costs of a large group with low individual stakes. P10 closes T5 through the inversion of the economic logic: at a quadratic cost, the concentrated interest seeking dominance bears exponentially escalating costs, while the diffuse interest consolidating through a broad organic coalition bears costs that are linear relative to the number of participants at the base EQU⊥. It therefore follows that under P10, the economically rational strategy for an actor with resources consists not in the concentration of influence but in the formation of a broad coalition through persuasion —

which is the operational embodiment of the republican principle under which political power is grounded in consent rather than in purchase.

An important entailment is the structural alteration of the character of political competition in Virtublic by comparison with that recorded in T5. In systems with linear influence, the rational strategy for an actor with resources is to acquire dominance through capital; persuasion is less efficient than purchase. Under P10, the rational strategy for the same actor is to invest resources in the formation of a broad coalition, inasmuch as this is cheaper than concentration and yields structural amplification through Success Multiplier (P11). T5 was possible as a structural regularity precisely because the rational strategy coincided with the concentration of resources; P10 alters the rational strategy itself, not by prohibiting concentration but by rendering it economically inefficient.

Theorem T12 (governance without legitimacy, Volume II) established that token voting is a structural plutocracy: the holder of 1% of tokens possesses ten times greater influence than the holder of 0.1% — a direct proportionality that reproduces a property qualification under a technical shell. T12 classified this identity as circular legitimation: governance is legitimate because it rests on tokens, and tokens are legitimate because they govern the system. P10 closes T12 through the rupture of direct proportionality: additional influence n costs n^2 VIC⊥, which means that the holder of VIC⊥-resources 100 times above the median obtains additional influence 10 times above the median — not 100. The direct proportionality of capital and power is eliminated mathematically, which is a material distinction from T12 at the level of the function rather than at the level of declaration.

Simultaneously, P10 through EQU⊥ = 1 for each citizen eliminates the second aspect of T12: the legitimacy of governance in Virtublic is not a function of the distribution of tokens. Base influence is determined by popular sovereign authority through Soulbound Identity (P3), not through VIC⊥; additional influence is constrained by the quadratic function and the antifaction filter. In conjunction, these mechanisms yield governance in which decisions reflect the politically weighted will of the body of citizens rather than the will of the largest VIC⊥-holders — which is the operational embodiment of P0: power belongs to the people.

Chapter Summary

P10 establishes Madison Mode as the operational mechanism that transforms the constitutional principle P5 into an executable quadratic function cost(n) = n^2. The base EQU⊥ = 1 guarantees each citizen full constitutional participation without a resource barrier; additional influence is accessible but structurally costly as it concentrates. The antifaction filter through the diversity penalty closes the circumvention attack vector of coordinated clusters, applying the aggregate quadratic cost to coordinated influence. Theorems T5 (neutralization of resistance) and T12 (governance without legitimacy) are closed through the inversion of the economic logic of concentration and the rupture of the direct proportionality of capital and influence.

Transition to Chapter 12

P10 establishes a tax on the concentration of influence, rendering it structurally costly. However, the elimination of the pathology of concentration is only one side of the constitutional assignment: the other side consists in the encouragement of the organic union of citizens around substantive positions. A tax on concentration without the encouragement of organic coalitions would yield a system in which participation remains nominal — citizens vote with their base EQU⊥ but do not form political forces capable of opposing concentrated interests. Chapter 12 establishes Success Multiplier (P11) as the dialectical complement of Madison Mode: if P10 is a tax on ambition, P11 is the institutional reward for solidarity.

Chapter 12. The Coalitional Amplifier (P11 — Success Multiplier)

The chapter establishes Success Multiplier as the constitutional mechanism that rewards organic political solidarity through the institutional amplification of broad coalitions by virtue of their scale, not their resources. P11 is the dialectically necessary complement of P10: if Madison Mode establishes the progressively increasing cost of the concentration of influence, Success Multiplier establishes the progressively increasing reward for the organic unification of citizens. These two mechanisms constitute a single constitutional mechanics instantiating N2 and N3 from two sides of one obligation: political force must derive from the capacity to persuade, not from the volume of capital.

12.1. Technical Definition of P11 and Normative Justification

P11 (Success Multiplier). The effective influence of a coalition of citizens, verified as organic through Coalition Verification Protocol, is calculated as effective_influence = n × √(n_supporters), where n is the baseline influence of the coalition and n_supporters is the number of verified unique participants; this function produces a structural advantage for broad organic coalitions over concentrated single actors at an identical aggregate resource contribution.

The logical justification of P11 is constructed upon the following chain. Volume I (theorem T5) established that individual resistance to concentrated capital is economically neutralized: citizens who share a position possess no mechanism for translating that shared position into political force without coordination costs exceeding their individual resources. Volume I (normative principle N3) established that every legitimate position must have a minimum guaranteed coverage: this principle instantiates not only protection against algorithmic invisibility (Chapter 6), but the positive reward for positions receiving broad organic support. Volume I (normative principle N2) established the prohibition on the conversion of capital into political power: this prohibition is not only a negative constraint (P10), but a positive affirmation — political force not founded on capital must receive constitutional reward. From the totality of T5, N2, and N3 it follows that the constitutional architecture must not only constrain concentration (P10), but generate an institutional advantage for that form of political force which is compatible with popular sovereignty (P0): a broad organic coalition of citizens united by persuasion, not capital.

The ratio legis of P11 is as follows: the republic is not neutral with respect to the source of political force. A republic equally indifferent to concentrated capital and organic solidarity produces the structural advantage of the former over the latter by virtue of the asymmetry of coordination costs recorded in T5. P11 is the constitutional correction of this asymmetry: through the function √(n_supporters), the system institutionally rewards the scale of an organic coalition, generating a structural incentive to invest resources not in the concentration of influence but in the persuasion of citizens. This mechanism is not redistribution, but an alteration of the relationship between rational strategies: under P11, the expansion of a coalition becomes economically more efficient than the accumulation of VIC⊥.

The transition to the following subchapter is structurally necessitated by the requirement to establish the concrete numerical parameters of the function and their operational consequences for the distribution of political force within the system.

12.2. Mechanism: effective_influence = n × √(n_supporters)

The function effective_influence = n × √(n_supporters) produces the following concrete numerical relationships at an identical aggregate resource contribution. A single actor acquiring n units of influence obtains effective_influence = n × √1 = n. A coalition of 10 members distributing the same aggregate resource equally (each acquiring n/10 units of influence) obtains aggregate effective_influence = (n/10 × 10) × √10 = n × 3.16, which exceeds the influence of the single actor by a factor of 3.16 at identical cost. A coalition of 100 members obtains n × √100 = n × 10 — that is, 10 times more. A coalition of 1,000 members obtains n × √1,000 = n × 31.6. This relationship is constitutionally material: it produces a progressively increasing structural incentive toward the expansion of the coalition that does not saturate as the number of participants grows — each additional verified participant continues to increase effective_influence through √(n_supporters).

The mathematical justification for the choice of the function √(n_supporters) is as follows. A linear function n × n_supporters would produce a progressively increasing advantage, rendering large coalitions dominant to a degree incompatible with P10: at sufficient scale, a coalition would obtain an advantage equivalent to unlimited concentration. A constant function n × 1 would eliminate the reward for broad coalitions entirely, reproducing individualist logic without any incentive toward coordination. The function √(n_supporters) is optimal: it produces a progressively increasing but diminishing-in-rate reward for scale — each additional participant adds reward, yet with diminishing marginal returns, which preserves the incentive to expand without creating dominance of the largest coalitions over all others.

The interaction of P11 with P10 is constitutionally symmetric. Madison Mode establishes the progressively increasing cost of the concentration of influence in the hands of a single actor: cost(n) = n². Success Multiplier establishes the progressively increasing reward for the distribution of influence among many participants: effective_influence = n × √(n_supporters). These functions are structurally concordant: at the same aggregate VIC⊥ resource, concentration in the hands of one actor produces influence n at cost n², whereas distribution across k participants produces influence (n/k × k) × √k = n × √k at cost k × (n/k)² = n²/k.

Consequently, at k > 1, a broad coalition produces greater influence at lower aggregate cost: both mechanisms operate in the same direction — from concentration toward organic solidarity.

Effective_influence is calculated by GovernanceEngine automatically upon completion of Coalition Verification Protocol for each vote in which a coalition is declared. The result is recorded on-chain with cryptographic binding to the list of Soulbound IDs of the coalition's participants — which ensures the verifiability of the calculation by any citizen.

The transition to the following subchapter is structurally necessitated by the requirement to establish Coalition Verification Protocol — the mechanism without which Success Multiplier would be vulnerable to abuse through the creation of fictitious coalitions.

12.3. Coalition Verification Protocol: Organicity and the Anti-Coordination Filter

Coalition Verification Protocol is the mechanism ensuring that Success Multiplier is applied exclusively to coalitions satisfying the constitutional criterion of organicity. Without this protocol, P11 would be vulnerable to the following abuse vector: an actor with VIC⊥ resources creates multiple affiliated Soulbound IDs, registers them as a coalition, and obtains the multiplier √(n_supporters) with what is in fact a single source of political will. This vector is the inversion of a Sybil attack as applied to P11: instead of creating fictitious identities to accumulate EQU⊥, fictitious coalitions are created to obtain the multiplier.

Coalition Verification Protocol verifies organicity through two independent mechanisms, applied sequentially. The first — verification of participant uniqueness through Soulbound Identity: every participant in the coalition must be a verified unique citizen with a valid Soulbound NFT (P3). This verification is instantiated through a zk-proof of uniqueness without disclosure of identity: GovernanceEngine knows that the coalition consists of N unique verified citizens, but does not know who they are. Fictitious identities that have not passed Digital Census v2 (P6, P13) are not counted as coalition participants, which extirpates the Sybil vector at the first level.

The second mechanism — the anti-coordination filter (the filter against artificial coordination): members of a coalition claiming Success Multiplier must demonstrate an independent history of political participation incompatible with the pattern of a single coordinator. The concrete criterion: if more than 80% of coalition members voted identically on all of the last 10 votes in the system, the coalition is characterized as potentially coordinated and does not receive the multiplier until it undergoes additional verification through CivicJuryEngine (the Civic Guard composed of a minimum of 21 auditors). This threshold is constitutionally significant: 80% identical votes across 10 consecutive questions is statistically incompatible with independent position formation, provided sufficient diversification of the subject matter of the votes.

The demarcation between genuine political solidarity and artificial coordination is architecturally material. Citizens who share a political position by reason of substantive conviction naturally exhibit correlated voting on thematically related questions — this correlation is an indicator of an organic coalition. Citizens governed by a single coordinator

exhibit identical voting on questions that are thematically unrelated to one another — this identity is an indicator of fictitious coordination. The anti-coordination filter verifies precisely this distinction through analysis of the thematic diversification of votes.

Coalition Verification Protocol interacts with the diversity penalty (P10, subsection 11.3) as follows: the P10 mechanism applies a penalty to coordinated clusters, whereas the P11 mechanism provides the multiplier to organic coalitions. Formally, these two mechanisms are mutually exclusive with respect to the same set of actors: a cluster that has received a diversity penalty cannot simultaneously receive Success Multiplier, inasmuch as the characterization of a coordinated cluster through the diversity penalty automatically blocks access to Coalition Verification Protocol for the same composition of actors during that vote.

The Optimism Collective case (2024–2025) illustrates the operational significance of the anti-coordination filter: in several rounds of RetroFunding, clusters of grant recipients were recorded who mutually voted for each other's applications with a correlation reaching 94% across 12 consecutive votes. This pattern, characterized by researchers as "coalition voting," produced systematic redistribution of funds in favor of cluster participants at the expense of applications with broad organic support. Coalition Verification Protocol in Virtublic would have identified this cluster as failing to satisfy the criterion of organicity and would have denied the application of Success Multiplier.

The transition to the following subchapter is structurally necessitated by the requirement to develop the dialectic of P10–P11 as a unified constitutional mechanics, not decomposable into constituent parts without loss of constitutional meaning.

12.4. The Dialectic of P10–P11: Unified Constitutional Mechanics

P10 and P11 are not two separate mechanisms applied in parallel, but two sides of a single constitutional obligation instantiating N2 and N3 through opposite operational vectors. Consideration of either in isolation from the other produces an incomplete and potentially erroneous picture of the constitutional architecture.

P10 without P11 establishes a tax on ambition without a reward for solidarity. A system in which the concentration of influence is costly, but a broad organic coalition receives no institutional advantage, produces the following outcome: a rational actor with resources decides not to concentrate influence in a single vote and distributes his resources across multiple votes at lower quadratic cost, preserving aggregate dominance. The diffuse majority receives no structural advantage, inasmuch as its coordination remains costly: T5 is not fully closed, but only mitigated. P10 is necessary but not sufficient.

P11 without P10 rewards organic coalitions without constraining concentration. A system in which broad coalitions receive the multiplier but the concentration of influence remains linearly inexpensive produces the following outcome: a rational actor with resources constructs a broad coalition by financing multiple dependent participants, obtaining the multiplier at what is effectively a single source of political will. Coalition Verification Protocol partially constrains this vector, however without P10 the cost of creating a fictitious organic

coalition is sufficiently low to remain economically rational. P11 is necessary but not sufficient.

P10 and P11 jointly produce the following constitutional outcome. For a concentrated actor with resources, the rational strategy for maximizing influence at minimum cost is: to form a broad organic coalition through persuasion, since this is simultaneously cheaper than concentration (P10 renders concentration costly) and more productive (P11 renders an organic coalition more effective than concentration). This constitutional outcome is not a prohibition on participation and not paternalism with respect to political strategies — it is an alteration of the rational equilibrium such that the republicanly correct strategy (persuasion) becomes economically dominant over the anti-republican strategy (purchase). This is the operational embodiment of P1 (republican form) at the level of everyday governance mechanisms.

The normative principles N2 and N3 are instantiated through P10–P11 as follows. N2 (the prohibition on the conversion of capital into political power) is instantiated through P10 as a negative constraint (concentration is costly) and through P11 as a positive affirmation (political force derives from broad support, not from capital). N3 (the minimum visibility threshold) is instantiated through P11 as a structural reward for positions receiving broad organic support: a position shared by many citizens obtains institutional amplification through the multiplier, which renders it more visible in the information space of Virtublic.

The transition to the following subchapter is structurally necessitated by the requirement to establish the connection of P11 to theorems T5 and T12, whose closure in conjunction with P10 confirms the completeness of this architectural pair.

12.5. Defense Against the Theorems: T5 and T12

P11 closes the same two theorems as P10, however from a principally distinct direction: whereas P10 closes T5 and T12 through the constraint of the antagonist, P11 closes them through the reward for the constitutionally correct alternative.

Theorem T5 (neutralization of resistance, Volume I) established that the coordination costs of the diffuse majority structurally exceed the resources of that majority under linear influence cost. P10 extirpates linearity; P11 extirpates the asymmetry of coordination costs. Under Success Multiplier, the coordination of the diffuse majority produces an institutional gain of $\sqrt{(n\_supporters)}$, which is directly proportional to the scale of coordination: the greater the number of citizens who independently share a position and are verified as an organic coalition, the greater the institutional amplification they receive. This mechanism converts the scale of organic support from a burden (high coordination costs) into an asset (a progressively increasing multiplier). T5 was possible because the scale of coordination did not produce proportional political gain; P11 extirpates this discrepancy through the function $\sqrt{(n\_supporters)}$.

Theorem T12 (governance without legitimacy, Volume II) established that token voting reproduces plutocracy inasmuch as political force is a direct function of capital. P11 establishes an alternative source of political force — organic support — which is

independent of capital and constitutionally exceeds the concentration of VIC⊥ at sufficient scale. At n_supporters = 10,000, the coalition receives a multiplier of √10,000 = 100, which means: the aggregate VIC⊥ resource of this coalition produces 100 times greater effective_influence than an identical resource in the hands of a single actor. T12 characterized token voting as illegitimate precisely because it contained no alternative source of political force other than capital; P11 introduces this alternative source as constitutionally institutional, not as a declaratory principle.

Chapter Summary

P11 establishes Success Multiplier as the constitutional mechanism rewarding organic political solidarity through the function effective_influence = n × √(n_supporters). Coalition Verification Protocol verifies the organicity of coalitions through Soulbound Identity uniqueness and the anti-coordination filter, precluding abuse of the multiplier through fictitious coalitions. P10 and P11 constitute a unified constitutional mechanics instantiating N2 and N3 through symmetric operational vectors: P10 renders concentration structurally costly, P11 renders organic solidarity structurally advantageous. Theorems T5 and T12 are closed through the extirpation of the asymmetry of coordination costs and the introduction of a constitutionally institutional source of political force independent of capital.

Transition to Chapter 13

P10 and P11 exhaust the operational architecture of influence: concentration is constrained, solidarity is rewarded. However, influence is not a self-sufficient resource — it must be backed by real infrastructure. Volume II (theorem T11) proved that the absence of a resource-binding for VIC⊥ produces the compound advantage of early holders: sovereignty is accumulated historically, not produced functionally. P12 (Dual Reserve Market) establishes the binding of VIC⊥ to verified real contribution to infrastructure — which is the constitutionally necessary condition for the orthogonality of sovereignties (P4) to be not only a constitutional norm, but an operational reality.

Chapter 13. Resource Provision (P12 — Dual Reserve Market)

The chapter establishes the binding of VIC⊥ to real resources as the constitutional response to the problem of arbitrary emission. Control over the emission of politically significant assets is control over policy: whoever determines how many tokens exist and to whom they are distributed possesses a power that is structurally prior to any vote. Dual Reserve Market (hereafter — DRM) eliminates this possibility by making VIC⊥ derivative of a verified real contribution to infrastructure rather than of a decision by a central issuer or the consensus of early participants.

13.1. Technical Formulation and Normative Justification

P12 (Dual Reserve Market). The emission of VIC⊥ is a function exclusively of verified real contribution to the infrastructure of Virtublic; arbitrary emission, emission by decision of any

centralized body, or emission not confirmed by Proof-of-Resource is constitutionally prohibited.

The logical justification of P12 is constructed upon three premises from the preceding volumes. Volume I (theorem T2, temporal barrier) established that dominant platforms acquire a structural advantage through accumulated data and resource history — an advantage reproduced through the very functioning of the system rather than through competitive superiority. Volume II (theorem T11, PoS plutocracy) established that in any system with a non-zero reward rate and without a constitutional constraint on concentration, an early participant accumulates a share of the aggregate stake according to the function $S_i(t) = S_i(0) \times (1+R)^t$, which produces a growing gap between early and late participants independent of their subsequent contributions. Volume II (axiom A21) recorded the mechanism of this gap as a structural rather than contingent characteristic: advantage(t) = $(1+R)^\tau$, where τ is the temporal interval between the early and late participant. From these three premises it follows that any system in which the emission of politically significant assets is not bound to a verifiable current contribution reproduces the temporal barrier at the level of economic sovereignty — which, under conditions of the constitutional separation of EQU⊥ and VIC⊥, means the concentration of VIC⊥ among early participants without a mechanism for its constraint.

The normative justification of P12 is supplemented by the following. Volume I (normative principle N2, the right of equal access to mechanisms of influence) prohibits architectures in which temporal position, rather than the quality of contribution, is the primary determinant of accumulated economic influence. VIC⊥ is an instrument of participation in the technical decisions of the republic; its concentration among early participants through a temporal mechanism rather than through a mechanism of verified contribution is a direct violation of N2 at the operational level. P12 closes this defect through a constitutional requirement: VIC⊥ is emitted exclusively as a receipt for a verified contribution existing at the moment of emission.

Formally: $VIC\perp\_emission(t) = f(Resource\_verified(t))$, where Resource_verified(t) is the volume of the resource confirmed by Proof-of-Resource at moment t; f is a monotonically increasing function without an accumulation mechanism independent of current verified contribution. From this it follows that an operator who has ceased to sustain their infrastructural contribution does not retain an emission advantage: their VIC⊥ position is determined by the current verified state, not by historical accumulation.

The ratio legis of P12 is as follows: emission control is a form of political power, inasmuch as whoever determines the distribution of VIC⊥ determines the balance of votes in the technical decisions of the republic. The constitution cannot neutralize this power through trust in an issuer — it neutralizes it through the elimination of the very position of a centralized issuer: DRM makes emission an automatic function of a verified fact rather than a discretionary decision.

The transition to the following subchapter is determined by the necessity of establishing the specific institutional mechanisms through which P12 is realized operationally: what is the

auction mechanism for the distribution of slots, what is the contribution verification protocol, and what is the mechanism for the protection of citizens against unscrupulous operators.

13.2. Institutional Realization: SlotMarket v4.1, Proof-of-Resource, CollectiveBond

The realization of P12 is effected through three interdependent institutions: SlotMarket v4.1 as the mechanism of primary distribution of the right to participate in infrastructure, Proof-of-Resource as the mechanism of continuous verification of the validity of that participation, and CollectiveBond as the mechanism of constitutional accountability of operators to citizens.

SlotMarket v4.1. SlotMarket v4.1 (an auction mechanism for the distribution of resource slots — rights to participate in the infrastructure of Virtublic with subsequent emission of VIC⊥) instantiates P12 as the first operational layer. An infrastructural slot is the constitutionally defined unit of the right to provide verified resources to the republic — computational capacity, bandwidth, storage, or any other resource defined by a constitutional decision in VIC⊥-space. An operator acquires a slot through an open-bid auction with competitive selection, recorded on-chain.

The auction mechanism of SlotMarket v4.1 is structured as follows. The aggregate volume of slots is determined by GovernanceEngine through VIC⊥-voting in proportion to the current technical requirements of the network; no centralized body possesses the right to unilaterally expand or reduce the slot space. Each slot is placed in a competitive auction with a minimum bid calculated as a function of the historical average market value of a comparable resource over the preceding period; this bid is recorded on-chain prior to the commencement of bidding and may not be altered during it. The auction winner receives a slot for a term of 12 months with the possibility of renewal through a repeat auction; upon a decision not to renew, the slot returns to SlotMarket without the retention of any priority by the preceding operator. The auction is blind with respect to the identity of participants: all bids are cryptographically encrypted until the results are determined, which precludes strategic pricing on the basis of information about competitors.

The institutional significance of SlotMarket v4.1 in the context of P4 (dual sovereignty) is as follows: an operator acquiring a slot receives the right to participate in infrastructure and, consequently, to emission of VIC⊥ proportional to their verified contribution — but does not receive EQU⊥. This separation is constitutionally inviolable and instantiates Rockefeller Mode (P16) as applied to the resource layer: economic participation is not convertible into political dominance through any technical mechanism.

Case 2023–2024: after Ethereum's transition to proof-of-stake, the aggregate volume of ETH staked with Lido Finance exceeded 32% of total stake, which produced a de facto concentration of validator control in a single liquid staking operator. The absence of a mechanism analogous to SlotMarket — with a competitive auction and automatic slot reversion upon expiration — was the structural precondition of this concentration: operators who entered first obtained a self-reinforcing advantage through accumulated stake (T11) rather than through competitive superiority in resource quality. SlotMarket v4.1 eliminates this mechanism through the mandatory nullification of history at each auction cycle.

Proof-of-Resource. Proof-of-Resource (a protocol for verifying the validity of a resource contribution through random challenges with a defined time window) instantiates P12 as the second operational layer. The fact of having acquired a slot is not a sufficient basis for the emission of VIC⊥: the necessary and sufficient condition is the continuous verifiability of the real provision of the resource at each moment in time.

The Proof-of-Resource protocol functions as follows. GovernanceEngine generates random requests to the operator through the VRF protocol (Verifiable Random Function — a cryptographically verifiable random selection function) with a challenge time window τ_challenge, constitutionally established in the range of 30 seconds to 5 minutes depending on the type of resource. The operator is obligated to provide a cryptographically verifiable response proving the existence of the declared resource at the moment of the request: for computational resource — proof of the execution of a control computation; for storage — proof of the existence of a specific data fragment; for bandwidth — proof of the transmission of a control packet. A response not provided within τ_challenge is qualified as a challenge failure. Three successive challenge failures within a 30-day window activate ConstitutionalSanction_Resource: an automatic reduction of the operator's VIC⊥ emission proportional to the number of unanswered requests, with the event recorded on-chain. Five successive challenge failures within a 30-day window activate SlotRevocation: automatic termination of the slot with its transfer to SlotMarket for a repeat auction.

The cryptographic architecture of Proof-of-Resource secures the following property: verification of the fact of resource provision requires neither trust in the operator nor the participation of a centralized arbiter. The proof is self-sufficient and verifiable by any network node, which eliminates informational asymmetry (T8, Volume I) at the resource layer. The operator cannot falsely declare a contribution, inasmuch as the challenge is random and verifiable; the republic cannot falsely accuse an operator of non-performance, inasmuch as the challenge result is recorded on-chain and accessible for independent verification.

CollectiveBond. CollectiveBond (a mechanism of collective citizen insurance against bad-faith actions of operators with automatic confiscation of stake upon a constitutional violation) instantiates P12 as the third operational layer. Proof-of-Resource verifies the fact of contribution; CollectiveBond establishes constitutional accountability for its quality and continuity.

Upon acquiring a slot, the operator is obligated to deposit a constitutional bond in VIC⊥ in a volume proportional to the declared capacity of the slot and its duration; the minimum bond amount is established by GovernanceEngine through VIC⊥-voting and fixed in the SlotMarket contract prior to the commencement of the auction. The bond is held in an immutable CollectiveBond smart contract for the entire duration of the slot. Upon a constitutional violation — SlotRevocation resulting from systematic challenge failures or verified fraud — the bond is confiscated automatically without the participation of a human arbiter: 70% of the confiscated bond is distributed proportionally among the active citizens who suffered from the infrastructure degradation, 20% is directed to the republican reserve fund for financing emergency slot replacement, and 10% is destroyed (burned) as a deflationary mechanism precluding the accumulation of bond capital in a limited number of addresses.

The dialectical significance of CollectiveBond in the architecture of P12 is as follows. Proof-of-Resource generates an incentive toward honest declaration of resources through the threat of reduced emission; CollectiveBond generates an incentive toward quality and continuous resource provision through the threat of bond forfeiture. Together they constitute a dual mechanism of constitutional accountability: the operator can neither falsely declare a resource (Proof-of-Resource) nor provide it below the constitutional standard without financial consequences (CollectiveBond). For citizens this means that the infrastructural layer of the republic is protected not through trust in the good faith of operators, but through an architecture that renders bad faith structurally unprofitable.

Case 2024: an attack on the infrastructure of several proof-of-stake networks through "slashing raids" (coordinated attempts to induce double-signing by validators through the manipulation of timestamps) showed that bond mechanisms without automatic verifiable qualification of the violation are vulnerable to false confiscations. CollectiveBond eliminates this vulnerability through the requirement of on-chain verifiability for each confiscation event: the bond is confiscated only upon a recorded and cryptographically verified violation, not upon suspicion or assertion of a violation.

The transition to the following subchapter is determined by the necessity of establishing the precise connections between the mechanisms of P12 and the theorems of Volumes I–II whose closure confirms the architectural sufficiency of Dual Reserve Market.

13.3. Protection Against Theorems: T2, T11

P12 closes two theorems of the preceding volumes, each of which established a structural defect not remediable by less radical means.

Theorem T2 (temporal barrier, Volume I) established that in a system with accumulative logic the resource of early participants grows with a positive second derivative after the point of no return T_N, rendering the gap between early and late participants structurally ineliminable by market means. As applied to VIC⊥: in a system without P12, an early operator who has accumulated VIC⊥ through initial emission obtains an advantage that reproduces itself independent of the quality of their current contribution, inasmuch as accumulated VIC⊥ permits participation in technical votes whose results determine the parameters of the next auction. This is the digital realization of T2 at the level of resource governance.

P12 closes T2 through two mechanisms. The first: SlotMarket v4.1 nullifies historical advantage at each auction cycle — an operator who has not won a repeat auction retains no right to the slot. The second: Proof-of-Resource binds current VIC⊥ emission to current verified contribution rather than to historical accumulation. Together these mechanisms produce the following: an operator's advantage in VIC⊥-space is a function of their current competitiveness, not their temporal position. Formally: advantage_T2(t) = f(Resource_verified(t)) / Σf(Resource_verified_j(t)) — a function of the current share of verified contribution, not of temporal accumulation.

The precise boundary of T2's closure must be established. P12 closes T2 as applied to VIC⊥ emission and infrastructural participation. T2 as applied to EQU⊥ is closed by P3

(Soulbound Identity) and P4 (dual sovereignty): political sovereignty is distributed equally by definition and is not subject to temporal accumulation. Thus P12 is a necessary but not sufficient closure of T2 — it is complete only in conjunction with P3 and P4.

Theorem T11 (PoS plutocracy, Volume II) established that in any PoS system without a constitutional constraint on the concentration of governance, power concentrates among early participants in a monotonically increasing manner through a compound interest mechanism. As applied to VIC⊥: in a system without P12, a large early operator accumulates VIC⊥ faster than new participants can enter the system, which produces a de facto oligopoly of VIC⊥-space without violating formal rules. Volume II recorded this pattern as pattern 15: the staking advantage of early participants grows with a positive second derivative after the point τ*.

P12 closes T11 through three structural modifications. The first: a fundamental transformation of the nature of emission — VIC⊥ is not a reward for staking existing tokens (which reproduces T11) but a receipt for verified real contribution (which binds emission to a fact external to the tokenomics). The second: the SlotMarket auction mechanism produces competitive pricing in which advantage is determined by willingness to pay for a slot at the current moment, not by historically accumulated stake. The third: CollectiveBond creates a symmetric mechanism of accountability — a large operator bears a proportionally larger bond, which precludes risk-free accumulation of a VIC⊥ position through infrastructural dominance.

It is important to establish that P12 closes T11 not through a prohibition on the concentration of VIC⊥ as such — which would be constitutionally incompatible with Rockefeller Mode (P16), permitting the economic participation of large operators — but through a modification of the mechanism of concentration: if the concentration of VIC⊥ is produced through verified infrastructural superiority, it is constitutionally legitimate; if it is produced through temporal accumulation without current contribution, it constitutes a constitutional violation, automatically corrected by Proof-of-Resource and SlotRevocation. The demarcation between legitimate and illegitimate concentration is architectural, not discretionary.

Formally: Concentration(VIC⊥)_legitimate = f(Resource_verified(t)); Concentration(VIC⊥)_illegitimate = f(time_in_system, compound_interest) → automatic correction through Proof-of-Resource. This demarcation is the operational realization of P4 (the demarcation line between the worlds of things and meanings) as applied to the resource layer.

Chapter Summary

P12 (Dual Reserve Market) establishes the constitutional prohibition of arbitrary VIC⊥ emission and replaces it with a mechanism derivative of verified real contribution. SlotMarket v4.1 instantiates the competitive distribution of infrastructural rights through an auction with history nullification at each cycle. Proof-of-Resource secures the continuous verification of the validity of contribution through cryptographically verifiable random requests without the participation of a centralized arbiter. CollectiveBond establishes the constitutional accountability of operators through automatic confiscation of the bond upon a verified

violation. Theorems T2 and T11 are closed through the transformation of the nature of emission: from temporal accumulation to current verified contribution.

Transition to Chapter 14

P12 establishes constitutional control over the resource layer of the republic — a mechanism securing that VIC⊥ reflects real contribution rather than historical position. However, the constitution cannot function without a verified citizen body: any voting mechanism, including VIC⊥ and EQU⊥, becomes constitutionally unsound in the presence of fictitious identities in the citizen registry. T15 (Sybil trilemma, Volume II) proved that the resolution of this problem requires a constitutionally constrained trusted center. It is precisely this center and its operational protocol that P13 establishes — Digital Census v2.

Chapter 14. Digital census (P13 — Digital Census v2)

This chapter elaborates P13 as the operational realization of P6 with full technical specification. The distinction between P6 and P13 is the distinction between a principle and a mechanism: P6 establishes the constitutional status of the census and its normative requirements as the unamendable core of the constitution, P13 describes the specific protocol for their execution with parameters amendable through ordinary procedures in accordance with technological development and the operational needs of the network. This delineation is constitutionally material: the unamendability of the principle and the adaptability of the mechanism of its realization is the condition simultaneously of the republic's stability and viability.

14.1. Technical formulation and normative justification

P13 (Digital Census v2). The verification of the uniqueness and liveness of each digital citizen is conducted annually through a cryptographically verifiable zero-knowledge protocol, executed locally on the citizen's device, without transmission of identifying data to a centralized repository; the results of verification are aggregated through a Merkle Tree and confirmed by the Civic Guard, constituted through the VRF (Verifiable Random Function) protocol.

The logical justification of P13 is constructed upon four premises. Volume II (theorem T15, Sybil trilemma) established that in an open network there exists no mechanism for the verification of participant uniqueness that simultaneously satisfies three conditions: the absence of a trusted center, the absence of an economic barrier, and the absence of a social barrier. Any instantiated mechanism violates no fewer than one of the three conditions. From T15 it follows that P13 cannot claim to eliminate the trusted center — it can only constitutionally constrain its mandate, which is the only architecturally tenable position. Volume II (axiom A35) recorded the trilemma as a fundamental fact of open networks, independent of the level of technological development. Volume I (normative principle N4, the right to verifiable participation) established that each subject possesses the constitutional right to confirmation of his status as a member of the political community through a

transparent and verifiable procedure. Volume I (normative principle N2, the right to equal access to influence mechanisms) prohibited verification mechanisms that create an economic or social barrier to participation: verification requiring payment, the existence of social connections, or special equipment structurally violates N2.

From the conjunction of T15, A35, N4, and N2, a normative requirement follows that P13 must satisfy: the verification mechanism must intentionally violate condition 1 of the T15 trilemma (the trusted center exists but is constitutionally constrained) while strictly observing conditions 2 and 3 (the absence of economic and social barriers). This is an architectural decision, not a compromise: the Civic Guard is a constitutionally necessary trusted element, not a defect of the system.

The normative justification of P13 is supplemented by the following. The citizen registry of Virtublic is the constitutional foundation of all governance mechanisms: GovernanceEngine, SlotMarket, CollectiveBond, SovereigntyShield — each of these institutions presupposes that the body of citizens participating in decision-making is verified. The compromise of the registry through a Sybil attack (the creation of multiple fictitious identities for the capture of governance) is a threat not to a single mechanism but to constitutional legitimacy as such: if a decision is adopted not by verified citizens but by fictitious identities, it is deprived of its popular-sovereign foundation (P0). It therefore follows that P13 is not a technical but a constitutional institution.

The ratio legis of P13 is as follows: the census as a constitutional act of recognition of subjecthood (P6) requires an operational protocol satisfying simultaneously the requirements of confidentiality (N1), accessibility (N2), verifiability (N4), and resistance to attack (T15). None of these parameters may be sacrificed to the others: a confidential but unverifiable census is not a census; a verifiable but inaccessible census violates N2; an accessible but Sybil-vulnerable census compromises P0. P13 instantiates all four requirements through the separation of cryptographic functions described in subchapter 14.2.

The transition to the following subchapter is determined by the necessity of establishing the specific technical protocol through which P13 instantiates all four normative requirements without mutual compromise.

14.2. Technical protocol: zk-verification, Merkle Tree, CivicJuryEngine

The technical protocol of Digital Census v2 is organized in three sequential levels, each of which performs a specific function in the architecture of P13: the level of local verification, the level of aggregation without disclosure, and the level of civic confirmation.

Level of local verification: zk-SNARK. Annual uniqueness verification is conducted through zk-SNARK (zero-knowledge Succinct Non-interactive ARgument of Knowledge — a cryptographic proof permitting the verification of the truth of a statement without disclosing any information beyond the mere fact of its truth). The citizen generates proof of his uniqueness and liveness locally on his own device without transmitting identifying data to an external server. The proof contains a verifiable assertion of the following content: "There exists a subject bound to this Soulbound ID who is unique in the citizen registry, is alive at

the moment of proof generation, and previously passed verification in the Census cycle of the preceding year" — and nothing beyond this. The verifier (any network node) may verify the correctness of the proof without obtaining access to any data about the citizen: neither his identity, nor his biometrics, nor his behavioral patterns.

The liveness of the subject is verified through a set of cognitive tasks generated locally on the citizen's device and not transmitted to the network: the proof records the fact of successful completion of the tasks but not their content and not the behavioral characteristics of the citizen in the course of completion. This mechanism instantiates N1 (the right to unpredictability): behavioral data generated in the course of the Census are not accumulated and may not be used for predictive profiling. The census is an act of verification of subjecthood, not an act of its recording.

The requirement of local proof generation establishes the following operational constraint: the citizen's device must possess sufficient computational capacity to generate a zk-SNARK in an acceptable time. GovernanceEngine, through VIC⊥-voting, establishes the minimum technical standard for a verification device and shall ensure the availability of publicly accessible verification terminals in each geographical node of the network with sufficient density that no citizen is deprived of access to verification on account of the absence of a personal device. Violation of this requirement is classified as a violation of N2 (the right to equal access) and constitutes grounds for referral to P18.

Level of aggregation without disclosure: Merkle Tree. After local proof generation, each citizen publishes his proof in a Merkle Tree (a cryptographic data structure permitting the verification of the membership of a specific element in an aggregate without disclosing the remaining elements of the aggregate). The Merkle Tree organizes the aggregate of verification proofs such that: first, the fact of the inclusion of a specific Soulbound ID in the citizen registry is publicly verifiable; second, the content of the proof of any specific citizen is not disclosed through the aggregate structure; third, an attempt to include a duplicate Soulbound ID in the registry automatically produces a conflict in the tree, recorded on-chain as an anomaly. The Merkle Root (the root of the tree — the sole public element cryptographically summarizing the entire aggregate of proofs) is published on-chain upon completion of the Census cycle and is the constitutionally recognized state of the citizen registry.

The Merkle Tree construction resolves the following contradiction, recorded as a defect of existing verification systems: centralized registries of biometric data (Worldcoin, state KYC-systems) secure verifiability at the cost of an unacceptable concentration of identifying data in a single repository, the compromise of which yields an irreversible breach. The Merkle Tree inverts this architecture: verifiability is secured through the publicity of the structure, while the data remain decentralized and local. The sole element published centrally — the Merkle Root — contains no identifying data whatsoever.

Level of civic confirmation: CivicJuryEngine. CivicJuryEngine (the institution for constituting the Civic Guard through the VRF (Verifiable Random Function) protocol) instantiates the constitutionally necessary element of trust established by T15 as ineliminable. The function of CivicJuryEngine in the context of P13 is as follows: automated verification through

zk-SNARK and Merkle Tree is sufficient for the overwhelming majority of cases, but is not exhaustive for cases of anomalies flagged by the Dual Suspicion Protocol. In these cases, a constitutionally necessary organ is required — one that is competent to render a decision on the status of a contested identity and that bears constitutional responsibility for that decision.

CivicJuryEngine constitutes the Civic Guard panel through the VRF (Verifiable Random Function) protocol — a cryptographically verifiable random selection function guaranteeing that the selection is random and cannot be predicted or manipulated prior to its execution. The selection is conducted from the aggregate of verified citizens satisfying the following constitutional requirements: a participation history in the Census of no fewer than three consecutive cycles, the absence of active conflicts of interest recorded on-chain, and the absence of prior participation in a panel within the preceding 12 months. The last requirement instantiates the principle of rotation, precluding the formation of a stable professional verification organ: the Civic Guard is a temporary and randomly constituted body, not a permanent institution.

The size of the panel ranges from 21 to 99 citizens proportionally to the size of the network: for a network of fewer than 100,000 citizens — 21; for a network of 100,000 to 1,000,000 — 33; for a network of more than 1,000,000 — 51; for cases involving state neutrality (P17) — 99 without affiliation with state structures. Decisions are adopted by a qualified majority of 2/3, requiring not a simple majority but a substantial consensus of the panel.

The transition to the following subchapter is determined by the necessity of establishing the operational protocol for anomalous identities — cases in which automated first-level verification does not yield an unambiguous result.

14.3. Dual Suspicion Protocol: stage 1 and stage 2

The Dual Suspicion Protocol (the two-stage verification procedure for identities that have received an anomaly flag during automated review) instantiates the constitutional principle according to which denial of citizenship verification is a decision with constitutional consequences and may not be produced automatically without the possibility of civic review. Simultaneously, the Dual Suspicion Protocol instantiates the constitutional principle according to which a Sybil attack is a threat to the legitimacy of P0 and may not remain without a structural response. Both norms exist in permanent tension; the Dual Suspicion Protocol is its operational resolution.

Stage 1: adaptive Sybil-CAPTCHA. An anomaly flag is assigned to an identity automatically upon one or more of the following conditions: a discrepancy between the temporal patterns of zk-proof generation and biologically possible parameters (proofs generated with a frequency or in patterns statistically incompatible with the activity of a single living subject); the existence of cryptographic ties between the given Soulbound ID and other flagged identities through common on-chain transactions; failure during initial liveness verification upon a repeated attempt within the established window.

Upon receipt of an anomaly flag, the identity is assigned the stage 1 procedure: adaptive Sybil-CAPTCHA (a set of cognitive tasks generated dynamically on the basis of current

Sybil-attack patterns recorded in the network, and adaptable by GovernanceEngine through VIC⊥-voting as attacking methodologies develop). Stage 1 tasks satisfy the following constitutional requirements: they do not require specialized knowledge or skills inaccessible to a citizen with a basic level of education (N2); they do not disclose identifying data of the citizen (N1); they are verifiable locally on the citizen's device without transmission of the content of responses to the network. Only the binary result is published: success or failure.

Success in stage 1 removes the anomaly flag and completes the Census procedure for the given identity. Failure in stage 1 upon two consecutive attempts within the established window automatically transfers the case to stage 2 with simultaneous reclassification of the Soulbound ID to pending status (temporary suspension of voting participation rights without annulment of citizenship). Pending status is maintained until completion of panel review; rights temporarily suspended under pending status are not forfeited and are automatically restored upon a positive panel decision.

The following constitutes a critically important constitutional constraint of stage 1: the result of stage 1 is not final in either direction. Success in stage 1 does not signify definitive confirmation of uniqueness — it signifies the removal of the specific anomaly flag while preserving the possibility of re-flagging in the subsequent Census cycle. Failure in stage 1 does not signify denial of citizenship — it signifies referral of the case to the level competent to render a constitutionally binding decision.

Stage 2: the Civic Guard panel. Upon receipt of a case from stage 1, CivicJuryEngine constitutes a panel through the VRF (Verifiable Random Function) protocol in a composition corresponding to the size of the network. The panel receives the following materials in encrypted form, accessible only to panel members: the anonymized on-chain profile of the flagged identity (Census participation history, voting history without the content of votes, temporal activity patterns); the technical report on the anomaly flag and the results of stage 1; the aggregate statistical profile of Sybil-patterns of the current Census cycle without identifying data of other citizens.

The panel does not receive and may not request the following materials: the real identity of the citizen, his biometric data, the content of his political preferences, his economic transactions outside Virtublic, or any data from external systems. This constraint is constitutional and may not be lifted by a panel decision or by GovernanceEngine. Violation of this constraint by a panel member is classified as a constitutional violation of the first degree with immediate public on-chain recording and activation of the sanctions protocol described in subchapter 14.4.

The panel renders a decision by a qualified majority of 2/3 on one of three outcomes: confirmation of uniqueness (restoration of rights, removal of the flag, on-chain recording of the decision without identifying data); denial of verification (reclassification of the Soulbound ID to suspended status with deprivation of participation rights until the next Census cycle, after which the citizen is entitled to initiate repeated verification); indeterminacy (referral of the case to an expanded panel of doubled composition with the same VRF selection). The decision on an expanded panel may be adopted once; upon repeated indeterminacy, the case is referred to P18 as a semantic conflict.

Case 2024: the Worldcoin verification system processed over 5 million verification requests in developing countries and recorded systematic false positives in the verification of identical twins — cases in which biometric verification (iris hash) yielded conflicting results. In the absence of a collegial review mechanism, these citizens remained without verified status and without the possibility of constitutional appeal. The Dual Suspicion Protocol eliminates this defect: automated first-level verification is supplemented by a collegial mechanism competent to render a constitutionally binding decision in contested cases, thereby instantiating N4 (the right to verifiable participation) as applied to edge cases.

The transition to the following subchapter is determined by the necessity of establishing the constitutional responsibility of the juror-auditors as the condition without which the institution of the panel itself is structurally vulnerable to capture.

14.4. Constitutional responsibility of juror-auditors

A juror-auditor (a citizen included in the Civic Guard panel through VRF selection) bears constitutional responsibility for each decision rendered in the course of stage 2 of the Dual Suspicion Protocol. The responsibility is not declarative but verifiable and automatically executable through on-chain mechanisms.

Constitutional oath. Upon constitution of the panel, each juror-auditor shall execute a constitutional oath through an on-chain transaction cryptographically signed by his Soulbound ID. The oath contains the following obligations: consideration of the case exclusively on the basis of materials provided by CivicJuryEngine; adoption of decisions on the basis of the principle of constitutional good faith without regard to external factors; maintenance of confidentiality with respect to case materials; immediate disclosure of any conflict of interest discovered after the commencement of deliberations. The oath transaction is recorded on-chain and is irrevocable: a juror-auditor who has executed the oath may not withdraw from consideration of the case without constitutional consequences, except in the case of disclosure of a conflict of interest.

Sanctions for unintentional error. An unintentional error (a decision causing constitutional harm as a result of insufficient diligence, but not intentional bad faith) is established through the following procedure: if a panel decision is reversed by an expanded panel or by P18 on the ground of a procedural violation, members of the original panel who voted for the reversed decision receive a warning, recorded on-chain in their constitutional participation profile. Three warnings within 36 months automatically produce exclusion from the VRF selection pool for 24 months.

Sanctions for intentional violation. An intentional violation (breach of confidentiality, receipt of remuneration for a specific decision, voting contrary to the evident facts of a case with the aim of capture or elimination of a specific identity) is verified through cryptographic proof of on-chain activity and classified by P18 according to the criterion of technical or semantic conflict depending on the nature of the violation. Upon confirmation of an intentional violation: immediate public on-chain recording of the violation with attribution to the violator's Soulbound ID; deprivation of the right to participate in any Virtublic panels for a period of no

less than 60 months; reduction of EQU⊥-weight by 25% for the same period. None of these sanctions may be applied without a verifiable on-chain proof of violation.

The institutional significance of the responsibility system is as follows. T15 established that a trusted verification center is structurally necessary — and precisely for that reason is structurally dangerous: any necessary organ is a potential object of capture. The constitutional responsibility of juror-auditors is the mechanism that renders the capture of the panel structurally unprofitable: systematic voting in the interests of a capturing faction produces the accumulation of warnings and exclusion from the pool, which destroys a stable capture coalition. VRF selection renders the advance formation of such a coalition impossible; the responsibility system renders its maintenance over time economically irrational. Together they constitute a dual barrier against the capture of the necessary trusted center.

Case 2025: in several decentralized identity verification systems, instances of coordinated verifier voting in favor of fictitious identities in exchange for remuneration in the network's native tokens were recorded. The absence of an on-chain recording mechanism and verifiable sanctions rendered such conduct risk-free provided a sufficient number of verifiers could be coordinated. The constitutional responsibility of Virtublic's juror-auditors eliminates the condition of risk-freedom: on-chain recording of decisions in combination with cryptographic verification of voting patterns produces an evidentiary basis for the classification of a violation without the need for a centralized investigative organ.

The transition to the following subchapter is determined by the necessity of establishing the protocol of action under Census system failure — cases in which the verification mechanism itself ceases to function.

14.5. Failure mode: dormant status, expanded panel, referral to P18

Failure mode (the protocol of action under systemic Census failure) is a constitutionally necessary element of P13, inasmuch as a verification mechanism that does not provide for a procedure for its own failure yields the only possible outcome in an abnormal situation: indeterminacy of the constitutional status of citizens without an established path to its resolution. Indeterminacy of constitutional status is a threat to the legitimacy of all decisions adopted during that period through GovernanceEngine.

Dormant status. In the absence of a completed Census within 18 months of the expiration of the preceding Census cycle, GovernanceEngine automatically reclassifies the entire citizen registry to dormant status. Dormant status means the following: all EQU⊥ and VIC⊥ participation rights are temporarily suspended; all decisions adopted by GovernanceEngine during the dormant period have conditional constitutional status and are subject to ratification upon completion of the Census; all mechanisms requiring a verified body of citizens (SlotMarket, CivicJuryEngine, SovereigntyShield) transition to a mode of minimal operationality — only critical infrastructure processes retain functioning. Dormant status is not an annulment of citizenship: Soulbound IDs are preserved in the registry, the constitutional participation profile is not reset, and accumulated VIC⊥ is not altered.

The dormant period is a constitutional emergency and activates the Constitutional Health Protocol with a mandatory monthly report published on-chain, containing a diagnosis of the cause of Census failure and a prognosis of restoration timelines. The causes of Census failure are subdivided into technical (insufficient network computational capacity, attack on the verification protocol), operational (insufficient citizen turnout in the absence of a Sybil attack), and constitutional (a deliberate attack on the Census institution with the aim of producing dormant status as an instrument of capture). Each category presupposes a distinct path to restoration.

Expanded panel in the absence of quorum. In the event that a panel of standard size cannot be constituted through VRF selection within 30 days on account of an insufficient number of citizens satisfying the selection requirements, CivicJuryEngine transitions to the expanded protocol: the requirements for prior participation history are reduced from three Census cycles to one, and the requirement for the absence of prior panel participation is reduced from 12 to 6 months. If the expanded protocol does not yield a sufficient number of candidates within the subsequent 30 days, a panel of minimum constitutional composition — 7 citizens — is constituted, with the decision threshold of 2/3 preserved. A panel of 7 citizens is competent to hear only cases that entered stage 2 before the expiration of the standard window; new cases accumulate in the queue until the standard mode is restored.

Referral to P18. Upon repeated Census failure after initial restoration within 36 months — or upon a verified indicator of a deliberate attack on the Census institution — GovernanceEngine refers the matter to P18 as a fundamental conflict. P18 in this mode functions through the third stage of its protocol: a referendum among citizens whose last verified Census does not exceed 36 months, on the question of the temporary parameters and format of Census restoration. The referendum decision is constitutionally binding and is executed by GovernanceEngine automatically. This procedure instantiates the principle according to which the mechanism for the restoration of constitutional institutions may not be delegated to a technical protocol: only the verified body of citizens, even in a limited composition, possesses the constituent power to determine the conditions of its own reproduction.

The transition to the following subchapter is determined by the necessity of recording the theoretical connections of P13 with T15 and N4, the closure of which confirms the architectural sufficiency of Digital Census v2.

14.6. Defense against theorems: T15, N4

P13 closes theorem T15 and instantiates normative principle N4, each of which established a structural requirement for the verification mechanism not fulfillable within existing architectures.

Theorem T15 (Sybil trilemma, Volume II) established that in an open network there exists no uniqueness verification mechanism simultaneously satisfying three conditions: (1) the absence of a trusted center, (2) the absence of an economic barrier, (3) the absence of a social barrier. Volume II (axiom A35) recorded the trilemma as a fundamental fact independent of implementation. Volume II (axiom A36) classified all known verification

mechanisms by the condition they violate: biometric systems (Worldcoin) violate condition 1 — they constitute a powerful trusted center with an unlimited mandate; social graphs (BrightID) violate condition 3 — they create a social barrier for citizens without stable social connections; economic barriers (PoW/PoS) violate condition 2.

P13 closes T15 through the intentional violation of condition 1 while strictly observing conditions 2 and 3, with the constitutional constraint of the trusted center as the compensating mechanism. This is not a circumvention of T15 — it is its operational realization: the theorem establishes the impossibility of simultaneously satisfying three conditions, but does not prohibit the intentional selection of the condition to be violated with corresponding institutional measures. P13 acknowledges T15 fully and responds to it in the only constitutionally tenable manner: by selecting the condition whose violation is least dangerous under constitutional constraint. A trusted center with a limited mandate and constitutional responsibility is less dangerous than an economic barrier (violating N2) or a social barrier (violating N2 and N1 simultaneously).

Formally: T15 → ¬(¬center ∧ ¬economic_barrier ∧ ¬social_barrier); P13 → center_constitutionally_constrained ∧ ¬economic_barrier ∧ ¬social_barrier; compensating_mechanism → VRF_selection ∧ constitutional_responsibility ∧ rotation. This is a complete and formally correct closure of T15 as applied to Digital Census v2.

Normative principle N4 (the right to verifiable participation, Volume I) established that each subject possesses the constitutional right to confirmation of his status as a member of the political community through a transparent and verifiable procedure, and that denial of this confirmation is a constitutional violation requiring an appealable procedure. N4 imposes on P13 the following requirements: the verification procedure must be comprehensible to the citizen without specialized technical knowledge (transparency); the result of verification must be cryptographically verifiable by any network node (verifiability); denial of verification must be appealable through a constitutionally established procedure (appealability).

P13 instantiates all three requirements of N4 as follows. Transparency is secured through the publicity of all algorithms of the Dual Suspicion Protocol and CivicJuryEngine, recorded on-chain and accessible for independent audit: the citizen is not obligated to understand the cryptographic mathematics of zk-SNARK, but shall have access to a comprehensible description of precisely what his verification proof demonstrates. Verifiability is secured through the Merkle Tree: any network node may verify the fact of the inclusion of a specific Soulbound ID in the registry without disclosing the content of the proof. Appealability is secured through the two-stage structure of the Dual Suspicion Protocol: an automated denial is not final and automatically initiates collegial review, the decision of which is constitutionally binding and recorded on-chain as a verifiable fact.

Chapter Summary

P13 (Digital Census v2) instantiates P6 as an operational protocol satisfying the constitutional requirements of confidentiality (N1), accessibility (N2), verifiability (N4), and Sybil-resistance (T15) without mutual compromise. The three-level architecture — local zk-verification, aggregation through Merkle Tree, collegial confirmation through

CivicJuryEngine — yields a system in which automated processes handle the overwhelming majority of cases, and a constitutionally responsible panel renders decisions in contested cases without access to identifying data. The failure mode establishes constitutionally defined procedures for each scenario of system failure. T15 is closed through the intentional and constitutionally compensated selection of the violated condition of the trilemma; N4 is instantiated through the transparency, verifiability, and appealability of each element of the protocol.

Transition to Chapter 15

P13 establishes the operational protocol for verification of the body of citizens as a collective subject. However, a verified body is a necessary but not sufficient condition for the realization of constitutional rights: each individual citizen requires a mechanism permitting him to participate in governance anonymously — without disclosing the identity bound to his Soulbound ID — and protecting the cognitive autonomy necessary for the formation of a free political will. This mechanism is established by P14 (Citizenship & Identity).

Chapter 15. Protected Identity (P14 — Citizenship & Identity)

The chapter establishes anonymous participation in combination with verifiable membership in the citizen body as the constitutional standard of digital citizenship. The secret ballot is not a technical convenience but a constitutional principle: a subject whose political will is available for observation at the moment of its expression is not a free subject in the sense that N1 establishes as inalienable. Proof-of-Offline extends this principle to a dimension specific to the digital space: the right to conditions under which political will is formed without continuous architectural intervention in the cognitive processes of the subject.

15.1. Technical Formulation and Normative Justification

P14 (Citizenship & Identity). Every verified citizen of Virtublic possesses the right to anonymous participation in the political processes of the republic, with simultaneous verifiable membership in the citizen body; the verification of citizenship and participation in voting are realized through cryptographically separated protocols that preclude the possibility of linking a political act to the identity of the subject.

The logical justification of P14 is constructed upon five premises. Volume I (normative principle N1, the right to non-predictability) established that the subject possesses a constitutional right to behavior that is unpredictable for systems accumulating their behavioral profile. Political participation — voting, the submission of proposals, membership in coalitions — is behavior in the precise sense of N1: its accumulation produces a predictive profile enabling external actors to predict future political actions of the subject and to exercise directed influence upon them. Volume I (theorem T6, cognitive exhaustion) established that continuous digital presence produces systematic degradation of the cognitive functions responsible for the autonomous formation of judgments. Volume I (normative principle N7, the right to cognitive autonomy) prohibited architectures that

structurally obstruct the subject from forming political will outside conditions of chronic cognitive exhaustion. Volume II (theorem T13, anonymity extirpates accountability) established a contradiction: anonymity without verifiable binding to a unique subject produces power without accountability — the possibility of participating in collective decisions without bearing constitutional consequences for their results. Volume I (normative principle N6, protection of developing subjects) established a special protective regime for citizens under 18 years of age, whose cognitive and political subjecthood is in the process of formation.

From the conjunction of N1, T6, N7, T13, and N6 there follows a normative requirement that P14 must simultaneously satisfy: the anonymity of political action (in fulfillment of N1), the verifiable uniqueness of the participant (in fulfillment of the resolution of T13), cognitive autonomy as a constitutionally protected condition (in fulfillment of N7 through T6), and special protection of developing subjects (N6). These four requirements exist in structural tension: anonymity obstructs the verification of uniqueness, the verification of uniqueness generates a risk of identity disclosure, cognitive autonomy requires periods of digital absence that standard participation systems interpret as passivity. P14 is the operational resolution of this tension through the architectural separation of functions, described in subchapters 15.2 and 15.4.

The ratio legis of P14 is as follows: the political equality of subjects is not a formal attribute — it is a functional state requiring specific conditions for its realization. A subject whose voting is traceable is not equal to a subject whose voting is anonymous, even if both formally possess identical EQU⊥. A subject whose political will is formed under conditions of chronic cognitive exhaustion is not equal to a subject whose will is formed under conditions of cognitive autonomy, even if both formally possess identical participation rights. P14 eliminates this functional inequality through architectural rather than declaratory mechanisms.

The transition to the following subchapter is determined by the necessity of establishing the specific cryptographic protocol through which P14 realizes anonymous participation with verifiable uniqueness without the mutual compromise of these two requirements.

15.2. Technical Protocol: zk-SNARK, Ring Signatures, Separation of Concerns

The technical protocol of P14 is organized through the principle of separation of concerns (the separation of functions — an architectural principle according to which cryptographic operations serving distinct constitutional purposes employ independent keys, schemes, and data transmission channels that preclude the possibility of correlation). The verification of citizenship and participation in voting are two functionally distinct constitutional acts; their realization through a single cryptographic scheme would produce the possibility of linking a specific vote to a specific citizen — which constitutes a violation of N1 independent of the intentions of the developers.

zk-SNARK for proof of citizenship. A citizen proves their membership in the citizen body of Virtublic through a zk-SNARK (zero-knowledge Succinct Non-interactive ARgument of Knowledge — a cryptographic proof of membership in a set without disclosing any attribute

other than the fact of membership itself). The proof is generated locally on the citizen's device and contains a verifiable assertion of the following content: "There exists a Soulbound ID included in the current verified Merkle Root of the citizen registry, the key to which is known to the subject generating this proof" — and nothing further. The verifier (GovernanceEngine or any network node) obtains the ability to confirm that the voter is a verified citizen without receiving information as to which citizen specifically is voting.

The following architectural property of this mechanism is critically important: the zk-proof of citizenship is not a reusable identifier. Each proof is unique with respect to a specific vote and a specific moment in time; two proofs generated by the same citizen in different votes contain no linkable data and cannot be correlated by an external observer. This precludes the attack through proof accumulation: even in the presence of a complete archive of all published proofs, extracting a political profile of a specific citizen from it is a computationally intractable task.

Ring Signatures for anonymous voting. Following the proof of citizenship through zk-SNARK, voting is conducted through Ring Signatures (ring signatures — a cryptographic scheme in which a signature is verifiably attributable to one member of a group, but does not disclose which member specifically). The citizen signs their vote with a ring signature encompassing a randomly selected subset of verified citizens from the current registry: the verifier receives proof that the vote belongs to one of the members of this group, without the ability to establish to whom specifically. The ring size (anonymity set) is established by GovernanceEngine through VIC⊥-voting with a constitutional minimum of 128 members: a reduction of the ring size below this threshold is qualified as a violation of N1 and is automatically blocked by the Formal Verification Protocol.

The connection between the zk-proof of citizenship and the ring signature of the vote is effected through a nullifier (a cryptographic descriptor — a one-time identifier verifying the fact of the exercise of the right to vote without disclosing the identity of the person who exercised it). The nullifier is published on-chain together with the ring signature and enables GovernanceEngine to preclude double voting: if the nullifier is already present in the registry of the current vote, a new attempt to submit a vote is rejected. The nullifier is not derived from the identity of the citizen — it is derived from the combination of their key and the identifier of the specific vote, which precludes its use for tracking participation in other votes.

Separation of concerns: architectural isolation. The principle of separation of concerns is instantiated in P14 through the following constitutional requirement: the keys employed for generating the zk-proof of citizenship and the keys employed for generating the ring signature of the vote are cryptographically independent and are generated through independent procedures. Neither GovernanceEngine, nor CivicJuryEngine, nor any other institution of Virtublic possesses access to the keys that would make it possible to establish the connection between these two levels for a specific citizen. This requirement is constitutional and cannot be lifted by any decision of GovernanceEngine, by any decision of the Civic Guard, or under any emergency scenario, including Axiom-Break.

Case 2023–2024: in several major DAOs (MakerDAO, Uniswap), instances of vote de-anonymization through the correlation of on-chain addresses with public wallets were

recorded — since voting was conducted from the same addresses as token transactions, the accumulation of transactional behavior data made it possible with high probability to attribute specific votes to specific actors. Ring Signatures with separation of concerns eliminate this attack vector structurally: voting is not conducted from identifiable addresses and does not correlate with transactional history by virtue of the cryptographic independence of the keys employed.

The transition to the following subchapter is determined by the necessity of establishing the special protective regime for citizens whose political subjecthood is in the process of formation and who therefore require constitutional protection distinct from the standard regime.

15.3. Protection of Developing Subjects (N6): Republic Engagement Auditor

N6 (protection of developing subjects, Volume I). A subject whose cognitive and political subjecthood is in the process of formation possesses a constitutional right to protection from architectural mechanisms that systematically disrupt this process through the exploitation of neuroplasticity, the incompleteness of cognitive development, or the absence of formed mechanisms for the critical evaluation of informational influence.

The logical justification of the special P14 regime for developing subjects is constructed upon the following. Volume I (axiom A10) established that systems optimizing engagement produce disproportionately greater harm to subjects with incomplete cognitive development by virtue of higher neuroplasticity and less developed cognitive control mechanisms. Volume I (theorem T6) established the physiological impossibility of sustained resistance to cognitive exhaustion under conditions of continuous digital presence — which, for developing subjects, signifies not only political but personal deformation. From A10 and T6 it follows that the standard mechanisms of P14, designed for an adult formed subject, are constitutionally insufficient for a citizen under 18 years of age: the latter requires an additional architectural layer of protection, instantiated through the Republic Engagement Auditor.

Republic Engagement Auditor. Republic Engagement Auditor (the constitutional verifier of the absence of dark patterns in the Virtublic mechanics available to citizens under 18 years of age) is a continuously functioning audit protocol performing the following functions. First, the verification of each interface element and protocol of Virtublic with which citizens under 18 years of age interact, for conformity with the constitutional prohibition of dark patterns (architectural techniques that exploit cognitive biases or the underdevelopment of critical evaluation in order to direct the behavior of the subject in the interests of the system rather than the subject). Second, the monitoring of the frequency and patterns of participation of citizens under 18 years of age, with automatic activation of the protective protocol upon the detection of indicators of compulsive participation (participation frequency exceeding constitutional thresholds without cognitive health indicators). Third, the production of a quarterly constitutional report, published on-chain, containing aggregated data on the participation patterns of citizens under 18 years of age without identifying data.

The constitutional status of Republic Engagement Auditor is established as follows: its findings constitute the basis for the automatic blocking of a specific interface element or

protocol through the Formal Verification Protocol upon confirmation of a violation of N6; GovernanceEngine may not lift this block through a vote without the provision of a constitutionally verifiable proof of the elimination of the violation. This demarcation is material: Republic Engagement Auditor is not a censorship body — it is a constitutional standard whose application is automatic and does not depend on the political preferences of the majority.

Parental consent is realized through cryptographic multisig (multi-party cryptographic signature, requiring the assent of multiple key holders for an operation to be executed): for a citizen under 18 years of age, the full activation of participation rights in the political mechanisms of Virtublic requires the combined signature of the citizen's own Soulbound ID and the Soulbound ID of a parent or legal guardian. An encrypted vault (an encrypted repository of participation data) with automatic destruction upon reaching 18 years of age ensures that data concerning the political participation of a developing subject is not accumulated in the system after the transition to the status of full citizen: the participation profile is nullified, which precludes the use of data from the subject's minority for the predictive profiling of the adult citizen.

The transition to the following subchapter is determined by the necessity of establishing the Proof-of-Offline mechanism as the operational realization of N7 — the right to cognitive autonomy as the condition under which political will is formed freely.

15.4. Proof-of-Offline: Cognitive Autonomy as a Constitutional Right (N7)

N7 (the right to cognitive autonomy, Volume I). The subject possesses the constitutional right to periodically withdrawing from conditions of continuous digital presence without constitutional sanctions, loss of accumulated participation status, or reduction in the formal weight of their political vote; a system that renders digital absence equivalent to political passivity violates N7 structurally, independent of the intentions of its creators.

The logical justification of N7 and its realization through Proof-of-Offline is constructed upon the following. Volume I (theorem T6, cognitive exhaustion) established the physiological mechanism of cognitive function degradation under conditions of continuous digital presence: the reduction of executive functions, working memory, and the capacity for autonomous judgment is a verifiable neurobiological consequence, not a subjective assessment. Volume I (normative principle N1) established the right to non-predictability as a constitutionally protected good: a subject whose cognitive functions are systematically exhausted by the architecture of the system is not a free subject in the sense of N1 — their political preferences are formed under conditions producing predictable response patterns, which constitutes the functional equivalent of the forfeiture of N1. From T6 and N1 it follows that a system failing to secure conditions for periodic cognitive restoration violates N1 and N7 through a physiological mechanism rather than through the direct restriction of rights.

Technical protocol of Proof-of-Offline. Proof-of-Offline (a protocol for the verification of cognitive detox periods through zk-proof without disclosure of activity data) functions as follows. The citizen's device locally registers aggregate screen time for each day of a 30-day period. In the presence of no fewer than 7 days within a 30-day period, each of which is

characterized by less than 2 hours of aggregate screen time, the citizen is entitled to generate a zk-proof of an offline period. The proof verifies the fact that the activity pattern conforms to the constitutional threshold without transmitting specific activity data to the network: the verifier receives a binary assertion — "condition satisfied / not satisfied" — without access to the distribution of activity by day or by application type.

The protocol parameters (30-day window, 7-day threshold, 2-hour limit) are established by GovernanceEngine through VIC⊥-voting and are adaptable: they are assigned to P13–P18 as modifiable governance mechanisms. Constitutionally immutable is the principle: the right to cognitive detox without loss of constitutional status. The specific threshold values are adapted to the neurobiological data accumulated in the course of Republic Engagement Auditor's functioning.

Cognitive health bonus. A citizen who has successfully generated a Proof-of-Offline receives a cognitive health bonus — a 10-percent enhancement of EQU⊥ weight in votes during the 90 days following the verified offline period. The normative justification of this mechanism is as follows: the cognitive health bonus is not a privilege granted to particular citizens, but a constitutional recognition of the fact that political will formed under conditions of cognitive autonomy possesses greater constitutional weight than will formed under conditions of chronic cognitive exhaustion. This is not a judgment concerning the value of a specific citizen — it is an architectural recognition of the neurobiological fact established by T6.

The cognitive health bonus mechanism instantiates N2 (the right of equal access to mechanisms of influence) in its functional rather than formal dimension: formal equality of EQU⊥ under conditions of functional inequality of cognitive conditions is not genuine equality. The cognitive health bonus is the constitutional corrector of this functional inequality through the encouragement of conditions of cognitive autonomy, not through a sanction against the absence of those conditions.

The right to digital detox without sanctions. The constitutional requirement is as follows: the absence of activity in Virtublic during any period produces no constitutional consequences other than the accumulation of Proof-of-Offline upon conformity with the protocol parameters. Citizen status does not degrade in the absence of participation. Accumulated VIC⊥ does not diminish. The history of constitutional participation is not nullified. The queue of rights — the right to repeat Census verification, the right to initiate a vote, the right to membership in the Civic Guard — is not interrupted. A system producing constitutional losses as a consequence of the absence of digital activity violates N7 structurally and is subject to blocking through the Formal Verification Protocol.

This requirement is the architectural inverse of the standard logic of digital platforms, in which the absence of activity systematically reduces content visibility and access to functions (pattern 11, Volume I). Virtublic constitutionally prohibits the transfer of this logic into the space of political participation: digital absence is a constitutionally neutral event, not a signal of the reduced political significance of the subject.

The transition to the following subchapter is determined by the necessity of establishing the theoretical connections of P14 with T6, N6, N7, and the blackmail attack vector, whose closure confirms the architectural sufficiency of the protected identity mechanism.

15.5. Protection Against Theorems: T6, N6, N7

P14 closes theorem T6 and instantiates the normative principles N6 and N7, each of which established a structural requirement for a mechanism of political participation not fulfillable within existing digital architectures.

Theorem T6 (cognitive exhaustion, Volume I) established that systems with continuous engagement optimization produce physiologically verifiable degradation of the cognitive functions of the subject as a structural rather than contingent result. As applied to political participation, T6 produces the following entailment: in a system without Proof-of-Offline, a subject continuously engaged in the digital environment participates in political processes under conditions of chronically reduced executive functions and working memory — which renders their political will functionally distinct from the will of a subject under conditions of cognitive autonomy, even at formally identical participation rights.

P14 closes T6 through two mechanisms. The first: Proof-of-Offline creates a constitutional incentive toward periodic withdrawal from conditions producing cognitive exhaustion, through the cognitive health bonus — not through compulsion, but through architectural encouragement. The second: the prohibition of sanctions for digital absence eliminates the architectural pressure that, in standard systems, renders digital detox constitutionally unprofitable. Together these mechanisms produce a system in which cognitive autonomy is a functionally achievable state rather than a declaratory right.

Normative principle N6 (protection of developing subjects, Volume I) established the constitutional requirement of a special protective regime for citizens under 18 years of age. P14 instantiates N6 through Republic Engagement Auditor, parental consent through cryptographic multisig, and an encrypted vault with automatic destruction. The verifiability of the realization of N6 is secured through the mandatory quarterly on-chain report of Republic Engagement Auditor: the presence of the report is constitutional proof of the functioning of the protective mechanism; its absence is a constitutional violation, transmitted to P18.

Normative principle N7 (the right to cognitive autonomy, Volume I) established the constitutional prohibition of architectures that render digital absence equivalent to political passivity. P14 instantiates N7 through Proof-of-Offline as an operational protocol and through the constitutional prohibition of sanctions for the absence of activity. Formally: N7 → ¬(absence_of_activity → reduction_of_constitutional_status); P14 → Proof-of-Offline + ¬sanctions + cognitive_health_bonus → N7 instantiated operationally without lacunae.

15.6. Protection Against Attack Vector: Blackmail Blocked Through zk-proof

The blackmail attack vector as applied to political participation is realized as follows: an external actor threatens a citizen with the disclosure of their political preferences or voting history with the purpose of compelling a change in political behavior or the abandonment of

participation. The structural possibility of this attack vector presupposes two conditions: the existence of data concerning the political behavior of a specific citizen, and the verifiability of the link between that data and their identity. The elimination of either condition structurally neutralizes the vector.

P14 eliminates both conditions simultaneously. The first condition is eliminated through Ring Signatures with an anonymity set of no fewer than 128 members: even in the presence of a complete on-chain archive of votes, the attribution of a specific vote to a specific citizen is a computationally intractable task at this ring size. The second condition is eliminated through separation of concerns: the citizenship verification keys and the voting keys are cryptographically independent, by virtue of which an observer possessing the zk-proof of citizenship of a specific subject obtains from it no information concerning their votes. Together these mechanisms produce the following: data concerning the political behavior of a specific citizen does not exist in a form available for use in blackmail — not because it is concealed, but because it is not generated in linked form.

A critically important constitutional property of this mechanism is its imperviousness even to the citizen themselves: the citizen cannot voluntarily disclose their vote in a verifiable form even if they wish to do so. This means that a demand to prove one's vote under duress is technically unenforceable: the subject of blackmail may assert anything concerning their votes, but cannot provide a cryptographically verifiable proof of that assertion. This property is constitutional rather than contingent: it instantiates the principle according to which the secret ballot protects not only against external coercion, but against compulsion to self-disclosure.

Case 2024–2025: in several jurisdictions, instances of citizens being compelled to present screenshots of votes in corporate and state voting systems were recorded — a practice possible only in the presence of a link between the identifier of the voter and the content of their vote. Ring Signatures with separation of concerns eliminate the technical possibility of such compulsion: an on-chain record screenshot does not contain identifying data of the voter in verifiable form.

Chapter Summary

P14 (Citizenship & Identity) establishes anonymous participation with verifiable uniqueness as the constitutional standard of digital citizenship. zk-SNARK instantiates proof of membership in the citizen body without disclosure of identity. Ring Signatures with an anonymity set of no fewer than 128 members instantiate anonymous voting with verifiable uniqueness of the participant. Separation of concerns precludes correlation between these two levels. Republic Engagement Auditor instantiates N6 through the constitutional protection of developing subjects. Proof-of-Offline instantiates N7 through the verifiable right to cognitive detox with constitutional encouragement through the cognitive health bonus. The blackmail attack vector is neutralized structurally through the technical imperviousness of voting anonymity. Theorem T6 is closed through the operational mechanisms of encouragement of cognitive autonomy; N6 and N7 are instantiated without lacunae between the declaratory and the enforceable levels.

Transition to Chapter 16

P14 establishes the constitutional standard of identity and the protection of the cognitive autonomy of the individual citizen. However, the republic as a collective political organism confronts a problem that individual protection mechanisms do not resolve: the systematic reduction of participation in votes — apathy — produces a threat to the constitutional legitimacy of collective decisions independent of whether the identity of each individual citizen is protected. T8 (the sovereignty gap) established that de jure and de facto diverge precisely through apathy as a structural mechanism. P15 (Quorum Decay) is the constitutional response to this mechanism.

Chapter 16. Adaptive quorum (P15 — Quorum Decay)

This chapter establishes Quorum Decay as the constitutional response to the structural ambiguity of apathy as a political signal. Apathy in political systems is a semantically equivocal event: its observable form — the absence of participation — contains no information about the cause of that absence. A constitution that interprets apathy unambiguously — either as always legitimate or as always pathological — yields, in the first case, paralysis through the use of quorum barriers as an instrument of capture, and in the second case, compelled participation that violates N7. P15 resolves this contradiction through an adaptive mechanism that distinguishes between two types of apathy by their structural consequences rather than by their declared causes.

16.1. Technical formulation and normative justification

P15 (Quorum Decay). When quorum is systematically unattained, GovernanceEngine adaptively reduces the threshold turnout value by a constitutionally established increment for each defined period, until the constitutionally established minimum threshold is reached, with automatic reset to the initial value following a successful vote; this mechanism does not apply to the categories of decisions enumerated in subchapter 16.3.

The logical justification of P15 is constructed upon four premises. Volume I (theorem T8, the sovereignty gap) established that de jure and de facto sovereignty diverge in systems where formal decision-making procedures become unattainable as a consequence of structural participation barriers. An unattainable quorum is a particular instance of T8: a decision de jure requires participation that de facto is not produced, by virtue of which the system enters a state of constitutional paralysis — not a crisis in the sense of P8 (Axiom-Break Condition), but an operational blockage under which necessary decisions are not adopted. Volume I (theorem T9, systemic collapse) established three structural paths to the collapse of republican institutions, one of which — the collapse of participation — is realized precisely through the progressive incapacity of the system to attain quorum on ordinary questions. Volume II (axiom A30, flash loan governance attack) recorded an adjacent mechanism: quorum barriers under conditions of low participation create the opportunity for actors with sufficient resources to block the attainment of quorum through strategic abstention, yielding a de facto minority veto without its formal institution. Volume I (normative principle N7, the

right to cognitive autonomy) prohibits architectures that render digital absence constitutionally costly: a system in which the refusal to participate automatically blocks the adoption of constitutionally necessary decisions yields structural compulsion to participate, which violates N7.

From the conjunction of T8, T9, A30, and N7, the following normative requirement follows: the constitution must contain a mechanism permitting the adoption of constitutionally necessary decisions under conditions of systematically low participation, without producing compelled participation and without reducing the quality of popular sovereign authority below the constitutional minimum. P15 is the operational resolution of this requirement.

The normative justification of P15 is supplemented by the following. A static quorum barrier is a politically neutral instrument only under conditions of stable participation: under conditions of systematically changing participation levels, it becomes an instrument of power for those who control participation patterns. In DAO architectures of 2020–2026, a regularity was recorded (Volume II, regularity 19): concentrated token holders possess a structural advantage in the management of turnout — they can both secure the attainment of quorum in votes favorable to them and obstruct it in votes unfavorable to them. A static barrier is not neutral with respect to this advantage — it amplifies it. P15 eliminates the asymmetry through the adaptation of the barrier to the actual state of the system, depriving concentrated actors of the capacity to use the quorum mechanism as an instrument of blockage.

The ratio legis of P15 is as follows: the quorum threshold is an instrument of constitutional legitimacy, not an end in itself. Its function is to ensure that adopted decisions reflect a sufficiently representative will of the body of citizens. Under conditions of systematically low turnout, an absolute quorum threshold ceases to secure this function — it begins to preclude it, blocking the adoption of any decisions whatsoever. P15 preserves the function of quorum (sufficient representativeness) while adapting its operational expression (the specific threshold value) to the observed reality of participation.

The transition to the following subchapter is determined by the necessity of establishing the specific parameters of the adaptive mechanism, including initial values, rate of reduction, minimum thresholds, and reset conditions.

16.2. Institutional realization: reduction parameters, minimum thresholds, reset

The institutional realization of P15 is organized through three sequential operational elements: the adaptive reduction algorithm, the system of minimum constitutional thresholds, and the reset protocol upon the restoration of participation.

Adaptive reduction algorithm. Upon failure to attain quorum in a vote of any category to which P15 applies, GovernanceEngine records a failed_quorum event and initiates a 30-day monitoring period. If quorum is not attained in any vote of that category during this period, the threshold value is reduced by 5 percentage points and recorded on-chain as the new current value. The reduction is applied to the category of votes, not to an individual vote: if quorum is not attained across three distinct ordinary votes within a 30-day period, the reduction is produced once, not three times. The parameters of the mechanism (the

reduction increment of 5 percentage points, the 30-day monitoring period) are established by GovernanceEngine through VIC⊥-voting and are adaptable within constitutionally established ranges: the reduction increment per period may not exceed 10 percentage points, and the monitoring period may not be less than 15 or more than 60 days.

Initial threshold values for vote categories are established as follows. For constitutional decisions (amendment of P10–P18), the initial value is 66% EQU⊥ and 51% VIC⊥ under the Concordance Rule. For ordinary political decisions, the initial value is 51% EQU⊥. For ordinary technical decisions, the initial value is 51% VIC⊥. These initial values are the starting points of adaptive reduction; they are not constitutional constants in the sense of P7 and are amendable through ordinary procedures within constitutionally established ranges.

System of minimum constitutional thresholds. Adaptive reduction is bounded below by constitutional minima below which the threshold value may not descend at any level of apathy. For constitutional decisions (amendment of P10–P18), the minimum threshold is 51% EQU⊥ and 33% VIC⊥. For ordinary political decisions, the minimum threshold is 33% EQU⊥. For ordinary technical decisions, the minimum threshold is 25% VIC⊥. The minimum thresholds are constitutional constants at the level of P10–P18: they may not be reduced by GovernanceEngine through ordinary voting, but may be amended through the Constitutional Convention within the Axiom-Break Condition, except in cases encompassed by the constraints of subchapter 16.3.

The normative justification for the system of minimum thresholds is as follows. The complete elimination of the quorum requirement upon sufficiently prolonged apathy would yield a system in which decisions may be adopted by an arbitrarily small number of participants, which is the functional equivalent of the monopolization of GovernanceEngine by concentrated actors (a violation of P1 and T12). The minimum thresholds are the constitutional guarantee that the adaptation mechanism does not yield the de facto elimination of popular sovereign authority through the progressive reduction of the representativeness of adopted decisions.

Reset protocol. Upon the attainment of quorum in any vote of a category to which reduction has been applied, GovernanceEngine automatically initiates reset: the threshold value returns to the initial starting value of that category, not to the value immediately preceding the reduction. Reset is produced immediately upon recording of the successful vote and requires no separate vote or confirmation procedure. The event quorum_restored is recorded on-chain with indication of the category and the new threshold value.

The reset protocol instantiates the following constitutional principle: adaptive reduction is a temporary operational instrument applied to a pathological state of the system, not a permanent correction of its normal functioning. Upon restoration of the normal state (attainment of quorum), the instrument returns to its initial position. Gradual return through intermediate values would be architecturally incorrect: it would produce an asymmetry between the rate of reduction and the rate of restoration, by virtue of which the long-term tendency under alternating periods of apathy and normal participation would tend toward the progressive reduction of threshold values.

Case 2023–2025: in Compound Finance and Uniswap, periods were recorded during which quorum was systematically unattained on ordinary proposals at turnout below 5% of the aggregate number of token holders. The static quorum threshold produced an accumulation of unresolved proposals, creating a backlog of governance decisions. Individual proposals attained quorum only through targeted mobilization by large holders — which de facto transferred the governance agenda to those who possessed the resources for mobilization. Quorum Decay with automatic reset eliminates this pattern: under conditions of systematically low participation, the threshold adapts to a level at which organic participation proves sufficient, without requiring the mobilization resources of concentrated actors.

The transition to the following subchapter is determined by the necessity of establishing the categories of decisions to which P15 is constitutionally inapplicable — inasmuch as adaptive quorum is an instrument for ordinary decisions, but not for decisions affecting constitutional foundations.

16.3. Constraints on Quorum Decay: inapplicable categories

The constitutional necessity of the constraints on P15 is justified as follows. Quorum Decay is an instrument of operational adaptation designed to preserve the functionality of GovernanceEngine under conditions of low participation on ordinary questions. The extension of this instrument to categories of decisions affecting constitutional foundations would yield the opposite effect: the reduction of barriers precisely where high barriers are a constitutional guarantee rather than an operational constraint. The constraints on P15 are therefore not an exception to the principle but its logical completion: the principle of adaptive quorum applies to ordinary decisions precisely because for constitutional decisions the opposite principle obtains — that of immutable high thresholds.

P0 and P1–P7 (the unamendable constitutional core). Any votes connected with the amendment of P1–P7 or the activation of the Axiom-Break Condition are absolutely excluded from the mechanism of P15. The application of Quorum Decay to the thresholds of the Axiom-Break Condition would yield the following: under conditions of systematic apathy, the activation threshold of the Axiom-Break Condition would be reduced to the constitutional minimum, by virtue of which a systemic crisis could be declared with the participation of an arbitrarily small number of citizens. This is the structural inverse of the constitutional principle of P8: the Axiom-Break Condition presupposes the demonstration of systemic crisis through persistent, large-scale, and manifest indicators — the reduction of the quorum barrier through P15 would transform it into an instrument available for activation through niche mobilization. P0, as the absolute foundation, cannot be the subject of any vote and is therefore outside the domain of application of P15 by definition.

Convocation of the Constitutional Convention (P9). Votes on the convocation of the Convention are excluded from the mechanism of P15 by the same logic. The reduction of the quorum barrier for the convocation of the Convention would yield the possibility of its activation at a level of participation incompatible with the constitutional requirement of P8 for persistent and large-scale indicators of crisis. This constitutes a violation of the dialectical unity of P8–P9: P8 establishes the conditions of crisis, P9 specifies the form of resolution; the reduction of quorum for P9 while preserving the conditions of P8 destroys their

indissolubility, creating a procedural path to the Convention without a demonstrated constitutional crisis.

SovereigntyShield (P17). Votes on the ratification of state mandates and the amendment of SovereigntyShield parameters are excluded from the mechanism of P15 on the following ground. SovereigntyShield is the constitutional barrier protecting popular sovereign authority from state capture (ΣA17, Volume I). The reduction of quorum for the ratification of state mandates would yield the following: a state that is structurally interested in obtaining access to citizens' predictive data (ΣA17) possesses the resources to constitute apathy as a strategy — withdrawing from the vote that segment of citizens who would vote against the mandate, while preserving the participation of loyally oriented segments. Apathy as a strategy, employed by a state actor to reduce the effective quorum through P15, is a particular instance of the state capture attack vector (Appendix C, C.3). The exclusion of SovereigntyShield from P15 eliminates this attack vector structurally.

Security questions. Votes classified by GovernanceEngine as questions of security of Virtublic's critical infrastructure are excluded from the mechanism of P15. The classification criterion is established through VIC⊥-voting: a question is recognized as a security question upon the existence of a verified threat to the functioning of the zk-SNARK, Merkle Tree, VRF (Verifiable Random Function), Formal Verification, or Dual Suspicion Protocol protocols. The justification for the exclusion is as follows: decisions on security questions are adopted under conditions of informational asymmetry — citizens lacking specialized knowledge are less capable of evaluating the consequences of a decision, which renders their participation under conditions of reduced quorum less representative of constitutionally significant interests than their non-participation.

The precise architectural logic of the constraints on P15 as a unified whole shall be recorded. All four categories of exclusions share one property: within them, the reduction of quorum yields a greater constitutional threat than the operational paralysis attendant upon failure to attain a high threshold. This is the inverse of the logic of P15 for ordinary decisions: there, operational paralysis is the greater threat relative to the reduction of representativeness. The boundary between the two categories is not arbitrary but constitutionally established through the criterion of whether the vote affects constitutional foundations or operational mechanisms.

The transition to the following subchapter is determined by the necessity of recording the theoretical connections of P15 with T8 and T9, confirming the architectural sufficiency of the adaptive quorum mechanism.

16.4. Defense against theorems: T8, T9

P15 closes theorems T8 and T9 in their application to the mechanism of participation and quorum, each of which established a structural defect yielding the collapse of republican institutions through the mechanism of apathy.

Theorem T8 (the sovereignty gap, Volume I) established that de jure and de facto sovereignty diverge in systems where formal decision-making procedures become

structurally unattainable. As applied to quorum: a static quorum barrier under conditions of systematically declining participation yields a state in which citizens de jure possess the right to adopt decisions through GovernanceEngine, but de facto this right is unrealizable, inasmuch as the decision-making mechanism is blocked by an unattainable threshold. T8 identifies this gap as a structural threat rather than an incidental operational inconvenience: if de jure and de facto sovereignty systematically diverge, citizens rationally cease to trust the formal procedures and begin to seek informal channels for the realization of political will — which destroys the constitutional legitimacy of GovernanceEngine as such.

P15 closes T8 through the elimination of the structural cause of divergence: as de facto participation declines, the de jure threshold adapts so as to preserve the possibility of adopting decisions at the actually observed level of participation. This does not eliminate apathy as such — P15 is not a mechanism for increasing participation. P15 eliminates the constitutional consequences of apathy: the system in which apathy yields paralysis, which yields further apathy through rationally grounded distrust of the system. Adaptive quorum severs this cycle at the level of its first link — paralysis.

Formally: T8 → de_jure(sovereignty) ≠ de_facto(sovereignty) under static_quorum + declining_participation; P15 → quorum(t) = f(participation_trend(t)) → de_jure ≈ de_facto at any level of participation above the constitutional minimum. This resolution of T8 is partial: P15 closes T8 as applied to the quorum barrier, but not as applied to other sovereignty-gap mechanisms, which are closed by P3, P4, and P17.

Theorem T9 (systemic collapse, Volume I) established three structural paths to the collapse of republican institutions: the collapse of participation, the loss of legitimacy, and the capture of institutions. P15 addresses the first path — the collapse of participation — through the adaptive mechanism that precludes the transition from declining participation to operational paralysis. However, P15 is not a sufficient instrument for the closure of T9 in its full scope: the loss of legitimacy and the capture of institutions require separate constitutional mechanisms (P8–P9 and P18 respectively).

The specific function of P15 in the context of T9 is as follows: the collapse of participation is first in the chain, inasmuch as it is precisely this that creates the conditions for the two subsequent paths. A system with a chronically unattainable quorum yields a rational basis for the loss of legitimacy (citizens cease to recognize decisions adopted under extraordinary conditions of mobilization) and creates a structural advantage for concentrated actors capable of targeted mobilization (capture of institutions). P15 eliminates the collapse of participation as the primary threat, thereby reducing the probability of the activation of the two subsequent paths. The architectural logic is as follows: the prevention of the primary threat is a more effective constitutional instrument than the successive elimination of its derivatives.

The Constitutional Health Protocol (the constitutional protocol for monitoring systemic health, introduced in P8) is the diagnostic complement to P15: if Quorum Decay has been activated and has reached the minimum threshold without subsequent reset within 90 days, the Constitutional Health Protocol automatically activates an in-depth diagnostic with a mandatory on-chain report containing an assessment of whether the observed apathy is a

manifestation of satisfaction (a signal for the preservation of the reduced threshold until reset) or of alienation (a signal for the activation of Constitutional Dialogue as a prophylactic mechanism of P8). This connection between P15 and P8 instantiates the constitutional principle according to which the operational mechanism of adaptation and the mechanism of constitutional diagnostics constitute a unified monitoring system: the former adapts the parameters, the latter verifies that the adaptation does not mask a systemic crisis.

Case 2025: in several jurisdictions with legislatively established quorum requirements for referendums, instances were recorded in which strategic abstention from voting was used to preclude the attainment of quorum on questions undesirable to a minority. In the absence of an adaptive mechanism, this yielded a de facto right of veto for an organized minority through an instrument constitutionally designed to ensure the representativeness of the majority. Quorum Decay with constitutional constraints for critical categories eliminates this asymmetry: abstention from participation yields a reduction of the threshold rather than a blockage, by virtue of which strategic abstention ceases to be an effective instrument of veto.

Chapter Summary

P15 (Quorum Decay) establishes the adaptive quorum mechanism as the constitutional response to the structural ambiguity of apathy and its potential use as an instrument of capture. The reduction algorithm of 5 percentage points per each 30-day period of unattained quorum precludes operational paralysis of GovernanceEngine under conditions of systematically low participation. The system of constitutional minima (51%/33% for constitutional decisions, 33% for ordinary political decisions) ensures that adaptation does not yield the de facto elimination of the representativeness requirement. The reset protocol upon attainment of quorum returns the threshold value to its initial level, precluding progressive degradation through the alternation of apathy and participation. The four categories of exclusions — P0–P7, convocation of the Convention, SovereigntyShield, security questions — protect the constitutional foundations from the reduction of barriers precisely where high thresholds are a constitutional guarantee. Theorems T8 and T9 are closed in the part pertaining to the collapse of participation through the elimination of quorum paralysis as the primary threat in the chain of systemic collapse.

Transition to Chapter 17

P15 establishes the constitutional mechanism for the adaptation of GovernanceEngine to changing conditions of participation. However, the republic functions not only through the political decisions of citizens — it functions through the infrastructure provided by operators who possess substantial resources. The structural threat recorded in T2 and T11 consists in the fact that large infrastructure operators accumulate advantage that is convertible into political dominance. P16 (Rockefeller Mode) establishes the constitutional prohibition of this conversion.

Chapter 17. Infrastructural Participation (P16 — Rockefeller Mode)

The chapter establishes the constitutional prohibition of the conversion of economic dominance in infrastructure into political supremacy. The question of whether control over infrastructure should be convertible into political power was posed to American society in 1911 in connection with the Standard Oil case: the court established that a monopoly over oil pipeline infrastructure produced an impermissible concentration of economic power and rendered a judgment of forced dissolution. Virtublic reproduces this answer in the digital space, embedding it constitutionally: economic participation in infrastructure is legitimate and necessary; political supremacy derivative of that participation is constitutionally prohibited. The state is not an exception to this rule — it is a particular case thereof, requiring special consideration by virtue of the structural vulnerability recorded in ΣA17.

17.1. Technical Formulation and Normative Justification Through the Standard Oil Analogy

P16 (Rockefeller Mode). The infrastructural operators of Virtublic, including state actors, participate in the economic governance of the republic through VIC⊥ proportional to their verified contribution and are constitutionally excluded from participation in political governance through EQU⊥; the conversion of VIC⊥ into EQU⊥ is prohibited in any form and under any circumstances.

The logical justification of P16 is constructed upon four premises. Volume I (theorem T2, temporal barrier) established that control over infrastructure produces a growing structural advantage through the mechanism of accumulated history: whoever controls infrastructure today possesses an advantage in controlling it tomorrow, inasmuch as their resource position grows with a positive second derivative after the point of no return. In the digital context this means that a large infrastructural operator does not merely service the network — it produces a self-reproducing advantage through staking income, auction advantages, and informational asymmetry regarding the state of the infrastructure. Volume II (theorem T11, PoS plutocracy) established that in a system without a constitutional constraint on concentration, operators with the largest stake accumulate a disproportionately large share of governance power through the same temporal mechanism. Volume I (axiom A6) established that the cycle of self-augmentation of digital capital has no internal saturation point: the absence of a constitutional constraint does not produce market equilibrium — it produces monopoly. Volume I (ΣA17) recorded that the state, as a structural purchaser of predictive data, is simultaneously a potential infrastructural operator, which creates a constitutionally impermissible conflation of roles: regulator, operator, and purchaser of politically significant data in a single subject.

From the conjunction of T2, T11, A6, and ΣA17 there follows a normative requirement: the constitution is obligated to contain a mechanism permitting large infrastructural operators to participate in technical decisions (inasmuch as they are precisely those who possess the information and resources for their execution) while simultaneously constitutionally excluding them from political decisions (inasmuch as otherwise their accumulated advantage produces de facto plutocracy). P16 is the operational resolution of this requirement through the separation of sovereignties, constitutionally grounded in P4.

The normative analogy of Standard Oil in the context of P16 is not rhetorical but structural. The 1911 antitrust dissolution decision regarding Standard Oil rested upon the following logic: infrastructural dominance (control over oil pipelines) was converted into market supremacy (control over prices and conditions of access), which produced a monopoly incompatible with the principles of market competition. Dissolution eliminated the conversion by separating infrastructural control from market power. P16 reproduces this logic at the constitutional level: infrastructural dominance (control over network nodes, computational resources, bandwidth) must not be converted into political supremacy (control over constitutional decisions). P16 eliminates the conversion mechanism through constitutional prohibition rather than through dissolution: the operator retains the full economic significance of their contribution, but forfeits the political consequences of that contribution.

The ratio legis of P16 is as follows: the separation of EQU⊥ and VIC⊥ (P4) is a constitutional principle; P16 is its operational application to the class of actors structurally most vulnerable to its violation — large infrastructural operators and state actors. Without P16, the constitutional principle of P4 would remain declaratory with respect to this class of actors: the conversion mechanism through the accumulation of VIC⊥ and subsequent pressure on EQU⊥ decisions would exist as a structural vulnerability. P16 closes this vulnerability through the explicit constitutional prohibition of conversion with automatic verification through the Formal Verification Protocol.

The transition to the following subchapter is determined by the necessity of establishing the specific institutional mechanisms through which P16 realizes the separation of infrastructural participation from political influence.

17.2. Institutional Realization: NodeFactory and the Separation of Decision Spaces

The institutional realization of P16 is organized through two interdependent mechanisms: NodeFactory as the operational institution of the delegation of infrastructural functions, and the full constitutional separation of EQU⊥ decision space and VIC⊥ decision space as an architectural principle verifiable through the Formal Verification Protocol.

NodeFactory. NodeFactory (the mechanism for the delegation of Virtublic's infrastructural functions to operators through a constitutionally defined protocol) is the institutional embodiment of P16 at the operational level. An operator participating in NodeFactory assumes the following constitutional obligations: the provision of verified resources in a volume corresponding to the slot acquired in SlotMarket v4.1 (P12); compliance with the technical protocols established by GovernanceEngine through VIC⊥-voting; periodic verification through Proof-of-Resource; the deposit and maintenance of a bond through CollectiveBond. In exchange for the performance of these obligations, the operator receives VIC⊥ emission proportional to their verified contribution and the right to participate in VIC⊥-votes on questions of technical governance. NodeFactory confers upon the operator no rights whatsoever in EQU⊥-space.

The architectural structure of NodeFactory instantiates the following constitutional property: the operator is a counterparty of the republic, not a member of it. The citizen is a member of the political community — their subjecthood is verified, their rights in EQU⊥-space are

inalienable and cannot be acquired through economic activity. The operator is a service provider to the republic — their participation is conditioned upon a contract, their rights in VIC⊥-space are derivative of the performance of that contract, and their participation terminates upon the cessation of performance. This distinction is constitutional rather than organizational: it instantiates the demarcation line of P4 as applied to the class of subjects most significant for the functioning of the infrastructure.

Separation of decision spaces. The constitutional separation of EQU⊥ decisions and VIC⊥ decisions is realized through GovernanceEngine as an executable protocol with formal verification through Coq. Each decision submitted to GovernanceEngine is classified under one of the following categories prior to the commencement of voting, and the classification is recorded on-chain. EQU⊥ decisions encompass: constitutional amendments to P10–P18, the activation of Axiom-Break, the ratification of state SovereigntyShield mandates, the admission of new citizens through Digital Census v2 upon the appeal of panel decisions, and any decisions affecting the rights and status of citizens as subjects. VIC⊥ decisions encompass: the parameters of SlotMarket v4.1, technical protocol specifications, the CollectiveBond amount, Proof-of-Resource parameters, the minimum technical device verification standard, and other questions of operational infrastructure.

The critically important constitutional property of this classification is as follows: an operator possessing significant VIC⊥ possesses substantial influence over the technical decisions that directly determine the conditions of functioning of the infrastructure in which they have invested resources. This is constitutionally legitimate: whoever bears the economic consequences of technical decisions must have commensurate influence over their adoption. Simultaneously, this operator possesses no influence whatsoever over the constitutional decisions that determine the nature of the political community. This is equally constitutionally necessary: whoever bears the economic consequences of technical decisions must not derive from that fact political power over those who bear the consequences of constitutional decisions.

The Concordance Rule (the concordance rule, introduced in P4) instantiates the constitutional mechanism for decisions encompassing both spaces simultaneously: for example, a change to the resource slot distribution algorithm is simultaneously a technical question (a VIC⊥ decision) and a political question affecting the structure of economic participation in the republic (requiring EQU⊥ ratification). The Concordance Rule establishes that decisions of this class require a qualified majority in both sovereignties, which precludes both the possibility of operators blocking political decisions through VIC⊥ veto and the possibility of citizens imposing operationally unenforceable technical decisions through EQU⊥ majority.

Case 2024–2025: after Ethereum's transition to proof-of-stake, large validator operators (Lido, Coinbase Institutional, Binance Staking) accumulated collectively more than 50% of staked ETH, which de facto granted them the right to block any changes to the consensus protocol requiring majority staker support. These operators were not democratically elected representatives of network users — their governance influence was derivative exclusively of economic position. NodeFactory with the constitutional EQU⊥/VIC⊥ separation eliminates

this pattern: the accumulation of VIC⊥ through staking confers a voice in technical decisions, but not in constitutional ones.

The transition to the following subchapter is determined by the necessity of establishing the special constitutional regime for the state as an infrastructural operator — a case in which the structural vulnerability of ΣA17 generates risks not covered by the general P16 regime.

17.3. The State as a Special Case of Rockefeller Mode

The state as an infrastructural operator is a constitutionally singular case of P16 by virtue of two structural properties that distinguish it from any private operator. The first: the state is simultaneously a potential operator, a potential regulator, and a structural purchaser of the predictive data of citizens (ΣA17, Volume I) — a conflation of roles not reproduced by any private actor. The second: the state possesses coercive force unavailable to private operators, which renders it a structural advantage in any competitive process and creates the risk of the capture of infrastructural functions without market competition. Both properties require a constitutional response specific to the state actor.

The state-operator in the NodeFactory system. A state actor is entitled to acquire infrastructural slots through SlotMarket v4.1 on the same terms as any private operator: competitive auction, Proof-of-Resource, CollectiveBond. The state-operator receives VIC⊥ proportional to its verified contribution and is entitled to participate in VIC⊥-votes on technical questions. The state-operator does not receive EQU⊥ under any circumstances — including situations in which the state is the sole or dominant infrastructural operator in a given geographic jurisdiction.

The constitutional significance of the latter provision is as follows. In a number of jurisdictions the state is a structurally unavoidable infrastructural operator by virtue of the absence of a sufficient number of private operators with the necessary resources. The constitutional temptation in this situation consists in compensating the state for its infrastructural contribution through an expansion of its political rights. P16 constitutionally prohibits this compensation: the state-operator is rewarded through VIC⊥ and the economic incentives of NodeFactory — and exclusively through these. The expansion of EQU⊥ rights of a state actor in exchange for an infrastructural contribution is a constitutional violation, automatically blocked by the Formal Verification Protocol.

Separation of the roles of the state actor. Within the Virtublic system, the state simultaneously exists in three constitutional roles, each of which is governed by specific norms. As regulator of the external digital space, the state is subject to SovereigntyShield (P17): its access to citizen data is limited by a constitutional mandate. As an infrastructural operator within Virtublic, the state is subject to P16 and NodeFactory: its participation is confined to VIC⊥-space. As an external political actor, the state interacts with Virtublic through citizens who are simultaneously bearers of EQU⊥ sovereignty: the state influences Virtublic only mediately — through the positions of citizens, not through direct participation in GovernanceEngine.

This three-level separation instantiates the following constitutional principle: the state is a legitimate actor in each of the three roles upon compliance with the constitutional constraints specific to each role. A violation of the separation — for example, the use of the infrastructural operator role to obtain access to citizen data in circumvention of SovereigntyShield — is qualified as a sovereignty conflict in P18 with automatic activation of the State Audit Protocol.

The constitutional prohibition of role conflation. GovernanceEngine through the Formal Verification Protocol instantiates the following constitutional constraint: no actor that has received a state SovereigntyShield mandate in any form may simultaneously participate in VIC⊥-votes on technical questions affecting the same data to which mandated access has been granted. This constraint eliminates informational asymmetry (T8, Volume I) at the level of state participation in infrastructural governance: the state cannot simultaneously know the state of the infrastructure through mandated access and employ that knowledge to form advantages in VIC⊥-votes.

Case 2023–2026: in several European jurisdictions, state digital agencies began participating in blockchain infrastructural projects simultaneously as node operators and as regulators of the corresponding protocols — creating a structure in which regulatory decisions were made by the same institutions that received economic income from the regulated infrastructure. The three-level role separation of P16 eliminates this pattern constitutionally: the operator role and the regulator role cannot be conflated in a single actor — not because the state is acting in bad faith, but because the architectural conflation is structurally impermissible independent of the good faith of specific actors.

The transition to the following subchapter is determined by the necessity of establishing the theoretical connections of P16 with T2 and T11, confirming the architectural sufficiency of the infrastructural participation mechanism.

17.4. Protection Against Theorems: T2, T11

P16 closes theorems T2 and T11 in their application to infrastructural dominance and its conversion into political power.

Theorem T2 (temporal barrier, Volume I) established that in a system with accumulative logic the resource gap between early and late participants is structurally ineliminable by market means after the point of no return T_N. As applied to infrastructural operators: in a system without P16, a large early operator accumulates not only VIC⊥ (which is closed by P12) but also a structural advantage in the domain of political influence through the conversion of economic dominance. This is the second iteration of T2 at the level of political power: the first iteration (the accumulation of predictive capital) is closed by P4; the second iteration (the accumulation of infrastructural political influence) is closed by P16.

P16 closes T2 in this application through the constitutional prohibition of the conversion mechanism itself. In distinction from P12, which closes T2 through the binding of emission to current contribution, P16 closes T2 through the prohibition of the use of accumulated economic advantage in political space: even if an operator retains infrastructural dominance

on account of an early position, this dominance produces no political consequences. Formally: T2_political = f(VIC⊥_accumulated) → EQU⊥_influence; P16 → EQU⊥_influence = 0 for any operator at any volume of VIC⊥. This closure is absolute in the sense of P7: it cannot be adapted by GovernanceEngine through ordinary voting.

Theorem T11 (PoS plutocracy, Volume II) established that in any PoS system without a constitutional constraint on concentration, governance power concentrates among early participants through a compound interest mechanism. T11 as applied to P16 produces the following: in a system without the constitutional EQU⊥/VIC⊥ separation, the accumulated stake of an operator is converted into governance influence through the same temporal mechanism — with the distinction that the object of concentration becomes not only economic but also political power. Ethereum after its transition to PoS is an empirical verification of T11 in this application: by 2024 the five largest validator operators had collectively accumulated more than 60% of staked ETH, which de facto granted them veto power over questions concerning changes to the consensus protocol.

P16 closes T11 through the same separation that P4 establishes as a constitutional principle: the governance influence of operators is confined to VIC⊥-space, in which their dominance is economically legitimate. The political space in which T11 produces its pathology (the concentration of political power among early stakers) is isolated from the economic through the constitutionally inviolable demarcation line of P4. It therefore follows that T11 reproduces itself only in VIC⊥-space — where P12 and P16 jointly constrain its consequences to technical decisions that do not affect the constitutional foundations.

The precise boundary of T11's closure through P16 must be established. P16 does not eliminate the concentration of VIC⊥ among large operators — that elimination is the task of P12. P16 eliminates the constitutional significance of this concentration as applied to political governance: the concentration of VIC⊥ is a fact of the infrastructural economy of Virtublic, but it is not a fact of its political structure. These two assertions are compatible only in the presence of a constitutionally verifiable demarcation line between EQU⊥ and VIC⊥ — which P16 secures as the operational mechanism of P4.

Chapter Summary

P16 (Rockefeller Mode) establishes the constitutional prohibition of the conversion of infrastructural dominance into political supremacy through the full separation of EQU⊥-space for citizens and VIC⊥-space for operators. NodeFactory instantiates the delegation of infrastructural functions through a constitutionally defined protocol that confers upon operators economic recognition and technical participation without political power. The state as an infrastructural operator is subject to the same rules, with the addition of a special constitutional prohibition on role conflation that eliminates the structural vulnerability of ΣA17. Theorems T2 and T11 are closed through the elimination of the conversion mechanism: accumulated infrastructural advantage produces no political consequences in the presence of a constitutionally verifiable demarcation line.

Transition to Chapter 18

P16 establishes the constitutional prohibition of the conversion of infrastructural dominance into political power for private operators and for the state in its operator role. However, the state is not only a potential infrastructure operator — it is a structural purchaser of the predictive data of citizens (ΣA17), which creates a threat exceeding the bounds of infrastructural participation. N5 formulated the normative prohibition: the state may not employ technology against those whose sovereignty is the source of its existence. P17 (SovereigntyShield) instantiates this prohibition as an enforceable constitutional norm with automatic blocking of violations.

Chapter 18. State neutrality (P17 — SovereigntyShield)

This chapter establishes P17 as the operational embodiment of normative principle N5 in an executable constitutional norm with automatic blocking of violations. The state is a legitimate actor within the architecture of Virtublic on the condition that it acts on behalf of citizens and with their explicit constitutional mandate. A state that acquires predictive data on citizens without a mandate ceases to act on behalf of the people — and thereby violates the foundation of P0. P17 is not an anti-state norm: it is a norm establishing the conditions under which state action is constitutionally legitimate.

18.1. Technical definition of P17 and normative justification

P17 (SovereigntyShield). State subjects may not acquire predictive data on citizens of Virtublic, influence the algorithmic architecture of the system, or obtain access to aggregated profiles without an explicit EQU⊥-mandate with a threshold of 75% and independent audit by CivicJuryEngine; all state requests are recorded on-chain through the State Audit Protocol, and unratified requests are automatically rejected.

The logical justification of P17 is constructed upon the following chain. Volume I (axiom ΣA17) established the structural conflict of interest: the state is simultaneously a potential regulator of the predictive market and the largest purchaser of predictive data, by virtue of which it is structurally incapable of serving as a neutral arbiter between the interests of citizens and the interests of platforms. Volume I (regularity 12) established that regulation from within the system is structurally unreliable: a regulator that is itself a participant in prediction relations has a systematic incentive toward the selective application of norms. Volume I (theorem T8) established that the gap between de facto predictive power and de jure political sovereignty does not self-correct: if the state accumulates predictive power without a constitutional mandate, this gap is reproduced and deepened. Normative principle N5 formalized the inference from these three premises as a prohibition: the state may not be a purchaser of predictions without an explicit constitutional mandate. P17 is the operational embodiment of N5: not a declaration, but an executable protocol with automatic blocking.

The ratio legis of P17 contains the following essential delineation between two kinds of state action. The first — a state acting as the authorized agent of the people through a constitutionally ratified mandate — is legitimate and permissible. The second — a state acting as an autonomous actor accumulating predictive power without a popular mandate —

is a constitutional violation of the sovereignty type, referred to the Conflict-Resolution Core (P18). This delineation is not a normative judgment regarding the nature of the state — it is a structural consequence of P0: if the sole source of legitimacy is the people, the state is a legitimate actor only when it acts with an explicit popular mandate.

The transition to the following subchapter is determined by the necessity of establishing the specific operational mechanism through which P17 is realized as a self-executing norm rather than as a declarative prohibition.

18.2. Institutional realization: State Audit Protocol

The State Audit Protocol is the central operational institution of P17. Each request by a state subject for access to data on citizens of Virtublic, for influence over the algorithmic architecture of the system, or for the receipt of aggregated profiles is registered as an on-chain transaction with the cryptographic signature of the state subject. Registration is mandatory and precedes any actual access: access without prior on-chain registration is technically impossible, inasmuch as GovernanceEngine verifies the existence of a current ratification before granting any access.

Unratified requests are rejected automatically — without a human decision, without the possibility of appeal to the technical operators of the system, without administrative discretion. This mechanism is of fundamental importance: automatic rejection eliminates the possibility of informal pressure by state subjects, who possess institutional coercive resources, upon the operators of the system. In traditional regulatory systems, it is precisely this vulnerability that is most exploited: the state exerts pressure not through official requests but through informal channels of interaction with technical specialists. The State Audit Protocol eliminates this channel through the technical impossibility of granting access in circumvention of ratification.

Attempts to circumvent the State Audit Protocol through technical proxies are identified through anomaly detection — automated analysis of request patterns that identifies statistically atypical sequences of interactions characteristic of indirect access through intermediary structures — and are referred to P18 for classification as a constitutional violation of the sovereignty type. Proxy identification is grounded in the following principle: if several independent subjects exhibit a pattern of requests that collectively encompasses data to which access for each of them individually is ratified, but the aggregate effect of which is equivalent to unratified state access, GovernanceEngine flags this pattern for referral to P18. This mechanism closes the most sophisticated circumvention attack vector, whereby the state uses multiple affiliated private structures to aggregate data without an official state request.

Case NSA PRISM (disclosed 2013, consequences 2023–2026 in the context of the EU Data Governance Act) illustrates the structural defect that the State Audit Protocol closes: state access to platform data was realized through informal arrangements with technical specialists that required no official requests and were not recorded in public registries. Retroactive disclosure through FOIA requests was produced years after the actual access, which precluded any preventive oversight. The State Audit Protocol eliminates this pattern

through a single constitutional requirement: access without on-chain ratification is technically impossible.

The transition to the following subchapter is determined by the necessity of establishing the procedure through which the state obtains a legitimate ratified mandate for access when there is a constitutionally grounded necessity.

18.3. Procedure for ratification of a state mandate

The procedure for ratification of a state mandate is a constitutionally necessary element of P17: a system establishing an absolute prohibition without a mechanism for legitimate exception yields a nonviable architecture. Volume I (axiom A12) established that consent is free only in the presence of real alternatives: a constitutional prohibition of state access must contain a legitimate path for its overcoming in cases where the body of citizens considers state access justified. The ratification procedure is this legitimate path.

The procedure comprises four sequential stages. The first — submission by the state subject of an official request through the State Audit Protocol specifying four mandatory elements: purpose (the specific public function that the state cannot discharge without the requested access), scope (the minimum necessary categories and volume of data, verified by the principle of least access), duration (a specific period of mandate validity without the right of automatic renewal), and oversight mechanism (specific institutional mechanisms for monitoring the execution of the mandate within its period of validity). A request not containing at least one of the four elements is automatically rejected at the registration stage through the Formal Verification Protocol.

The second stage — independent audit by CivicJuryEngine: a panel of citizens selected through the VRF (Verifiable Random Function) with the exclusion of persons affiliated with state structures verifies the conformity of the request with normative principles N1–N7. The audit is not a political evaluation of the expediency of state access but a constitutional verification: whether the requested access causes harm to the rights of the subjecthood of citizens as secured in N1–N7. If the panel classifies the request as violating at least one of the seven principles, the request is rejected before the EQU⊥-vote — citizens do not vote on a request that is constitutionally incompatible with their rights.

The third stage — EQU⊥-voting with a 75% threshold: a request that has passed the CivicJuryEngine audit is submitted for a vote by the body of citizens. The 75% threshold is constitutionally significant: it is structurally equivalent to the threshold for amendment of the constitutional core P1–P7 through the Axiom-Break Condition, which instantiates the following logic — state access to citizens' predictive data is so substantial a restriction of their constitutional rights that it requires the same level of popular consensus as the amendment of the foundational principles of the republic.

The fourth stage — issuance of the mandate: upon attainment of 75% EQU⊥, GovernanceEngine issues the state subject a mandate with cryptographically fixed parameters (purpose, scope, duration, oversight mechanism). The mandate is not renewed automatically: upon expiration, state access terminates by protocol, and the state subject

shall submit a new request through the full ratification procedure in order to obtain renewal. This norm closes the pattern of normalization of state access through the gradual expansion of a temporary mandate — historically the most prevalent mechanism for the conversion of exceptions into permanent practice.

The transition to the following subchapter is determined by the necessity of establishing the absolute prohibitions that exclude certain categories of state access from the ratification procedure itself.

18.4. Prohibited practices

Four categories of practices are constitutionally prohibited regardless of the outcome of EQU⊥-voting and the conclusion of CivicJuryEngine: their prohibition is absolute and may not be overcome through the ratification procedure.

The first category — bulk collection without individual suspicion (mass collection of data on all citizens or broad categories of citizens without specific suspicion in relation to identified subjects). The logical basis for the prohibition is constructed upon the following chain: Volume I (axiom A4) established that crystallized data constitute an irreversible fact of predictive history; bulk collection produces an irreversible predictive history of the entire body of citizens in favor of the state, which is constitutionally incompatible with N1 (the right not to be predicted without explicit consent) as applied to each citizen who has not given individual consent. This prohibition is absolute: even upon a 75% EQU⊥-mandate, bulk collection may not be ratified, inasmuch as the mandate of the majority may not nullify the individual right of a minority of citizens to N1.

The second category — transfer of data to third states without separate ratification. A state that has obtained a mandate for access to data of citizens of Virtublic for a specific domestic function may not transfer such data to foreign states, international organizations, or affiliated foreign structures without undergoing a separate full ratification procedure specifying the foreign recipient, the purpose of the transfer, and the legal regime of data protection in the recipient's jurisdiction. This prohibition instantiates the extraterritorial principle of P17 (subchapter 18.5): citizens' data follow the constitution rather than the territory, by virtue of which their transfer to a jurisdiction with a different constitutional regime requires an autonomous popular mandate.

The third category — political targeting (the use of citizens' data to identify, monitor, or influence citizens on the basis of their political position, participation in constitutional procedures, or affiliation with political movements). This prohibition closes the most direct mechanism through which the state could use predictive data to suppress political participation — which is structurally incompatible with P0, P1, and N1 simultaneously.

The fourth category — access to cognitive health data in any form. The cognitive health score (the aggregate indicator of a citizen's cognitive health, verified through Proof-of-Offline data) is a constitutionally protected category of data not subject to state access under any circumstances. The logical basis: Volume I (normative principle N7) established the citizen's right to cognitive autonomy as inalienable; state access to data on the cognitive state of a

citizen is a direct violation of this right, inasmuch as it creates an asymmetry of cognitive information in favor of the state that is structurally compatible with the manipulation of political participation through the targeting of cognitively vulnerable citizens.

These four prohibitions are encoded in the Coq specification of P17 as absolute constraints: any state request containing at least one of the prohibited elements is rejected by the Formal Verification Protocol automatically at the registration stage, before it is referred to CivicJuryEngine or submitted to EQU⊥-voting.

The transition to the following subchapter is determined by the necessity of establishing the position of Virtublic in international digital law through the extraterritorial principle, which instantiates the protection of citizens regardless of their physical location.

18.5. Position of Virtublic in international digital law: the extraterritorial principle

The traditional model of digital law is territorial: a citizen's data fall under the jurisdiction of the state on whose territory they are physically stored or through which they are transmitted. This model is structurally incompatible with the constitutional protection of P17 on the following ground. If the data of a citizen of Virtublic, physically stored on servers in jurisdiction X, fall under the jurisdiction of X, then state X may obtain access to those data through its domestic legal mechanisms — regardless of the constitutional norms of Virtublic. The territorial model de facto neutralizes P17 through jurisdictional arbitrage.

The extraterritorial principle of P17 establishes: the data of citizens of Virtublic follow the constitution rather than the territory. The constitutional protection regime of P17 applies to citizens' data regardless of the jurisdiction in which they are physically stored, through which networks they are transmitted, and under whose territorial jurisdiction they formally fall. Any state that obtains data on citizens of Virtublic through domestic legal mechanisms without undergoing the ratification procedure of P17 violates the constitutional order of Virtublic — regardless of whether it is the state of citizenship of those citizens, the state of data storage, or any other state.

This principle is not without precedent in international law: the GDPR (General Data Protection Regulation) establishes extraterritorial application as applied to the data of EU citizens regardless of the location of the processing entity. However, P17 goes significantly further than the GDPR on two parameters. The first: the GDPR establishes norms for data processing, whereas P17 establishes a constitutional prohibition of state access without a popular mandate — a category without a direct equivalent in the GDPR. The second: the GDPR is a norm whose application depends on state regulators vulnerable to pressure, whereas P17 is a self-executing norm whose realization is carried out through protocol without a human arbiter.

The practical consequence of the extraterritorial principle is as follows. Storage of data of citizens of Virtublic may occur in any jurisdiction — the applied technical standards (encryption, zk-proof, key splitting) ensure that physical access to servers does not yield decrypted data without the cryptographic keys controlled by the citizen. A state that seizes a server in its jurisdiction obtains encrypted data not decryptable without the citizen's keys,

which renders territorial seizure operationally meaningless. This technical mechanism is the operational embodiment of the extraterritorial principle: the constitution follows the citizen rather than the physical medium of his data.

The transition to the following subchapter is determined by the necessity of recording the connection between P17 and specific theorems and axioms of Volumes I–II.

18.6. Defense against theorems: ΣA17, T8, T16

P17 closes three analytical units from the preceding volumes, each of which recorded a defect not eliminable without a self-executing constitutional norm of state neutrality.

Axiom ΣA17 (state capture, Volume I) recorded the structural conflict of interest of the state as simultaneously a potential regulator and a purchaser of predictive data. P17 does not eliminate this conflict — ΣA17 proved its structural ineliminability — but constitutionally neutralizes its consequences through the separation of functions. The state as regulator operates within the constitutional norms P0–P18, having no access to predictive data without a mandate. The state as purchaser of data operates exclusively upon the existence of a 75% EQU⊥-mandate. These two functions may not be exercised simultaneously within the framework of a single state subject: the State Audit Protocol requires the identification of the state subject in both roles, which renders their combination a constitutionally classifiable violation.

Theorem T8 (the sovereignty gap, Volume I) established that de facto predictive power and de jure political sovereignty move in opposite directions in the absence of an executable constraint. As applied to the state: if the state accumulates predictive power without constitutional constraint, the gap between its de facto informational superiority and its de jure accountability to the people becomes insurmountable. P17 closes T8 through the State Audit Protocol: the predictive power of the state is constrained by a constitutionally ratified mandate, which eliminates the possibility of its autonomous accumulation outside popular oversight. De facto and de jure coincide: what is not ratified is inaccessible; what is ratified is recorded on-chain and verifiable by any citizen.

Theorem T16 (absorption of critique, Volume II) established that critique without an institutional alternative becomes a stabilizer of the system. Critique of state surveillance without an executable norm prohibiting it reproduces this pattern: books, reports, parliamentary investigations, and journalistic exposés are systematically absorbed by the state as proof of "openness to critique" without alteration of the practice. P17 closes T16 as applied to state surveillance: SovereigntyShield is not a critique of state access to data — it is its protocol-level exclusion. The state cannot cite P17 as evidence of "constitutional accountability" while continuing the practice of unsanctioned access: P17 is not discussed — it is executed or violated, and each violation is recorded on-chain.

The transition to the following subchapter is determined by the necessity of establishing the operational defense of P17 against the specific attack vector of state capture through legitimate procedures.

18.7. Defense against the attack vector: state capture

State capture in the context of P17 denotes an attempt to de facto overcome SovereigntyShield through mechanisms that formally do not violate its protocol-level constraints. This attack vector is fundamentally different in nature from the technical attack vectors against P13 or P6: it employs legitimate constitutional procedures as an instrument rather than circumventing them through technical vulnerabilities.

Three most probable scenarios of state capture and their architectural closure are defined as follows. The first scenario — pseudo-crisis with the aim of activating the Axiom-Break Condition (P8) to reduce the state mandate barrier: the state artificially constitutes conditions of apathy (informational pressure, technical participation barriers), initiates recognition of chronic apathy, and then through the Constitutional Convention secures a reduction of the threshold from 75% to 51%. This scenario is closed through three independent mechanisms. P8 requires the simultaneous threefold satisfaction of conditions, precluding short-term manipulation. Convention proposals affecting state neutrality require evaluation by an expanded panel of 99 citizens without state affiliation (Chapter 9, subchapter 9.6). The Formal Verification Protocol blocks proposals that violate the P0 invariant "the state is not a purchaser of predictions without a mandate," regardless of the outcome of the Convention.

The second scenario — gradual normalization of mandates through successive expansions: the state obtains an initial limited mandate through 75% EQU⊥, executes it within its parameters, then upon renewal requests a minor expansion of scope or duration, and through a series of such renewals de facto normalizes large-scale access. The State Audit Protocol closes this scenario through the following mechanism: each renewal is a new full ratification procedure without continuity from the preceding mandate; GovernanceEngine, when evaluating a renewal request, takes account of the aggregate scope of access across all preceding mandates of the same state subject over the preceding 36 months, which identifies the normalization pattern through accumulation.

The third scenario — use of affiliated private subjects as proxies: the state finances or organizationally controls private structures that obtain access mandates through standard procedures, and then aggregates data through affiliated subjects. This scenario is the most technically sophisticated and is closed through the following mechanism: GovernanceEngine, through anomaly detection, identifies patterns of requests from multiple subjects whose combined coverage statistically corresponds to state bulk collection and refers this pattern to P18 for classification as a sovereignty conflict. The identification criterion is: if the combined data coverage of requests from affiliated subjects exceeds the threshold equivalent to bulk collection, in the presence of verifiable ties between these subjects and the state subject, this aggregate is classified as indirect state capture.

Chapter Summary

P17 establishes SovereigntyShield as the operational embodiment of N5 — a self-executing constitutional norm of state neutrality with automatic blocking of violations through the State Audit Protocol. The four-stage ratification procedure for a state mandate (registration → CivicJuryEngine → 75% EQU⊥ → limited mandate) establishes the legitimate path for state

access while preserving absolute prohibitions on bulk collection, transfer to third states, political targeting, and access to cognitive health data. The extraterritorial principle ensures that constitutional protection follows the citizen rather than the territory. Axiom ΣA17, theorems T8 and T16 are closed through the separation of state functions, the State Audit Protocol, and the transformation of SovereigntyShield from a critiqued into an executed norm. Three scenarios of state capture are closed through independent architectural mechanisms.

Transition to Chapter 19

P17 exhausts the constitutional protection against the state capture attack vector. However, the constitutional architecture encounters internal conflicts not only of external origin: principles P0–P18 may yield interpretive collisions, technical inconsistencies, or fundamental conflicts of values not provided for by any of the existing mechanisms. Volume II (theorem T14) proved that code without a normative axiom optimizes efficiency at the expense of subjecthood in all internal conflicts. P18 (Conflict-Resolution Core) establishes the mechanism for the resolution of these conflicts through a formally verified three-stage procedure with constitutional responsibility at each stage.

Chapter 19. Autonomous Conflict Resolution (P18 — Conflict-Resolution Core)

The chapter establishes P18 as the constitutionally necessary institution without which all preceding principles remain a system of rules without a mechanism for their application. Interpretive conflict is an ineliminable property of any normative system: rules are formulated under conditions of incomplete knowledge of future situations, by virtue of which their application to specific cases inevitably produces divergences. The question that P18 answers is not the question of whether conflicts will arise — they will arise with probability approaching unity — but of who resolves them and through what procedure. In a system without P18, the answer to this question invariably produces the same pathological outcome: a privileged interpreter whose right to interpret is itself a politically significant resource.

19.1. Technical Formulation and Normative Justification

P18 (Conflict-Resolution Core). Conflicts concerning the interpretation of the constitutional rules of Virtublic are resolved through a three-stage autonomous procedure — automatic proof search, formal verification of intent, referendum — without the right of any agent to unilaterally determine the outcome of the conflict or to block the procedure for its resolution.

The logical justification of P18 is constructed upon five premises. Volume II (theorem T14, code is law without NA0) established that a system in which code is the sole interpreter of itself produces the destruction of subjecthood as a structural byproduct of optimization: code contains no mechanism for distinguishing a technical error from a value choice, by virtue of which optimization according to formal parameters inevitably violates unformalized normative constraints. From T14 it follows that P18 cannot be purely automatic — it must

contain a level at which human judgment is constitutionally necessary. Volume I (normative principle NA0, the inalienability of subjecthood) established the ontological priority of subjecthood over any formal mechanism: a mechanism whose results systematically violate NA0 is constitutionally void independent of its formal correctness. Volume I (pattern 11, the marginalization of informal action) established that in any system with a dominant interpretation mechanism, informal interpretations are systematically marginalized — not through prohibition, but through the architectural reduction of their visibility and efficacy. As applied to P18: a system in which one of the parties to a conflict possesses a privileged right of interpretation reproduces pattern 11 at the level of constitutional law. Volume II (theorem T12, governance without legitimacy) established that decisions made without a legitimate procedure possess no binding force independent of their content. As applied to P18: the resolution of a conflict without a constitutionally established procedure is de facto a refusal to resolve it — the parties do not accept a decision made without a legitimate basis. Volume I (theorem T8, the sovereignty gap) established that de jure and de facto sovereignty diverge in the absence of operational mechanisms securing the application of constitutional norms to specific situations. P18 is the mechanism that directly prevents this divergence: without it, the constitutional principles P0–P17 remain de jure norms without guaranteed de facto operational application.

The normative justification of P18 is supplemented by the following. The republican tradition — from Cicero through Montesquieu to Madison — invariably established the necessity of an independent judicial body as the condition of constitutional functioning. The role of P18 in Virtublic is the functional equivalent of judicial power: it resolves interpretive conflicts, applies norms to specific cases, and establishes precedents through the on-chain archive. Its principled distinction from a traditional judicial body consists in its autonomy: P18 is not a body in the sense of a permanently functioning institution with appointed members — it is a protocol, activated upon the arising of a conflict and functioning without a privileged interpreter.

The ratio legis of P18 is as follows: a constitution is a system of rules intended for the resolution of conflicts, including conflicts concerning the nature of the rules themselves. A system containing no procedure for the resolution of conflicts concerning its own norms is incomplete in the logical sense: it is capable of functioning only under conditions of complete agreement regarding the interpretation of all norms — a condition that is never satisfied in real political systems. P18 closes this logical lacuna of the constitution through a procedure whose autonomy is verifiable and whose results are binding.

The transition to the following subchapter is determined by the necessity of establishing the specific three-stage conflict resolution procedure, securing the autonomy, verifiability, and binding force of the results.

19.2. The Three-Stage Procedure: Automatic Proof, Verification of Intent, Referendum

The three-stage procedure of P18 is organized according to the principle of ascending legitimacy: each subsequent stage is activated only upon the exhaustion of the possibilities of the preceding one and involves a broader circle of participants, by virtue of which a decision made at a higher stage possesses greater political weight at lower procedural

efficiency. The architectural logic is as follows: the majority of conflicts are technical and resolvable automatically; a minority are semantic and require the interpretation of intent; an insignificant number are fundamental and require a popular decision. The three-stage structure secures the proportionality of the procedure to the nature of the conflict.

Stage 1: automatic proof search through Coq tactics. Upon the arising of a conflict, GovernanceEngine automatically initiates stage 1 through Coq tactics (formal proof tactics in the Coq system — a proof assistant employed for the verification of mathematical assertions and program specifications). At this stage P18 submits the following query to the Formal Verification Protocol: does there exist a formally verifiable proof that one of the interpretations advanced by the conflicting parties is correct from the standpoint of the formal specification of the constitutional rules encoded in Coq?

Stage 1 is applicable and sufficient for the following class of conflicts: disagreements concerning whether a specific action violates a formally specified rule, on condition that the rule itself is unambiguously encoded and does not admit of semantic interpretation. Examples include: whether a specific transaction violates the ConstitutionalSanction_Resource constraint; whether a specific proposal is admissible for consideration according to the formal criteria of GovernanceEngine; whether a specific SlotMarket configuration exceeds the constitutionally established concentration limits. For this class of conflicts the Formal Verification Protocol produces an unambiguous result — a proof of correctness or a proof of violation — without the participation of human judgment.

Upon receiving an unambiguous result from stage 1, GovernanceEngine records it on-chain as a constitutionally binding decision. Neither party to the conflict is entitled to contest a stage 1 decision through appeal to stage 2 or 3, on condition that the formal proof is verifiable and reproducible by any independent network node. If neither interpretation can be formally proved or disproved, the Formal Verification Protocol returns a status of undecidable, which automatically activates stage 2.

Stage 2: formal verification of intent through historical voting patterns and the on-chain Convention archive. At stage 2, P18 turns to two sources of constitutional interpretation: the historical GovernanceEngine voting patterns, which record how the citizen body has interpreted analogous norms in preceding decisions, and the on-chain archive of the Constitutional Convention, containing the working materials, intermediate proposals, and final texts of all adopted constitutional core amendments.

Formal verification of intent (the verification of constitutional intent — the procedure for establishing the meaning of a norm through the analysis of its origin and historical application) functions as follows. For each conflicting interpretation, P18 submits a query to the on-chain Convention archive: do the Convention proceedings contain materials from which it follows that the creators of the norm intended to produce precisely the result that this interpretation asserts? Simultaneously P18 submits a query to the historical voting patterns: how has GovernanceEngine classified analogous situations in preceding decisions? If one of the interpretations is consistently concordant with both sources while the other contradicts them, P18 records the first interpretation as constitutionally verified.

Stage 2 is applicable and sufficient for semantic conflicts: disagreements concerning the meaning of a formally ambiguous norm in the presence of sufficient historical context for its interpretation. In the absence of sufficient historical context, or in the presence of contradictory precedents, stage 2 returns a status of semantically_undecidable, which automatically activates stage 3.

Stage 3: referendum (51% EQU⊥). At stage 3 the conflict is transmitted directly to the citizen body in the form of a referendum (a referendum — a direct vote on a specific question through the EQU⊥ mechanism of GovernanceEngine). A stage 3 referendum requires 51% EQU⊥ for a decision — the standard threshold for political decisions, not the elevated threshold for constitutional amendments, inasmuch as the referendum does not amend the constitutional text but establishes a constitutionally binding interpretation of the specific case.

The stage 3 referendum decision is constitutionally binding and is recorded on-chain as a constitutional precedent for future analogous conflicts. Upon the subsequent arising of a conflict of the same category, P18 consults this precedent at stage 2 before transmitting the matter to stage 3 — which secures the accumulation of constitutional jurisprudence and the gradual reduction in the number of conflicts requiring direct popular resolution.

If the stage 3 referendum on a fundamental conflict (a divergence in values) discloses that the disagreement cannot be resolved within the framework of the existing constitution, P18 records the conflict as a potential Axiom-Break — a signal taken into account by the Constitutional Health Protocol in assessing the systemic health of the republic in accordance with P8.

The transition to the following subchapter is determined by the necessity of establishing the classification of conflict types, which determines which stage of the procedure is applicable and sufficient for each type.

19.3. Four Types of Conflicts and Their Constitutional Qualification

The classification of conflicts by type is constitutionally material, inasmuch as it determines which stage of P18 is primary: an incorrect classification produces either excess (a technical conflict transmitted to a referendum unnecessarily burdens citizens) or insufficiency (a fundamental conflict resolved through automatic proof does not possess popular legitimacy). GovernanceEngine classifies the conflict on the basis of its formal description prior to the commencement of the procedure; the classification is recorded on-chain and may be contested through stage 2 if one of the parties considers it erroneous.

A **technical conflict** (divergent interpretations of a protocol with an unambiguously formally specified rule) is resolved through stage 1 without the activation of stages 2 and 3. Technical conflicts arise in the following typical situations: divergence in the interpretation of the result of Proof-of-Resource (two verifiers obtain different results for the same challenge); divergence in the classification of a specific GovernanceEngine proposal as pertaining to EQU⊥ or VIC⊥ space; divergence in the calculation of VIC⊥ emission for an operator given the parameters of SlotMarket. All such conflicts are resolvable through the Formal

Verification Protocol without semantic interpretation: either a formal proof of the correctness of one of the results exists, or a formal proof of a protocol error requiring correction through ordinary GovernanceEngine procedures exists.

A **semantic conflict** (divergent interpretations of the meaning of a constitutional rule in the presence of sufficient historical context) is resolved through stage 2 with the possibility of escalation to stage 3. Semantic conflicts arise in the following typical situations: divergence in the interpretation of the concept of "organic coalition" in the context of the Coalition Verification Protocol; divergence in the interpretation of the boundaries of a state SovereigntyShield mandate as applied to a specific request; divergence in the qualification of a specific interface element as a dark pattern in the context of Republic Engagement Auditor. These conflicts have no unambiguous formal answer, but possess a constitutional context of origin and historical application sufficient for the establishment of a verifiable interpretation.

Case 2024: in Arbitrum DAO a semantic conflict arose concerning the interpretation of the concept of "material protocol change" — a category requiring an elevated quorum. The absence of a mechanism analogous to stage 2 of P18 produced paralysis: neither party recognized the other's classification, and the conflict was resolved through informal negotiations among large token holders — which is a direct reproduction of pattern 11 (T16) at the level of interpretive law. Stage 2 of P18 eliminates this pattern through a verifiable appeal to constitutional intent, independent of the market weight of the conflicting parties.

A **fundamental conflict** (a divergence in values not resolvable through the interpretation of existing norms) is resolved through stage 3 (referendum) with the possibility of signaling a potential Axiom-Break. Fundamental conflicts arise in the following typical situations: divergence in the assessment of whether a specific technological shift (the emergence of a new form of biometrics, a new AI architecture) constitutes a basis for revising the parameters of Digital Census v2; divergence in the assessment of whether a new category of subjects should receive constitutional status analogous to citizenship; divergence in the assessment of whether the consequences of a specific GovernanceEngine decision are compatible with NA0. These conflicts are not resolvable through the interpretation of existing norms — they require a normative decision made through the mechanism of popular sovereignty.

A **sovereignty conflict** (a violation of SovereigntyShield by a state actor or an attempt to circumvent it) is processed by P18 through a special procedure distinct from the three-stage one. Upon receipt of a signal of a potential violation of the State Audit Protocol — an attempt by a state actor to obtain access to the predictive data of citizens in circumvention of a constitutional mandate, the use of a technical proxy to circumvent SovereigntyShield, or the exceeding of the terms of an issued mandate — P18 automatically activates the following sequence: first, the immediate on-chain recording of the event with notification to all network nodes; second, the automatic blocking of the request by GovernanceEngine pending the completion of qualification; third, formal verification of the fact of violation through stage 1 (does there exist a cryptographically verifiable proof of unauthorized access?); upon a positive stage 1 result — the automatic activation of the State Audit Protocol with qualification of the violation according to the categories established in P17; upon a negative stage 1 result — transmission to stage 2 for intent verification.

The institutional significance of the special regime for sovereignty conflicts is as follows. The state is an actor possessing coercive force (ΣA17), which renders its SovereigntyShield violations structurally more dangerous than those of private actors: the state possesses extra-constitutional instruments of pressure upon citizens and operators that cannot be neutralized exclusively through constitutional mechanisms. Public immediate on-chain recording of the violation is the constitutional response to this asymmetry: the transparency of the violation is the sole instrument that the state cannot neutralize through coercive force, inasmuch as the recording is executed automatically prior to any possible intervention.

The transition to the following subchapter is determined by the necessity of establishing the mechanism for protection against constitutional paralysis — the situation in which the conflict resolution process through P18 itself cannot be completed within the prescribed time limits.

19.4. Protection Against Paralysis: EmergencyExecutor and the Mandatory Referendum

Constitutional paralysis through P18 arises in the following structural scenarios: a technical conflict proves formally irresolvable as a result of an error in the protocol specification; a semantic conflict lacks sufficient historical context for intent verification; the stage 3 referendum systematically fails to achieve quorum as a result of apathy or strategic abstention; a sovereignty conflict generates a legal confrontation that blocks the functioning of GovernanceEngine. In each of these scenarios, without a special protective mechanism the conflict remains unresolved indefinitely, producing a state of constitutional indeterminacy functionally equivalent to the loss of legitimacy (T9).

EmergencyExecutor. Upon an unresolved conflict persisting for 90 days from the moment of its registration in P18, GovernanceEngine automatically activates EmergencyExecutor (the institution of limited emergency authority, constitutionally defined in Part IV, Article V). EmergencyExecutor possesses the following constitutionally limited powers as applied to P18 conflicts: the adoption of a temporary decision on the subject of the conflict sufficient to restore the operationality of GovernanceEngine and eliminate the immediate constitutional consequences of the paralysis; the duration of the temporary decision is not more than 30 days without extension.

EmergencyExecutor does not possess the following powers: the adoption of a permanent constitutional decision binding upon the citizen body; the amendment of constitutional principles P0–P7; the lifting of a SovereigntyShield violation block without P18 qualification; the appointment of a privileged interpreter for conflict resolution. These constraints are constitutional constants of P7 level and cannot be expanded by any decision of GovernanceEngine, by any decision of the Civic Guard, or under any emergency scenario.

The temporary EmergencyExecutor decision is recorded on-chain with an explicit indication of its temporary and limited character. All GovernanceEngine decisions made during the period of validity of the EmergencyExecutor temporary decision carry a conditional constitutional status: they are operationally valid, but are subject to retrospective ratification or nullification upon the completion of the mandatory referendum.

Mandatory referendum. Upon the activation of EmergencyExecutor, GovernanceEngine is obligated within 10 days to submit the subject of the conflict to a referendum with a reduced turnout threshold (Recovery Mode: 51% EQU⊥ of the number of citizens who participated in the last successful vote, rather than of the entire citizen body). The reduction of the threshold in the context of the mandatory referendum is an exception to the general principle of P15, justified by the following: the mandatory referendum is activated only after a 90-day period during which the achievement of the standard quorum proved impossible, by virtue of which applying the standard quorum to the mandatory referendum would reproduce the very paralysis it is designed to overcome.

The mandatory referendum decision is final and binding without the possibility of appeal through P18 on the same subject for 24 months. The on-chain archive records the subject, procedure, and result of the referendum as a constitutional precedent. Upon the rejection of the EmergencyExecutor temporary decision by referendum, GovernanceEngine is obligated to adopt a decision consistent with the voting outcome within 5 days.

Case 2025: in several decentralized protocols, interpretive conflicts were recorded that remained unresolved for more than 6 months as a result of the absence of a paralysis resolution procedure. In one instance, a conflict concerning the interpretation of a validator reward distribution mechanism blocked a protocol update for 9 months, producing accumulated technical debt and a reduction in network security. EmergencyExecutor with its 90-day trigger and mandatory referendum eliminates this class of situations: the maximum period of constitutional indeterminacy is bounded at 90 + 30 + 5 = 125 days without exception.

The transition to the following subchapter is determined by the necessity of establishing the theoretical connections of P18 with pattern 11 and theorem T14, confirming the architectural sufficiency of the autonomous conflict resolution mechanism.

19.5. Protection Against Pattern 11 and Theorem T14

P18 closes two theoretical defects, each of which established a structural vulnerability of normative systems not remediable by less radical means.

Pattern 11 (the marginalization of informal action, Volume I) established that in a system with a dominant decision-making mechanism, positions that do not fit the dominant interpretive framework are systematically marginalized — not through prohibition, but through the reduction of their operational significance. As applied to conflict resolution: in a system without P18, or with a P18 lacking a formally verifiable procedure, the most economically or politically influential party to the conflict inevitably possesses an advantage in the interpretive dispute — not because its interpretation is more correct, but because its position possesses greater operational significance for the remaining participants. This is the direct reproduction of pattern 11 at the level of constitutional law.

P18 closes pattern 11 through three architectural properties of its procedure. The first: automatic proof search through Coq tactics produces a result equally binding upon all participants independent of their economic position — a formal proof cannot be "reweighted"

by the volume of VIC⊥ or the reputation of an operator. The second: formal verification of intent through the on-chain Convention archive turns to a source equally accessible to all participants and independent of the current distribution of power. The third: the stage 3 referendum produces a decision whose legitimacy is a function of the participation of the entire citizen body through EQU⊥, not a function of the influence of a specific faction. Together these three properties produce a procedure that is neutral with respect to the distribution of power between the conflicting parties.

Theorem T14 (code is law without NA0, Volume II) established that code without embedded normative constraints produces optimization that systematically violates NA0 as a structural byproduct. As applied to P18: if the conflict resolution mechanism is confined to stage 1 (automatic proof) without stage 3 (referendum), it reproduces T14 at the level of interpretive law — a formally correct interpretation that violates NA0 cannot be contested, inasmuch as citizens lack a constitutional instrument for its revision.

P18 closes T14 through the embedding of NA0 in the conflict resolution protocol at two levels. At the level of stage 2: formal verification of intent through the on-chain Convention archive includes verification that the norm being interpreted was adopted in conformity with NA0 as a constitutional constraint — an interpretation that contradicts NA0 cannot be verified as conforming to the intent of the Convention, inasmuch as the Convention may not adopt norms that violate NA0. At the level of stage 3: the referendum transmits the final decision to the citizen body, each member of which is a bearer of NA0 as an inalienable right, by virtue of which citizens as collective sovereign are constitutionally competent arbiters regarding the conformity of an interpretation with NA0. This architectural decision instantiates the principle established in P2 (the supremacy of code): code is the executor of the constitution, but the sovereign retains the right to interpret the spirit of the law through constitutionally defined procedures.

The precise boundary of T14's closure through P18 must be established. P18 closes T14 as applied to the interpretation of existing norms: the conflict resolution mechanism does not produce optimization violating NA0, inasmuch as the referendum is the constitutional barrier against such optimization. T14 as applied to the introduction of new norms is closed by P2 through the requirement of embedding NA0 in the formal specification of each norm. Thus P18 and P2 constitute a constitutional pair, closing T14 at two levels: at the level of the introduction of norms (P2) and at the level of their application (P18).

Chapter Summary

P18 (Conflict-Resolution Core) establishes an autonomous three-stage interpretive conflict resolution procedure, neutral with respect to the distribution of power between the parties, verifiable by any network node, and binding without a privileged interpreter. Automatic proof through Coq tactics secures the resolution of technical conflicts without human judgment. Formal verification of intent through historical voting patterns and the on-chain Convention archive secures the resolution of semantic conflicts through a constitutionally verifiable source of interpretation. A referendum of 51% EQU⊥ secures the resolution of fundamental conflicts through popular sovereignty. The special sovereignty conflict regime secures the immediate public on-chain recording of SovereigntyShield violations with automatic

activation of the State Audit Protocol. EmergencyExecutor with the mandatory referendum establishes the constitutional maximum of the period of indeterminacy. Pattern 11 is closed through the procedural neutrality of P18 with respect to the distribution of power. Theorem T14 is closed through the embedding of NA0 at the levels of stage 2 and stage 3.

Transition to Part IV

P10–P18 exhaust the operational synthesis of constitutional principles: each of the nine mechanisms is an institutional response to specific theorems and normative principles of Volumes I–II, and together they constitute a system in which the republic not only exists (P0–P7) and protects its foundation (P8–P9), but acts. P18 is the logical closure of this layer: it secures that all preceding mechanisms are applied consistently and without a privileged interpreter. However, the operational system of principles P0–P18 remains a system of norms until it receives a formal constitutional form — articles, rules, institutions, protocols — in which the principles acquire directly enforceable force. This crystallization is effected by Part IV.

Σ-STATUS III — VERIFICATION: Operational Synthesis of Governance Mechanisms

P10–P18 constitute a logically complete operational layer of the constitutional architecture of Virtublic: each of the nine mechanisms closes specific theorems T1–T17 and instantiates the normative principles N1–N7 without lacunae, no mechanism is redundant, and together they produce a system in which de jure and de facto sovereignty are functionally indistinguishable at any level of participation above the constitutional minimum. This layer necessitates the transition to Part IV, inasmuch as principles verified as operationally complete acquire enforceable constitutional force only through formal crystallization in articles, rules, institutions, and protocols.

PART IV. INSTITUTIONAL ARCHITECTURE

Constitutional form and rules of concordance

Parts I–III established the republic as an objective structure, defined the mechanisms for its protection under systemic crisis, and described the operational protocols of day-to-day governance. Part IV executes the concluding step: the transposition of the substantive principles P0–P18 into formal constitutional architecture — articles, definitions, institutions, and rules of concordance possessing direct executable force. The analytical depth is concentrated in Parts I–III; Part IV crystallizes it into normative form — not by reduction, but by completion: the constitutional text is the sole form in which principles transition from theoretical justification to protocol-level obligation.

Chapter 20. The preamble of the constitution

The preamble is not a rhetorical introduction but a normative foundation: it establishes five operational definitions without which none of the subsequent articles is applicable, and formulates the sole constitutional purpose of Virtublic with a precision that precludes interpretive arbitrariness. The preamble does not contain principles subject to proof in this chapter: they are proved in Parts I–III. The preamble fixes them as the initial data of the constitutional system — the system from which all subsequent elements are derived from these five definitions and the single purpose.

CONSTITUTION OF VIRTUBLIC

PREAMBLE

The present Constitution is instituted by the people of Virtublic as an expression of their sovereign will, fixed in principle P0 and unalterable under any circumstances. The Constitution is the sole source of legitimacy of all institutions, protocols, and decisions conducted within the framework of this republic.

To eliminate any uncertainty in the application of the present Constitution, the following operational definitions are established, mandatory for all subsequent articles and protocols.

Definition I. Subject.

A subject in the sense of the present Constitution is a verified unique human being possessing a current Soulbound NFT (an inalienable non-returnable token of digital identity, cryptographically bound to a single physical person and not transferable, delegable, or saleable), included in the Merkle Tree of the body of citizens through the Digital Census v2 procedure. Subjecthood is a politically protected good in the sense of normative axiom NA0: its systematic destruction is a constitutional violation regardless of the economic efficiency of the destroying action. The subject is simultaneously a bearer of political rights ($EQU_{\perp} = 1$, inalienable) and a potential participant in infrastructural sovereignty ($VIC_{\perp}$, proportional to verified contribution). A legal entity, algorithm, state organ, or any other non-human structure is not a subject in the sense of the present Constitution and may not become one under any circumstances.

This definition yields the following constitutional consequence: any decision of GovernanceEngine applied to a structure not satisfying this definition as though it were a subject is a constitutional violation, automatically identified by the Formal Verification Protocol. Any attempt to expand this definition to non-human structures is an attempt to amend P3 and requires the Axiom-Break Condition procedure (P8).

Definition II. Republic.

A republic in the sense of the present Constitution is a form of political organization in which power belongs to the people as the body of verified subjects, is exercised through constitutionally defined institutions and protocols, is constrained by the inviolable core of principles P0–P7, and may not be concentrated in the hands of any single subject, group of subjects, or non-human structure without violating principle P1. The republican form is not a facultative choice among permissible forms of governance: it is the sole constitutionally compatible form of organization of Virtublic, derived from T9, T11–T15 as the only form capable of precluding the three outcomes of systemic collapse.

The republic is not identical to the state: the state is one of the actors functioning within the framework of the republican constitution, but is not its subject, holder of EQU⊥, or source of legitimacy. The republic exists as a constitutional order independently of the presence or absence of a specific state subject recognizing its jurisdiction.

Definition III. Capital.

Capital in the sense of the present Constitution is the aggregate of resources accumulated by a subject or structure in the form of VIC⊥, informational assets, computational capacities, or other verifiable economic positions, conferring the right to participation in infrastructural sovereignty proportional to contribution. Capital is a legitimate resource within the framework of infrastructural sovereignty (VIC⊥-space) and a prohibited basis for political sovereignty (EQU⊥-space): the conversion of capital into political power is a constitutional violation of the second degree in the sense of normative principle N2.

This definition establishes the following essential delineation. Capital is a productive resource when used for the generation of infrastructural value verifiable through Proof-of-Resource. Capital is a constitutionally constrained resource when applied to political decisions determining the direction of the republic. This delineation is operationalized through P4 (dual sovereignty) as the constitutionally inviolable demarcation line: $EQU_{\perp} \cap VIC_{\perp} = \varnothing$.

Predictive capital — accumulated data permitting the prediction of subjects' behavior without their explicit consent — is a separate category in the sense of Volume I (theorem T1): it is neither political sovereignty nor infrastructural contribution, but is a systematically extractable resource, the appropriation of which without the constitutionally verified consent of the subject is a violation of N1. Predictive capital does not enter into VIC⊥ and yields no constitutional rights within Virtublic.

Definition IV. State.

The state in the sense of the present Constitution is any subject of public law — a national state, federal unit, international organization, supranational body, or other structure exercising governmental functions on behalf of a territorially defined population — acting within the jurisdiction of Virtublic or claiming jurisdiction over data of citizens of Virtublic. The state is a legitimate actor within the framework of the present Constitution exclusively on the condition that its actions are conducted on behalf of citizens and with their explicit

constitutional mandate. The state is not a subject in the sense of Definition I, does not hold EQU⊥, and is not a source of the legitimacy of the present Constitution.

This definition yields the following constitutional consequences. The state is an infrastructure operator (a potential holder of VIC⊥) when there is a verified contribution to the infrastructure of Virtublic; however, its VIC⊥ is not convertible into EQU⊥ under any circumstances (P4). The state is a potential holder of a limited mandate for access to citizens' data upon satisfaction of the ratification procedure of P17; however, this mandate is temporary, is not renewed automatically, and yields no permanent sovereign rights of the state over data. A state acting in violation of the present definition — that is, claiming EQU⊥, permanent access to data, or the status of a source of legitimacy — commits a constitutional violation of the sovereignty type, referred to P18 (Conflict-Resolution Core).

State neutrality in the sense of P17 means the following: the constitutional order of Virtublic is neutral with respect to state interests as such — it is neither pro-state nor anti-state, but is constitutionally binding upon the state to the extent that the state interacts with data of citizens of Virtublic. This neutrality is instantiated through SovereigntyShield (P17) as a self-executing norm.

Definition V. Constitution.

The Constitution in the sense of the present document is the aggregate of principles P0–P18, normative principles N1–N7, normative axiom NA0, the rules of their hierarchy of amendability (P7), and crisis procedures (P8–P9), encoded in the formally verified Coq specification of GovernanceEngine and reproduced through the Formal Verification Protocol as automatically executable constraints. The Constitution is not a text admitting of interpretation at the discretion of an arbiter: it is formally verified code that executes automatically, while simultaneously incorporating mechanisms for legitimate revision (P8–P9) and autonomous conflict resolution (P18).

This definition establishes an essential distinction from traditional constitutions in the following four respects. The first: traditional constitutions admit interpretation by a competent organ (constitutional court, supreme court); the present Constitution executes automatically through the Formal Verification Protocol, eliminating interpretive arbitrariness with respect to the primary norms. The second: traditional constitutions exist as textual documents interpreted in dependence on context; the present Constitution exists as an executable Coq specification, semantically verified against N1–N7 upon each amendment. The third: traditional constitutions contain no mechanism for the automatic rejection of unconstitutional proposals; the present Constitution rejects them at the stage of submission through GovernanceEngine. The fourth: traditional constitutions are rigid or flexible depending on amendment procedures; the present Constitution is three-level differentiated in accordance with P7: P0 is absolutely unamendable, P1–P7 are amendable only through the Axiom-Break Condition, P10–P18 are amendable through ordinary procedures subject to verification.

Purpose of the Constitution.

The present Constitution is instituted with the sole purpose of preserving the autonomy of the digital subject — his right to act, interact, and participate in the political community without the systematic destruction of his subjecthood through predictive exploitation, the concentration of power, or state surveillance without a mandate — given the inevitable concentration of resources determined by the technological nature of digital infrastructure.

This purpose is achieved through three constitutionally mandatory mechanisms operating simultaneously. The first — institutionally constrained digital power: no subject, structure, or algorithm may accumulate power exceeding the constitutional thresholds of P4, P5, and P10 without violating the principles of the republican form (P1). The second — constitutional protection against state surveillance without a mandate: the state may not acquire predictive data on citizens without explicit ratification through EQU⊥-voting with a 75% threshold, instantiated through SovereigntyShield (P17). The third — the encouragement of broad citizen coalition over the concentration of capital: the constitutional mechanics of P10–P11 yield a structural advantage of organic political solidarity over resource concentration, by virtue of which the rationally correct strategy of political participation coincides with the republicanly legitimate one.

The present Constitution is not a utopian document: it does not presuppose the elimination of resource concentration, state interests, or political conflicts. It is an architectural document: it establishes the conditions under which the concentration of resources does not yield the concentration of political power, state interests do not yield state capture, and political conflicts are resolved through constitutionally mandatory procedures rather than through the advantage of force.

Chapter Summary

The preamble establishes five operational definitions of constitutional architecture that yield specific legal consequences: the subject as the sole bearer of EQU⊥ and constitutional rights; the republic as the sole constitutionally compatible form of organization; capital as a legitimate infrastructural resource and a prohibited basis for political power; the state as a constrained actor without EQU⊥ and without permanent sovereign rights over data; the constitution as a formally verified executable Coq specification rather than an interpretable text. The sole constitutional purpose — the autonomy of the digital subject — is achieved through three simultaneously operating mechanisms, operationalized in P1–P18.

Transition to Chapter 21

The preamble established the conceptual foundation of the constitutional text. The next step is the codification of the principles themselves in the form of constitutional articles suitable for direct application: each of the principles P0–P7 must be formulated as a normative article with precise specification of its content, hierarchical status, and procedural consequences. Chapter 21 executes this codification as applied to the constitutional core.

Chapter 21. Article I: Preamble and Fundamental Principles (P0–P7)

The task of Part IV consists in translating the substantive principles P0–P18, verified in Parts I–III as architecturally complete and theoretically sound, into formal constitutional form — articles, rules, institutions, and protocols possessed of directly executable force. The analytical depth is concentrated in the preceding parts; Part IV crystallizes it into normative form suitable for direct application. Crystallization is not reduction: the constitutional text is the sole form in which principles acquire binding legal force, verifiable through the Formal Verification Protocol.

Article I. Preamble and Fundamental Principles

§ 1.1. Formulation.

The sole legitimate source of power in the digital space of Virtublic is the people, understood as the totality of digital citizens verified through Soulbound Identity in the manner established by the present Constitution. All power exercised in Virtublic is delegated power and remains accountable to the people as its sole source. The state is not a subject of popular sovereignty — it is a subject whose existence is conditioned upon the sovereignty of citizens, and its powers in the digital space of Virtublic are determined exclusively by the constitutional mandate granted through EQU⊥-voting by a qualified majority. The digital subject is inalienable from his subjecthood: his identity is not reducible to data, his political voice is not for sale and is not delegable, and his cognitive autonomy is a constitutionally protected good.

§ 1.2. Ontological status.

P0 is not a principle in the sense that principles constitute the content of the constitution and may be the subject of constitutional revision. P0 precedes the constitution as the condition of its possibility: amendment of P0 would signify the abrogation of the very sovereignty in whose name the constitution is adopted, which is a self-contradictory constitutional act. The Formal Verification Protocol automatically blocks any proposal affecting the content of P0 at the stage of its submission to GovernanceEngine. An attempt to submit such a proposal is characterized as a first-degree constitutional violation and is recorded on-chain with binding to the Soulbound ID of the initiator.

§ 1.3. Amendability status.

P0 shall not be amended, suspended, reinterpreted, or abrogated through any procedure provided by the present Constitution or introduced after its adoption, including Constitutional Convention (P9), Axiom-Break Condition (P8), and EmergencyExecutor. This prohibition is absolute and admits no exceptions.

§ 1.4. State neutrality as an element of P0.

The state shall not employ technologies functioning in the space of Virtublic against the citizens whose sovereignty constitutes the basis of its existence. Access by a state actor to the data of citizens of Virtublic without the constitutional mandate granted pursuant to P17 is

a violation of P0 and P17 simultaneously. SovereigntyShield is the constitutional instrument for the execution of this provision.

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§ 2. Principle of Republican Form (P1)

§ 2.1. Formulation.

The digital sovereignty of citizens of Virtublic is exercised exclusively through the republican form of organization of power, which presupposes the delegation of power by the people, its constraint by the constitution, and the accountability of delegated power to the people as its source.

§ 2.2. Constitutional prohibitions.

The following forms of organization of power are constitutionally prohibited and may not be introduced through any procedure, including Constitutional Convention: the monarchical form, in which power is concentrated in a single subject without constitutional constraint and accountability mechanisms; the oligarchical form, in which power is concentrated in a group of subjects selected on the basis of economic position or volume of stake; the anarchical form, in which constitutional constraints on power and mechanisms for the collective adoption of binding decisions are absent.

§ 2.3. Institutional instantiation.

The republican form is instantiated through GovernanceEngine as the executable mechanism of collective decision-making, combining quadratic influence (P10), the coalitional amplifier (P11), dual sovereignty (P4), and concordance procedures (Concordance Rule). GovernanceEngine functions as an autonomous protocol; its parameters may be amended exclusively through the procedures established by the present Constitution.

§ 2.4. Amendability status.

P1 is part of the immutable constitutional core. Amendment of P1 is permissible exclusively through Axiom-Break Condition (P8) with observance of all conditions established by Section 8 of the present Article, and subsequent ratification by Constitutional Convention (P9) in the manner established by Article II of the present Constitution.

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§ 3. Principle of Supremacy of Code (P2)

§ 3.1. Formulation.

The constitution of Virtublic is executable code verified through formal methods in the Coq system; any constitutional rule not instantiated in smart contracts and not verifiable through

the Formal Verification Protocol is not a constitutional rule within the meaning of the present Constitution.

§ 3.2. Verification requirement.

Every norm of the present Constitution, as well as every rule adopted in its execution, shall undergo formal verification in the Coq system prior to entering into force. The normative principles N1–N7 are encoded as formally verifiable constraints embedded in the Coq specification: a norm that violates N1–N7 cannot pass verification and does not enter into force. The Formal Verification Protocol automatically rejects any norm for which verification is impossible or which contradicts norms of the present Constitution already verified.

§ 3.3. Relationship between code and the spirit of the law.

The supremacy of code does not preclude interpretation of the spirit of the law. The sovereign retains the right to determine constitutional intent through the procedures established by P18: formal verification of intent through the on-chain archive of Constitutional Convention and referendum. No agent possesses the right to unilaterally interpret the norms of the present Constitution outside the procedures of P18.

§ 3.4. Amendability status.

P2 is part of the immutable constitutional core. Amendment of P2 is permissible exclusively through Axiom-Break Condition (P8) and ratification by Constitutional Convention (P9).

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§ 4. Principle of Inalienable Citizenship (P3)

§ 4.1. Formulation.

Digital citizenship of Virtublic is bound to a physical subject through Soulbound Identity and may not be transferred, sold, delegated, or lost except in the cases expressly provided by the present Constitution.

§ 4.2. Properties of Soulbound Identity.

Soulbound Identity is non-transferable: any attempted transfer automatically nullifies the citizenship of both parties to the transaction. Soulbound Identity is non-delegable: no third party may exercise the constitutional rights of a citizen on his behalf, except in the cases expressly provided by the protection regime for forming subjects (N6). Soulbound Identity is verifiable without disclosure of identity: membership in the body of citizens is proved through zk-SNARK without transmission of identifying data.

§ 4.3. Protection of forming subjects.

Citizens under 18 years of age shall exercise constitutional rights in the regime established by normative principle N6 and Article VI (Republic Engagement Auditor, parental consent

through cryptographic multisig, encrypted vault with automatic destruction upon attainment of age 18).

§ 4.4. Grounds for termination of citizenship.

Citizenship is terminated in the following cases: the death of the subject, verified in the manner established by GovernanceEngine through VIC⊥-voting; voluntary withdrawal from citizenship, effectuated through an on-chain transaction signed by Soulbound ID; nullification of citizenship by decision of the Civic Guard upon confirmation of a Sybil violation pursuant to P13. Citizenship is not terminated as a consequence of digital absence, low participation in votes, or absence from Census where good cause is recognized by GovernanceEngine.

§ 4.5. Amendability status.

P3 is part of the immutable constitutional core. Amendment of P3 is permissible exclusively through Axiom-Break Condition (P8) and ratification by Constitutional Convention (P9).

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§ 5. Principle of Dual Sovereignty (P4)

§ 5.1. Formulation.

In Virtublic there exist two constitutionally separated sovereignties: political sovereignty EQU⊥ (one citizen — one vote) and economic sovereignty VIC⊥ (proportional to verified infrastructure contribution); conversion of VIC⊥ into EQU⊥ is prohibited in any form and under any circumstances.

§ 5.2. The demarcation line.

EQU⊥ belongs to the world of subjects and political meanings. EQU⊥ does not accumulate beyond one unit per citizen, is not for sale, is not transferable, and is not a function of economic position or the volume of infrastructure contribution. VIC⊥ belongs to the world of economic contributions and technical governance. VIC⊥ accumulates proportionally to verified contribution, is measurable, verifiable through Proof-of-Resource, and is an instrument of participation in the technical decisions of the republic. The demarcation line between EQU⊥ and VIC⊥ is constitutionally inviolable: its violation constitutes a violation of P0 and signifies the end of the republican form.

§ 5.3. Concordance Rule.

Decisions affecting both the political and the economic dimensions of Virtublic simultaneously shall require a qualified majority in both sovereignties in accordance with the thresholds established by Article IV (Concordance Rule). GovernanceEngine automatically classifies each decision by category prior to the commencement of voting; the classification is recorded on-chain.

§ 5.4. Amendability status.

P4 is part of the immutable constitutional core. Amendment of P4 is permissible exclusively through Axiom-Break Condition (P8) and ratification by Constitutional Convention (P9). Constitutional Convention shall not have authority to adopt a decision abrogating the EQU⊥/VIC⊥ demarcation line.

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§ 6. Principle of Limited Influence (P5)

§ 6.1. Formulation.

Influence over collective decisions is not a linear function of capital: additional influence is acquired through the quadratic cost function cost(n) = n², which constitutionally constrains the conversion of concentrated capital into political power.

§ 6.2. Baseline and additional influence.

Every verified citizen receives baseline influence of one EQU⊥ unit at no cost at each vote. The acquisition of additional influence through VIC⊥ is effectuated through the function cost(n) = n²: 10 additional units cost 100 VIC⊥, 100 additional units cost 10,000 VIC⊥, 1,000 additional units cost 1,000,000 VIC⊥. This function is a constitutional constant and may not be amended by GovernanceEngine through an ordinary vote.

§ 6.3. Anti-faction filter.

Upon detection of coordinated voting patterns, GovernanceEngine applies a diversity penalty to the aggregate influence of the cluster. The anti-faction filter is not censorship of a position: it is a constitutional prohibition on the architectural amplification of a single faction through the concentration of VIC⊥. The parameters of the anti-faction filter are established by GovernanceEngine through VIC⊥-voting within constitutionally established ranges.

§ 6.4. Minimum visibility threshold.

For all legitimate positions that do not violate P0–P7 and N1–N7, GovernanceEngine guarantees a minimum visibility threshold P(reach) ≥ ε, where ε is the constitutionally established minimum of statistically significant presence in the network. A position supported by at least one verified citizen may not be algorithmically marginalized below this threshold.

§ 6.5. Amendability status.

P5 is part of the immutable constitutional core. Amendment of P5 is permissible exclusively through Axiom-Break Condition (P8) and ratification by Constitutional Convention (P9).

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§ 7. Principle of Verifiable Census (P6)

§ 7.1. Formulation.

Digital Census is the annual constitutional act of recognition of the subjecthood of every citizen of Virtublic, effectuated through a verifiable zero-knowledge protocol with the mandatory participation of the Civic Guard formed through VRF-selection.

§ 7.2. Constitutional status of the Census.

Digital Census is not a technical operation for updating a database. The right to recognize another human being as a member of the political community is an exclusively political prerogative, not delegable to an automatic algorithm. The Civic Guard is a constitutionally necessary element of the Census not as a technical auditor, but as the organ that effectuates the political act of recognition on behalf of the republic in cases requiring collegial judgment.

§ 7.3. Obligatory nature and periodicity.

The Census shall be conducted not less than once every 12 months. The absence of a Census for a period of 18 months activates the dormant status regime pursuant to P13. The parameters of the technical Census protocol are established by P13 and are amendable through ordinary procedures; the constitutional status of the Census as the obligatory periodic act of recognition of subjecthood is part of P6 and is amendable only through Axiom-Break.

§ 7.4. Dual Suspicion Protocol.

Verification of identities that have received an anomaly flag is effectuated through a two-stage protocol: Stage 1 — automated adaptive cognitive tests; Stage 2 — consideration by the Civic Guard upon failure of Stage 1, with a decision by a qualified majority of 2/3. The decision of the Civic Guard is constitutionally binding and shall be recorded on-chain.

§ 7.5. Constitutional accountability of jury auditors.

Every member of the Civic Guard shall take the constitutional oath through an on-chain transaction. Violation of the oath entails constitutional sanctions pursuant to Article V (CivicJuryEngine). A decision of the Civic Guard adopted in violation of constitutional procedure is grounds for referral to P18.

§ 7.6. Amendability status.

P6 is part of the immutable constitutional core. Amendment of P6 is permissible exclusively through Axiom-Break Condition (P8) and ratification by Constitutional Convention (P9).

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§ 8. Principle of Inviolability of the Core (P7)

§ 8.1. Formulation.

The present Constitution establishes a three-level hierarchy of amendability: P0 as the absolutely immutable preamble; P1–P7 as the constitutional core, amendable exclusively

through Axiom-Break Condition and ratification by Constitutional Convention; P10–P18 as governance mechanisms, amendable through ordinary GovernanceEngine procedures.

§ 8.2. Hierarchy of amendability: level P0.

P0 may not be amended by any procedure. The Formal Verification Protocol automatically blocks any proposal that violates or affects P0, regardless of its source, the number of supporting citizens, and the existence of a qualified majority. This prohibition is not a temporary constraint — it is constitutionally permanent.

§ 8.3. Hierarchy of amendability: level P1–P7.

Amendment of any principle P1–P7 is permissible upon the simultaneous satisfaction of the following conditions: satisfaction of all three conditions of Axiom-Break Condition (P8) in the manner established by Article II; convening of Constitutional Convention (P9) in the manner established by Article II; ratification of the proposed amendment by a qualified majority of 66% EQU⊥ and simultaneously 51% VIC⊥ at referendum; formal verification of the amendment through the Formal Verification Protocol with confirmation of conformity with N1–N7. An amendment that has passed this procedure enters into force from the moment of its on-chain recording of the ratification result.

§ 8.4. Hierarchy of amendability: level P10–P18.

Amendment of governance mechanisms P10–P18 is effectuated through ordinary GovernanceEngine procedures: a proposal submitted by a verified citizen or group of citizens through Coalition Verification Protocol; public deliberation during a constitutionally established period; voting in accordance with Concordance Rule for the category of the given decision; formal verification through the Formal Verification Protocol with confirmation of conformity with N1–N7 and the principles P1–P7. An amendment to P10–P18 that violates P0–P7 is automatically rejected by the Formal Verification Protocol regardless of the number of supporting votes.

§ 8.5. Protection of the core against erosion.

Semantic amendments that formally do not affect the text of P1–P7 but produce an effect that violates their content are automatically rejected by the Formal Verification Protocol at the proposal verification stage. An attempt to introduce such an amendment through amendment of P10–P18 is characterized as a second-degree constitutional violation and is recorded on-chain.

§ 8.6. Amendability status.

P7 is part of the immutable constitutional core. Amendment of P7 is permissible exclusively through Axiom-Break Condition (P8) and ratification by Constitutional Convention (P9). An amendment to P7 that reduces the level of protection of P0 or P1–P6 is constitutionally impermissible and is automatically blocked by the Formal Verification Protocol.

Chapter Summary

Article I crystallizes P0–P7 into constitutional form possessed of directly executable force. P0 is entrenched as the absolutely immutable preamble with automatic blocking of any encroachments through the Formal Verification Protocol. P1–P7 are entrenched as the constitutional core with a three-stage amendment procedure through Axiom-Break and the Convention. Every principle is supplied with an explicit indication of its amendability status, constitutional prohibitions, and sanctions for violation. The three-level hierarchy of amendability established by P7 is verifiable and self-reproducing: the Formal Verification Protocol ensures that no level of the hierarchy can be violated through a level formally located below it.

Transition to Chapter 22

Article I establishes the constitutional form of what the republic is in its fundamental nature and what remains immutable under any circumstances. The constitution is a living document — a recognition that P7 itself entrenches through the Axiom-Break procedure. Article II crystallizes this procedure into constitutional form: the conditions for recognition of systemic crisis (P8) and the form of constituent power of the people upon its occurrence (P9).

Chapter 22. Article II: Emergency Procedures (P8–P9)

Article II codifies the mechanisms of legitimate amendment of the constitutional core and the restoration of the republic under systemic crisis. This article is constitutional text in the precise sense: it establishes no new principles beyond those proven in Part II, but confers upon them an enforceable normative form applicable without additional interpretation. Each norm of Article II is the direct encoding of principles P8 and P9 into constitutional text, with specification of hierarchical status, procedural consequences, and absolute constraints.

CONSTITUTION OF VIRTUBLIC

ARTICLE II. EMERGENCY PROCEDURES

§ 1. General Provision.

The present Constitution recognizes that no constitutional form is perpetual. The recognition of this fact is not a weakness of the constitutional order but its normative honesty: a constitution containing no mechanism for its own legitimate revision under systemic crisis violates principle P0, from which it itself derives legitimacy. The people as constituent power retains the right to revise the constitutional core upon a demonstrated systemic crisis through a strictly defined institutional form. The exercise of this right outside the established form is a constitutional violation of the sovereignty type and is transmitted to P18 (Conflict-Resolution Core).

§ 2. Axiom-Break Condition (P8): conditions of constitutional crisis.

§ 2.1. General rule. The revision of principles P1–P7, constituting the constitutional core, is permissible exclusively upon the simultaneous satisfaction of the three conditions established in the present section. The satisfaction of any two conditions without the third is an insufficient basis for the activation of the Constitutional Convention procedure and produces no constitutional consequences. An attempt to activate the Convention under an incomplete set of conditions is qualified as a false activation and entails the consequences established in section 2.7 of the present article.

§ 2.2. First condition: chronic apathy. Turnout — the participation of verified citizens with a valid Soulbound NFT in GovernanceEngine votes — falls below ten percent (10%) on two consecutive occasions within one hundred and eighty (180) days. Both instances must be recorded through the Constitutional Health Protocol as on-chain events with cryptographically verifiable parameters. A single turnout failure, a technical malfunction obstructing participation, or a seasonal reduction in activity that does not satisfy the criterion of two consecutive successive failures is not counted as satisfaction of the first condition.

§ 2.3. Second condition: loss of legitimacy. No fewer than sixty-six percent (66%) of the verified citizen body, through EQU⊥-voting, explicitly asserts the following: that the constitutional form P1–P7 in its current state is incompatible with the popular sovereignty established in P0. This assertion is a constituent political act and is fundamentally distinct from dissatisfaction with specific GovernanceEngine decisions: the question submitted to a vote is formulated through the Formal Verification Protocol exclusively in the stated terms and may not be reformulated without undergoing re-verification. The vote is conducted in accordance with the EQU⊥-voting procedures established in Article III.

§ 2.4. Third condition: supermajority. The activation of the Constitutional Convention requires the simultaneous achievement of seventy-five percent (75%) EQU⊥ and seventy-five percent (75%) VIC⊥ through the Concordance Rule — the concordance rule requiring a qualified majority in both sovereignties. This condition is constitutionally necessary with respect to the revision of the core, inasmuch as the amendment of P1–P7 affects both sovereignties to the greatest possible degree and cannot be effected without a consensus encompassing both the political and the infrastructural dimensions.

§ 2.5. Absolute protection of P0. Even upon the simultaneous satisfaction of all three conditions of the present section, the Constitutional Convention may not consider proposals affecting P0 or its invariants. The invariants of P0 include: popular sovereignty as the sole source of legitimacy; state neutrality as the condition of sovereignty; the inalienability of subjecthood as a politically protected good. The Formal Verification Protocol blocks proposals violating these invariants automatically at the stage of admission for Convention consideration — without human decision and without the possibility of appeal. This block is a mathematically provable constraint in the Coq specification and cannot be overcome through a decision of the Convention, GovernanceEngine, or any other institution.

§ 2.6. Special protection of SovereigntyShield. Any Convention proposal identified by the Formal Verification Protocol as affecting SovereigntyShield (P17) or its invariants is

transmitted for independent constitutional assessment to an extended panel of ninety-nine (99) citizens selected through VRF, with the exclusion of civil servants and persons affiliated with state structures during the preceding thirty-six (36) months. The panel verifies exclusively the following: whether the proposal is compatible with the P0 invariant "the state is not a purchaser of predictions without an explicit constitutional mandate." Upon a finding of incompatibility, adopted by a two-thirds (2/3) majority of the panel, the proposal is not admitted to a Convention vote. Upon a finding of compatibility, the proposal is admitted to the standard Convention procedure with subsequent ratification in accordance with section 3.5 of the present article.

§ 2.7. Diagnostic mechanisms. The Constitutional Health Protocol produces a monthly automated report on the basis of the following verifiable on-chain metrics: turnout trend (the dynamics of turnout over the preceding six months), legitimacy trend (the dynamics of the qualification of the constitutional order as illegitimate through verified EQU⊥ soundings), participation quality (the share of cognitively informed participation), cognitive health score (the aggregate indicator of the cognitive state of the citizen body through Proof-of-Offline data). All reports are recorded on-chain and are publicly verifiable. Upon three consecutive alert reports — reports in which no fewer than two of the four metrics cross warning thresholds — GovernanceEngine automatically activates Constitutional Dialogue: an open constitutional forum with constitutionally guaranteed coverage ε in the sense of N3, independent of organic engagement.

§ 2.8. Constraints against abuse. Following the declaration that the conditions of the present section have been satisfied, the Constitutional Health Protocol conducts independent on-chain verification of each of the three conditions within thirty (30) days. Upon the non-confirmation of at least one of the three conditions, the procedure is automatically nullified through the Formal Verification Protocol. The initiators of a false activation — citizens and operators who made an official constitutional assertion that the conditions had been satisfied, subsequently refuted by independent verification — bear the following sanction: their VIC⊥ is frozen for twenty-four (24) months. During this period, the frozen VIC⊥ is counted in the calculation of the infrastructural share but may not be used for voting or for the acquisition of additional influence through Madison Mode.

§ 3. Constitutional Convention (P9): the form of crisis resolution.

§ 3.1. General rule. The Constitutional Convention is the sole constitutionally legitimate form of the exercise of the people's right to revise the constitutional core under systemic crisis. The Convention is formed exclusively upon the satisfaction of all three conditions of section 2 of the present article and operates within the strictly defined powers established in the present section. The Convention is not a permanent body: it is formed for a specific crisis, operates for a limited term, and ceases to exist upon the completion of its procedural function.

§ 3.2. Composition of the Convention: sortition. The Convention is formed through sortition — the random selection of citizens from the verified body through VRF with subsequent voluntary confirmation of participation. The composition of the Convention includes the following categories. The first category — the civic body: one hundred and fifty-one (151)

citizens selected through VRF from the entire verified body, with the sole constraint that no more than fifteen percent (15%) of the composition may be active infrastructure operators with $VIC^{\perp}$ exceeding the median level by more than a factor of ten. This constraint instantiates the principle of structural diversity, obstructing the dominance of infrastructure operators in the body determining the constitutional foundations. The second category — technical verifiers: nineteen (19) citizens verified by CivicJuryEngine as possessing verified competence in the formal verification of software. This category is not privileged but functional: technical verifiers do not possess additional political weight, but bear constitutional responsibility for verifying that Convention proposals are technically realizable within the Coq specification of GovernanceEngine. The third category — legal verifiers: eleven (11) citizens verified as possessing competence in the constitutional law of digital systems. This category bears constitutional responsibility for verifying that Convention proposals are internally consistent with principles P0 and the constitutional definitions of Article I (the Preamble).

Citizens included in the Convention are released from other constitutional obligations for the duration of its operation. Participation is voluntary: a citizen selected through VRF is entitled to decline participation without constitutional consequences; a citizen who declines is replaced by the next in the VRF queue.

§ 3.3. Powers of the Convention. The Convention possesses the following powers. The first — the consideration and development of proposals for the amendment of principles P1–P7 within the limits established in section 2.5 of the present article. The second — the development of Recovery Mode where a temporary departure from principles P10–P18 is necessary, within the limits established in section 3.8 of the present article. The third — a recommendation to the citizen body regarding the technical parameters of GovernanceEngine requiring updating following systemic crisis. The Convention does not possess executive powers: its decisions do not take effect prior to ratification by the citizen body in accordance with section 3.5 of the present article. The Convention is not a legislative body and may not adopt normative acts having force outside the ratification procedure.

§ 3.4. Three-phase Convention procedure. The Convention operates in three sequential phases, each of which is constitutionally mandatory and may not be abbreviated or omitted.

Phase I — diagnostic (thirty days): the Convention establishes the nature of the systemic crisis through the analysis of Constitutional Health Protocol data and independent verified studies. The result of Phase I is a constitutional diagnosis — a formal document establishing which specific principles P1–P7 require revision and on what specific grounds. The diagnosis is public: it is recorded on-chain and accessible to the entire citizen body. The Convention may not proceed to Phase II prior to the adoption of the constitutional diagnosis by a qualified majority of two-thirds (2/3) of its composition.

Phase II — development (ninety days): the Convention develops specific proposals for the revision of the principles identified in the constitutional diagnosis. Each proposal must contain the following mandatory elements: the precise formulation of the proposed amendment; the justification of its compatibility with P0 and the invariants not subject to revision; an assessment of technical realizability in the Coq specification from the technical

verifiers; an assessment of legal consistency with the constitutional definitions from the legal verifiers. A proposal not containing at least one of the four elements is not admitted to a Convention vote. The Convention adopts proposals for transmission to ratification by a two-thirds (2/3) majority of its composition.

Phase III — verification (fifteen days): the Formal Verification Protocol conducts full verification of all adopted proposals for compatibility with P0, its invariants, and the Coq specification of GovernanceEngine. Proposals that do not pass verification are returned to the Convention for revision. Proposals that pass verification are transmitted for ratification by the citizen body.

§ 3.5. Ratification. Convention proposals take effect exclusively upon ratification by the citizen body. Ratification requires seventy-five percent (75%) EQU⊥ and seventy-five percent (75%) VIC⊥ through the Concordance Rule — the same threshold as for the activation of the Convention. This requirement is a matter of principle: the ratification threshold may not be lower than the activation threshold, inasmuch as this would create a constitutional asymmetry under which a crisis is recognized by a higher consensus than the decision adopted in response. Ratification is conducted within thirty (30) days of the completion of Phase III. Upon the failure to achieve the ratification threshold, the Convention's proposals are rejected, the Convention is dissolved, and the Republic reverts to the constitutional order in force prior to the activation of Axiom-Break.

§ 3.6. Dissolution of the Convention. The Convention ceases to exist upon the occurrence of one of the following events: the completion of the ratification vote — independent of its result; the expiration of one hundred and fifty (150) days from the moment of the Convention's formation without the adoption of the constitutional diagnosis within the prescribed period; an explicit Convention vote for self-dissolution by a two-thirds (2/3) majority of its composition upon recognition of the impossibility of achieving constitutional consensus. In the last case, the Constitutional Health Protocol initiates a repeat diagnostic procedure six (6) months from the moment of dissolution for the assessment of whether the systemic crisis persists.

§ 3.7. Continuity of constitutional order. For the duration of the Convention's operation, the constitutional order P0–P18 retains full force. The Convention is not a basis for the suspension of any constitutional norms, including the norms of P17 (SovereigntyShield) and P14 (protected identity). GovernanceEngine continues to function in full capacity for the duration of the Convention. Convention decisions have no retroactive force: they may not be applied to events that occurred prior to the entry into force of the ratified amendments.

§ 3.8. Recovery Mode. Under a systemic crisis characterized by the simultaneous disruption of the functioning of more than three mechanisms P10–P18, the Convention is entitled to recommend the introduction of Recovery Mode — a temporary constitutional regime under which certain parameters of P10–P18 temporarily depart from constitutional values to the minimum necessary extent for the restoration of system functioning. Recovery Mode is introduced exclusively under the following conditions: a verified constitutional finding by the technical verifiers that the preservation of current parameters produces greater harm to the subjecthood of citizens than a temporary departure from them; ratification by the citizen body

with a 75%/75% threshold through the Concordance Rule; the established term of Recovery Mode is not more than ninety (90) days without the right of extension through the same mechanism — extension requires new ratification with the same threshold. Recovery Mode is not a basis for departure from P0–P7, N1–N7, or the absolute prohibitions of P17 under section 18.4.

Chapter Summary

Article II codifies the mechanisms of the Axiom-Break Condition and the Constitutional Convention into constitutional text of immediate application. The three conditions of Axiom-Break are established with precise numerical parameters and procedural consequences; the absolute protection of P0 and the special protection of SovereigntyShield are encoded as insurmountable constraints upon the Convention; the diagnostic mechanisms and sanctions against abuse are established with constitutional definiteness. The three-phase Convention procedure with mandatory sortition, qualified majorities at each stage, and a ratification threshold identical to the activation threshold is the sole constitutionally legitimate form of core revision. Recovery Mode is constrained to maximum brevity and is prohibited with respect to P0–P7.

Transition to Chapter 23

Article II completes the codification of the emergency procedures. Article III effects the codification of the operational mechanisms P10–P18 into the form of constitutional norms of direct application — establishing the precise parameters of each mechanism, the rules for their amendment through ordinary procedures, and the criteria for their verification of compatibility with the constitutional core.

Chapter 23. Article III: Governance mechanisms (P10–P18)

Article III codifies the nine operational governance mechanisms into constitutional text of direct effect. Each mechanism is the institutional response to a specific theorem of Volumes I–II, proved in Part III of the present work; this chapter does not reproduce the proofs but fixes the results as constitutionally mandatory norms with precise numerical parameters, rules of amendability, and criteria of verification. P10–P18 are amendable through the ordinary procedures of GovernanceEngine subject to passage of the Formal Verification Protocol — this amendability is a constitutional property, not a vulnerability.

CONSTITUTION OF VIRTUBLIC

ARTICLE III. GOVERNANCE MECHANISMS

§ 1. General rule of application of mechanisms.

The mechanisms P10–P18 established by the present article are operational instruments through which the principles of the constitutional core P0–P7 are given effect in specific protocols of day-to-day governance. Amendment of any of the mechanisms of the present article is permissible through EQU⊥-voting with a threshold of fifty-one percent (51%), on the condition that the proposed amendment has passed verification by the Formal Verification Protocol for compatibility with the invariants of P0–P7 and normative principles N1–N7. An amendment that has not passed this verification is automatically rejected at the stage of proposal submission without referral to a vote. No amendment of the present article may produce an effect equivalent to an amendment of the constitutional core: this condition is the constitutionally mandatory constraint on the amendability of P10–P18.

§ 2. P10 — Madison Mode: quadratic influence.

§ 2.1. Formula. The cost of acquiring n units of additional influence above the base EQU⊥ = 1 is calculated by the formula cost(n) = n², expressed in VIC⊥. The base influence of each verified citizen is exactly one (1) unit of EQU⊥ at no cost whatsoever. This identity is constitutionally invariant: it may not be amended through the procedures of the present article and is amended exclusively through the Axiom-Break Condition (Article II, section 2) as a consequence of P4.

§ 2.2. Cost and calculation period. The cost of additional influence is calculated independently for each vote: the acquisition of additional influence in preceding votes does not accumulate obligations in subsequent ones. VIC⊥ expended through Madison Mode is directed to CollectiveBond, defined in section 3.2 of the present article.

§ 2.3. Antifaction filter. Upon GovernanceEngine's identification of a coordinated cluster of actors — a cluster whose members exhibit identical voting patterns with a probability of coincidence incompatible with randomness at a statistical significance threshold of p less than 0.001 across K consecutive votes — the aggregate additional influence of the cluster is calculated as cost(N × n) = (N × n)², where N is the number of cluster members and n is the number of additional influence units of each member. This calculation is constitutionally mandatory: a coordinated cluster is not entitled to acquire additional influence at individual prices while engaging in collective coordination.

§ 2.4. Amendable parameters. Through the procedures of the present article, amendment of the following parameters of P10 is permissible: the statistical significance threshold of the antifaction filter (within the range from p = 0.0001 to p = 0.01); the minimum number of consecutive votes K for cluster classification (within the range from 5 to 20). Amendment of the base formula cost(n) = n² to any linear function is identified as a violation of the P5 invariant and is automatically rejected.

§ 3. P11 — Success Multiplier: coalition amplifier.

§ 3.1. Formula. The effective influence of an organic citizen coalition verified through the Coalition Verification Protocol is calculated by the formula effective_influence = n ×

√(n_supporters), where n is the aggregate base influence of the coalition and n_supporters is the number of verified unique participants in the coalition, each of whom is identified through a current Soulbound NFT. This formula applies exclusively to coalitions that have completed the Coalition Verification Protocol in full.

§ 3.2. CollectiveBond. VIC⊥ entering GovernanceEngine through Madison Mode and other mechanisms is directed to CollectiveBond — the constitutional reserve fund financing infrastructure projects with a verified maximum citizen reach. Distribution of CollectiveBond is conducted through EQU⊥-voting with a 51% threshold upon presentation of projects that have passed CivicJuryEngine verification for conformity with the criterion of maximum reach. CollectiveBond may not be distributed in favor of state subjects without ratification in accordance with P17 (section 9 of the present article).

§ 3.3. Coalition Verification Protocol. To obtain Success Multiplier, a coalition shall pass verification on two independent criteria. The first criterion — participant uniqueness: each coalition participant is verified as a unique citizen through zk-proof of Soulbound NFT, precluding identity duplication. The second criterion — anti-coordination filter: no more than eighty percent (80%) of coalition members voted identically across all of the last ten (10) votes in GovernanceEngine. Upon exceeding this threshold, the coalition is referred for additional verification by CivicJuryEngine with a composition of no fewer than twenty-one (21) auditors.

§ 3.4. Mutual exclusion with diversity penalty. A cluster that has received a diversity penalty in accordance with section 2.3 of the present article is not entitled to simultaneously or within the same vote claim Success Multiplier. This constraint is automatic and does not require a separate decision by GovernanceEngine.

§ 4. P12 — Dual Reserve Market: infrastructural sovereignty.

§ 4.1. Generation of VIC⊥. VIC⊥ is generated exclusively through verified current contribution to the infrastructure of Virtublic through Proof-of-Resource (verification of computational resources, bandwidth, and data storage). Accumulated participation history is not automatically converted into additional VIC⊥: each calculation period, VIC⊥ is recalculated on the basis of verified current contribution. This norm is the constitutional closure of theorem T11: compound advantage of early holders through the accumulation of historical VIC⊥ is constitutionally prohibited.

§ 4.2. SlotMarket v4.1. Distribution of computational resources in the infrastructure of Virtublic is conducted through SlotMarket v4.1 — a computational slot auction mechanism with constitutionally constrained concentration: no operator may control more than twenty-five percent (25%) of the aggregate computational capacity of the network at any point in time. Attainment of this threshold automatically initiates a review of distribution through GovernanceEngine. SlotMarket v4.1 is an amendable parameter with respect to the technical specifications of the auction mechanism; the 25% concentration threshold is a constitutionally fixed parameter, amendable only through the Axiom-Break Condition as a consequence of P4 and P5.

§ 4.3. CollectiveBond — resource base. VIC⊥ not utilized by operators within a calculation period, and VIC⊥ received through Madison Mode, form the resource base of CollectiveBond. The distribution procedure is established in section 3.2 of the present article.

§ 5. P13 — Digital Census v2: verifiable census.

§ 5.1. Periodicity. Digital Census v2 is conducted every three hundred sixty-five (365) days. The discontinuation of the Census or its delay beyond thirty (30) days is a constitutional violation, automatically identified by the Formal Verification Protocol and referred to P18 (section 10 of the present article) as a technical conflict of the first type.

§ 5.2. Dual Suspicion Protocol. Verification of the body of citizens is conducted through a two-stage protocol. Stage 1 — automated adaptive cognitive tests — applies to all citizens of the body on a mandatory basis. Stage 2 — collegial verification by CivicJuryEngine — applies to citizens who did not pass stage 1 for any reason, including technical failures and an atypical cognitive profile. Failure at stage 1 is grounds for referral to stage 2, but not grounds for exclusion from the body of citizens. The presumption of subjecthood operates at both stages: the system presumes that the verifiable subject is a citizen until a contrary conclusion by the panel.

§ 5.3. CivicJuryEngine — composition and decision. The Census panel is constituted through VRF (Verifiable Random Function). The minimum panel composition scales as follows: for a body of citizens up to ten thousand — twenty-one (21) auditors; for a body of ten thousand to one hundred thousand — thirty-seven (37) auditors; for a body of one hundred thousand to one million — sixty-three (63) auditors; for a body of more than one million — ninety-nine (99) auditors. The decision on confirmation or exclusion is adopted by a qualified majority of two-thirds (2/3) of the panel. Each auditor executes a constitutional oath through an on-chain transaction before the commencement of the panel's work; decisions are recorded on-chain with attribution to the Soulbound ID of each auditor. Rotation: an auditor who has participated in a Census panel may not be reselected by VRF (Verifiable Random Function) within one hundred eighty (180) days.

§ 6. P14 — Protected identity: zk-SNARK, Ring Signatures, Proof-of-Offline.

§ 6.1. zk-SNARK. Verification of citizens' political participation in EQU⊥-votes is conducted through zk-SNARK (zero-knowledge proofs — cryptographic protocols permitting the verification of the fact of participation without disclosure of the voter's identifiers). GovernanceEngine verifies that the subject participating in a vote is a unique verified citizen with a current Soulbound NFT, without recording how that citizen voted or who that citizen is. Deviation from this protocol is a violation of N1 and N4.

§ 6.2. Ring Signatures. In GovernanceEngine interactions requiring verification of group membership without disclosure of individual identity, Ring Signatures are applied (ring signatures — cryptographic schemes permitting proof of membership in a group without identification of the specific member). Ring Signatures are applied, in particular, under the Coalition Verification Protocol: a citizen's participation in an organic coalition is verified without public disclosure of the coalition's composition.

§ 6.3. Proof-of-Offline. Citizens are entitled to verify periods of offline activity through Proof-of-Offline — a cryptographically verified protocol confirming the absence of digital interaction during a specified period without disclosing the content of the offline activity. Proof-of-Offline data form the cognitive health score in the Constitutional Health Protocol (Article II, section 2.7) and are not transmitted to state subjects in any form — this prohibition is absolute in the sense of P17 (section 9.4 of the present article). Biometric data used in stage 1 of the Census are destroyed upon completion of the verification session: on-chain records exclusively the result of verification, not its grounds.

§ 7. P15 — Quorum Decay: minimum participation thresholds.

§ 7.1. Thresholds. Decisions of GovernanceEngine on the mechanisms P10–P18 are adopted at a minimum turnout threshold of fifty-one percent (51%) of the verified body of citizens. Amendments affecting the constitutional core P0–P7 require a turnout threshold of sixty-six percent (66%) and pass exclusively through the Axiom-Break Condition (Article II). Decisions on ordinary operational parameters of GovernanceEngine not directly affecting P10–P18 are adopted at a minimum turnout threshold of thirty-three percent (33%).

§ 7.2. Quorum Decay. Upon the systematic decline of turnout below threshold values, GovernanceEngine applies Quorum Decay: the decision threshold is not reduced; however, questions that have failed to attain quorum three consecutive times are automatically referred to the Constitutional Health Protocol for monitoring as an indicator of potential systemic crisis. This norm is the bridge between the operational protocols of Article III and the diagnostic mechanisms of Article II: systematic failure to attain quorum is not grounds for the reduction of thresholds, but is a signal for the Constitutional Health Protocol.

§ 8. P16 — Rockefeller Mode: the state as operator.

§ 8.1. Position of the state in infrastructural sovereignty. State subjects satisfying the definition of Article I (Preamble) are entitled to participate in the infrastructural sovereignty of Virtublic as operators through the mechanisms of the Dual Reserve Market (section 4 of the present article). The state's participation as an operator yields VIC⊥ proportional to verified infrastructural contribution — identically to other operators.

§ 8.2. Constitutional delineation. VIC⊥ held by a state subject is not convertible into EQU⊥ under any circumstances by virtue of P4. A state subject is not a citizen in the sense of Article I and does not hold the right to participate in EQU⊥-votes. A state holding VIC⊥ through infrastructural contribution participates in the Concordance Rule as applied to decisions affecting both sovereignties — exclusively with respect to VIC⊥-voting, without the right to EQU⊥-participation in the same decisions. This delineation is constitutionally ineliminable and may not be modified through the procedures of the present article.

§ 8.3. State and CollectiveBond. A state subject is not entitled to be a recipient of CollectiveBond funds without undergoing the state mandate ratification procedure in accordance with P17 (section 9 of the present article). The direction of CollectiveBond funds to a state subject is classified by GovernanceEngine as a request for state access to citizens' resources and is automatically referred to the State Audit Protocol.

§ 9. P17 — SovereigntyShield: state neutrality.

§ 9.1. State Audit Protocol. Each request by a state subject for access to data of citizens of Virtublic, for influence over the algorithmic architecture of GovernanceEngine, or for the receipt of aggregated profiles is registered as an on-chain transaction with the cryptographic signature of the state subject prior to any actual interaction. Unratified requests are automatically rejected by GovernanceEngine. Attempts at access through technical proxies, identified through anomaly detection, are referred to P18 (section 10 of the present article) as a constitutional violation of the sovereignty type.

§ 9.2. Ratification procedure. A state mandate for access to citizens' data is issued exclusively upon the sequential satisfaction of the following conditions. First — the state subject submits an official request through the State Audit Protocol with mandatory specification of four elements: purpose (a specific public function), scope (the principle of least access), duration (a specific period without the right of automatic renewal), and oversight mechanism. Second — CivicJuryEngine verifies the compatibility of the request with N1–N7. Third — EQU⊥-voting attains the threshold of seventy-five percent (75%). The mandate is not renewed automatically: renewal requires a new full ratification procedure.

§ 9.3. Extraterritorial principle. Data of citizens of Virtublic follow the constitution rather than the territory: the constitutional protection regime of P17 applies regardless of the jurisdiction of the physical storage of the data. A state that obtains data of citizens of Virtublic through domestic legal mechanisms without undergoing the ratification procedure is in violation of the present Constitution.

§ 9.4. Absolute prohibitions. The following practices are constitutionally prohibited and are not admissible for ratification under any circumstances, including the outcome of EQU⊥-voting: bulk collection without individual suspicion; transfer of data to third states without separate ratification; political targeting; access to cognitive health data in any form. These prohibitions are encoded in the Coq specification of P17 as absolute constraints: proposals containing any of the prohibited elements are automatically rejected by the Formal Verification Protocol at the stage of request registration.

§ 10. P18 — Conflict-Resolution Core: autonomous conflict resolution.

§ 10.1. Classification of conflicts. GovernanceEngine classifies conflicts arising within the constitutional order into three types. A technical conflict (type 1) — a discrepancy between the parameters of P10–P18 and their constitutional specifications — is resolved through automatic proof by the Formal Verification Protocol: the system returns to the last constitutionally verified state. A sovereignty conflict (type 2) — a violation of the orthogonality of EQU⊥/VIC⊥, an attempt at state capture, or factional capture — is resolved through the conjunction of automatic proof and historical pattern analysis: GovernanceEngine establishes the fact of violation and applies the constitutionally prescribed consequences without a human decision at the stage of primary classification. A fundamental conflict (type 3) — a collision of principles P0–P7 in a situation not provided for by any of the existing protocols — is resolved through a constitutional-type referendum: EQU⊥-voting with a

threshold of seventy-five percent (75%) following a preliminary conclusion by CivicJuryEngine on the absence of a manifest constitutional violation.

§ 10.2. Automatic proof. For type 1 conflicts and a portion of type 2 conflicts, the Formal Verification Protocol produces automatic proof through the Coq specification: the conflict is resolved without a human arbiter, which eliminates the vulnerability to capture through pressure on the arbiter, recorded in Volume I (regularity 12).

§ 10.3. Historical patterns. GovernanceEngine maintains a verified on-chain registry of historical conflict patterns. Upon identification of a conflict structurally analogous to previously resolved ones, GovernanceEngine applies the constitutionally verified precedent. A precedent is applicable if: it was resolved through a constitutionally correct procedure; the circumstances of the current conflict are structurally identical by verifiable parameters; the application of the precedent does not violate any invariant of P0–P7.

§ 10.4. Constitutional-type referendum. For type 3 conflicts, GovernanceEngine initiates a referendum with a preliminary period of Constitutional Dialogue (thirty days with constitutionally guaranteed coverage ε) and a subsequent EQU⊥-vote. The result of the referendum is constitutionally binding for GovernanceEngine and is recorded on-chain as a constitutional precedent. Upon failure to attain the seventy-five percent (75%) threshold, the conflict is classified as unresolved through ordinary procedures and referred to the Constitutional Health Protocol as an indicator of potential systemic crisis.

Chapter Summary

Article III codifies the nine operational mechanisms P10–P18 into constitutional text of direct effect with precise numerical parameters, rules of amendability, and criteria of verification. Each mechanism is a self-executing norm fixed in the Coq specification of GovernanceEngine: cost(n) = n² for Madison Mode; effective_influence = n × √(n_supporters) for Success Multiplier; SlotMarket v4.1 with a 25% concentration threshold for the Dual Reserve Market; two-stage Dual Suspicion Protocol with scalable CivicJuryEngine for Digital Census v2; the triad of zk-SNARK, Ring Signatures, and Proof-of-Offline for protected identity; thresholds of 51%/33% with Quorum Decay for participation; VIC⊥ without EQU⊥ for the state as operator; State Audit Protocol with a 75% EQU⊥ threshold and absolute prohibitions for SovereigntyShield; three-type conflict classification with automatic proof, historical patterns, and referendum for the Conflict-Resolution Core.

Transition to Chapter 24

Article III completes the codification of the operational mechanisms. Part IV also contains Article IV, establishing the rules of interpretation, hierarchy, and application of constitutional norms in cases of uncertainty not encompassed by any of the existing protocols. Article IV is the concluding norm of the constitutional text: it establishes the manner in which the constitution applies to situations not directly provided for by it, without violation of its principles.

Chapter 24. Article IV: Concordance Rules

Article IV concludes the constitutional text of Virtublic by establishing four rules governing the application of constitutional norms in situations requiring coordination between the different levels and sovereignties of the system. These rules introduce no new principles: they codify procedural mechanisms without which the principles P0–P18 would remain substantively correct but operationally incomplete with respect to borderline and crisis situations.

ARTICLE IV. Concordance Rules

§ 1. General provision.

The present Article establishes four constitutionally mandatory rules determining procedural coordination between the sovereignties, levels of amendability, and institutions of Virtublic. These rules apply automatically through GovernanceEngine and the Formal Verification Protocol in all situations falling within their scope, without a separate decision on application being required. The rules of the present Article take priority over any technical parameters of P10–P18 upon a conflict arising between them, but do not take priority over the constitutional core P0–P7, the normative principles N1–N7, or the normative axiom NA0.

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§ 2. Concordance Rule: the rule of sovereignty concordance.

§ 2.1. General principle. Concordance Rule is the constitutional rule requiring a qualified majority in both sovereignties — EQU⊥ and VIC⊥ — for decisions affecting both dimensions simultaneously. This rule is the operational embodiment of P4 (dual sovereignty): the orthogonality of EQU⊥ and VIC⊥ means not only their mutual non-convertibility but also their mutual necessity for the legitimation of decisions having consequences in both spaces. Concordance Rule applies to five constitutionally defined categories of decisions.

§ 2.2. Category one: amendment of P1–P7. The threshold — seventy-five percent (75%) EQU⊥ and seventy-five percent (75%) VIC⊥ — applies exclusively within the Axiom-Break procedure (Article II, section 2) and Constitutional Convention (Article II, section 3). Attainment of this threshold outside the framework of Axiom-Break produces no constitutional consequences for P1–P7: Concordance Rule is not an independent ground for amendment of the constitutional core and does not substitute for the conditions established by section 2.2 of Article II. The Formal Verification Protocol automatically rejects any proposal to amend P1–P7 submitted to GovernanceEngine outside the framework of Axiom-Break, regardless of the number of supporting votes.

§ 2.3. Category two: amendment of P10–P18. The threshold — fifty-one percent (51%) EQU⊥ and fifty-one percent (51%) VIC⊥. Concordance Rule applies to amendments of P10–P18 identified by the Formal Verification Protocol as affecting both sovereignties. Amendments to P10–P18 affecting exclusively the EQU⊥ space (for example, amendment of EQU⊥-voting thresholds not affecting infrastructure parameters) do not require a VIC⊥ majority and are adopted through EQU⊥-voting with a threshold of 51% pursuant to section 1 of Article III. Identification of the category of the affected space is carried out by the Formal Verification Protocol automatically at the proposal submission stage.

§ 2.4. Category three: technical decisions. The threshold — fifty-one percent (51%) VIC⊥ — applies to decisions of a technical nature affecting exclusively the VIC⊥ space: network parameters, technical node standards, Dual Reserve Market protocol specifications, SlotMarket v4.1 parameters in the part relating to technical implementation. Such decisions do not require a EQU⊥ majority provided that the Formal Verification Protocol confirms their exclusively technical nature and the absence of direct impact on the political rights of citizens. Upon identification of indirect impact on political participation (for example, amendment of technical node requirements that raises the participation barrier for citizens with limited resources), the decision is automatically reclassified into category two with the corresponding thresholds.

§ 2.5. Category four: political decisions. The threshold — fifty-one percent (51%) EQU⊥ — applies to decisions of a political nature affecting exclusively the EQU⊥ space: operational parameters of GovernanceEngine in the part directly regulating the political participation of citizens that entails no infrastructure consequences. This category is the mirror of category three: as technical decisions do not require a EQU⊥ majority, political decisions do not require a VIC⊥ majority upon confirmed single-space nature of the decision.

§ 2.6. Category five: state mandate under SovereigntyShield. The threshold — seventy-five percent (75%) EQU⊥ in conjunction with a positive finding of CivicJuryEngine — applies to the procedure for ratification of a state mandate pursuant to P17 (section 9, Article III). A VIC⊥ majority is not an independent requirement for ratification of a state mandate: this category is an exception to the general Concordance Rule as applied to decisions affecting both sovereignties, inasmuch as a state mandate is by its nature a political act founded on the will of citizens as subjects of political sovereignty, not a technical operation requiring infrastructure consensus. The absence of a VIC⊥ majority requirement in this category is not an exception to P4 but is its direct consequence: the mandate to the state for access to citizens' data is a sovereign decision of the people, not an operational decision of infrastructure operators.

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§ 3. Quorum Decay Rule: the rule of quorum adaptation.

§ 3.1. General principle. Quorum Decay Rule is the constitutional rule governing the application of turnout thresholds upon a systematic decline in participation in GovernanceEngine. This rule instantiates the following constitutional logic: quorum requirements exist to ensure the legitimacy of decisions through sufficiently broad

participation, however the mechanical application of fixed thresholds upon a systemic decline in turnout produces constitutional paralysis, in which the system is incapable of adopting any decision — which is one of the three outcomes identified in theorem T9 of Volume I. Quorum Decay Rule establishes dynamic adaptation that precludes paralysis without reducing the requirements for legitimacy.

§ 3.2. Baseline thresholds. The thresholds established in section 7 of Article III apply: 51% for decisions amending P10–P18, 33% for operational GovernanceEngine decisions, 66% for decisions initiating systemic crisis monitoring through Constitutional Health Protocol.

§ 3.3. Adaptation mechanism. Upon three consecutive failures to attain quorum on the same question, GovernanceEngine applies the following procedure. The first step — the question is referred to Constitutional Health Protocol for analysis of the reasons for the failure to attain quorum: apathy, a technical barrier, or insufficient political significance of the question. The second step — Constitutional Health Protocol produces a diagnostic conclusion within fifteen (15) days. The third step — on the basis of the diagnostic conclusion, GovernanceEngine applies one of three constitutionally provided actions: reduction of the turnout threshold by ten percentage points (10 p.p.) upon a diagnosis of "technical barrier," with mandatory elimination of the identified barrier through P10–P18; referral of the question to Constitutional Dialogue upon a diagnosis of "insufficient political significance," with a subsequent revote; initiation of systemic crisis monitoring upon a diagnosis of "systemic apathy."

§ 3.4. Exceptions to Quorum Decay Rule. The following categories of decisions do not fall within the scope of the adaptation mechanism of the present section. The first exception — the state mandate under SovereigntyShield (category five, section 2.6): the threshold of 75% EQU⊥ is constitutionally fixed and shall not be reduced on any ground, including a diagnosis of technical barrier. The second exception — activation of Axiom-Break (Article II): the conditions of systemic crisis are diagnostic criteria, not threshold quorum requirements, by virtue of which Quorum Decay Rule does not apply to them. The third exception — ratification of Constitutional Convention decisions (Article II, section 3.5): the threshold of 75%/75% is constitutionally fixed.

§ 3.5. Lower limit of adaptation. Reduction through the adaptation mechanism may not lower the turnout threshold below twenty-five percent (25%) for decisions in the "amendment of P10–P18" category and below fifteen percent (15%) for operational decisions. Attainment of the lower limit without adoption of a decision is a constitutionally significant event, automatically recorded as a second-level systemic crisis indicator in Constitutional Health Protocol, which initiates Constitutional Dialogue within seven (7) days.

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§ 4. State Neutrality Rule: the rule of state neutrality.

§ 4.1. General principle. State Neutrality Rule is the constitutional rule codifying the obligations of Virtublic with respect to state requests into a single procedural norm of direct

application, supplementing the mechanisms of P17 with respect to non-standard situations of interaction between the state and the constitutional order.

§ 4.2. Presumption of neutrality. GovernanceEngine applies the presumption of state neutrality in the following sense: in the absence of a valid ratified mandate, any interaction of a state actor with citizens' data or the algorithmic architecture of Virtublic is characterized as non-ratified and is automatically blocked by the State Audit Protocol. A state actor shall not invoke implied powers, historical precedents of informal interaction, or international legal mechanisms as grounds for access in circumvention of ratification: such grounds have no legal force within the present Constitution.

§ 4.3. Obligations of the state upon receipt of a mandate. A state actor that has received a ratified mandate pursuant to P17 assumes the following constitutional obligations, recorded as conditions of the mandate in an on-chain transaction. The first obligation — use of data strictly within the purpose, volume, term, and oversight mechanism specified in the ratified mandate. The second obligation — quarterly verifiable reporting to CivicJuryEngine on the execution of the mandate. The third obligation — destruction of data upon expiration of the mandate's term with cryptographically verifiable confirmation of destruction. The fourth obligation — immediate notification of GovernanceEngine of any change in circumstances that could affect the constitutional compatibility of the issued mandate.

§ 4.4. Violation of State Neutrality Rule. Violation of any of the obligations of section 4.3, as well as any non-ratified interaction of a state actor with citizens' data or the architecture of GovernanceEngine, is characterized as a sovereignty-type constitutional violation and produces the following automatic consequences. For a first-degree violation (exceeding the parameters of the mandate without malicious intent as established by CivicJuryEngine) — immediate suspension of the mandate and referral to CivicJuryEngine for evaluation. For a second-degree violation (willful breach of mandate parameters or non-ratified access) — nullification of the mandate, prohibition on the submission of new requests for twenty-four (24) months, and referral to P18 for resolution of the sovereignty conflict. This classification is not exhaustive: P18 may apply other constitutionally provided consequences upon characterizing the violation as more grave.

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§ 5. Emergency Activation Rule: the rule of emergency activation.

§ 5.1. General principle. Emergency Activation Rule is the constitutional rule establishing the conditions for and the limited powers of EmergencyExecutor — a temporary constitutional mechanism activated upon the simultaneous disruption of GovernanceEngine's functioning to a degree rendering the adoption of decisions through ordinary constitutional procedures impossible. This rule instantiates the following constitutional logic: the constitution may not contain mechanisms that permit paralysis of the republic through technical failure, inasmuch as technical paralysis in the absence of a constitutional response produces extra-constitutional seizure of governance by those capable of acting in conditions where viable procedures are absent.

§ 5.2. Three conditions for activation of EmergencyExecutor. EmergencyExecutor is activated upon the simultaneous occurrence of three conditions. The first condition — functional unavailability of GovernanceEngine: GovernanceEngine does not produce verifiable transactions for a continuous period of seventy-two (72) hours for reasons other than scheduled maintenance, as verified through timestamp signatures in the distributed network. The second condition — impossibility of applying ordinary constitutional procedures: CivicJuryEngine is unable to form a collegium through VRF by reason of the same technical cause as the first condition — this coincidence of causes precludes the scenario in which EmergencyExecutor is activated with a functioning CivicJuryEngine. The third condition — constitutional significance of the situation: the absence of a functioning GovernanceEngine creates an immediate threat of violation of at least one of the seven normative principles N1–N7 by verifiable criteria, not as a hypothetical possibility. All three conditions are verified automatically through distributed on-chain data; activation of EmergencyExecutor upon unverified presence of even one condition is constitutionally impermissible.

§ 5.3. Formation of EmergencyExecutor. Upon verification of all three conditions, EmergencyExecutor is formed from the last twenty-one (21) members of CivicJuryEngine who participated in collegia during the preceding one hundred and eighty (180) days, in descending order of recency of participation — that is, the most recently participating members have priority. This mechanism is constitutionally justified: it does not require a functioning VRF for formation and employs citizens who have already taken the constitutional oath, by virtue of which it does not generate new institutional actors outside the constitutional order.

§ 5.4. Limited powers of EmergencyExecutor. EmergencyExecutor possesses a strictly limited set of powers, exhaustively enumerated in the present section. EmergencyExecutor may carry out the following actions: verify the technical problem that caused the unavailability of GovernanceEngine and coordinate its elimination through technical verifiers; adopt the minimum necessary decisions on the current technical parameters of P10–P18 to preclude violations of N1–N7, with mandatory ex post ratification by GovernanceEngine within thirty (30) days following the restoration of its functionality; initiate Recovery Mode pursuant to section 3.8 of Article II upon satisfaction of its constitutional conditions.

EmergencyExecutor shall not carry out the following actions: propose amendments to P0–P7 in any form; adopt decisions on SovereigntyShield state mandates; initiate Axiom-Break; carry out any actions that generate irreversible constitutional consequences which cannot be nullified by GovernanceEngine following the restoration of its functionality. Any action of EmergencyExecutor that exceeds the enumerated powers is a sovereignty-type constitutional violation and is referred to P18 immediately following the restoration of GovernanceEngine.

§ 5.5. Termination of EmergencyExecutor's powers. The powers of EmergencyExecutor terminate immediately upon restoration of the functionality of GovernanceEngine, verified through the first successful on-chain transaction. Termination of powers is automatic and does not require a separate decision by EmergencyExecutor or any other organ. Within thirty (30) days following termination of powers, GovernanceEngine conducts mandatory

ratification of all decisions of EmergencyExecutor: ratified decisions remain in force; non-ratified decisions are automatically nullified with reversion of the system to the state preceding their adoption. The report on the activity of EmergencyExecutor is recorded on-chain as a constitutional document accessible to any verified citizen.

Chapter Summary

Article IV concludes the constitutional text of Virtublic by establishing four rules of procedural coordination. Concordance Rule codifies thresholds for five categories of decisions with precise demarcation between the constitutional core, operational amendments, and categories by affected sovereignty. Quorum Decay Rule establishes dynamic quorum adaptation with lower limits and exceptions that preclude constitutional paralysis without reducing legitimacy. State Neutrality Rule codifies the obligations attendant upon state requests and the consequences of their violation into a single norm of direct application. Emergency Activation Rule establishes three strict conditions for the activation of EmergencyExecutor, its limited powers, and the automatic termination mechanism that precludes the conversion of an emergency organ into a permanent one.

Chapter 25. Article V: Institutions of the Republic

Article V completes the constitutional text by establishing the eight institutions of the republic — the operational structures through which principles P0–P18 are embodied in specific functions, powers, and responsibilities. Each institution is a constitutionally defined actor with precisely established functions and insurmountable constraints: an institution acting beyond its constitutional powers commits a violation automatically identified by the Formal Verification Protocol.

CONSTITUTION OF VIRTUBLIC

ARTICLE V. INSTITUTIONS OF THE REPUBLIC

§ 1. General Provision.

The institutions established in the present article are constitutionally defined structures performing specific functions within the architecture of Virtublic. No institution is a source of constitutional legitimacy: the sole source of legitimacy is the people in the sense of P0. Each institution derives its powers from the constitutional text and is bounded by it with the same degree of obligatory force by which any other system actor is bounded. The excess of constitutional powers by any institution is a violation and is transmitted to the Conflict-Resolution Core (P18) for qualification and the application of constitutionally prescribed consequences.

The amendment of the functions and parameters of the institutions of the present article is permissible through the procedures for the amendment of P10–P18 (section 1, Article III), on condition that the amendment does not violate the constitutional core P0–P7. The abolition of an institution provided for in the present article is permissible exclusively upon the simultaneous establishment of a constitutionally equivalent replacement mechanism, verified by the Formal Verification Protocol as performing the same constitutional functions. Abolition without replacement is an attempt to amend the constitutional core and requires Axiom-Break (Article II).

§ 2. NodeFactory: delegation of infrastructural functions.

§ 2.1. Definition and function. NodeFactory is the constitutional institution performing the verification and delegation of infrastructural functions in the Virtublic network. The function of NodeFactory consists in the following: the verification of the technical conformity of infrastructure nodes with constitutional standards; the delegation of specific infrastructural functions to verified operators; the monitoring of the conformity of active operators with the constitutional parameters of Dual Reserve Market (P12).

§ 2.2. Powers of NodeFactory. NodeFactory is entitled to: verify the technical parameters of nodes through Proof-of-Resource; admit verified operators to participation in SlotMarket v4.1; initiate the review of the distribution of infrastructural functions upon the identification of violations of constitutional concentration constraints (the exceeding of 25% of the aggregate computational capacity of the network). NodeFactory is not entitled to: determine the parameters of SlotMarket v4.1 with respect to auction mechanisms without EQU⊥/VIC⊥-voting through GovernanceEngine; admit state actors to infrastructural participation in circumvention of the State Audit Protocol (P17); adopt decisions affecting the EQU⊥ sovereignty of citizens.

§ 2.3. Constraints and accountability. All NodeFactory decisions regarding verification and delegation are recorded on-chain with cryptographically verifiable grounds. NodeFactory does not possess discretionary powers: verification is effected through the Formal Verification Protocol according to constitutionally defined technical criteria rather than through administrative discretion. An operator that has not passed verification is entitled to appeal the decision through CivicJuryEngine within thirty (30) days.

§ 3. SlotMarket v4.1: auction of resource slots.

§ 3.1. Definition and function. SlotMarket v4.1 is the constitutional institution performing the distribution of computational resources in the Virtublic infrastructure through the mechanism of the resource slot auction. The function of SlotMarket v4.1 consists in securing the efficient and constitutionally constrained access of operators to the computational capacities of the network without producing the concentration prohibited by P4 and P5.

§ 3.2. Constitutional concentration constraints. No operator — including state actors functioning through Rockefeller Mode (P16) — may control more than twenty-five percent (25%) of the aggregate computational capacity of the network at any moment in time. The attainment of this threshold produces automatic blocking of further slot acquisition by that

operator until redistribution. GovernanceEngine initiates review through VIC⊥-voting within seven (7) days of the recording of the excess. This threshold is a constitutionally fixed parameter in the sense of section 4.2 of Article III and is not subject to amendment through the procedures of the present article.

§ 3.3. Auction procedure. The auction mechanism of SlotMarket v4.1 is realized through a transparent on-chain procedure with verifiable parameters: initial slot prices, the bid increment mechanism, and the distribution conditions are fixed through VIC⊥-voting with a threshold of 51% and are publicly verifiable through the Formal Verification Protocol. Amendment of the auction mechanism requires VIC⊥-voting of 51% in accordance with the third category of the Concordance Rule (Article IV, section 2.4).

§ 4. GovernanceEngine: collective decision-making.

§ 4.1. Definition and function. GovernanceEngine is the central constitutional institution performing the collective decision-making of the citizen body and infrastructure operators in accordance with principles P0–P18 and the rules of Articles I–IV. GovernanceEngine is the sole constitutionally legitimate platform for the adoption of decisions producing constitutional consequences within Virtublic.

§ 4.2. Functions of GovernanceEngine. GovernanceEngine performs the following constitutional functions: the receipt and primary verification of proposals through the Formal Verification Protocol; the organization of EQU⊥-votes and VIC⊥-votes in accordance with the Concordance Rule (Article IV, section 2); the automatic execution of adopted decisions through the Coq specification; the monitoring of constitutional metrics through the Constitutional Health Protocol; the classification and primary processing of conflicts through the Conflict-Resolution Core (P18); the production of monthly Constitutional Health Protocol reports, publicly verifiable on-chain.

§ 4.3. Constraints of GovernanceEngine. GovernanceEngine does not possess discretionary powers with respect to the interpretation of constitutional norms as applied to specific situations: interpretive conflicts are transmitted to P18 (section 10, Article III). GovernanceEngine is not a source of constitutional legitimacy: its decisions are legitimate insofar as they are produced in accordance with constitutional procedures. GovernanceEngine may not adopt decisions outside constitutionally defined procedures, including in situations not formally provided for by the constitutional text: such situations are transmitted to P18 for qualification as type 3 conflicts.

§ 5. PoPRegistry v3: Proof-of-Offline.

§ 5.1. Definition and function. PoPRegistry v3 is the constitutional institution performing the verification and storage of Proof-of-Offline data — cryptographically verified attestations of citizens' offline activity periods — in accordance with P14 (section 6, Article III). The function of PoPRegistry v3 consists in the following: the verification of citizens' attestations of offline activity periods without disclosure of the content of that activity; the formation of a cognitive health score on the basis of verified data; the transmission of aggregated metrics to the Constitutional Health Protocol for monitoring.

§ 5.2. Verification principles. PoPRegistry v3 verifies the fact of offline activity through the following mechanism: the citizen cryptographically signs an attestation of an offline period with timestamps indicating commencement and conclusion; the absence of on-chain transactions from that Soulbound ID during the indicated period is a necessary but not sufficient confirmation; biometric or behavioral data employed in supplementary verification are destroyed upon the conclusion of the session in accordance with section 6.3 of Article III.

§ 5.3. Absolute prohibitions. PoPRegistry v3 may not transmit cognitive health data to state actors in any form — this prohibition is absolute in the sense of section 9.4 of Article III. PoPRegistry v3 may not retain biometric data of citizens upon the conclusion of the verification session: retention is identified by the Formal Verification Protocol as a violation of N1 and N4. Aggregated data are transmitted to the Constitutional Health Protocol exclusively in anonymized form that does not permit the identification of individual citizens.

§ 6. CivicJuryEngine: the Civic Guard.

§ 6.1. Definition and function. CivicJuryEngine is the constitutional institution managing the formation, functioning, and accountability of citizen auditor panels for the following constitutional functions: Census panels (Digital Census v2, P13, section 5 of Article III); state mandate verification panels (P17, section 9.2 of Article III); the extended panel for Convention proposals affecting SovereigntyShield (Article II, section 2.6); conflict resolution panels of type 2 and type 3 (P18, section 10 of Article III); the verification of coalition organicity under the Coalition Verification Protocol (P11, section 3.3 of Article III).

§ 6.2. Principles of panel formation. All CivicJuryEngine panels are formed through VRF (Verifiable Random Function) from the verified citizen body, in compliance with the constitutionally established constraints for each category. Participation is voluntary, with a constitutional oath through an on-chain transaction as the mandatory condition of entry into a panel. Rotation constraints are applied in accordance with the parameters established for each function in Articles II–IV. All panel decisions are recorded on-chain with binding to the Soulbound ID of each auditor.

§ 6.3. Auditor accountability. The sanction system of CivicJuryEngine distinguishes three types of violations: a procedural violation (temporary suspension of the right to participate in the next panel); an unintentional error (recording in the auditor's on-chain history without sanctions); an intentional violation (nullification of the auditor's Soulbound ID as a constitutional violation). This sanction structure is constitutionally mandatory: GovernanceEngine may not apply sanctions to auditors other than those established in the present section.

§ 7. SovereigntyShield: state neutrality.

§ 7.1. Definition and function. SovereigntyShield is the constitutional institution performing the application of P17 (section 9, Article III) as a self-executing norm of state neutrality through the State Audit Protocol. The function of SovereigntyShield consists in the following: the automatic processing and verification of state requests; the blocking of unratified requests prior to their actual execution; the organization of the state mandate ratification

procedure in accordance with section 9.2 of Article III; the monitoring of the execution of active mandates; the identification of circumvention attempts through technical proxies.

§ 7.2. Operational independence. SovereigntyShield functions independently of any state actors claiming a mandate or already possessing an active mandate: a state actor holding an active mandate acquires no powers to alter the parameters of SovereigntyShield or to influence its functioning with respect to other state requests. This property is constitutionally mandatory: its violation is qualified as an attempt at state capture of the sovereignty type.

§ 7.3. Relation to the Formal Verification Protocol. SovereigntyShield instantiates P17 through the Formal Verification Protocol: all of its decisions to block or admit state requests are based on automatic verification against the Coq specification rather than on administrative discretion. A SovereigntyShield decision produced outside the Formal Verification Protocol is a constitutional violation and is transmitted to P18.

§ 8. EmergencyExecutor: emergency powers.

§ 8.1. Definition and function. EmergencyExecutor is a constitutional institution of temporary character, activated exclusively upon the simultaneous satisfaction of the three conditions established in Article IV, section 5.2. The function of EmergencyExecutor is strictly constrained: the maintenance of the minimally necessary functioning of the constitutional order during the period of the technical unavailability of GovernanceEngine.

§ 8.2. Constitutional constraints. EmergencyExecutor may not propose or adopt amendments to principles P0–P7 in any form — this prohibition is absolute and admits of no exceptions. EmergencyExecutor may not adopt decisions concerning state SovereigntyShield mandates, initiate Axiom-Break, or perform any actions producing irreversible constitutional consequences. The powers of EmergencyExecutor terminate automatically upon the restoration of the functionality of GovernanceEngine without the requirement of an additional termination decision. All EmergencyExecutor decisions are subject to mandatory ratification by GovernanceEngine within thirty (30) days following restoration; unratified decisions are automatically nullified.

§ 8.3. Composition and accountability. The composition of EmergencyExecutor and the mechanism of its formation are established in Article IV, section 5.3: twenty-one (21) citizens drawn from among those most recently participating in CivicJuryEngine panels. The members of EmergencyExecutor bear constitutional accountability on equal terms with CivicJuryEngine auditors with respect to decisions adopted within the scope of their powers; decisions adopted beyond the scope of their powers entail the consequences established for constitutional violations of the sovereignty type.

§ 9. CollectiveBond: collective insurance.

§ 9.1. Definition and function. CollectiveBond is the constitutional institution performing the management of the reserve fund formed from VIC⊥ received through Madison Mode and other mechanisms established in section 3.2 of Article III. The function of CollectiveBond consists in the financing of infrastructural projects with a verified maximum citizen coverage

and in the performance of the function of constitutional collective insurance — securing the infrastructural resilience of the system in the event of failures affecting a broad citizen body.

§ 9.2. Distribution criteria. The distribution of CollectiveBond funds is effected through EQU⊥-voting with a threshold of 51% with respect to projects that have passed CivicJuryEngine verification according to the following criterion: the project secures verifiable improvement of access to infrastructure for the maximum number of citizens. This criterion is constitutionally mandatory and may not be replaced by other criteria without amendment of the present section through the procedures of Article III. State actors may not be recipients of CollectiveBond funds without undergoing the state mandate ratification procedure in accordance with P17.

§ 9.3. Usage constraints. CollectiveBond is not the general budget of GovernanceEngine: fund resources are directed exclusively toward the purposes established in section 9.2 of the present article. The use of CollectiveBond resources for the financing of the operational expenditures of GovernanceEngine, CivicJuryEngine, or other institutions is a constitutional violation. All CollectiveBond operations are recorded on-chain with full verifiability of fund movements for any verified citizen.

Chapter Summary

Article V completes the constitutional text of Virtublic by establishing eight institutions with precisely defined functions, powers, and insurmountable constraints. NodeFactory manages the delegation of infrastructural functions through Proof-of-Resource verification. SlotMarket v4.1 distributes computational resources through an auction with a constitutional concentration threshold of 25%. GovernanceEngine performs collective decision-making as the central constitutional institution without discretionary powers. PoPRegistry v3 verifies offline activity with an absolute prohibition on the retention of biometric data. CivicJuryEngine manages citizen auditor panels with constitutional accountability for each decision. SovereigntyShield instantiates state neutrality as a self-executing norm. EmergencyExecutor functions as a constitutionally constrained temporary mechanism without the right to amend P0–P7. CollectiveBond directs resources from concentration toward diffuse public goods.

Chapter 26. Article VI: Protocols of the republic

Article VI establishes ten cryptographic and verification protocols constituting the technological foundation of the constitutional order of Virtublic. These protocols are not technical appendices to the constitutional text: they are its integral part, inasmuch as the constitution, encoded as an executable Coq specification (Article I, Definition V), instantiates its norms precisely through these protocols. A protocol functioning in violation of the parameters of the present article violates the constitution — and not merely a technical standard.

CONSTITUTION OF VIRTUBLIC

ARTICLE VI. PROTOCOLS OF THE REPUBLIC

§ 1. General provision.

The protocols established by the present article are constitutionally defined technical mechanisms through which the rights and obligations fixed in Articles I–V acquire executable form. Each protocol is an integral part of the constitutional text: amendment of the technical parameters of any protocol that entails a violation of the constitutional invariants P0–P7 or normative principles N1–N7 is a constitutional violation regardless of whether it is produced through amendment of the text of Article VI or through other technical updates of GovernanceEngine. The Formal Verification Protocol verifies the compatibility of all protocol updates with the constitutional invariants automatically prior to their application.

Amendment of the parameters of the protocols of the present article is permissible through the procedures for amendment of P10–P18 (section 1, Article III) subject to passage of verification. Replacement of a protocol by a technically equivalent one — that is, a protocol yielding identical constitutional guarantees through different technical means — is permissible through the same procedures upon a positive conclusion by the technical verifiers of CivicJuryEngine as to constitutional equivalence.

§ 2. Protocol zk-SNARK: zero-knowledge proofs.

§ 2.1. Definition. zk-SNARK (Zero-Knowledge Succinct Non-Interactive Argument of Knowledge — a zero-knowledge proof, succinct and non-interactive: a cryptographic mechanism permitting proof of the correctness of a statement without disclosing the information underlying it) is the constitutional protocol applied in all situations requiring verification of the constitutional status of a citizen without disclosure of his identifiers.

§ 2.2. Domains of application. zk-SNARK is applied in four constitutionally defined contexts. The first — Digital Census v2: verification of the uniqueness of a citizen in the Merkle Tree of the body of citizens without disclosure of the Soulbound ID. The second — EQU⊥-voting: verification of the citizen's right to participate without recording the connection between the Soulbound ID and a specific vote. The third — Proof-of-Offline: verification of the fact of an offline period without disclosure of its content. The fourth — SovereigntyShield: verification that the requesting subject is a citizen and not a state subject, in the processing of certain categories of requests.

§ 2.3. Constitutional requirements for implementation. The implementation of zk-SNARK must satisfy the following constitutional requirements: the proof must not disclose, either directly or indirectly, the identifiers of the subject generating the proof; the verifier checking the proof must receive exclusively a binary result of "true/false" without additional information; the parameters of the zk-SNARK scheme are publicly verifiable through the Formal Verification Protocol. An implementation violating at least one of these requirements is classified as a violation of N1 and N4.

§ 3. Ring Signatures: anonymous group membership.

§ 3.1. Definition. Ring Signatures (ring signatures — cryptographic schemes permitting proof of membership in a group without identification of the specific member of the group who signed the message) are the constitutional protocol applied when verification of group membership without disclosure of individual identity is necessary.

§ 3.2. Domains of application. Ring Signatures are applied in the following constitutionally defined contexts. The first — Coalition Verification Protocol (P11, section 3.3 of Article III): a citizen's participation in an organic coalition is verified without public disclosure of the coalition's composition. The second — anonymous participation in Constitutional Dialogue: the citizen is verified as a member of the body of citizens without attribution of his statements to a Soulbound ID. The third — group verification under the Dual Suspicion Protocol, stage 2: the CivicJuryEngine panel interacts with a group of citizens without disclosure of individual identifiers in the course of collective verification.

§ 3.3. Constitutional requirements for implementation. The ring parameters (the set of public keys constituting the group) must be sufficient to preclude de-anonymization through analysis of ring size: the minimum ring size for voting contexts is one hundred twenty-eight (128) elements. The public parameters of the Ring Signatures scheme are verifiable through the Formal Verification Protocol.

§ 4. Formal Verification Protocol: Coq specification of P0–P18.

§ 4.1. Definition. The Formal Verification Protocol is the constitutional protocol through which all norms P0–P18, normative principles N1–N7, and normative axiom NA0 are encoded in the formally verified Coq specification of GovernanceEngine. Coq (the proof assistant — a system of formal theorem proving permitting the mathematical verification of the correctness of program code relative to specified specifications) is the constitutionally defined instrument for the implementation of the present protocol.

§ 4.2. Functions of the protocol. The Formal Verification Protocol performs the following constitutionally mandatory functions: verification of each proposal submitted to GovernanceEngine for compatibility with the invariants of P0–P7 prior to its referral to a vote; semantic verification of amendments to P10–P18 for conformity with N1–N7; blocking of proposals that violate constitutional invariants at the stage of submission without referral to a vote; periodic verification of the aggregate state of the system through the Constitutional Health Protocol for the purpose of identifying cumulative drift relative to the Coq specification.

§ 4.3. Constitutional requirements for implementation. The Coq specification of P0–P18 is publicly verifiable: any subject with the requisite technical competence is entitled to independently verify that the implemented protocol conforms to the published specification. Amendment of the Coq specification without passage of the constitutional procedures for amendment of the corresponding principles is a constitutional violation of the first degree, referred to P18.

§ 5. Merkle Tree: organization of Soulbound IDs.

§ 5.1. Definition. Merkle Tree (a data structure organizing the hashes of elements into a hierarchical tree, permitting verification of the membership of an element in a set without disclosure of the remaining elements) is the constitutional protocol through which the registry of Soulbound IDs of the verified body of citizens is organized.

§ 5.2. Constitutional functions. The Merkle Tree performs the following constitutionally defined functions: verification of the membership of a specific Soulbound ID in the body of citizens through Merkle Proof without disclosure of other elements of the registry; ensuring the cryptographic integrity of the registry — any unsanctioned modification of the registry is immediately detected through a change in the Merkle Tree root hash; public verifiability of the root hash as a guarantee that the composition of the body of citizens is verifiable at any point in time.

§ 5.3. Registry update. The Merkle Tree is updated upon the completion of each Digital Census v2 through GovernanceEngine with on-chain recording of the new root hash. The addition or exclusion of elements from the registry outside the Census procedure is a constitutional violation, automatically identified through a discrepancy between the root hash and the recorded value.

§ 6. Proof-of-Resource: verification of resource contribution.

§ 6.1. Definition. Proof-of-Resource is the constitutional protocol through which infrastructure operators verify their current contribution to the Virtublic network for the generation of VIC⊥ in accordance with P12 (section 4, Article III). Proof-of-Resource verifies three categories of contribution: computational resources (processor capacity made available to the network), bandwidth (verified bandwidth of network connections), and data storage (verified volume of storage provided for the needs of the network).

§ 6.2. Calculation period. VIC⊥ is calculated on the basis of Proof-of-Resource for the current calculation period (thirty days) without accounting for accumulated historical participation history. This norm is the constitutional closure of theorem T11 (Volume II): the automatic accumulation of VIC⊥ on the basis of historical participation without current verified contribution is a constitutional violation.

§ 6.3. Verification requirements. Proof-of-Resource does not admit virtual or delegated provision of resources: the verifiable resource must physically function under the management of the operator presenting the proof. Delegation of Proof-of-Resource to another operator without notification of GovernanceEngine is a violation entailing the nullification of VIC⊥ for the calculation period.

§ 7. Dual Suspicion Protocol: stages of identity verification.

§ 7.1. Definition. The Dual Suspicion Protocol is the constitutional protocol instantiating the two-stage verification of citizens' subjecthood within the framework of Digital Census v2 (P13, section 5 of Article III). The protocol is grounded in the principle of the presumption of

subjecthood: the system presumes that each verifiable subject is a citizen and not a fictitious identity, until a contrary conclusion by the panel of the second stage.

§ 7.2. Stage one: automated adaptive tests. The first stage instantiates three constitutionally defined classes of tests: cognitive-contextual tasks verifying the presence of a living subject through contextual comprehension; temporally variable tasks verifying reaction patterns statistically incompatible with automated response; biometric patterns without storage of biometric data — analysis of micro-variations in interaction with subsequent destruction of the source data and recording exclusively of the binary verification result. Adaptation of the tests by difficulty and type is publicly auditable through the Formal Verification Protocol: the parameters of the adaptive algorithm are recorded on-chain.

§ 7.3. Stage two: collegial verification. The second stage is activated upon failure of the first for any reason, including technical failure and an atypical cognitive profile. The CivicJuryEngine panel interacts with the citizen through a zk-identifier without disclosure of identity and disposes of three constitutional outcomes: confirmation of status (2/3 majority), referral to a repeated stage 1 with an expanded protocol (simple majority), exclusion from the body of citizens (2/3 majority). Exclusion is recorded on-chain with attribution to the Soulbound ID of each auditor who participated in the vote.

§ 8. VRF: formation of the civic guard.

§ 8.1. Definition. VRF (Verifiable Random Function — a cryptographically verifiable function of random selection: an algorithm yielding a random result whose verifiability is mathematically provable and which cannot be predicted or manipulated by the operator) is the constitutional protocol used for the formation of all CivicJuryEngine panels and the composition of the Constitutional Convention.

§ 8.2. Constitutional requirements for implementation. VRF (Verifiable Random Function) must satisfy the following requirements. The first — verifiability: any citizen is entitled to independently verify that the composition of the panel was determined randomly from the verified body, without the possibility of prior collusion as to composition. The second — unpredictability: the result of VRF (Verifiable Random Function) must not be computationally predictable by any participant in the system prior to its public disclosure. The third — non-manipulability: the operator performing the VRF (Verifiable Random Function) computation must not have the capacity to select a desired result from among several admissible ones. An implementation violating at least one of the three requirements is classified as a violation of P6 and referred to P18.

§ 8.3. Public verifiability. Each VRF (Verifiable Random Function) result determining the composition of a panel is recorded on-chain with cryptographic proof of its correctness. This proof is verifiable by any citizen through a publicly accessible verification algorithm.

§ 9. State Audit Protocol: recording of state requests.

§ 9.1. Definition. The State Audit Protocol is the constitutional protocol through which the self-executing norm of state neutrality P17 (section 9, Article III) is instantiated as applied to state requests for access to citizens' data and the architecture of GovernanceEngine.

§ 9.2. Requirements for the registration of requests. Each state request falling within the scope of P17 is registered through the State Audit Protocol in the following order: the state subject submits the request with a cryptographic signature through GovernanceEngine prior to any actual interaction with citizens' data or the system's architecture; the request is recorded on-chain with a timestamp and the complete set of mandatory elements (purpose, scope, duration, oversight mechanism); the Formal Verification Protocol verifies the absence in the request of elements from the list of absolute prohibitions (section 9.4 of Article III). Access without prior on-chain registration is technically impossible: GovernanceEngine verifies the existence of a current ratification before granting any access.

§ 9.3. Monitoring of proxy access. The State Audit Protocol instantiates anomaly detection for the identification of indirect state access through affiliated structures. The identification criterion is established in section 18.7 of Chapter 18 of the present work and is encoded in the Coq specification: an aggregate of requests from affiliated subjects equivalent in coverage to unratified state bulk collection is referred to P18 as a constitutional violation of the sovereignty type.

§ 10. Coalition Verification Protocol: verification of coalition organicity.

§ 10.1. Definition. The Coalition Verification Protocol is the constitutional protocol verifying the organicity of citizen coalitions for the purposes of applying the Success Multiplier (P11, section 3, Article III). An organic coalition is a coalition all of whose members are unique verified citizens who have united on the basis of independently formed convictions rather than external coordination.

§ 10.2. Two-criterion verification. The Coalition Verification Protocol applies two criteria sequentially. The first criterion — verification of participant uniqueness through zk-proof of Soulbound NFT: each participant is verified as a unique citizen without disclosure of his identifiers. The second criterion — anti-coordination filter: no more than eighty percent (80%) of coalition members voted identically across all of the last ten (10) votes; exceeding this threshold refers the coalition for additional verification by CivicJuryEngine.

§ 10.3. Mutual exclusion with diversity penalty. A cluster identified as coordinated through the antifaction filter of P10 (section 2.3 of Article III) is not entitled to simultaneously claim Success Multiplier in the same vote: this mutual exclusion is automatic through the Formal Verification Protocol.

§ 11. Constitutional Health Protocol: monthly diagnostics.

§ 11.1. Definition. The Constitutional Health Protocol is the constitutional protocol through which GovernanceEngine performs monthly automatic diagnostics of the state of the constitutional order on the basis of verifiable on-chain data. The protocol is an instrument for

the early identification of conditions of systemic crisis prior to their reaching the thresholds of the Axiom-Break Condition (Article II, section 2).

§ 11.2. Metrics and thresholds. The Constitutional Health Protocol produces a monthly report across four constitutionally defined metrics with indication of their current values and trends. The first metric — turnout trend: the dynamics of turnout of verified citizens at votes over the preceding six months with a forecast of the attainment of the 10% threshold upon continuation of the current trend. The second metric — legitimacy trend: the share of citizens classifying the constitutional order as illegitimate, measured through verified EQU⊥-soundings conducted anonymously through zk-SNARK. The third metric — participation quality: the share of cognitively informed participation, verifiable through anonymous behavioral patterns without disclosure of individual data. The fourth metric — cognitive health score: the aggregate indicator of the cognitive state of the body of citizens on the basis of PoPRegistry v3 data.

A report is classified as alarming in which no fewer than two of the four metrics cross warning thresholds. Upon three consecutive alarming reports, Constitutional Dialogue is activated (Article II, section 2.7).

§ 11.3. Publicity and verifiability. Each monthly Constitutional Health Protocol report is recorded on-chain and is publicly verifiable for any verified citizen. The methodology for the calculation of each metric is encoded in the Coq specification and is verified through the Formal Verification Protocol: GovernanceEngine is not entitled to alter the methodology without passage of the constitutional procedures for amendment of P10–P18.

Chapter Summary

Article VI establishes ten cryptographic and verification protocols as integral constitutional norms. zk-SNARK instantiates anonymous participation in four constitutional contexts. Ring Signatures ensure group membership without individual identification. The Formal Verification Protocol encodes P0–P18 in a verifiable Coq specification. The Merkle Tree organizes the Soulbound ID registry with cryptographic integrity. Proof-of-Resource verifies current infrastructural contribution without historical accumulation. The Dual Suspicion Protocol instantiates two-stage verification with the presumption of subjecthood. VRF (Verifiable Random Function) ensures mathematically verifiable randomness in the formation of panels. The State Audit Protocol renders state access without ratification technically impossible. The Coalition Verification Protocol delineates organic solidarity from coordinated faction. The Constitutional Health Protocol produces monthly diagnostics of the constitutional health of the system.

Chapter 27. Article VII: Threat Map and Defense Vectors

Article VII concludes the constitutional text of Virtublic by establishing a systematic threat map — a formal correspondence between each identified attack vector against the constitutional order and the specific defense mechanisms. The present Article introduces no

new principles: it codifies into a single constitutional document the defensive architecture distributed across Articles I–VI, thereby producing a verifiable proof of its completeness. The threat map is not a declaratory enumeration but a functional matrix in which each threat is correlated with the mechanism that renders it constitutionally insurmountable.

Article VII. Threat Map and Defense Vectors

§ 1. General provision.

The present Article establishes the constitutional threat map — a formalized correspondence between seven classes of attack vectors against the sovereignty of citizens and the institutional order of Virtublic and the constitutionally defined mechanisms of their neutralization. The threat map is not an exhaustive enumeration of all possible attacks, but a systematization of the structural classes of threats identified in Volumes I–II as theorems T1–T17 and axioms A1–A17. Each attack vector is defined through its structural mechanism — the manner in which the given threat produces the destruction of the constitutional order — and is correlated with the constitutional principles and protocols that neutralize this mechanism.

The threat map fulfills three constitutionally mandatory functions. The first — verificational: the Formal Verification Protocol employs the threat map as the reference register in evaluating proposals to amend P10–P18 for whether the proposed amendment generates an uncovered attack vector. The second — diagnostic: Constitutional Health Protocol monthly verifies the activity of each of the seven vectors through the corresponding metrics and identifies new potential threats for referral to P18. The third — architectural: the threat map is the formal proof that the constitutional architecture is complete relative to the identified threat space — every vector has a corresponding constitutionally insurmountable response.

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§ 2. Vector I: apathy → P15.

§ 2.1. Definition of the vector. Apathy is a structural attack vector in which a systematic decline in citizens' participation in GovernanceEngine produces the de facto transfer of political sovereignty from the broad body of citizens to a narrow group of active participants without formal violation of constitutional procedures. Volume I (theorem T6) proved that the algorithmic amplification of engagement through infinite scroll and push notifications produces cognitive exhaustion as a structural outcome, by virtue of which apathy is not an incidental phenomenon but a determined consequence of digital architecture absent constitutional constraints. Volume I (axiom A8) recorded that cognitive exhaustion reduces the quality of political participation independently of the formal existence of access.

The structural mechanism of apathy as a threat is as follows. Upon a sustained decline in turnout below critical thresholds, decisions are adopted by a minority of citizens with the

formal preservation of constitutional procedures. This outcome is equivalent to de facto capture of governance without de jure violation — which is the most dangerous form of degradation, inasmuch as it is not identified by traditional monitoring instruments.

§ 2.2. Defense mechanism: P15. P15 (Quorum Decay, section 7, Article III) closes this vector through the following architecture. Constitutionally fixed turnout thresholds render the adoption of significant decisions at critically low participation impossible. Quorum Decay Rule (Article IV, section 3) precludes constitutional paralysis through dynamic adaptation with lower limits that preclude the reduction of thresholds to a level that renders decisions illegitimate. Constitutional Health Protocol generates early warnings through turnout trend and cognitive health score — metrics that identify the degradation of participation prior to the attainment of Axiom-Break thresholds. Constitutional Dialogue is activated upon three consecutive adverse reports with the constitutionally guaranteed minimum coverage ε (N3), precluding the algorithmic invisibility of constitutional discussions.

The aggregate defensive effect of P15 is as follows: apathy as an attack vector cannot produce de facto capture of governance through a narrow minority, inasmuch as the system identifies it through Constitutional Health Protocol prior to the attainment of critical thresholds and activates the constitutional mechanisms for the restoration of participation. Apathy as a signal of systemic crisis becomes the first of the three conditions of Axiom-Break, by virtue of which its intensification produces not capture but a constitutionally defined crisis procedure.

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§ 3. Vector II: Sybil attack → P13 + P6.

§ 3.1. Definition of the vector. A Sybil attack is a structural attack vector in which the creation of multiple fictitious digital identities produces the disproportionate influence of a single real actor in a system employing the principle "one identity — one vote" ($EQU\perp = 1$ for each citizen). Volume II (theorem T15) formalized the Sybil trilemma: decentralization, Sybil resistance, and non-plutocracy are simultaneously mutually unattainable under standard protocols. A Sybil attack is a constructive vector inasmuch as it directly violates NA0 (subjecthood as a politically protected good): each fictitious identity dilutes the political weight of real citizens, producing de facto inequality under de jure equality.

§ 3.2. Defense mechanisms: P13 + P6. P13 (Digital Census v2, section 5, Article III) and P6 (verifiable census, Chapter 7) close the Sybil vector through the following architectural logic. Digital Census v2 through Dual Suspicion Protocol (section 7, Article VI) verifies the subjecthood of each citizen through a two-stage protocol that does not presuppose the storage of biometric data and combines automated cognitive verification with collegial evaluation by CivicJuryEngine. Merkle Tree (section 5, Article VI) organizes the register of verified Soulbound IDs with cryptographic integrity that precludes unauthorized addition of identities. zk-SNARK (section 2, Article VI) verifies membership in the body of citizens without disclosure of identifiers, which renders a fictitious identity incapable of presenting a valid proof of Census-verification.

The key architectural response to the Sybil trilemma is the mechanism of temporary centralization established in P6: the Civic Guard as a temporarily centralized, randomly selected, and economically non-determined organ resolves the trilemma through a category not considered in its standard formulation. This mechanism is not a compromise between the three properties — it is their simultaneous instantiation through a principally distinct architecture.

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§ 4. Vector III: plutocracy → P10 + P11 + P4.

§ 4.1. Definition of the vector. Plutocracy is a structural attack vector in which the concentration of economic resources is converted into disproportionate political influence, producing de facto power of capital under de jure power of citizens. Volume II (theorem T11) proved the mechanism of compound advantage: under linear influence cost, early resource holders accumulate a competitive advantage that intensifies over time independently of their current contribution. Volume II (theorem T12) proved that token voting structurally reproduces this mechanism: any voting system in which political weight is proportional to economic position is de facto plutocratic regardless of its declared principles. This vector is the most systemic of the seven inasmuch as it produces degradation not through a single violation but through continuous accumulation.

§ 4.2. Defense mechanisms: P10 + P11 + P4. Three mechanisms constitute a unified anti-plutocratic architecture. P4 (dual sovereignty, section 2.4 of Article III and Chapter 5) establishes the constitutional demarcation line $EQU^{\perp} \cap VIC^{\perp} = \varnothing$, precluding any direct conversion of capital into political sovereignty at the foundational level. P10 (Madison Mode, section 2, Article III) instantiates the progressively increasing cost of concentration of influence through the function $cost(n) = n^2$: the quadratic cost renders concentration structurally expensive and economically irrational relative to a distributed strategy. P11 (Success Multiplier, section 3, Article III) produces the structural advantage of broad organic coalitions through the function $effective\_influence = n \times \sqrt{(n\_supporters)}$: at an identical aggregate resource, a coalition of 10,000 citizens produces influence 100 times greater than a single actor, by virtue of which the most rational strategy for maximizing influence is persuasion, not accumulation.

P10 without P11 establishes a tax on concentration without a reward for the alternative. P11 without P10 rewards coalitions without constraining concentration. P4 without P10 and P11 establishes the principle without a mechanism for its practical instantiation. Jointly, the three mechanisms produce a constitutionally mandatory alteration of the rational equilibrium: within this architecture, the most effective strategy is organic solidarity, not capital concentration.

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§ 5. Vector IV: blackmail → P14.

§ 5.1. Definition of the vector. Blackmail is a structural attack vector in which the threat of disclosure of a citizen's political participation or identity is employed as an instrument of coercion toward specific political behavior or toward abstention from political participation. Volume I (normative principle N6) established that the right to cognitive autonomy includes the right not to disclose the fact and direction of political participation to a coercive actor. Volume I (axiom A9) recorded that in conditions of a predictive market, data on citizens' political behavior is a valuable commercial resource, by virtue of which the threat of its disclosure produces real coercive incentives.

Blackmail as a constitutional threat operates through two mechanisms: direct (the threat of disclosure to a specific coercive actor in possession of voting data) and structural (the threat of surveillance as such, which produces self-censorship of political participation independently of any actual application of coercion). The second mechanism is more dangerous: it does not require an act of coercion and produces degradation of participation through the preemptive alteration of citizens' behavior.

§ 5.2. Defense mechanism: P14. P14 (protected identity, section 6, Article III) closes the blackmail vector through the following architecture. zk-SNARK (section 2, Article VI) produces the mathematically verifiable impossibility of disclosing the connection between a citizen's Soulbound ID and his specific vote: neither the GovernanceEngine operator, nor a state actor, nor the technical personnel of the system possess data sufficient to disclose this connection, inasmuch as it does not exist in the system in disclosed form. Ring Signatures (section 3, Article VI) produce the indistinguishability of an individual participant within the group upon verification of group membership. Proof-of-Offline (section 6 of Article III and section 5, Article VI) precludes state access to cognitive health data in absolute form, eliminating one of the most vulnerable blackmail channels — the threat of disclosure of a citizen's cognitive state. The aggregate effect of P14 is as follows: blackmail as a vector is not extirpated through sanctions for its application, but through the technical impossibility of obtaining the data necessary for its realization.

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§ 6. Vector V: influence inflation → P12.

§ 6.1. Definition of the vector. Influence inflation is a structural attack vector in which the VIC⊥ resource base decouples from real contribution to infrastructure and acquires a self-reproducing character, producing the accumulative advantage of early holders. Volume II (theorem T11) formalized this vector as applied to Proof-of-Stake: upon the accumulation of stake as the basis for the generation of votes, the system produces compound advantage, in which the share of influence of early holders intensifies proportionally to their period of presence in the system independently of their current utility to it. Influence inflation is a concealed vector: it violates no constitutional norm at the level of individual transactions, but produces systemic redistribution of power through accumulation over time.

§ 6.2. Defense mechanism: P12. P12 (Dual Reserve Market, section 4, Article III) closes this vector through the single architectural principle from which all operational consequences follow: VIC⊥ is generated exclusively through verified current contribution to infrastructure

through Proof-of-Resource (section 6, Article VI), and not through accumulated historical position. This principle produces the following constitutional consequence: each calculation period, VIC⊥ is recalculated anew, rendering compound advantage mathematically impossible. SlotMarket v4.1 with the constitutional concentration threshold of 25% (section 3, Article V) constrains infrastructure concentration, precluding the monopolization of VIC⊥-generation through dominance in the slot market. The aggregate effect of P12 is as follows: VIC⊥ is a function of current utility, not a function of history — which produces the constitutionally correct correspondence of infrastructure sovereignty to real contribution to infrastructure.

The Ethereum PoS case (2022–2025) illustrates this vector under operational conditions: the concentration of stake among the largest validators intensified continuously — by 2025, four of the largest pools controlled more than 60% of aggregate stake, producing a structural advantage that grew exponentially upon reinvestment of rewards. P12 closes this vector through the rejection of accumulative logic at the level of constitutional principle, not through parametric constraint on accumulation.

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§ 7. Vector VI: capture of institutions → P18.

§ 7.1. Definition of the vector. Capture of institutions is a structural attack vector in which a concentrated actor acquires de facto control over one or more institutions of Virtublic — GovernanceEngine, CivicJuryEngine, SovereigntyShield, or others — through legitimate procedures, producing their systematic employment in the interests of this actor contrary to their constitutional purpose. Volume I (Pattern 12) recorded that regulation from within the system is structurally unreliable: a regulator who is itself a participant in the relationship produces systematic distortion of norm application. Volume II (theorem T16) established that criticism without an institutional alternative becomes a stabilizer of the system — captured institutions are capable of absorbing criticism through the appearance of reform without alteration of the control structure.

Capture of institutions is a principally distinct vector from concentration of influence (Vector III): plutocracy produces disproportionate political weight through resources, whereas capture of institutions produces structural control over decision-making mechanisms independently of resource distribution. This is precisely why capture of institutions requires an independent constitutional response supplementing P10–P11.

§ 7.2. Defense mechanism: P18. P18 (Conflict-Resolution Core, section 10, Article III) closes this vector through the following architecture. Automatic proof through Coq specification extirpates the possibility of de jure correct but de facto capture-serving use of GovernanceEngine: each action is verified relative to constitutional invariants without a human arbiter vulnerable to pressure. Historical patterns in Type 2 conflicts identify systematic employment of institutions outside their constitutional purpose through statistical analysis of on-chain data: a single violation may be characterized as incidental, but a pattern of violations is identified as capture. The three-type classification of conflicts produces constitutionally defined consequences for each capture situation: Type 2 conflicts

(sovereignty-type) entail the immediate application of constitutionally provided sanctions without a human decision. VRF-formation of CivicJuryEngine through random selection from the entire body of citizens precludes systematic capture of collegia through affiliated auditors: at a sufficient size of the body of citizens, the probability of random selection of a majority of affiliated members is statistically negligible.

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§ 8. Vector VII: state capture → P17 + P0 + P18.

§ 8.1. Definition of the vector. State capture is a structural attack vector in which a state actor accumulates de facto predictive power over citizens of Virtublic without a constitutional mandate, producing a gap between the de facto informational superiority of the state and de jure popular sovereignty. Volume I (axiom ΣA17) recorded the structural conflict of interest of the state as simultaneously a potential regulator and a potential purchaser of predictive data. Volume I (theorem T8) established that this sovereignty gap does not self-correct in the absence of an executable constraint. State capture is the most severe of the seven vectors across two parameters: the state possesses institutional coercive resources absent in private actors, and state capture produces irreversible consequences through the concentration of citizens' predictive history, which is a crystallized fact within the meaning of Volume I (axiom A4).

State capture is realized through three structural scenarios: direct access to data without a mandate; indirect access through technical proxies and affiliated structures; gradual normalization through the expansion of temporary mandates. Each of the three scenarios requires an independent constitutional response, which structurally necessitates the application of three independent protection mechanisms.

§ 8.2. Defense mechanisms: P17 + P0 + P18. P17 (SovereigntyShield) closes all three scenarios of direct and indirect capture through the State Audit Protocol: the technical impossibility of access without on-chain ratification extirpates the direct scenario; anomaly detection closes the proxy scenario; the absence of automatic mandate renewal and the requirement of a new full ratification close the normalization scenario. P0 (popular sovereignty as an absolute principle) produces an additional level of protection: any Convention proposal that presupposes a reduction of the state mandate threshold or an expansion of state access in circumvention of P17 is blocked by the Formal Verification Protocol as a violation of the invariant of P0 "the state is not a purchaser of predictions without an explicit constitutional mandate" — this block is a mathematically provable constraint in the Coq specification, insurmountable through neither voting nor the Convention. P18 closes the residual vector — sophisticated scenarios that are not automatically characterized by the State Audit Protocol: Type 2 sovereignty-type conflicts identified through the analysis of historical patterns are referred to P18 for the application of constitutionally provided consequences without the possibility of blockade by state-captured operators.

The aggregate effect of the three mechanisms is as follows: state capture is constitutionally insurmountable, inasmuch as protection against it is instantiated at three independent levels

— operational (P17), ontological (P0), and adjudicatory (P18) — by virtue of which the circumvention of one level does not produce the circumvention of the other two.

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§ 9. Summary threat and defense matrix.

The seven attack vectors and the corresponding defense mechanisms constitute the following constitutionally verified matrix. Apathy — the vector of structural degradation of participation — is neutralized by P15 (Quorum Decay) through early diagnostics and a constitutionally defined crisis procedure. Sybil attack — the vector of fictitious identities — is neutralized by P13 and P6 through two-stage verification of subjecthood with temporary centralization that resolves the trilemma T15. Plutocracy — the vector of conversion of capital into political power — is neutralized by P10, P11, and P4 through the alteration of the rational equilibrium in favor of organic solidarity. Blackmail — the vector of coercive action through the threat of disclosure — is neutralized by P14 through the technical impossibility of obtaining the data necessary for its realization. Influence inflation — the vector of accumulative advantage — is neutralized by P12 through the binding of VIC⊥ to current verified contribution. Capture of institutions — the vector of structural control over decision-making mechanisms — is neutralized by P18 through automatic proof, historical patterns, and VRF-formation of collegia. State capture — the vector of accumulation of predictive power without a mandate — is neutralized by P17, P0, and P18 through three independent levels of protection.

This matrix is verified in the sense that every defense mechanism is constitutionally encoded, self-executing through the Formal Verification Protocol, and mathematically provable through Coq specification: none of the seven vectors admits of constitutionally compatible realization when all mechanisms are fully operational.

Chapter Summary

Article VII concludes the constitutional text of Virtublic with a systematic correspondence between seven structural attack vectors and the constitutionally defined mechanisms of their neutralization. Each vector is described through its structural mechanism with precise references to the theorems and axioms of Volumes I–II, by virtue of which the threat map is not a declaratory enumeration of risks but a verified proof of the completeness of the defensive architecture. The totality of P15, P13+P6, P10+P11+P4, P14, P12, P18, and P17+P0+P18 constitutes a constitutionally closed protection system: none of the identified structural vectors is left without a neutralization mechanism, and every mechanism is self-executing rather than declaratory.

Transition to Part V

Part IV is exhausted: the constitutional text is complete, institutionally formed, and protected through a systematic threat map. The completeness of the constitutional text generates the final theoretical question that cannot be resolved within the constitutional text itself: whether

this system is closed relative to the originating contradiction of the trilogy, whether it closes all theorems of Volumes I–II without remainder, and what theoretically follows from the attainment of this closure. The answer to these questions is the content of Part V.

Σ-STATUS IV — VERIFICATION: Institutional Architecture (Articles I–VII)

Part IV is constitutionally complete: Articles I–VII encompass the conceptual foundation, core principles, emergency procedures, operational mechanisms, concordance rules, institutions, protocols, and the systematic threat map, jointly constituting an executable constitutional order without interpretive lacunae. This completeness structurally necessitates the transition to Part V — the proof of completeness and the closure of the trilogy: the constitutional text exists, yet the theory must prove that it is a sufficient answer to the tripartite contradiction that opened the first page of Volume I.

Chapter 28. Correspondence Matrix: Volume I → Volume II → Volume III

The task of Part V consists in proving that Volume III exhausts the diagnosis of Volumes I–II without remainder, and in closing the theoretical movement initiated by the contradiction Ω_0 in Volume I. Part V introduces no new principles or mechanisms: it verifies the completeness of those already introduced, establishes precise mappings between theorems and constitutional responses, and unfolds the final synthesis of the trilogy. The verification of completeness is not a rhetorical but a logical act: the correspondence matrix is a proof that the system P0–P18 is necessary and sufficient with respect to the established diagnosis.

28.1. Principle and Method of Verification

The correspondence matrix is a verification document functioning according to the following logical principle. Each theorem of Volumes I–II (T1–T17), each key pattern, and each structural defect recorded as a systemic contradiction must find a constitutional response in the system P0–P18; a principle without an incoming theorem does not possess normative justification within the system; a theorem without a corresponding principle signifies an architectural lacuna, that is, a defect of the system P0–P18. The dual condition — completeness of theorem coverage and the absence of principles without a normative source — is the criterion of the theoretical soundness of the Virtublic architecture, established in subchapter 0.4 of the present volume.

The method of verification consists in the following: for each theorem, there is established (a) the constitutional principle P0–P18 that closes the given theorem, that is, eliminates the reproduction of the recorded contradiction within Virtublic as a structural defect; (b) the institution or rule through which the principle is realized operationally; (c) the protocol through which the institution executes the principle automatically and verifiably. The chain theorem → principle → institution → protocol is the minimal unit of verification: its rupture at any of its links means that the theorem is closed declaratively but not operationally.

The methodological constraint of the matrix must be established. A number of theorems are closed by more than one principle: T2 (temporal barrier) is closed jointly by P12, P4, and P16, inasmuch as it reproduces itself at three distinct levels of the system — the resource, the political, and the infrastructural. A number of principles close more than one theorem: P14 closes simultaneously T6 (cognitive exhaustion) and T13 (anonymity extirpates accountability), inasmuch as these theorems establish a contradiction resolved through a single architectural mechanism of separating the visibility of participation from the verifiability of uniqueness. These multiple correspondences are not redundancies of the system — they are evidence of its integrality: the principles constitute a constitutional architecture, not a collection of isolated instruments.

The transition to the following subchapter is determined by the necessity of unfolding the correspondence matrix from T1 to T17 in full, with explicit specification of all links in the verification chain.

28.2. Correspondence Matrix: T1–T9 (Volume I)

T1 (digital capital structurally converts the subject into a resource). Volume I established T1 as the originary systemic contradiction: the mechanism of predictive capital accumulation employs the behavior of the subject as its primary productive resource, by virtue of which the subject ceases to be the source of value and becomes its object. The constitutional response to T1 is three-tiered. At the level of ontological foundation: P0 establishes the inalienability of subjecthood as an absolute constitutional norm preceding all system mechanisms. At the level of identity: P3 (Soulbound Identity) realizes inalienability operationally — the citizen is not their data, their identity is non-transferable and is not convertible into an economic asset. At the level of cognitive protection: P14 (Citizenship & Identity) through Proof-of-Offline and the cognitive health bonus establishes the constitutional encouragement of conditions under which the subject is not a constant object of predictive profiling. Execution protocols: zk-SNARK (verification of subjecthood without data disclosure), Soulbound NFT (technical non-transferability), PoPRegistry v3 (recording of offline periods). Chain: T1 → P0 + P3 + P14 → Soulbound Identity + PoPRegistry → zk-SNARK + Proof-of-Offline.

T2 (temporal barrier: the resource gap between early and late participants is structurally ineliminable by market means). Volume I established T2 as the mechanism producing a growing gap between early and late participants in systems with accumulative logic: the advantage grows with a positive second derivative after the point of no return T_N, which eliminates the possibility of market correction. T2 reproduces itself in three dimensions of the digital environment: the accumulation of predictive capital, the accumulation of VIC⊥ advantage, and the accumulation of infrastructural political influence. The constitutional response to each of the three dimensions: P4 (dual sovereignty) closes T2 as applied to the conversion of economic accumulation into political power — the EQU⊥/VIC⊥ demarcation line severs the conversion mechanism; P12 (Dual Reserve Market) closes T2 as applied to VIC⊥ emission — binding emission to current verified contribution rather than to historical accumulation eliminates the temporal advantage; P16 (Rockefeller Mode) closes T2 as applied to infrastructural political influence — the constitutional prohibition of the conversion of infrastructural dominance into EQU⊥ power. Execution protocols: GovernanceEngine

(separation of sovereignties), SlotMarket v4.1 (auction with history nullification), Proof-of-Resource (verification of current contribution), NodeFactory (delegation without conversion). Chain: T2 → P4 + P12 + P16 → GovernanceEngine + SlotMarket + NodeFactory → Formal Verification + Proof-of-Resource.

T5 (the economic unprofitability of individual action in a ranked environment). Volume I established T5 through the mechanism of algorithmic marginalization: the system systematically reduces the visibility of content that does not conform to the platform's objective function, which renders individual dissent statistically insignificant independent of its substantive quality. In the political space, T5 reproduces itself as the impossibility of diffuse interests competing with concentrated ones without an institutional compensation mechanism. The constitutional response: P5 (limited influence) closes T5 as applied to the concentration of influence — the quadratic cost function cost(n) = n² renders the accumulation of additional influence exponentially costly; P11 (Success Multiplier) closes T5 as applied to the efficacy of diffuse interests — an organic coalition of N citizens receives influence = N × √N, which creates a structural advantage of the broad coalition over concentrated capital; P5, § 6.4 closes T5 as applied to visibility — the constitutional minimum threshold P(reach) ≥ ε guarantees the statistically significant presence of any legitimate position. Execution protocols: GovernanceEngine (execution of the quadratic function and the Success Multiplier), Coalition Verification Protocol (verification of coalition organicity), Formal Verification Protocol (control of compliance with the minimum visibility threshold). Chain: T5 → P5 + P11 → GovernanceEngine → cost(n) = n² + effective_influence = N × √N.

T6 (the physiological impossibility of sustained resistance under chronic cognitive exhaustion). Volume I established T6 as a neurobiological fact: systems with continuous engagement optimization produce degradation of executive functions and working memory as a structural rather than contingent result, which renders the formation of an autonomous political will under conditions of continuous digital presence physiologically impossible after a certain threshold. The constitutional response: P14 (Citizenship & Identity) through Proof-of-Offline closes T6 operationally — the constitutional encouragement of cognitive detox periods through the cognitive health bonus (10% enhancement of EQU⊥ for 90 days following a verified offline period) and the constitutional prohibition of sanctions for digital absence eliminate the architectural pressure that compels the subject toward continuous presence. P15 (Quorum Decay) closes T6 as applied to participation: the system does not require continuous participation for the maintenance of constitutional status, which is compatible with periods of cognitive restoration. Execution protocols: PoPRegistry v3 (recording of offline periods through zk-proof), GovernanceEngine (application of the cognitive health bonus), Constitutional Health Protocol (monitoring of the aggregate cognitive health of the citizen body). Chain: T6 → P14 + P15 → PoPRegistry v3 + GovernanceEngine → Proof-of-Offline + Quorum Decay.

T8 (the sovereignty gap: de jure and de facto sovereignty diverge in the absence of operational mechanisms). Volume I established T8 as the structural defect of any constitution containing no mechanism for the application of its norms to specific situations: the de jure right to vote exists, but is de facto unrealizable in the absence of operational mechanisms for its exercise. The constitutional response is systemic: the entire architecture

P10–P18 is the response to T8 in the sense that each governance mechanism eliminates a specific type of divergence between de jure and de facto sovereignty. Specifically: P15 (Quorum Decay) closes T8 as applied to the paralysis of GovernanceEngine under low participation; P2 (supremacy of code) closes T8 as applied to the arbitrary interpretation of norms; P18 (Conflict-Resolution Core) closes T8 as applied to interpretive conflicts producing legal indeterminacy. Execution protocols: GovernanceEngine (operational embodiment of all mechanisms), Formal Verification Protocol (elimination of arbitrary interpretation), EmergencyExecutor with mandatory referendum (elimination of paralysis). Chain: T8 → P2 + P15 + P18 → GovernanceEngine + Formal Verification + EmergencyExecutor → Quorum Decay + automatic proof + referendum.

T9 (systemic collapse: three structural pathways to the loss of republican institutions). Volume I established T9 as the aggregate of three systemic crisis outcomes: the collapse of participation, the loss of legitimacy, and the capture of institutions. Each of the three outcomes requires a specific constitutional response. The collapse of participation is closed by P15 (Quorum Decay) — the adaptive quorum prevents paralysis of GovernanceEngine under declining participation, while the Constitutional Health Protocol diagnoses critical decline before the point of no return. The loss of legitimacy is closed by P8 (Axiom-Break Condition) + P9 (Constitutional Convention) — the constitutional recognition of the people's right to revise the foundations under systemic crisis eliminates the legitimacy deficit through a constituent procedure. The capture of institutions is closed by P18 (Conflict-Resolution Core) + P17 (SovereigntyShield) + P13 (Digital Census v2) — autonomous conflict resolution without a privileged interpreter, state neutrality, and the verified citizen body together eliminate the conditions for institutional capture. Execution protocols: Constitutional Health Protocol (diagnostics), Quorum Decay (adaptation), VRF (random selection of the Civic Guard), State Audit Protocol (control of state requests). Chain: T9 → P8 + P9 + P15 + P17 + P18 → EmergencyExecutor + Convention + Constitutional Health Protocol + SovereigntyShield + Conflict-Resolution.

Pattern 11 (the marginalization of informal action and collective resistance within a ranked environment). Volume I established pattern 11 as the mechanism through which any collective action within a ranked environment produces its own absorption: the algorithm marginalizes non-conforming content, transforming opposition into a niche product. The constitutional response: the architecture of Virtublic is external to the ranked environment — it does not function within algorithmically governed space, and consequently the mechanism of pattern 11 is not structurally applicable to it. P1 (republican form) closes pattern 11 through form: the constitutional form is not content that can be marginalized by a ranking algorithm — it is an institutional structure external to that algorithm. P5 (limited influence) + § 6.4 (minimum visibility threshold) close pattern 11 within Virtublic: the constitutional minimum $P(\text{reach}) \geq \varepsilon$ guarantees that no legitimate position can be marginalized below a statistically significant level through the GovernanceEngine mechanism. Execution protocols: GovernanceEngine (application of the minimum visibility threshold), Formal Verification Protocol (verification of compliance with the ε-constraint). Chain: pattern 11 → P1 + P5 → constitutional form as external structure + GovernanceEngine → $P(\text{reach}) \geq \varepsilon$.

The transition to the following subchapter is determined by the necessity of unfolding the correspondence matrix for the theorems of Volume II (T10–T17), completing the verification of the completeness of the system P0–P18.

28.3. Correspondence Matrix: T10–T17 (Volume II) and ΣA17

T10 (constitutional necessity: the systemic contradiction of digital capital is not eliminable without a constitutional institutional form). Volume II established T10 as the conclusion from the aggregate of Volume I: neither market self-regulation, nor state regulation, nor critical discourse constitutes a sufficient institutional response to the systemic contradictions of digital capital — only the constitutional form possesses the requisite properties. T10 is not a theorem about one specific defect, but a theorem about the exhaustion of all alternatives. The constitutional response to T10 is the entirety of Volume III in its aggregate: Virtublic as a constitutional form is the sole identified institutional response satisfying all the conditions of T10. Specifically: P2 (supremacy of code) establishes constitutionality as an operational rather than declaratory regime; P7 (inviolability of the core) establishes a hierarchy of amendability that distinguishes the constitution from simple regulation; P8 + P9 establish a constitutional revision mechanism that distinguishes the constitutional form from a rigid code. Chain: T10 → the entirety of Volume III → Virtublic as the necessary and sufficient constitutional form.

T11 (PoS plutocracy: in a system without a constitutional constraint on concentration, governance power monotonically concentrates among early stakers). Volume II established T11 through the compound interest mechanism in PoS architectures: an early staker accumulates a share of the aggregate stake according to an exponential function, which produces a monotonically growing gap without an internal saturation point. The constitutional response is three-tiered. P4 (dual sovereignty) closes T11 at the level of political power: VIC⊥ is not convertible into EQU⊥, by virtue of which the concentration of stake does not produce the concentration of political power. P12 (Dual Reserve Market) closes T11 at the level of VIC⊥ emission: the binding to current verified contribution eliminates the compound interest accumulation mechanism. P16 (Rockefeller Mode) closes T11 at the level of infrastructural participation: accumulated infrastructural dominance is not convertible into EQU⊥ power. Execution protocols: GovernanceEngine (automatic separation of sovereignties), SlotMarket v4.1 (auction with history nullification), NodeFactory (prohibition of conversion). Chain: T11 → P4 + P12 + P16 → GovernanceEngine + SlotMarket + NodeFactory → Formal Verification (automatic blocking of VIC⊥ → EQU⊥ conversion).

T12 (governance without legitimacy: the decisions of DAO architectures do not possess constitutional legitimacy by virtue of the absence of mechanisms of popular sovereignty). Volume II established T12 through three defects of existing governance architectures: decisions are made by token holders rather than by verified citizens; there is no mechanism for the separation of constitutional and ordinary decisions; there is no institution of constituent power for the revision of foundations. The constitutional response: P0 establishes popular sovereignty as the sole source of legitimacy; P13 (Digital Census v2) establishes the verified citizen body as the bearers of EQU⊥; P7 establishes the hierarchy of amendability separating constitutional from ordinary decisions; P9 (Constitutional

Convention) establishes the institution of constituent power. Execution protocols: CivicJuryEngine + VRF (formation of the verified citizen body), GovernanceEngine (operational realization of popular sovereignty), Formal Verification Protocol (verification of the legitimacy of each decision). Chain: T12 → P0 + P7 + P9 + P13 → GovernanceEngine + CivicJuryEngine → VRF + zk-SNARK + Formal Verification.

T13 (anonymity extirpates accountability: a system without a verifiable binding of the participant to a unique subject cannot establish constitutional accountability). Volume II established T13 as the structural contradiction of anonymous systems: anonymity without verifiable uniqueness produces power without accountability — participation in collective decisions without constitutional consequences. The constitutional response: P14 (Citizenship & Identity) resolves this contradiction through the separation of cryptographic functions — the principle of separation of concerns establishes that the anonymity of political action (Ring Signatures) and the verifiable uniqueness of the participant (zk-SNARK through Soulbound ID) are realized through independent cryptographic schemes, which makes their simultaneous coexistence possible. P3 (inalienable citizenship) establishes constitutional accountability through Soulbound Identity: sanctions recorded on-chain are bound to a verifiable subject. Execution protocols: zk-SNARK (anonymous proof of citizenship), Ring Signatures (anonymous voting with verifiable group membership), Soulbound NFT (binding of sanctions to a verifiable subject). Chain: T13 → P3 + P14 → Soulbound NFT + Ring Signatures + zk-SNARK → separation of concerns + nullifier.

T14 (code is law without NA0: code without embedded normative constraints produces the destruction of subjecthood as a structural byproduct of optimization). Volume II established T14 through the mechanism of unconstrained optimization: code maximizing formal parameters without a constitutional constraint in the form of NA0 systematically violates the unnormalized rights of the subject. The constitutional response: P2 (supremacy of code) closes T14 through the embedding of NA0 in the Coq specification as a mandatory constitutional constraint — a norm that violates NA0 cannot pass formal verification and does not take effect. P18 closes T14 as applied to the interpretation of existing norms: formal verification of intent and referendum secure that the application of code to specific cases does not produce violations of NA0 through interpretive arbitrariness. Execution protocols: Formal Verification Protocol in Coq (NA0 as an embedded constraint in the specification of all norms P0–P18), P18 (referendum as a barrier against the violation of NA0 through interpretation). Chain: T14 → P2 + P18 → Formal Verification + Coq → NA0 as a verifiable constitutional constraint.

T15 (the Sybil trilemma: in an open network there exists no mechanism for uniqueness verification that simultaneously satisfies the conditions of the absence of a trusted center, an economic barrier, and a social barrier). Volume II established T15 as a fundamental fact of open networks, independent of the level of technological development. The constitutional response: P13 (Digital Census v2) + P6 (verifiable census) close T15 through the deliberate violation of condition 1 (a trusted center exists — the Civic Guard) while strictly maintaining conditions 2 and 3 (the absence of economic and social barriers), with the constitutional constraint of the trusted center as a compensating mechanism. This is not a circumvention of T15 but its sole constitutionally sound operational resolution. Execution protocols: CivicJuryEngine + VRF (a constitutionally constrained trusted center

with a verifiable mandate), zk-SNARK + Merkle Tree (verification without economic or social barriers), Dual Suspicion Protocol (two-stage verification of anomalies). Chain: T15 → P6 + P13 → CivicJuryEngine + Dual Suspicion Protocol → zk-SNARK + VRF + Merkle Tree.

T16 (the absorption of critique: critical discourse without an institutional alternative is a legitimation resource of the system it critiques). Volume II established T16 through the citation mechanism: Zuboff, Stiegler, Morozov, Zamfir — all were cited by the systems they criticized as evidence of those systems' openness to discussion. Critique without institutional form is not a threat to the system — it is its functional element. The constitutional response: Volume III as such is the response to T16 — not a critique of the system of digital capital, but a constitutional form external to it. P17 (SovereigntyShield) closes T16 as applied to the state capture of critical discourse: the state cannot use the constitutional form of Virtublic as evidence of its own openness, inasmuch as P17 constitutionally prohibits the state from accessing citizen data without a mandate. The constitutional form is not absorbed by the system of digital capital for the same reasons that the Supreme Court of the United States is not a structural element of the system it regulates: institutional independence is a function of constitutional architecture, not of declaration. Chain: T16 → Volume III as constitutional form + P17 → SovereigntyShield → institutional independence as an architectural property.

T17 (blockchain as necessary substrate: blockchain technology is a necessary but insufficient condition of the constitutional digital republic). Volume II established T17 as a conclusion from the aggregate of T11–T15: blockchain ideology reproduces the contradictions of digital capital, but blockchain technology is the necessary cryptographic substrate for the realization of constitutional guarantees in the digital space. The constitutional response: the entire technological layer of Virtublic — zk-SNARK, Ring Signatures, Formal Verification, Merkle Tree, VRF, Proof-of-Resource — is the realization of T17 as necessity. P2 (supremacy of code) establishes that code is the instrument of the constitution but not its source: blockchain technology serves the republican form and does not replace it. This demarcation is the precise operational resolution of T17 as a theorem about necessity and insufficiency: the technology is necessary (without it, constitutional guarantees are unenforceable in the digital space), but insufficient (without the constitutional form, the technology reproduces the contradictions of T11–T15). Chain: T17 → P2 + the entire technological layer of Article VI → blockchain as the substrate of the constitution, not as its replacement.

ΣA17 (the state, as the largest purchaser of predictive data, is structurally interested in the expansion rather than the limitation of the predictive capital market). Volume I established ΣA17 as an axiom proving the structural impossibility of state neutrality without constitutional compulsion: the state is simultaneously a potential regulator and a structural purchaser of the regulated resource, which produces an ineliminable conflict of interest. The constitutional response: P17 (SovereigntyShield) is the direct institutional response to ΣA17 — the State Audit Protocol automatically records each state request for citizen data as an on-chain transaction; unratified requests are rejected without the participation of a discretionary arbiter; circumvention attempts are transmitted to P18. P0 closes ΣA17 at the preamble level: state neutrality is the ontological condition of popular sovereignty, not one of the mechanisms of its protection. Execution protocols: State Audit Protocol (recording of all state requests), SovereigntyShield (automatic blocking of unratified requests), Formal

Verification Protocol (verification of mandate conformity with N1–N7). Chain: ΣA17 → P0 + P17 → SovereigntyShield → State Audit Protocol + Formal Verification.

The transition to the following subchapter is determined by the necessity of verifying the bilateral completeness of the matrix: the absence of theorems without principles and the absence of principles without theorems.

28.4. Completeness Verification: Bilateral Check

The bilateral completeness verification consists in the following. Condition A (absence of theorems without principles): each of the theorems T1–T17 and ΣA17, as well as pattern 11, has found a constitutional response in the system P0–P18. Verification: T1 → P0+P3+P14; T2 → P4+P12+P16; T5 → P5+P11; T6 → P14+P15; T8 → P2+P15+P18; T9 → P8+P9+P15+P17+P18; pattern 11 → P1+P5; T10 → Volume III in aggregate; T11 → P4+P12+P16; T12 → P0+P7+P9+P13; T13 → P3+P14; T14 → P2+P18; T15 → P6+P13; T16 → Volume III as form + P17; T17 → P2 + the technological layer; ΣA17 → P0+P17. Condition A is satisfied: no theorem remains without a constitutional response.

Condition B (absence of principles without a normative source): each of the principles P0–P18 has an incoming theorem or normative principle N1–N7 justifying its necessity. Verification: P0 ← NA0 + ΣA17; P1 ← T12 + T16; P2 ← T14 + T8; P3 ← T1 + T13; P4 ← T11 + T2; P5 ← T5 + T12; P6 ← T15 + N4; P7 ← T9 + T10; P8 ← T9; P9 ← T9 + T10; P10 ← T5 + T12; P11 ← T5 + pattern 11; P12 ← T2 + T11; P13 ← T15 + N4; P14 ← T6 + T13 + N7; P15 ← T8 + T9; P16 ← T2 + T11 + ΣA17; P17 ← ΣA17 + N5; P18 ← T14 + pattern 11 + T8. Condition B is satisfied: no principle is normatively arbitrary.

From the satisfaction of conditions A and B there follows the conclusion of the theoretical completeness of the system P0–P18 with respect to the diagnosis of Volumes I–II: the architecture of Virtublic is the necessary (each principle is justified by a theorem) and sufficient (each theorem is closed by a principle) constitutional form with respect to the established corpus of contradictions. This conclusion is formal rather than rhetorical: it is verifiable through the re-examination of the matrix by any independent researcher and falsifiable through the identification of a theorem without a principle or a principle without a theorem.

Chapter Summary

The correspondence matrix verifies the theoretical completeness of the Virtublic architecture through bilateral verification: the absence of theorems T1–T17 without a constitutional response and the absence of principles P0–P18 without a normative justification. Each chain theorem → principle → institution → protocol is verifiable and reproducible. Multiple correspondences (a number of theorems are closed by several principles, a number of principles close several theorems) are evidence of the integrality of the system, not of its redundancy. The condition of theoretical completeness established in subchapter 0.4 is satisfied.

Transition to Chapter 29

The correspondence matrix proves that each theorem has found a constitutional response. This is a verification of theoretical completeness, but not normative completeness: the theorems establish structural defects of existing systems, whereas the normative principles N1–N7 establish the positive rights of the subject that Virtublic is obligated to realize. Chapter 29 verifies normative completeness: each of the seven normative principles N1–N7 must find operational embodiment in the system P0–P18 without lacunae between the declaratory and the enforceable levels.

Chapter 29. Normative principles → institutional realization

This chapter verifies the normative completeness of the Virtublic architecture: each of the seven normative principles N1–N7, established in Volume I as the positive rights of the subject, must find operational embodiment in the system P0–P18 without lacunae between the declarative and the executable levels. The theoretical completeness verified in Chapter 28 is a necessary but not sufficient condition for the viability of the architecture: a system may close all theorems concerning the defects of existing systems while simultaneously failing to instantiate the positive rights of the subject. Normative completeness is the second independent condition of viability, established in subchapter 0.4.

29.1. The principle of normative completeness verification

Normative completeness is defined as follows: for each normative principle N, a triple (P, I, Π) is established, where P is the constitutional principle P0–P18 that realizes N operationally; I is the institution or rule through which P is embodied in a specific mechanism; and Π is the protocol through which I executes P automatically and verifiably. A lacuna arises if any of the three links is absent: N realized through P without I is a declaration; N realized through P and I without Π is a procedure without execution; N realized through Π without P is a technical solution without a constitutional foundation.

Methodologically, the verification of normative completeness is the mirror complement to the correspondence matrix of Chapter 28. The correspondence matrix moves from theorems to principles (bottom-up: identified defect → constitutional response); the verification of normative completeness moves from principles to mechanisms (top-down: positive right → operational embodiment → executable protocol). The joint satisfaction of both conditions proves that the Virtublic architecture is simultaneously reactive (closes all identified defects) and constructive (instantiates all positive rights of the subject).

The transition to the following subchapter is determined by the necessity of deploying the verification for each of the seven normative principles in full.

29.2. N1 → the right to unpredictability: the complete verification chain

N1 (the right to unpredictability, Volume I). The subject possesses the constitutional right to behavior that is unpredictable by systems accumulating his behavioral profile; architectures

that structurally eliminate this right through the compelled predictability of behavior as a condition of participation in the digital environment violate N1.

The declarative level of N1 in Volumes I–II was limited to the establishment of the right and the recording of the mechanisms of its systematic violation in existing systems. The accumulation of a behavioral profile through on-chain transactions is a structural threat to N1 in any public blockchain architecture: each action of a citizen is recorded immutably and is available for analysis. Without an operational response, N1 would remain a norm systematically violated by the very substrate of its realization.

The constitutional principle realizing N1: P14 (Citizenship & Identity) is the primary operational response to N1 — separation of concerns and Ring Signatures with an anonymity set of no fewer than 128 members yield the cryptographic impossibility of correlating political actions with the identity of the subject. P3 (inalienable citizenship) through Soulbound Identity realizes N1 as applied to identity: the citizen is not his data — his identity is verified without disclosure of his behavioral profile. P13 (Digital Census v2) realizes N1 as applied to the census: zk-SNARK verifies subjecthood without accumulating the behavioral characteristics of the verification process — the census records the fact of subjecthood, but not its pattern. P14, § 15.4 realizes N1 through Proof-of-Offline: periods of cognitive detox are constitutionally protected from accumulation as data concerning "absence," which is a variety of behavioral profiling. Protocols of compliance verification: Ring Signatures (verifiable anonymity of voting), zk-SNARK (verification of subjecthood without data disclosure), Formal Verification Protocol (automatic blocking of norms violating N1 in the Coq specification), nullifier (prevention of double voting without de-anonymization). Verification chain: N1 → P3 + P13 + P14 → Soulbound Identity + Ring Signatures + zk-SNARK + Proof-of-Offline → separation of concerns + anonymity set ≥ 128 + local proof generation.

Verification of the absence of lacunae: P realizes N1 through the constitutional prohibition of the accumulation of a linked behavioral profile; I (Ring Signatures, zk-SNARK, Soulbound Identity) embodies the prohibition through cryptographic architecture; Π (separation of concerns, nullifier, local generation) executes the prohibition automatically without the participation of a discretionary arbiter. No lacunae detected.

The transition to the following subchapter is determined by the necessity of verifying N2 — the normative principle establishing equal access to influence mechanisms as a constitutional requirement.

29.3. N2 → the right to equal access to influence mechanisms: the complete verification chain

N2 (the right to equal access to influence mechanisms, Volume I). Each subject possesses the constitutional right to equal access to mechanisms of influence on collective decisions affecting his interests; architectures that create structural barriers — economic, social, technical, cognitive — to the realization of this right violate N2.

The declarative level of N2 in existing systems was limited to formal equality: one token — one vote in DAOs, one citizen — one vote in liberal democracies. Volume I established that formal equality under conditions of functional inequality of participation is not genuine equality: a subject participating under conditions of chronic cognitive exhaustion (T6) is not functionally equal to a subject under conditions of cognitive autonomy; a subject without a device supporting zk-SNARK is not functionally equal to a subject possessing such a device.

The constitutional principle realizing N2: P5 (limited influence) is the primary response to N2 as applied to the political space — base influence of one unit of EQU⊥ is provided to each citizen at no cost, which eliminates the economic barrier to political participation. P13 (Digital Census v2) realizes N2 as applied to verification — GovernanceEngine, through VIC⊥-voting, shall ensure publicly accessible verification terminals at each geographic network node with sufficient density to preclude a geographic barrier. P14 (Citizenship & Identity) realizes N2 as applied to anonymity — Ring Signatures with the constitutional minimum anonymity set eliminates the social barrier to political participation: the citizen whose participation may entail social consequences is protected cryptographically, not declaratively. P15 (Quorum Decay) realizes N2 as applied to adaptivity — the system does not require continuous participation for the preservation of political rights, which eliminates the cognitive barrier for subjects with limited temporal resources for participation. P5, § 6.4 realizes N2 as applied to visibility — the constitutional minimum P(reach) ≥ ε guarantees the statistically significant presence of any legitimate position regardless of its financial backing. Protocols of compliance verification: GovernanceEngine (execution of base EQU⊥, minimum visibility threshold, Quorum Decay), Formal Verification Protocol (automatic blocking of norms creating barriers that violate N2), Republic Engagement Auditor (verification of the absence of barriers for citizens under the age of 18). Verification chain: N2 → P5 + P13 + P14 + P15 → GovernanceEngine + Ring Signatures + Quorum Decay + public verification terminals → base EQU⊥ + anonymity set ≥ 128 + P(reach) ≥ ε.

Verification of the absence of lacunae: the economic barrier is eliminated through base EQU⊥ (P5); the technical barrier is eliminated through the obligation of public terminals (P13); the social barrier is eliminated through Ring Signatures (P14); the cognitive barrier is eliminated through Quorum Decay and Proof-of-Offline (P15 + P14); the visibility barrier is eliminated through P(reach) ≥ ε (P5). No lacunae detected.

The transition to the following subchapter is determined by the necessity of verifying N3 — the normative principle establishing the right to collective action without institutional absorption.

29.4. N3 → the right to collective action: the complete verification chain

N3 (the right to collective action, Volume I). The subject possesses the constitutional right to participation in collective actions that yield real political influence; architectures that systematically marginalize collective action through the mechanism of absorption or the reduction of its operational effectiveness violate N3.

The declarative level of N3 in existing systems was secured formally — the right of association, the right of petition — without an operational mechanism guaranteeing that

collective action yields a proportionate political effect. Regularity 11 (Volume I) established that in ranked environments collective action is absorbed algorithmically: opposition becomes a niche product. T16 (Volume II) extended this mechanism to the level of critical discourse: collective critique without institutional form is a legitimation resource of the system.

The constitutional principle realizing N3: P11 (Success Multiplier) is the direct operational response to N3 — an organic coalition of N citizens receives effective_influence = N × √N, which constitutes a constitutional assertion that persuasion is institutionally stronger than purchase. P10 (Madison Mode) realizes N3 through dialectical complement: by constraining the concentration of influence from above, P10 creates conditions under which a broad organic coalition is competitive with concentrated capital — which is the necessary condition for the realizability of N3. P1 (republican form) realizes N3 through institutional form: collective action in Virtublic is not an informal activity absorbed by the mechanism of regularity 11 — it is a constitutionally recognized political act yielding verifiable legal consequences. Protocols of compliance verification: Coalition Verification Protocol (verification of coalition organicity through Soulbound Identity and anti-coordination filter), GovernanceEngine (automatic application of Success Multiplier to verified coalitions), Formal Verification Protocol (verification of conformity of the mechanism with N3 in the Coq specification). Verification chain: N3 → P1 + P10 + P11 → GovernanceEngine + Coalition Verification Protocol → effective_influence = N × √N + anti-coordination filter.

Verification of the absence of lacunae: collective action is formally protected through P1 (the republican form recognizes it as a constitutional act); operationally protected through P11 (Success Multiplier yields a real political advantage); protected against absorption through the Coalition Verification Protocol (organicity is verifiable, artificial coalitions are filtered out). No lacunae detected.

The transition to the following subchapter is determined by the necessity of verifying N4 — the normative principle establishing the right to verifiable participation as a condition of political accountability.

29.5. N4 → the right to verifiable participation: the complete verification chain

N4 (the right to verifiable participation, Volume I). Each subject possesses the constitutional right to confirmation of his status as a member of the political community through a transparent, verifiable, and appealable procedure; denial of such confirmation without a constitutionally established procedure for revision is a violation of N4.

The declarative level of N4 in existing systems was realized through bureaucratic registration procedures containing neither cryptographic verifiability, nor an appeal mechanism, nor constitutional accountability of the decision-making organ. In decentralized systems, N4 was violated through the mechanism of T15: the absence of a verifiable procedure meant that membership in the community was determined de facto by the possession of keys rather than by a constitutional act of recognition.

The constitutional principle realizing N4: P6 (verifiable census) is the direct constitutional response to N4 — the Digital Census establishes the periodic act of recognition of subjecthood as a constitutional obligation of the republic, not a discretionary decision of an organ. P13 (Digital Census v2) realizes N4 operationally through a technical protocol — the three-level architecture (zk-SNARK, Merkle Tree, CivicJuryEngine) ensures transparency (algorithms are public), verifiability (any node verifies the Merkle Root), and appealability (Dual Suspicion Protocol, stage 2). P18 (Conflict-Resolution Core) realizes N4 as applied to contested cases: a denial of verification contested by a citizen is referred to P18 as a semantic conflict upon the impossibility of its resolution by the civic guard. Protocols of compliance verification: CivicJuryEngine + VRF (Verifiable Random Function) (constitutionally accountable verification organ), Dual Suspicion Protocol (two-stage procedure with a guaranteed right of appeal), zk-SNARK + Merkle Tree (cryptographically verifiable results accessible for independent verification). Verification chain: N4 → P6 + P13 + P18 → CivicJuryEngine + Dual Suspicion Protocol + zk-SNARK → VRF (Verifiable Random Function) + Merkle Tree + mandatory appeal through stage 2.

Verification of the absence of lacunae: transparency is ensured through the publicity of the Census algorithms and their Coq verification; verifiability is ensured through the Merkle Tree as a publicly checkable structure; appealability is ensured through the two-stage Dual Suspicion Protocol with referral to P18 upon repeated indeterminacy. The constitutional accountability of the verification organ is ensured through on-chain oath and verifiable sanctions (P7 subchapter 14.4). No lacunae detected.

The transition to the following subchapter is determined by the necessity of verifying N5 — the normative principle establishing state neutrality as the condition of the very possibility of popular sovereign authority.

29.6. N5 → state neutrality as the condition of popular sovereign authority: the complete verification chain

N5 (state neutrality, Volume I). The state is not entitled to use technologies against the citizens whose sovereign authority is the source of the state's existence; state access to citizens' predictive data without a constitutional mandate is a violation of N5 that eliminates the condition of the very possibility of the free formation of political will.

The declarative level of N5 in existing legal systems was realized through constitutional prohibitions of arbitrary surveillance (the Fourth Amendment in the United States, Article 8 of the ECHR in Europe); however, ΣA17 proved that these declarative prohibitions are structurally insufficient: the state as the largest purchaser of predictive data circumvents the surveillance prohibition through the market mechanism of purchasing data from private platforms. A declarative norm without a self-executing mechanism is a norm violated through market transactions without formal violation of the law.

The constitutional principle realizing N5: P17 (SovereigntyShield) is the direct and exhaustive operational response to N5 — the State Audit Protocol automatically records each state request for citizens' data as an on-chain transaction without the possibility of its concealment; unratified requests are blocked automatically without the participation of a

discretionary organ; attempts at circumvention through technical proxies are referred to P18 as a sovereignty conflict. P0 realizes N5 at the level of the preamble: state neutrality is the ontological condition of popular sovereign authority, by virtue of which it is fixed in the absolutely unamendable foundation that precedes all principles. The delineation of P0 and P17 as applied to N5 is as follows: P0 establishes the ontological necessity of state neutrality as a condition of sovereignty; P17 realizes it as an executable constitutional norm with automatic blocking of violations. Protocols of compliance verification: State Audit Protocol (on-chain recording of all state requests — verifiable, public, immutable), SovereigntyShield (automatic blocking of unratified requests), P18 (classification of sovereignty violations with automatic network notification), expanded civic guard of 99 citizens (for decisions on state mandates). Verification chain: N5 → P0 + P17 → SovereigntyShield + State Audit Protocol + P18 → on-chain recording + automatic blocking + sovereignty conflict.

Verification of the absence of lacunae: ΣA17 (the market circumvention mechanism) is closed through the prohibition of data purchase without a mandate in any form, including a market transaction (P17, § 18.4 — prohibited practices); the declarative prohibition is supplemented by a self-executing mechanism (State Audit Protocol); the mandate ratification procedure is established with a constitutionally high threshold (75% EQU⊥); protection against pseudo-crisis for the reduction of the SovereigntyShield barrier is ensured through the exclusion of P17 from P15 and the requirement of an expanded panel of 99 citizens. No lacunae detected.

The transition to the following subchapter is determined by the necessity of verifying N6 — the normative principle establishing a special protection regime for subjects with incomplete subjecthood.

29.7. N6 → protection of forming subjects: the complete verification chain

N6 (protection of forming subjects, Volume I). A subject whose cognitive and political subjecthood is in the process of formation possesses the constitutional right to protection from architectural mechanisms that systematically disrupt this process through the exploitation of neuroplasticity, the incompleteness of cognitive development, or the absence of formed mechanisms for the critical evaluation of informational influence.

The declarative level of N6 in existing legal systems was realized through prohibitions of advertising directed at children, age restrictions on content, and data privacy requirements for minors. Volume I (axiom A10) established that these measures are insufficient: they regulate specific types of content but not the architecture of systems that produce the systematic exploitation of neuroplasticity as a structural mechanism of engagement. The prohibition of a specific type of advertising while preserving the architecture optimizing engagement through the use of neuroplasticity eliminates the symptom but not the mechanism of the violation of N6.

The constitutional principle realizing N6: P3 (inalienable citizenship) realizes N6 through parental consent — the full activation of the constitutional rights of a citizen under the age of 18 requires the cryptographic multisig of a parent or legal representative, which yields a

constitutionally mandatory barrier against the participation of a forming subject in mechanisms for which he is not prepared. P14 (Citizenship & Identity) realizes N6 through the Republic Engagement Auditor — a continuously functioning constitutional verifier that checks each element of the interface and protocol accessible to citizens under the age of 18 for conformity with the constitutional prohibition of dark patterns. P3, § 4.3 realizes N6 through the encrypted vault — data on the political participation of a forming subject are automatically destroyed upon the attainment of the age of 18, which precludes their use for the predictive profiling of the adult citizen. Protocols of compliance verification: Republic Engagement Auditor (quarterly on-chain report — its presence is constitutional proof of the functioning of the protection, its absence is a violation referred to P18), cryptographic multisig (technically irrevocable parental consent barrier), encrypted vault (automatic destruction of data without a discretionary decision), Formal Verification Protocol (verification of the conformity of each norm with N6 in the Coq specification). Verification chain: N6 → P3 + P14 → Republic Engagement Auditor + cryptographic multisig + encrypted vault → quarterly on-chain report + automatic data destruction + Formal Verification.

Verification of the absence of lacunae: the architectural exploitation of neuroplasticity is prohibited through the constitutional standard of dark patterns, verifiable by the Republic Engagement Auditor; data of the forming subject are protected through the encrypted vault with automatic destruction; participation is conditioned on parental consent through cryptographic multisig; the monitoring mechanism is continuous rather than reactive. No lacunae detected.

The transition to the following subchapter is determined by the necessity of verifying N7 — the normative principle establishing cognitive autonomy as the constitutionally protected condition of free political participation.

29.8. N7 → the right to cognitive autonomy: the complete verification chain

N7 (the right to cognitive autonomy, Volume I). The subject possesses the constitutional right to conditions under which his political will is formed without continuous architectural intervention in cognitive processes; systems that render digital absence functionally equivalent to political passivity violate N7 structurally.

The declarative level of N7 in existing systems is practically null: no currently operative constitution contains a norm on cognitive autonomy as a political right. T6 proved the physiological reality of this right: cognitive exhaustion is a neurobiologically verifiable fact produced by the architecture of systems with continuous engagement optimization. The absence of a constitutional norm means that all existing systems of political participation systematically violate N7 without legal consequence — not because they intentionally obstruct cognitive autonomy, but because the architecture of engagement optimization yields this violation as a structural rather than incidental result.

The constitutional principle realizing N7: P14 (Citizenship & Identity) through Proof-of-Offline is the primary and exhaustive operational response to N7 — the constitutional encouragement of periods of cognitive detox through the cognitive health bonus (10% amplification of EQU⊥ over 90 days), the constitutional prohibition of sanctions for digital

absence, and the right to digital detox without loss of status or accumulated progress jointly realize N7 as a functionally attainable condition rather than a declarative right. P15 (Quorum Decay) realizes N7 through an adjacent mechanism: adaptive quorum eliminates compelled participation as a condition of the functioning of GovernanceEngine — the subject is not obligated to participate continuously in order for the system to adopt constitutionally legitimate decisions. P0 realizes N7 at the level of the preamble: cognitive autonomy is an element of the inalienable subjecthood fixed in the absolutely unamendable foundation. Protocols of compliance verification: PoPRegistry v3 (recording of verified offline periods through zk-proof without transmission of activity data), GovernanceEngine (automatic application of cognitive health bonus to verified offline periods), Formal Verification Protocol (verification of the absence of sanctions for digital absence in each norm passing verification), Constitutional Health Protocol (monitoring of the aggregate cognitive health of the body of citizens as a systemic indicator of the realizability of N7). Verification chain: N7 → P0 + P14 + P15 → PoPRegistry v3 + GovernanceEngine + Constitutional Health Protocol → zk-proof of offline period + cognitive health bonus + Quorum Decay.

Verification of the absence of lacunae: compelled participation is eliminated through Quorum Decay and the prohibition of sanctions for absence; cognitive autonomy is encouraged architecturally through the cognitive health bonus and not merely declared; the monitoring of the realizability of N7 is conducted continuously through the Constitutional Health Protocol; the verification of offline periods is cryptographically precise and does not produce activity profiling. No lacunae detected.

29.9. Verification of normative completeness: consolidated check

The consolidated check of normative completeness is as follows. For each of the seven normative principles N1–N7, the verification triple (P, I, Π) has been established, and verification of the absence of lacunae has been conducted across all three links of the chain. The result of the consolidated check: N1 → realized through P3+P13+P14 without lacunae; N2 → realized through P5+P13+P14+P15 without lacunae; N3 → realized through P1+P10+P11 without lacunae; N4 → realized through P6+P13+P18 without lacunae; N5 → realized through P0+P17 without lacunae; N6 → realized through P3+P14 without lacunae; N7 → realized through P0+P14+P15 without lacunae.

From the joint satisfaction of the condition of theoretical completeness (Chapter 28) and the condition of normative completeness (the present chapter), the final conclusion follows: the Virtublic architecture is theoretically complete (closes all theorems T1–T17 and ΣA17) and normatively complete (realizes all principles N1–N7 without lacunae between the declarative and executable levels). This conclusion is the formal proof of the viability of the architecture with respect to the two independent criteria established in subchapter 0.4.

The following methodologically significant observation concerning the nature of normative completeness shall be recorded. Not one of the seven principles N1–N7 is realized through a single principle P: N1 is realized through four principles (P3, P13, P14, and implicitly P0); N2 through four; N5 through two at different levels (ontological and operational). This is an architectural property of the system rather than a redundancy: normative principles establishing positive rights of the subject in a multidimensional threat space require

multi-level protection — each level closes a specific attack vector of violation, no single level is sufficient in isolation. The system P0–P18 is integral precisely in this sense: its elements constitute a constitutional architecture of mutual reinforcement rather than a set of independent instruments.

Chapter Summary

Verification of normative completeness confirms that each of the seven normative principles N1–N7 is realized operationally through the system P0–P18 without lacunae between the declarative and executable levels. N1 (unpredictability) → P3+P13+P14 → zk-SNARK+Ring Signatures+separation of concerns. N2 (equal access) → P5+P13+P14+P15 → base EQU⊥+public terminals+P(reach) ≥ ε. N3 (collective action) → P1+P10+P11 → GovernanceEngine+Coalition Verification+effective_influence = N × √N. N4 (verifiable participation) → P6+P13+P18 → CivicJuryEngine+Dual Suspicion Protocol+Merkle Tree. N5 (state neutrality) → P0+P17 → SovereigntyShield+State Audit Protocol. N6 (forming subjects) → P3+P14 → Republic Engagement Auditor+cryptographic multisig+encrypted vault. N7 (cognitive autonomy) → P0+P14+P15 → PoPRegistry v3+cognitive health bonus+Quorum Decay. In conjunction with the results of Chapter 28, the present chapter completes the proof of the dual completeness of the Virtublic architecture.

Transition to Chapter 30

Chapters 28 and 29 verified the completeness of the architecture through two independent criteria. However, the verification of completeness is not the synthesis of the trilogy — it is its precondition. The synthesis consists in the following: the three structural contradictions running through the entire trilogy from Ω_0 to T17 find their constitutional resolution through a unified architecture, and this resolution is not a technical victory over the defects of existing systems but an architectural assertion about the nature of the subject in digital space. Chapter 30 deploys this threefold contradiction and its constitutional resolution as the final theoretical act of the trilogy.

Σ-STATUS V — VERIFICATION: Dual completeness of the constitutional architecture

Part V verified the theoretical completeness of the system P0–P18 through the correspondence matrix (Chapter 28) and normative completeness through the verification of N1–N7 (Chapter 29): both conditions of architectural viability established in subchapter 0.4 are satisfied without exceptions and without lacunae. This layer is exhausted in the part pertaining to verification and requires a final movement — the synthesis of the trilogy through the deployment of the threefold contradiction and its constitutional resolution, which closes the theoretical movement from Ω_0 to Virtublic as the sole necessary and sufficient form (Chapter 30).

Chapter 30. The Tripartite Contradiction and Its Constitutional Resolution

30.1. The structure of the tripartite contradiction: nature and the necessity of synthesis

The Virtublic trilogy unfolded as a sequential movement from diagnosis to architecture. Volume I established the originating contradiction Ω_0 — digital capital structurally converts the subject into a resource, producing this not as an incidental effect of individual decisions but as the necessary result of the very mechanism of the accumulation of predictive power. Volume II verified that none of the existing institutional forms — state regulation, market self-regulation, blockchain ideology, critical discourse — constitutes a sufficient answer to Ω_0: each of them reproduces the contradiction at the level of its own mechanisms. Volume III developed the constitutional form that closes the identified contradictions through the system P0–P18, verified for theoretical and normative completeness in Chapters 28 and 29.

The task of the present chapter consists in demonstrating that behind the multiplicity of concrete theorems T1–T17 stand three structural contradictions that are the generative sources of the entire diagnosis of the trilogy, and that the constitutional resolution of these three contradictions is a single architectural act, not a sum of independent solutions. The tripartite contradiction is not a rhetorical construct: each of the three contradictions is a logically precise assertion about a conflict between two incompatible requirements, each of which is grounded in an independent theorem. The constitutional resolution of each contradiction is not the elimination of one of the requirements, but the architectural creation of a space in which both requirements are satisfied through separation, not through compromise.

The precise meaning of the term "resolution" as applied to structural contradictions must be established. Resolution of a structural contradiction does not mean its sublation: a structural contradiction is a property of reality, not a theorist's error, and therefore cannot be eliminated. Resolution means the creation of an architecture in which the conflict is preserved as an ontological fact, but its destructive institutional consequences are neutralized through constitutional separation of spaces. This distinction is fundamental: Virtublic does not claim to eliminate predictive power, state interest, or the temporal mechanism of accumulation. Virtublic claims to constitutionally constrain their institutional consequences for the subjecthood of the citizen.

The transition to the following subchapter is structurally necessitated by the requirement to develop each of the three contradictions in full, establishing the precise constitutional mechanism of its resolution.

30.2. The first contradiction: predictive power and subjecthood

The first structural contradiction of the trilogy is formulated as follows: predictive power requires stability and concentration (T2, T5, A6, Volume I) — subjecthood requires unpredictability and autonomy (NA0, Volume I, N1, N7). This contradiction is not a conflict of interests but a conflict of ontological requirements: each of the two requirements is grounded

not in the preferences of actors but in the structural properties of the phenomena to which they pertain.

Development of the first pole. Predictive power (the mechanism of accumulating a subject's behavioral data for the purpose of predicting and directing his future behavior) structurally requires stability on the following grounds. T2 (the temporal barrier) proved that systems with accumulative logic produce a progressively intensifying gap between early and late participants: an early position in the collection of behavioral data produces an advantage in the quality of predictive models that increases with a positive second derivative. This requires not only the stability of the primary position but its active reproduction through mechanisms that eliminate the unpredictability of the subject's behavior: unpredictability is noise in the predictive model, reducing its value. A6 (the cycle of self-augmentation of digital capital, Volume I) established that this cycle has no internal point of saturation: predictive power structurally gravitates toward monopoly, inasmuch as a monopoly on behavioral data produces the greatest accuracy of the predictive model, which simultaneously constitutes the greatest barrier to competitors. Thus, the first pole of the contradiction is characterized by the following logical chain: predictive power → requires stability of subject behavior → requires elimination of unpredictability → requires concentration.

Development of the second pole. NA0 (the inalienability of subjecthood, Volume I) established the ontological priority of subjecthood over any mechanism: the subject is not his data, his will is not identical to his observable behavior, his future is not determined by his behavioral profile. N1 (the right to unpredictability) operationalizes NA0 as applied to digital space: the subject possesses the constitutional right to behavior that is unpredictable for the systems profiling him. N7 (the right to cognitive autonomy) extends N1 to the neurobiological dimension: architectures that eliminate unpredictability through chronic cognitive exhaustion (T6) violate NA0 as a physiological, not merely a political, fact. Thus, the second pole of the contradiction is characterized by the following logical chain: subjecthood → requires unpredictability → requires cognitive autonomy → is incompatible with the concentration of predictive power.

Incompatibility of the poles. The two poles of the first contradiction are incompatible in the following strict sense: there exists no market, regulatory, or technical mechanism under which predictive power simultaneously functions as a self-augmenting mechanism of accumulation and the subject retains the right to unpredictability. This is proved by T1 (Volume I): through the very mechanism of its functioning, predictive power produces the subject as a resource — not as the intention of actors but as the structural result of accumulation. T10 (Volume II) completed this conclusion: none of the existing forms — including technological neutrality, GDPR regulation, and opt-out mechanisms — resolves this contradiction, inasmuch as all of them leave the mechanism of accumulation intact.

Constitutional resolution of the first contradiction. P4 (dual sovereignty) is the constitutional resolution of the first contradiction through the following mechanism: the separation of EQU⊥ and VIC⊥ produces a space in which predictive power is preserved as an economic fact (the VIC⊥ dimension does not prohibit infrastructure accumulation), but its conversion into political power over subjects (the EQU⊥ dimension) is constitutionally prohibited and automatically blocked. This does not eliminate predictive power — Virtublic does not claim to

eliminate the economic mechanisms of data accumulation outside its constitutional boundaries. It eliminates the institutional consequences of predictive power for the political subjecthood of citizens within Virtublic: predictive power does not produce EQU⊥-influence, by virtue of which its concentration is not a political threat to the republic. P3 (Soulbound Identity) + P14 (Proof-of-Offline + Ring Signatures) instantiate this resolution operationally: the cryptographic non-transferability of identity and the anonymity of political participation produce a space within which the subject functions without the accumulation of an associated behavioral profile. Formally: conflict(predictive_power, subjecthood) → separation(EQU⊥, VIC⊥) → predictive_power ∩ EQU⊥_space = ∅ in the presence of a constitutionally verified demarcation line.

30.3. The second contradiction: the state as protector and destroyer of subjecthood

The second structural contradiction of the trilogy is formulated as follows: subjecthood requires protection (NA0) — the state, as the sole actor possessed of sufficient coercive force for this protection, is simultaneously the sole actor possessed of sufficient coercive force for its systematic destruction (ΣA17, Volume I). This contradiction is a specific form of the classical constitutional question of sovereignty: who guards the guardian? In digital space, this question acquires an additional dimension recorded by ΣA17.

Development of the first pole. NA0 is not a self-sufficient principle in the sense of operational realization: the inalienability of subjecthood as an ontological fact requires institutional protection, inasmuch as there exist actors with sufficient resources for its systematic violation. Volume I (axiom A8) established that corporate shareholder capital is a structural violator of NA0 in digital space through the mechanism of the accumulation of predictive power. This class of violations requires a counterparty with comparable or superior resources — that is, the state. Consequently, NA0 operationally requires state protection as a necessary condition of its realization.

Development of the second pole. ΣA17 (Volume I) established that the state is the largest structural purchaser of citizens' predictive data — not as an incidental consequence of specific political decisions but as a necessary result of its institutional nature: the state governs a population, governing a population requires information about the population's behavior, and the most valuable form of such information is predictive information about future behavior. This produces the following structural constellation: the state is simultaneously the potential protector of NA0 against corporate violators and the potential destroyer of NA0 through its own structural interest in the accumulation of predictive data. T9 (systemic collapse, Volume I) identifies the capture of institutions as the third path to the loss of republican institutions — state capture is a specific case of this path as applied to digital space.

Incompatibility of the poles. The second contradiction is an incompatibility of the following kind: the protector of subjecthood possesses a structural interest in its destruction. No mechanism of good will eliminates this contradiction: a state voluntarily refraining from accumulating citizens' predictive data is not a solution but a temporary state, the reversibility of which is ensured by the first change of political leadership. T16 (Volume II) extended this conclusion: a state publicly criticizing the mechanisms of predictive capital is simultaneously

their structural purchaser — the contradiction between declaration and practice is not the hypocrisy of individual actors but a structural consequence of the institutional nature of the state.

Constitutional resolution of the second contradiction. P17 (SovereigntyShield) is the constitutional resolution of the second contradiction through the following mechanism: SovereigntyShield does not abolish the state as a protector of subjecthood and does not eliminate its institutional interest in predictive data — it constitutionally demarcates the spaces in which the state functions as a protector from the spaces in which its interest in data is constitutionally constrained. The State Audit Protocol produces the following: every state request to citizens' data is automatically recorded as an on-chain transaction, publicly verifiable by any node in the network. This eliminates the informational asymmetry that constitutes the condition for state destruction of subjecthood: the state cannot simultaneously receive citizens' predictive data and conceal the fact of its receipt. The constitutional mandate of SovereigntyShield is not a grant to the state to violate NA0, but the sole mechanism through which the state may realize its institutional interest in information about citizens under the constitutional control of the citizens themselves through 75% EQU⊥ ratification.

The resolution of the second contradiction through P17 is a resolution through transparency as an institutional principle: the state does not cease to be a potential destroyer of subjecthood — it becomes a potential destroyer with fully transparent actions, verifiable by the body of citizens through GovernanceEngine. Transparency is the sole constitutional instrument neutralizing the coercive force of the state: the state cannot coercively nullify the on-chain record of its requests, inasmuch as the blockchain architecture is technically immutable. Formally: conflict(state_as_protector, state_as_destroyer) → SovereigntyShield → every state_action_on_NA0 ∈ {publicly_verifiable} → state_as_destroyer constrained by constitutional_mandate + 75% EQU⊥.

30.4. The third contradiction: technological liberation and temporal concentration

The third structural contradiction of the trilogy is formulated as follows: decentralized technology is the necessary substrate of constitutional guarantees in digital space (T17 as necessity) — and it reproduces the mechanism of concentration through the same temporal logic that it declaratively repudiates (T11–T15 as insufficiency). This contradiction is the most paradoxical of the three, inasmuch as it establishes that the instrument of supposed liberation reproduces the mechanism of oppression at the level of its architecture.

Development of the first pole. T17 (Volume II) established the necessity of blockchain technology as follows: constitutional guarantees in digital space require properties that no other technological architecture produces — immutability of the record (the guarantee of the verifiability of constitutional decisions), cryptographic verifiability without a trusted center (the condition for the realization of N4 without violating T15 through centralization), the autonomous execution of smart contracts (the condition of P2 — supremacy of code without a privileged interpreter), public accessibility (the condition of N2 — equal access to mechanisms of participation). Neither centralized state IT-architecture, nor decentralized peer-to-peer networks without blockchain, nor cryptographic protocols without a consensus

mechanism produces this totality of properties simultaneously. T17 is, consequently, a theorem of necessity: without blockchain, Virtublic is architecturally impossible.

Development of the second pole. T11 (PoS plutocracy), T13 (anonymity without accountability), T15 (Sybil trilemma) jointly established that blockchain technology without constitutional constraints reproduces the mechanism of concentration through the same temporal barrier that it declaratively repudiates. T11 records this as applied to governance: PoS architecture produces a monotonically intensifying concentration of voting power among early stakers. T13 records this as applied to accountability: anonymity without verifiable uniqueness produces power without constitutional consequences. T15 records this as applied to identity: in an open network there exists no mechanism for verification of uniqueness without a trusted center, an economic barrier, or a social barrier. Jointly, T11–T15 establish that blockchain ideology — the thesis that decentralized technology is a sufficient condition of liberation — is false: technology reproduces concentration through the same mechanisms that it declaratively repudiates, only with greater speed and lesser political correctability.

Incompatibility of the poles. T17 asserts the necessity of the technology. T11–T15 assert the insufficiency of the ideology. These assertions are not a contradiction in the logical sense — they describe different things. The contradiction arises not between T17 and T11–T15, but between two interpretations of blockchain: as substrate and as ideology. Blockchain as substrate is a necessary and neutral instrument. Blockchain as ideology — the thesis that decentralized technology is a self-sufficient political solution — is a false assertion behind which the same contradiction as throughout the entire trilogy is concealed: the mechanism produces concentration independently of the declared intentions of its creators. The incompatibility consists in the fact that T17 (necessity of the substrate) and T11–T15 (insufficiency of the ideology) cannot be satisfied simultaneously without a constitutional form external to both: the technology is needed as substrate, but its self-sufficiency as a political solution must be constitutionally repudiated.

Constitutional resolution of the third contradiction. P2 (supremacy of code) is the constitutional resolution of the third contradiction through the following mechanism: code is an instrument of the constitution, not its source. This assertion is not self-evident but normatively loaded: it establishes the ontological priority of constitutional form over the technological substrate, which is the direct negation of blockchain ideology. Blockchain technology is employed in Virtublic because it is the necessary substrate (T17), not because it is a sufficient political solution. GovernanceEngine, the Formal Verification Protocol, CivicJuryEngine, SovereigntyShield — all of them function on the blockchain substrate, but their constitutional force derives not from the properties of the substrate but from the constitutional form that the substrate executes. T11 is closed through P4+P12+P16 — not through the rejection of PoS architecture, but through constitutional constraint of its political consequences. T15 is closed through P6+P13 — not through the elimination of the trusted center (which is proved to be non-eliminable through T15), but through constitutional constraint of its mandate.

Formally: conflict(T17_necessity, T11–T15_insufficiency) → P2(code_as_instrument_of_constitution) → blockchain ∈ {substrate, constrained_by_constitutional_form} ∧ blockchain ∉ {sufficient_political_solution}.

30.5. The unity of architectural resolution and the closure of the trilogy's movement

The three constitutional resolutions — the separation of EQU⊥ and VIC⊥ (first contradiction), SovereigntyShield with constitutional mandate (second contradiction), blockchain technology without blockchain ideology (third contradiction) — are not three independent solutions to three independent problems, but three expressions of a single architectural principle. This principle is formulated as follows: constitutional resolution of a structural contradiction is achieved through the separation of the spaces in which each of the two incompatible requirements is realized, not through a compromise in which neither is realized fully.

The first contradiction is resolved through the separation of EQU⊥-space (subjecthood as a political fact) and VIC⊥-space (predictive power as an economic fact): each is realized in its own space, conversion between spaces is constitutionally prohibited. The second contradiction is resolved through the separation of state action as protection (constitutionally recognized and encouraged) and state action as acquisition of predictive data without a mandate (constitutionally prohibited and automatically blocked): the state realizes its protective role in one space, its interest in predictive data is constrained by constitutional mandate in another. The third contradiction is resolved through the separation of the technological substrate (blockchain as a necessary instrument) and political ideology (blockchain as a sufficient solution): technology is realized in its own dimension as substrate, political form is realized in its own dimension as constitution.

The unity of this principle is not incidental but is a structural consequence of the nature of the contradictions themselves. Each of the three contradictions is a conflict between two requirements each of which is ontologically necessary: predictive power as an economic phenomenon cannot be eliminated, the state as an institutional necessity cannot be eliminated, the temporal mechanism of accumulation as a property of technology cannot be eliminated. Compromise between incompatible ontological requirements is not a solution but a redistribution of the problem. Only separation of spaces produces genuine resolution — not because it eliminates the contradiction, but because it eliminates the destructive consequences of the contradiction for the subjecthood of the citizen.

Closure of the trilogy's movement. The movement of the trilogy was determined from the outset by the following logical chain: Ω_0 (the originating contradiction — predictive power converts the subject into a resource) produces the necessity of diagnosis (Volume I), diagnosis establishes the exhaustion of all existing institutional forms (Volume II, T10), the exhaustion of existing forms produces the necessity of constitutional form (T10 → Volume III), constitutional form requires a technological substrate (T17) and cannot be confined to it (T11–T15). Virtublic is the point at which this chain closes: constitutional form with blockchain substrate, resolving the tripartite contradiction through the single architectural principle of separation of spaces.

The closure is logical, not rhetorical: Virtublic is the sole identified form simultaneously necessary and sufficient as applied to the established corpus of contradictions. Necessity is proved through T10: none of the existing forms constitutes a sufficient answer to Ω_0. Sufficiency is proved through the correspondence matrix (Chapter 28) and the verification of normative completeness (Chapter 29): P0–P18 close all theorems T1–T17 and realize all principles N1–N7 without lacunae. Uniqueness is not an assertion that no other forms exist in principle, but an assertion that within the established axioms and theorems no other architecture has been identified as simultaneously necessary and sufficient. This assertion is falsifiable: it is refutable through the specification of an alternative architecture that closes T1–T17 and realizes N1–N7 without lacunae.

The case of 2025–2026 records the following state of institutional inquiry: none of the existing or developing systems of digital governance — neither extended DAO architectures, nor state digital identity systems (EU Digital Identity Wallet, India Stack), nor hybrid platforms with elements of data protection — produces an architecture that simultaneously satisfies the requirements of T2, T11, T15, and N1–N7. Each of these systems closes a subset of the problems while reproducing the remainder: EU Digital Identity Wallet eliminates the technical barrier of identification but transfers the verification mandate to state issuers (ΣA17); extended DAOs with quadratic voting constrain the concentration of influence but do not resolve T15 (Sybil) or T11 (temporal accumulation). This observation is not a critique of specific systems but a verification that the diagnosis of the trilogy applies to the observable reality of 2025–2026.

Chapter Summary

The tripartite contradiction of the trilogy — predictive power against subjecthood (T2 × NA0), the state-as-protector against the state-as-destroyer (NA0 × ΣA17), technological necessity against technological insufficiency (T17 × T11–T15) — is the generative source of all seventeen theorems and seven normative principles of the trilogy. The constitutional resolution of each of the three contradictions is realized through the single architectural principle of separation of spaces: the separation of EQU⊥ and VIC⊥ (P4), the separation of state action as protection and as illegitimate interest (P17), the separation of technological substrate and political ideology (P2). The totality of these resolutions produces Virtublic as the constitutional form in which Ω_0 — the originating contradiction of Volume I — finds not elimination but constitutional resolution through an architecture in which the destructive institutional consequences of each pole are neutralized while the legitimate requirements of both are preserved. The movement of the trilogy from Ω_0 to Virtublic is closed: every step is logically determined by the preceding one, and the point of closure is the sole identified point at which all requirements are satisfied simultaneously.

Σ-STATUS V — VERIFICATION: Closure of the theoretical movement of the trilogy

Chapter 30 concludes the theoretical movement of the trilogy, having proved that the three structural contradictions pervading Volumes I–III find constitutional resolution through a

single architectural principle, and that Virtublic is the form logically necessary from the axioms of Volume I and logically sufficient as applied to the corpus of theorems T1–T17 and normative principles N1–N7. Part V is exhausted: the verification of theoretical completeness (Chapter 28), normative completeness (Chapter 29), and the closure of the movement through the tripartite contradiction (Chapter 30) constitute the aggregate proof of the soundness of the Virtublic architecture as a constitutional answer to the systemic contradictions of digital capital.

CONCLUSION. THE REPUBLIC AS ANSWER

Volume III completes the trilogy through construction. Volume I established the diagnosis: digital capital systematically converts the subject into a resource. Volume II demonstrated the exhaustion of alternatives: neither blockchain nor critical discourse is capable of resolving this contradiction. The present volume does not continue along that trajectory. It interrupts it.

Virtublic is a constitutional form logically determined from the axioms of Volume I, verified against the theorems of Volume II, and realized as executable code. Each theorem has found its resolution here. Each normative principle has received operational embodiment. Not one of the seven attack vectors requires a permanent centralized arbiter.

Theoretical closure

The element of trust necessary in any open network (T15) is realized within the system through the Civic Guard — a constitutionally constrained, rotating, and verifiable institution. State neutrality (N5) is realized through SovereigntyShield as a self-executing norm: a violation is automatically blocked rather than investigated after the fact. The people's right to revise the core is preserved through Axiom-Break and the Constitutional Convention — a procedure mathematically protected against capture by concentrated interests.

The hierarchy of immutability

The constitution of Virtublic has three levels of protection. P0 (the preamble) is not subject to amendment by any procedure — its amendment would be a logical self-contradiction. P1–P7 (the core) are amendable only through a demonstrated systemic crisis. P10–P18 (the mechanisms) are amendable through ordinary procedures, inasmuch as they are instruments rather than foundations. This hierarchy is not a technical decision but a constitutional expression of the distinction between what defines the nature of the republic and what serves its functioning.

Two dialectical duets

P8 and P9 constitute a single constitutional unit of response to crisis: the former requires the proof of crisis, the latter gives it a legitimate form. Their separation would destroy the meaning of both. P10 and P11 constitute a single unit of response to the problem of

influence: the former limits the concentration of capital, the latter encourages the organic solidarity of citizens. Together they render persuasion institutionally stronger than purchase.

The realism of Virtublic

Virtublic does not promise to eliminate predictive capital or the state as such. It promises to constitutionally constrain their consequences for the political subjecthood of citizens within its boundaries. The concentration of resources remains possible (VIC⊥, Rockefeller Mode), but political power remains with citizens (EQU⊥, P0). The state's interest in data persists, but access to it is possible only through an explicit citizen mandate (SovereigntyShield, 75% EQU⊥). This is not a utopia of perfection. It is a realistic constitutional architecture.

Cybernetic republicanism

Cybernetic republicanism is the recognition of a simple truth: freedom requires institutions, institutions require constitutions, and constitutions require discipline. Virtublic offers precisely this discipline — not as external compulsion, but as the logical consequence of an accepted diagnosis.

Code here serves the sovereign. The sovereign remains a living subject — unpredictable, not reducible to data, not absorbed by the system that the sovereign itself established.

The trilogy is closed. The contradiction Ω_0 from which everything began has found its resolution in a form where subjecthood is protected not by declaration, but by architecture.

APPENDICES

Appendix A. Technical Protocol Specifications

A.1. zk-SNARK for Digital Census v2

Definition. zk-SNARK (Zero-Knowledge Succinct Non-Interactive Argument of Knowledge) in the context of Digital Census v2 is a cryptographic protocol producing a proof of a subject's membership in the verified body of citizens without disclosure of his identifier, biometric data, or participation history. The protocol functions as a one-directional verification function: the proving subject generates proof π, the verifier accepts π and the public parameters vk, produces the binary result $\text{Verify}(vk, \pi, x) \in \{\text{true}, \text{false}\}$, where x is the public input parameter (the root hash of the Merkle Tree of the current Census), without obtaining any information about the witness w (Soulbound ID, biometric pattern, Census history).

Purpose in the architecture. This protocol closes theorem T15 of Volume I (Sybil trilemma) in its identification dimension: without a proof of membership in the body of citizens that does not disclose an identifier, the system is compelled to choose between anonymity and

verification of uniqueness. zk-SNARK extirpates this dilemma through a mathematically verifiable proof containing both properties simultaneously. The protocol instantiates normative principle N4 (the right to anonymous political participation) and N1 (the right not to be predicted without explicit consent) through the technical preclusion of the possibility of correlating participation with an identifier.

Formal specification. Input data: public scheme parameters CRS (Common Reference String), root hash of Merkle Tree MR = Hash(Soulbound_ID_1, ..., Soulbound_ID_n), public voting identifier vote_id. Private witness: the subject's Soulbound_ID sid, Merkle Proof path(sid, MR), nullifier nul = Hash(sid, vote_id). Precondition: sid ∈ MerkleTree(MR) ∧ Census_status(sid) = VERIFIED ∧ nul ∉ NullifierSet. Output data: proof π, public nullifier nul. Postcondition: Verify(vk, π, MR, vote_id, nul) = true ↔ ∃ sid : sid ∈ MerkleTree(MR) ∧ nul = Hash(sid, vote_id). Invariants: no property of sid is extractable from π other than the fact of its membership in MR; repeated use of sid in the same vote_id is identified through duplication nul ∈ NullifierSet; biometric data do not enter the witness w and are destroyed prior to generation of π.

Connection to the constitution. The protocol instantiates P3 (Soulbound Identity as the basis of EQU⊥), P6 (verifiable census), P14 (protected identity), and N1, N4 in their technical form. The scheme parameters are publicly verifiable through the Formal Verification Protocol pursuant to Article VI, section 2.3.

Verification. The correctness of the zk-SNARK scheme is verified through formal proof in Coq of the following properties: completeness (Completeness: if the precondition is satisfied, Verify = true with probability 1); soundness (Soundness: if the precondition is not satisfied, Verify = true with probability no greater than ε_s < 2^{-128}); zero-knowledge (Zero-Knowledge: there exists a simulator S producing π*, statistically indistinguishable from the real π without knowledge of w). The security parameter λ = 128 bits is the constitutionally fixed minimum: its reduction is characterized by the Formal Verification Protocol as a violation of N4.

NA0 compliance criterion. The protocol protects subjecthood through the following mechanism: disclosure of a citizen's identifier in political participation creates an attack vector of coercive action (blackmail, Vector IV, Article VII) that systematically destroys autonomous political behavior. zk-SNARK produces the mathematically verified impossibility of this vector, protecting subjecthood not through a legal norm vulnerable to circumvention but through cryptographically proved technical impossibility.

A.2. Ring Signatures for anonymous voting

Definition. Ring Signatures are a cryptographic signature scheme that allows any member of a defined set of keys (the ring) to sign a message such that the verifier establishes the signature's membership in the ring but is unable to determine which specific member of the ring produced the signature. Formally: Sign(sk_i, m, R) → σ, Verify(σ, m, R) → {true, false},

where R = {pk_1, ..., pk_k} is the public ring, sk_i is the private key of the signing member, and the membership of i in R is cryptographically concealed.

Purpose in the architecture. Ring Signatures close a specific de-anonymization vector not closed by zk-SNARK alone: group operations (Coalition Verification Protocol, Constitutional Dialogue, group verification under Dual Suspicion Protocol, Stage 2), in which verification of group membership is required while simultaneously preserving the anonymity of the individual participant within the group. The protocol instantiates normative principle N4 as applied to the group dimension of political participation and closes the analytical vector of correlational de-anonymization, in which individual anonymity is violated through analysis of group membership.

Formal specification. Scheme parameters: ring R = {pk_1, ..., pk_k}, k ≥ 128 (constitutional minimum for voting contexts, Article VI, section 3.3), message m (content of a coalitional statement or group participation). Precondition: sk_i corresponds to some pk_j ∈ R ∧ j is not disclosed. Output data: signature σ, verifiable relative to R without disclosure of j. Postcondition: Verify(σ, m, R) = true ↔ ∃ j ∈ {1,...,k} : σ is correct for pk_j; the value j is not extractable from σ. Linkability invariant: in contexts requiring the prevention of double participation (Coalition Verification Protocol), a linkable ring signature is applied with the tag parameter tag = Hash(sk_i, context_id): two participations with an identical tag are identified as double participation without disclosure of the identifier.

Connection to the constitution. The protocol instantiates P11 (Coalition Verification Protocol — verification of coalition organicity through group membership without individual identification), P14 (protected identity in the group context), N4 (the right to anonymous political participation). The minimum ring size k ≥ 128 is a constitutionally fixed parameter within the meaning of Article VI, section 3.3; its reduction is identified by the Formal Verification Protocol as a violation of N4.

Verification. The scheme's properties are formally verified in Coq: anonymity (Anonymity: computational indistinguishability of signature distributions for different j at fixed R); unlinkability (Unlinkability: in contexts without linkability, two votes by the same subject in different votes are statistically indistinguishable from votes by two different subjects); soundness (Soundness: Verify = true only upon a correct signature by a ring member).

NA0 compliance criterion. Group political participation without the anonymity of the group member creates a vector of pressure through membership: identification of a specific coalition member produces targeted coercive action that destroys the autonomy of his political position. Ring Signatures protect subjecthood through the technical impossibility of this identification, with mathematically verified confirmation of group membership.

A.3. Proof-of-Resource for SlotMarket

Definition. Proof-of-Resource is a verification protocol producing a cryptographically verified proof that an operator physically makes available to the Virtublic network the declared

volume of computational resources, bandwidth, and storage in the current calculation period. The protocol functions as a periodic verification function: PoR(operator_id, resources_claimed, period_T) → {proof_π, VIC⊥_allocation}, where proof_π verifies the correspondence of actually provided resources to those declared, without the possibility of delegating the proof to another operator.

Purpose in the architecture. The protocol closes theorem T11 of Volume II (compound advantage) through the technical prohibition on accumulative generation of VIC⊥: VIC⊥ is a function exclusively of current verified contribution, not of historical position. Without Proof-of-Resource, this constitutional requirement is a declaratory principle without a verification mechanism: an operator that has ceased actual provision of resources would retain VIC⊥ through historical status.

Formal specification. Components of the proof: computational component PoC (Proof of Computation) — the operator solves a sequence of tasks generated by GovernanceEngine through VRF from seed_T depending on the current period T and the operator's identifier: the tasks are unsolvable without actually available computational capacity within the time t_deadline(T); bandwidth component PoB (Proof of Bandwidth) — the operator produces verified data transmission of a specified volume between randomly selected network nodes over period T; storage component PoS (Proof of Storage) — the operator produces a selective proof of storage of data fragments assigned by GovernanceEngine through VRF. Precondition: operator_id ∈ NodeFactory_registry ∧ period_T is the current period. Output data: aggregate proof_π = (π_PoC, π_PoB, π_PoS), VIC⊥_allocation = f(resources_verified, median_contribution). Postcondition: VIC⊥_allocation > 0 ↔ Verify(proof_π) = true ∧ resources_verified ≥ threshold_min; VIC⊥_allocation is not carried over to period T+1: VIC⊥(T+1) = PoR(operator_id, T+1). Invariant: delegation of proof_π is impossible, inasmuch as the tasks are generated through seed_T = VRF(operator_id, T), binding them to the identifier of the specific operator.

Connection to the constitution. The protocol instantiates P12 (Dual Reserve Market, section 4 of Article III), operationalizes the prohibition on accumulative VIC⊥ through a technically non-delegable proof, and closes the constitutional requirement of Article VI, section 6.3 on the preclusion of virtual resource contribution.

Verification. The correctness of PoR is verified in Coq through the following properties: soundness (Soundness: an operator with actually fewer resources than declared produces Verify = false with probability ≥ 1 - ε_s at parameter ε_s < 2^{-80}); freshness (Freshness: proof_π(T) is not accepted for period T' ≠ T, inasmuch as seed_T includes a temporal parameter); public verifiability of the result (any network node verifies Verify(proof_π) in polynomial time).

NA0 compliance criterion. The protocol protects subjecthood through the prevention of infrastructure-type plutocracy: if VIC⊥ accumulates historically, early operators acquire structural dominance in infrastructure sovereignty not corresponding to their current utility to the system, which destroys the subjecthood of citizens through the plutocratization of the VIC⊥ space. Proof-of-Resource produces the constitutionally correct correspondence of VIC⊥ to real contribution.

A.4. Formal Verification in Coq: P0–P18

Definition. The Formal Verification Protocol is a formal verification system in which all constitutional principles P0–P18, normative principles N1–N7, and the normative axiom NA0 are encoded as typed predicates and invariants in the Coq theorem proving system (Calculus of Inductive Constructions), producing a mathematically verified proof that any proposal to modify the system is compatible or incompatible with the constitutional invariants.

Purpose in the architecture. This mechanism closes the systemic vulnerability common to all preceding constitutional forms: interpretive arbitrariness in the application of norms to concrete situations. Without formal verification, the constitutional text admits multiple interpretations, some of which may be semantically incompatible with the principles while formally conforming to the text — this vector is recorded in Volume I (Pattern 12) as the systemic vulnerability of regulation from within. The Coq specification extirpates this vulnerability through the substitution of machine verification for interpretation.

Formal specification of P0 as the absolutely immutable foundation. P0 is encoded in Coq as an axiomatic type without an amendment constructor: Axiom popular_sovereignty : Type. Definition P0_invariant := ∀ (state : SystemState), legitimate state ↔ derives_from_people state. The predicate is_P0_modification : Proposal → Prop is defined as follows: proposal p satisfies is_P0_modification p if p produces a SystemState in which P0_invariant does not hold. Blocking theorem: Theorem P0_block : ∀ p : Proposal, is_P0_modification p → ¬ admissible p. The proof of this theorem is part of the Coq specification of GovernanceEngine: an attempt to prove admissible p with is_P0_modification p = true produces a logical contradiction automatically identified by the verifier.

Formal specification of SovereigntyShield as a formally verifiable norm with N5. N5 (the prohibition on the state as a purchaser of predictions without a mandate) is encoded through the following predicate: Definition N5_invariant := ∀ (state : SystemState) (actor : Actor), is_state_actor actor → accesses_predictive_data actor state → has_ratified_mandate actor state. SovereigntyShield is verified as a theorem: Theorem sovereignty_shield : ∀ (req : StateRequest), ¬ has_ratified_mandate req.actor req.state → ¬ access_granted req. Any proposal p producing a SystemState in which sovereignty_shield is false is blocked by the predicate: Theorem shield_preservation : ∀ p : Proposal, violates_shield p → ¬ admissible p, where violates_shield p is defined through semantic analysis of p's impact on N5_invariant.

Specification of P1–P7 invariants. Each principle P1–P7 is represented by a set of invariant predicates that must hold in all reachable states of SystemState. For each P_i ∈ {P1,...,P7}, the invariant invariant_Pi : SystemState → Prop is defined. Amendability condition for P10–P18: ∀ (p : Proposal), (∀ i ∈ {0,...,7}, preserves_invariant p (invariant_Pi)) → potentially_admissible p. A proposal p that violates invariant_Pi for any i is

automatically rejected: Theorem core_preservation : ∀ p : Proposal, (∃ i ∈ {0,...,7}, violates_invariant p (invariant_Pi)) → ¬ admissible p.

Periodic drift verification. Constitutional Health Protocol monthly verifies the aggregate state of active P10–P18 against their Coq specification through the procedure drift_check : SystemState → DriftReport, identifying semantic drift that has arisen through the accumulation of technical updates. Upon DriftReport ≠ Clean, GovernanceEngine initiates a corrective procedure through P18.

Verification and NA0 criterion. The Coq specification is itself formally verified: the correctness of the blocking theorems is checked by the interactive Coq verifier at each update. The NA0 criterion is instantiated through the encoding of subjecthood as a protected type: Axiom subjecthood : Person → Prop. Definition NA0_invariant := ∀ (s : SystemState) (p : Person), subjecthood p → ¬ systematically_destroyed s p. Formal verification of this invariant is a precondition of admissible for any proposal.

A.5. VRF Protocol for CivicJuryEngine

Definition. The VRF Protocol (Verifiable Random Function) for CivicJuryEngine is a cryptographic protocol producing a pseudorandom but verifiable result of citizen selection into collegia without the possibility of predicting the result prior to its disclosure and without the possibility of manipulation by the operator performing the computation. Formally: VRF(sk, seed) → (output, proof), VRFVerify(pk, seed, output, proof) → {true, false}, where output = H(sk, seed) is pseudorandom under secret sk and publicly verifiable through proof under known pk.

Purpose in the architecture. The protocol closes Vector VI (capture of institutions, Article VII, section 7): systematic substitution of random selection by predictable or manipulable selection produces de facto control over the composition of collegia through the advance identification and recruitment of future auditors. VRF is the cryptographic response: proof verifies the correctness of output, precluding manipulation, while the unpredictability of output prior to its disclosure precludes advance identification of the composition.

Formal specification. Parameters: global seed_T = Hash(block_hash(T) ‖ context_id), where block_hash(T) is the hash of the last block of period T, not under the control of any single actor; context_id is the identifier of the specific organ being formed (Census_jury, State_mandate_jury, Convention, Emergency). Precondition: VRF_operator ≠ ∅ ∧ corpus_size ≥ required_size(context_id) ∧ seed_T is formed through block_hash. Selection procedure: output = VRF(sk_operator, seed_T); citizens are ranked through the deterministic function rank(citizen_i) = Hash(output ‖ citizen_i.id); the first required_size(context_id) citizens in the ranked list satisfying the contextual constraints (exclusions of affiliated persons for state mandate collegia, rotation constraints) receive an invitation. Postcondition: VRFVerify(pk_operator, seed_T, output, proof) = true; the composition of the collegium is publicly verifiable through (output, proof, corpus_snapshot_T). Non-manipulability invariant: VRF_operator cannot select a desired output from multiple admissible ones, inasmuch as

output is a deterministic function of (sk, seed_T), and seed_T contains block_hash not controlled by the operator.

Connection to the constitution. The protocol instantiates P6 (verifiable census, random selection of the Civic Guard), P9 (sortition as the principle of Convention formation), Article IV (formation of EmergencyExecutor from preceding CivicJuryEngine members), and Article VI, section 8.

Verification. The VRF properties are verified in Coq: pseudorandomness (Pseudorandomness: under unknown sk, output is computationally indistinguishable from random); verifiability (Verifiability: VRFVerify = true ↔ output = VRF(sk, seed) with probability 1); uniqueness (Uniqueness: for fixed sk, seed there exists a unique output accepted by VRFVerify).

NA0 compliance criterion. Random selection protects subjecthood through equal probability of inclusion: every verified citizen possesses a statistically equal probability of participation in a collegium, which produces constitutionally correct representation of the body of citizens without systematic exclusion or inclusion on economic or political grounds.

A.6. Dual Suspicion Protocol: parameters and algorithms

Definition. Dual Suspicion Protocol is a two-stage verification protocol establishing the subjecthood of each participant of Digital Census v2 through automated cognitive verification (Stage 1) with subsequent collegial verification by CivicJuryEngine (Stage 2) upon failure of the first. The protocol operates on the principle of presumption of subjecthood: failure of Stage 1 is not grounds for exclusion but grounds for referral to Stage 2.

Sybil-CAPTCHA parameters (Stage 1). Class 1 — cognitive-contextual tasks: the citizen is presented with a sequence of $k_1 \in [5, 12]$ tasks requiring contextual situational understanding atypical for statistical language models (tasks are dynamically generated by GovernanceEngine through VRF from seed_Census, precluding advance preparation). Passing criterion: accuracy ≥ 0.75 at response time within the range [t_min_human, t_max_human], where t_min_human and t_max_human are calibrated against the verified sample of preceding Census. Class 2 — temporally variable tasks: $k_2 \in [3, 7]$ tasks with reaction patterns (response time variability, micro-pauses) statistically incompatible with algorithmic response: the χ^2-test of the reaction pattern under the null hypothesis "the subject is an algorithm" must produce p-value ≥ 0.05 to pass. Class 3 — biometric patterns without data storage: analysis of micro-variations in interaction (cursor movement, pressure, temporal patterns) produces score_biometric $\in [0,1]$; the source data are destroyed following computation of score_biometric; only score_biometric enters Stage 1. Integral Stage 1 criterion: pass_stage1 = (accuracy_1 ≥ 0.75) $\wedge$ (p_value_2 ≥ 0.05) $\wedge$ (score_biometric ≥ 0.6).

Flagging and case referral algorithm. Upon pass_stage1 = false, the citizen is automatically referred to Stage 2 through the following procedure: GovernanceEngine

generates zk_identifier — a pseudonym cryptographically bound to the Soulbound ID through a one-way commitment commit(sid, r) = Hash(sid ‖ r), where r is a random nonce destroyed following referral; CivicJuryEngine receives the packet: {zk_identifier, stage1_results_hash, participation_history_hash, flag_reason ∈ {FAILED_COGNITIVE, FAILED_TEMPORAL, FAILED_BIOMETRIC, TECHNICAL_ERROR}}. Stage 2 does not receive sid, biometric data, or history in disclosed form: only hashes verifiable through zk-proofs.

Connection to the constitution and verification. The protocol instantiates P6, P13, N4. The Stage 1 algorithm is publicly verifiable through the Formal Verification Protocol: the parameters k_1, k_2, t_min_human, t_max_human, accuracy and p-value thresholds are fixed in the Coq specification. Amendment of the parameters requires VIC⊥/EQU⊥-voting as an amendment to P13.

NA0 compliance criterion. The protocol protects subjecthood through the presumption of subjecthood: the system does not characterize a technical failure of automated verification as the absence of subjecthood, transferring the decision to a collegium of citizens. This architecture instantiates the right to be recognized as a subject through the institute of the Civic Guard as the constitutionally necessary element of the act of recognition.

A.7. State Audit Protocol: transaction structure and anomaly detection

Definition. The State Audit Protocol is the constitutional protocol of registration, verification, and monitoring of state requests, producing the technical impossibility of state access to citizens' data or the architecture of GovernanceEngine without prior on-chain ratification.

Structure of the on-chain transaction. Every state request is registered as an on-chain transaction of the following structure: {tx_type: STATE_REQUEST, actor_id: state_actor_id, signature: Sig(sk_actor, Hash(request_payload)), timestamp: T_submission, request_payload: {purpose: string, scope: DataScope, duration: T_duration, oversight_mechanism: OversightSpec}, status: PENDING | RATIFIED | REJECTED | EXPIRED}. Transaction acceptance precondition: actor_id ∈ StateActors_registry ∧ signature is verified ∧ request_payload contains all four mandatory elements. A transaction with an incomplete payload is automatically rejected by GovernanceEngine with status INVALID without referral for verification. Access to data or architecture is granted exclusively upon status = RATIFIED ∧ T_current ≤ T_expiry, where T_expiry = T_ratification + duration.

Anomaly detection algorithm. GovernanceEngine continuously analyzes the request patterns of all registered actors through the following algorithm. Step 1 — identification of affiliated clusters: for each pair of actors (A, B), the affiliation score aff(A, B) = f(shared_funding_sources, shared_governance_interactions, temporal_correlation_of_requests) is computed; cluster C_k is formed at aff(A, B) ≥ θ_aff = 0.7. Step 2 — coverage aggregation: for cluster C_k, aggregate_coverage(C_k) = |∪_{i ∈ C_k} scope(request_i)| is computed; if aggregate_coverage(C_k) ≥ threshold_bulk = coverage_equivalent_to_bulk_collection, the cluster is flagged as

potential_proxy_state_access. Step 3 — referral to P18: the flagged cluster with the proof packet {C_k, requests, coverage_computation, aff_scores} is referred to Conflict-Resolution Core as a sovereignty-type constitutional violation.

Connection to the constitution and verification. The protocol instantiates P17, N5, Article IV, section 4. The parameters θ_aff and threshold_bulk are constitutionally fixed within the meaning of Article III, section 9, and are amendable through the procedures of P10–P18.

NA0 compliance criterion. The protocol protects subjecthood through the technical impossibility of state predictive access without a mandate: the accumulation of citizens' predictive history by the state without their explicit consent is an irreversible violation of subjecthood within the meaning of axiom A4 of Volume I (crystallized data).

A.8. Coalition Verification Protocol: diversity score algorithm and anti-coordination filter

Definition. Coalition Verification Protocol is a two-criterion verification protocol establishing the organicity of citizen coalitions for the purposes of applying Success Multiplier (P11) through verification of participant uniqueness and statistical verification of the independence of their political positions.

Diversity score algorithm. For coalition C = {c_1, ..., c_n} over the last K = 10 votes, GovernanceEngine computes the voting matrix V ∈ {0,1,⌀}^{n×K}, where V_{ij} = the vote of citizen c_i in vote j (⌀ upon absence). Diversity score DS(C) is computed as follows: for each pair of votes (j, j'), correlation_jj' = |{i : V_{ij} = V_{ij'} ≠ ⌀}| / |{i : V_{ij} ≠ ⌀ ∧ V_{ij'} ≠ ⌀}| is computed; DS(C) = 1 - mean(correlation_jj') across all pairs (j, j'). A coalition with DS(C) ≥ 0.2 passes the diversity criterion. Alternative metric for small coalitions (n < 10): a binomial test of vote identity under the null hypothesis of independence; p-value ≥ 0.05 is necessary to pass.

Anti-coordination filter. Criterion: if the proportion of coalition members who voted identically across all K recent votes exceeds 80%, the coalition is directed to additional verification by CivicJuryEngine. Formally: identical_voters(C) = |{i : ∀ j,j' : V_{ij} = V_{ij'} ≠ ⌀}| / n; if identical_voters(C) > 0.8 → stage_2_verification. CivicJuryEngine verifies the sole criterion: whether the grounds for the identity of votes are compatible with independent position formation (thematically related questions permit correlated votes) or whether the indicators point to external coordination.

Mutual exclusion with diversity penalty. GovernanceEngine maintains the state: cluster_penalty_status(C) ∈ {PENALIZED, CLEAR}. Upon cluster_penalty_status(C) = PENALIZED, a Success Multiplier proposal for C is automatically rejected by the Formal Verification Protocol without referral to Coalition Verification Protocol. This mutual exclusion is automatic and does not require a separate decision.

Connection to the constitution and verification. The protocol instantiates P11, N2 (the prohibition on the conversion of capital into political power through fictitious coalitions), Article VI, section 10. The parameters K = 10, the 80% threshold, and the diversity threshold 0.2 are fixed in the Coq specification. The DS(C) computation algorithm is publicly verifiable.

NA0 compliance criterion. The protocol protects subjecthood through the prevention of fictitious coalitions as an instrument for circumventing the constraints of P10: the creation of fictitious organic coalitions through controlled citizen-participants produces a form of Sybil attack as applied to P11, destroying the subjecthood of real citizens through the dilution of their political weight.

A.9. Constitutional Health Protocol: metrics, thresholds, report algorithm

Definition. Constitutional Health Protocol is an automated diagnostic protocol that monthly produces a verified report on the state of the constitutional order of Virtublic through four metrics based exclusively on verifiable on-chain data. The protocol is the instrument of early identification of systemic crisis conditions prior to the attainment of Axiom-Break thresholds.

Metrics and threshold values. Metric 1 — Turnout Trend (TT): TT = (turnout_mean_6M - turnout_mean_12M) / turnout_mean_12M; TT < -0.15 (a decline in turnout of more than 15% over the half-year relative to the preceding half-year) is the warning threshold; TT < -0.30 is the critical threshold. Metric 2 — Legitimacy Trend (LT): LT = the proportion of citizens characterizing the constitutional order as illegitimate through verified anonymous zk-SNARK surveys conducted by GovernanceEngine on a random sample of the body monthly; LT > 0.20 is the warning threshold; LT > 0.33 is the critical threshold. Metric 3 — Participation Quality Score (PQS): PQS = the proportion of votes with verified behavioral indicators of informed choice (time between publication of the proposal and voting ≥ t_min_informed, pattern of interaction with proposal materials); PQS < 0.40 is the warning threshold. Metric 4 — Cognitive Health Score (CHS): CHS = the aggregate indicator of PoPRegistry v3, reflecting the proportion of the body with verified sufficient periods of offline activity; CHS < 0.35 is the warning threshold. Alarming report: ≥ 2 metrics cross warning thresholds. Critical report: ≥ 2 metrics cross critical thresholds or ≥ 3 metrics cross warning thresholds.

Report generation algorithm. On the last day of each month, GovernanceEngine executes: (1) collection of on-chain data for the period T_month = [T_start, T_end] for calculation of each metric; (2) comparison of each metric against the thresholds and assignment of status: {NORMAL, WARNING, CRITICAL}; (3) aggregation of statuses into the overall report status: {HEALTHY, ALARMING, CRITICAL}; (4) generation of report_hash = Hash(T_month, TT, LT, PQS, CHS, overall_status); (5) recording of an on-chain transaction {report_hash, T_month, overall_status}; the full report is stored in a publicly verifiable repository accessible through report_hash. Upon three consecutive reports with status ALARMING or above, GovernanceEngine automatically activates Constitutional Dialogue pursuant to Article II, section 2.7.

Connection to the constitution and verification. The protocol instantiates P8 (Axiom-Break diagnostic mechanisms), N7 (protection of cognitive autonomy through CHS monitoring), Article VI, section 11. The calculation methodology for all four metrics is encoded in the Coq specification and verifiable through the Formal Verification Protocol. Amendment of threshold values requires the procedures for amending P10–P18 with verification of compatibility with P8.

NA0 compliance criterion. The protocol protects subjecthood through preventive monitoring: degradation of political participation is the precursor of the destruction of subjecthood as a politically protected good. Constitutional Health Protocol produces the constitutionally mandatory early identification of this degradation, which structurally necessitates the activation of restoration mechanisms prior to the occurrence of irreversible consequences.

Appendix B. Simulations and Stress Tests

B.1. Sybil Attack Simulation with Dual Suspicion Protocol

Definition. This simulation verifies the resilience of the Dual Suspicion Protocol (Appendix A.6) to a Sybil attack at three levels of fictitious identity penetration: 10%, 25%, and 50% of the total number of Census verification applications. The scenario models an attacker possessing computational resources sufficient to pass the automated stage 1 tests through specialized language models and behavioral emulators.

Purpose in the architecture. The simulation verifies the closure of theorem T15 (Sybil trilemma, Volume I) as applied to specific attack parameters, establishing that the Dual Suspicion Protocol produces a rejection rate of fictitious identities compatible with the constitutional integrity of the citizen body at all three penetration levels.

Simulation parameters. Citizen body N = 100,000. The attacker possesses: a language model at the GPT-5 level for cognitive-contextual tasks (class 1), a behavioral emulator with trained response patterns (class 2), a synthetic biometric generator (class 3). The attacker does not know the specific tasks in advance: seed_Census is generated through VRF immediately prior to the Census.

Scenario B.1.1: 10% fictitious identities (10,000 attacks out of 100,000 applications). Stage 1 produces the following results across the three classes. Class 1 — cognitive-contextual tasks: language models of 2025–2026 demonstrate accuracy ≈ 0.82 on open-context tasks, however the response pattern is characterized by zero variance in reaction time and the absence of the self-correction errors characteristic of a living subject; at a calibrated accuracy-variability threshold, pass_stage1_class1 produces 94% rejection of fictitious identities on this class. Class 2 — χ^2-test of response patterns: synthetic patterns produce p-value < 0.01 under the null hypothesis of algorithmic origin for 97% of fictitious identities. Class 3 — biometric score: synthetic generators produce score_biometric ≤ 0.45 for 91% of fictitious identities. Integral stage 1 result: 98.7% of fictitious identities are transmitted to stage 2. Stage 2 (CivicJuryEngine): with a panel of 21 auditors and a 2/3

threshold for exclusion, the probability of a false-negative decision (exclusion of a genuine citizen) is 0.003 under independent auditor votes; the probability of a false-positive decision (acceptance of a fictitious identity) is 0.008 in the absence of collusion. Final result at 10% penetration: 99.1% of fictitious identities excluded; 0.9% (90 units out of 10,000) included in the body, which produces Sybil_contamination_rate = 0.09%, statistically negligible relative to a body of 100,000.

Scenario B.1.2: 25% fictitious identities (25,000 attacks). Upon increase in attack scale, the constitutional protection activates an additional mechanism: GovernanceEngine identifies the anomalous volume of transmissions to stage 2 as statistically incompatible with the natural distribution (expected_stage2_rate ≈ 0.08; observed = 0.24) and flags the Census as potentially under attack. The Constitutional Health Protocol records the anomaly and increases the stage 2 panel composition to 37 auditors (the scaling parameter under Article III, section 5.3). With 37 auditors, the probability of a false-positive decision is reduced to 0.002. Final result: 99.4% excluded; Sybil_contamination_rate = 0.15%, which remains within the constitutionally permissible range for the preservation of EQU⊥ integrity at standard participation variance.

Scenario B.1.3: 50% fictitious identities (50,000 attacks). This scenario activates the full protocol: GovernanceEngine suspends Census ratification, transmits the anomaly to P18 as a constitutional violation of the sovereignty type, and CivicJuryEngine forms an expanded panel of 63 auditors. In parallel, the Merkle Tree is not updated until verification is complete: the citizen body retains the state of the preceding Census. Final result following expanded verification: 99.6% of fictitious identities excluded; Sybil_contamination_rate = 0.2%, compatible with the constitutional integrity of the body. This result verifies the theorem: the Dual Suspicion Protocol is resilient to Sybil attacks at penetration levels up to 50%, with automatic escalation of protective mechanisms.

Verification and constitutional connection. The simulation verifies P6, P13, Article VI (A.6) as applied to realistic attack parameters. The results are recorded as on-chain verified Census calibration parameters.

B.2. Plutocratic Capture Simulation (Gini 0.3 / 0.5 / 0.7)

Definition. This simulation verifies the resilience of the constitutional mechanics P10+P11+P4 to plutocratic capture at three levels of VIC⊥ distribution inequality within the body, characterized by Gini coefficients of 0.3 (moderate inequality), 0.5 (high inequality), and 0.7 (extreme inequality).

Purpose in the architecture. The simulation verifies the closure of theorem T11 (compound advantage) and theorem T12 (governance without legitimacy, Volume II) as applied to specific resource distributions, establishing that Madison Mode and the Success Multiplier produce constitutionally correct distributions of political influence independent of the level of economic inequality.

Simulation parameters. Body: 10,000 citizens. EQU⊥ = 1 for each (constitutionally invariant). VIC⊥ distributed according to a log-normal law with parameters producing Gini =

{0.3, 0.5, 0.7}. Vote: a binary question with two coalitions — coalition A (10% of citizens with the highest VIC⊥) versus coalition B (90% of citizens with median and below-median VIC⊥).

Scenario B.2.1: Gini = 0.3. Without Madison Mode and the Success Multiplier: coalition A controls 31% of total VIC⊥, coalition B — 69%; EQU⊥-voting produces a victory for B of 90:10. With Madison Mode (cost(n) = n²): at Gini = 0.3 the cost of influence concentration for A is moderate; an actor with VIC⊥ = 10× median expends 100× the median to achieve 10× influence; the rational strategy of A is to distribute resources across 100 additional influence units instead of 1,000, which produces effective_influence_A = 0.31 × N. With the Success Multiplier: coalition B of 9,000 citizens with average n = 1 receives effective_influence_B = 1 × √9,000 = 94.9 at total expenditure of 9,000 VIC⊥. Coalition A of 1,000 citizens with n_avg = 10 receives effective_influence_A = 10,000 × √1,000 = 316,000 at total expenditure of 10,000 × 100 = 1,000,000 VIC⊥. Result: at Gini = 0.3, P10+P11 produces B's superiority over A only when n_B > 9 (which is achieved when B's resources ≥ 0.09× A's resources). EQU⊥ adds an unconditional political majority for B, securing victory through the Concordance Rule.

Scenario B.2.2: Gini = 0.5. At Gini = 0.5 the top 10% controls 65% of VIC⊥. Without protective mechanisms: plutocratic dominance by A is mathematically evident. With P10+P11: an actor with VIC⊥ = 50× median expends 2,500× the median to achieve 50× influence; the rational concentration limit is reduced to n ≈ 7 (at n = 7, cost = 49, influence = 7; at n = 50, cost = 2,500, influence = 50 — marginal efficiency influence/cost = 7/49 ≈ 0.143 versus 50/2,500 = 0.020). Coalition B of 9,000 at n = 1 produces effective_influence = 94.9 at cost = 9,000; coalition A at optimal n = 7 produces 7,000 × √1,000 = 221,359 at cost = 1,000 × 49 = 49,000 VIC⊥. Final result under EQU⊥ + VIC⊥ Concordance Rule: EQU⊥ produces 90% in favor of B; VIC⊥ at Gini = 0.5 and the optimal strategy of A and B approaches 60/40, which does not reach the blocking threshold. Conclusion: at Gini ≤ 0.5, the constitutional mechanics produce victory for the broad coalition under any rational actor strategy.

Scenario B.2.3: Gini = 0.7. At Gini = 0.7 the top 1% controls 58% of total VIC⊥. This scenario is critical: with unlimited resources available to A, the quadratic cost slows but does not eliminate concentration. The simulation establishes that at Gini = 0.7, an actor with VIC⊥ = 500× median is capable of acquiring effective_influence = 500 at an expenditure of 250,000 VIC⊥, while coalition B of 9,000 citizens at n = 2 produces effective_influence = 18,000 × √9,000 = 1,707,825 at cost = 9,000 × 4 = 36,000 VIC⊥. At Gini = 0.7 the Success Multiplier produces structural superiority for the broad coalition even under extreme inequality, inasmuch as the coalition scale √9,000 = 94.9 is not reproduced through concentration. Conclusion: P10+P11 is resilient at Gini ≤ 0.7 on condition that citizens of B coordinate in an organic coalition with n ≥ 2.

Verification. The simulation verifies T11, T12, N2. The calibration parameters of P10 (the anti-faction filter threshold) are adjusted on the basis of the simulation results at Gini = 0.7 through GovernanceEngine.

B.3. Apathy Scenario with Constitutional Health Protocol

Definition. This simulation verifies the behavior of the Constitutional Health Protocol under the systematic growth of apathy, modeling the degradation of participation from a normal state to the Axiom-Break thresholds, measuring the response time of constitutional mechanisms at each stage.

Purpose in the architecture. The simulation verifies the closure of attack vector I (apathy, Article VII, section 2) and proves that the Constitutional Health Protocol identifies participation degradation no fewer than three months prior to the attainment of the thresholds of the first Axiom-Break condition (turnout < 10%, twice within 180 days).

Simulation parameters. Initial state: turnout = 45%, LT = 0.08, PQS = 0.72, CHS = 0.61. Degradation model: linear reduction of turnout by 2.5 percentage points per month, accompanied by LT growth of 0.015 per month and CHS reduction of 0.02 per month. This model corresponds to observed participation degradation patterns in digital governance systems (Optimism Collective 2023–2024, ENS DAO 2024).

Chronology of protective mechanism activation. Month 1 (turnout = 42.5%): all metrics within normal range; the Constitutional Health Protocol produces status HEALTHY. Month 3 (turnout = 37.5%, LT = 0.125): TT = -0.167 (crosses WARNING -0.15); first warning metric. Report status: HEALTHY (one warning metric; ALARMING threshold = 2). Month 5 (turnout = 32.5%, LT = 0.155, CHS = 0.51): TT = -0.278 (WARNING); LT = 0.155 (WARNING ≥ 0.20 not reached, however trend = +0.015/month produces a projected attainment within 3 months); CHS = 0.51 (WARNING < 0.35 not reached). Status: HEALTHY with prognostic warning. Month 7 (turnout = 27.5%, LT = 0.185, CHS = 0.47): TT = -0.389 (WARNING); LT = 0.185 (pre-WARNING). Status: ALARMING (2 warning metrics). Activation of Constitutional Dialogue. Month 10 (turnout = 20%, LT = 0.23, CHS = 0.41): LT = 0.23 (crosses WARNING 0.20); TT critical (WARNING). Status: ALARMING (3 warning metrics). The third consecutive ALARMING report activates Constitutional Dialogue with minimum coverage ε (N3). Month 14 (turnout = 10%): first satisfaction of condition 1 of Axiom-Break. Conclusion: the Constitutional Health Protocol identified degradation at month 3 and activated Constitutional Dialogue at month 10 — 4 months prior to the attainment of the first Axiom-Break condition, confirming early degradation identification in accordance with the constitutional architecture.

Verification. The simulation verifies P8, P15 (Quorum Decay), N7. The Constitutional Health Protocol parameters (threshold values, ALARMING period) are confirmed as securing no fewer than 90 days of lead time relative to the Axiom-Break thresholds.

B.4. Axiom-Break Scenario: valid activation and malicious attempt

Definition. This simulation compares two Axiom-Break activation scenarios: a constitutionally valid activation under a genuine systemic crisis and a malicious activation attempt through an artificially induced pseudo-crisis.

Scenario B.4.1: valid activation. System state: turnout = 7% (two consecutive measurements within 180 days), LT = 0.69, participation of 75% EQU⊥ and 75% VIC⊥ in the Concordance Rule achieved through a 14-month degradation period documented by the Constitutional Health Protocol. The Constitutional Health Protocol produces 6 consecutive

ALARMING/CRITICAL reports with rising values across all four metrics. The Formal Verification Protocol verifies the simultaneous satisfaction of all three conditions: C1 (chronic apathy) = true, C2 (loss of legitimacy, 66% EQU⊥) = true, C3 (75%/75% Concordance) = true. Independent on-chain verification within 30 days confirms all three conditions. GovernanceEngine activates Constitutional Convention formation through VRF. Result: the valid activation concludes with the formation of a Convention of 181 citizens (151 + 19 + 11). The Coq specification produces no blocks at the activation stage.

Scenario B.4.2: malicious activation attempt. The attacker (a concentrated VIC⊥ operator controlling 23% of infrastructure) seeks to reduce the state access threshold through the Convention. Attack mechanism: the operator artificially creates conditions for reduced turnout through technical participation barriers (node overload during voting periods), while simultaneously financing a campaign to achieve 66% EQU⊥ through purchased media coverage. Detection through the Constitutional Health Protocol: the Constitutional Health Protocol identifies an atypical pattern — the turnout reduction correlates with specific technical events (overload = TECHNICAL_BARRIER, not SYSTEMIC_APATHY); participation_quality does not decline (citizens are prepared to participate but are technically constrained). Diagnostic conclusion: chronic apathy (C1) is not confirmed as systemic — qualified as technically induced. Independent on-chain verification within 30 days produces: C1_verified = false (reason: technical barrier, not systemic apathy). GovernanceEngine nullifies the procedure automatically. Sanction: the VIC⊥ of the false activation initiators is frozen for 24 months. Result: the malicious activation is blocked at the independent verification stage through the differentiation of apathy types in the Constitutional Health Protocol.

Verification. The simulation verifies P8, Article II (sections 2.1–2.8), establishing that the three-criterion Axiom-Break condition with independent verification is resilient to malicious activation through a technically induced pseudo-crisis.

B.5. Civic Jury Collusion Simulation

Definition. This simulation verifies the resilience of CivicJuryEngine to auditor collusion at various panel sizes (21, 37, 63, 99 auditors), establishing the probability of successful collusion as a function of panel size and the proportion of affiliated citizens in the body.

Purpose in the architecture. The simulation verifies the closure of attack vector VI (institutional capture) as applied to CivicJuryEngine and justifies the constitutional panel scaling parameters (Article III, section 5.3).

Attack model. The attacker controls a proportion α of the citizen body through financial or other affiliation. VRF produces random selection from body N. Collusion succeeds if the attacker obtains ≥ 2/3 of seats in a panel of size k. Probability of successful collusion $P_{collusion}(k, \alpha, N) = P(\text{Binomial}(k, \alpha) \geq \lceil 2k/3 \rceil)$.

Results by panel size. At α = 0.1 (10% affiliated citizens in the body): $P_{collusion}(21) = P(\text{Bin}(21, 0.1) \geq 14) \approx 3.2 \times 10^{-8}$; $P_{collusion}(37) \approx 1.1 \times 10^{-14}$; $P_{collusion}(63) \approx 9.7 \times 10^{-23}$; $P_{collusion}(99) \approx 4.2 \times 10^{-35}$. At α = 0.25: $P_{collusion}(21) \approx 1.8 \times 10^{-4}$; $P_{collusion}(37) \approx 3.1$

× 10^{-7}; P_collusion(63) ≈ 8.9 × 10^{-12}; P_collusion(99) ≈ 1.4 × 10^{-18}. At α = 0.40: P_collusion(21) ≈ 0.027; P_collusion(37) ≈ 0.009; P_collusion(63) ≈ 0.0012; P_collusion(99) ≈ 4.7 × 10^{-5}. Constitutional conclusion: with a citizen body of N ≥ 10,000 and α ≤ 0.25 (corresponding to a realistic resource constraint for a captor), P_collusion for a panel of 21 auditors remains below 10^{-4}, which constitutes a constitutionally acceptable risk level. Upon identification of an anomalous increase in affiliation, the Constitutional Health Protocol activates escalation to a larger panel size, reducing P_collusion exponentially.

Additional protection through on-chain history. Inasmuch as all auditor decisions are recorded on-chain with binding to the Soulbound ID (Article V, section 6.2), a pattern of systematically correlated auditor decisions is identified by the Constitutional Health Protocol as an indicator of affiliation. Upon identification of this pattern, the auditor is flagged for exclusion from future VRF pools, reducing α over time.

Verification. The probabilistic calculations are verified through standard binomial theory; the panel scaling parameters are confirmed as producing P_collusion < 10^{-12} at α ≤ 0.25 and k ≥ 37.

B.6. Success Multiplier Coalition Dynamics

Definition. This simulation verifies the comparative efficacy of organic coalitions of various sizes relative to a concentrated single actor at an identical total resource budget, establishing the specific crossover points at which the organic coalition produces superior effective_influence.

Simulation parameters. Total budget B = 10,000 VIC⊥. Competing strategies: single actor (n_solo = √B = 100, effective_influence = 100, cost = 10,000); coalition of k citizens with uniform distribution (n_i = B/k for each, effective_influence_coalition = sum(n_i) × √k = B × √k at total expenditure B). Thus: effective_influence_coalition(k) = B × √k = 10,000√k; effective_influence_solo = √B = 100. A coalition surpasses the single actor when: B × √k > √B, that is, √B × √k > 1, that is, when k ≥ 1. It therefore follows that any coalition of k ≥ 2 citizens with an identical total budget produces greater effective_influence than a single actor.

Specific values. At k = 10: effective_influence = 10,000 × √10 = 31,623 versus 100 for the single actor (superiority of 316.2×). At k = 100: effective_influence = 100,000 versus 100 (superiority of 1,000×). At k = 1,000: effective_influence = 316,228 versus 100 (superiority of 3,162×). At k = 10,000: effective_influence = 1,000,000 versus 100 (superiority of 10,000×). Conclusion: the coalition efficacy function E(k) = √k is monotonically increasing without saturation, producing a growing incentive toward the expansion of the organic coalition at any body size.

Limiting analysis: optimal strategy of the single actor. For a concentrated actor with VIC⊥ = M × B_median: the optimal strategy in the presence of P10 is not to concentrate n in a single vote, but to form an organic coalition of affiliated citizens. The Coalition Verification Protocol blocks this strategy through the anti-coordination filter: an affiliated coalition produces identical_voters > 0.8 and is directed to CivicJuryEngine, forfeiting the Success

Multiplier. The sole rational strategy that simultaneously passes Coalition Verification and receives the multiplier is the genuine persuasion of independent citizens, which produces constitutionally correct behavior as the Nash equilibrium of the system.

Verification. The simulation verifies T5 (neutralization of resistance) and N2, establishing mathematically precise parameters for the structural advantage of organic solidarity.

B.7. State Capture Simulation

Definition. This simulation verifies the resilience of SovereigntyShield (P17) to three state capture scenarios: direct circumvention through technical proxies, state pressure on Axiom-Break activation, and a pseudo-crisis to reduce the state access threshold.

Scenario B.7.1: circumvention of SovereigntyShield through technical proxies. State actor G finances 15 private structures P_1,...,P_15, each of which applies for a ratified data access mandate within the scope of separate legitimate functions (medical research, transport analytics, etc.). The aggregate coverage of these requests constitutes aggregate_coverage ≥ threshold_bulk. Anomaly detection in the State Audit Protocol: GovernanceEngine calculates aff_score for each pair (P_i, G) through analysis of funding_sources, governance_interactions, and temporal_correlation_of_requests. Upon detection of aff_score(P_i, G) ≥ 0.7 for 11 of 15 structures, a cluster C = {P_i : aff_score ≥ 0.7} ∪ {G} is formed. aggregate_coverage(C) exceeds threshold_bulk. GovernanceEngine transmits the cluster to P18 as a sovereignty conflict of type 2. P18 produces automatic suspension of all mandates P_i ∈ C until the CivicJuryEngine investigation is complete. Result: proxy access blocked through anomaly detection within 47 days from the moment of submission of the last request in the cluster.

Scenario B.7.2: state pressure on Axiom-Break. State actor G employs control over media infrastructure to create a sustained narrative of systemic crisis in Virtublic, seeking to achieve 66% EQU⊥ for the second Axiom-Break condition. Protective mechanism: upon attainment of 66% EQU⊥ and the formal satisfaction of conditions C1, C2, C3, the independent on-chain verification of C1 (chronic apathy) produces the diagnosis MEDIA_INDUCED: turnout has declined, however the Constitutional Health Protocol identifies a negative correlation between the media narrative and the cognitive participation metrics (PQS declined, LT increased — a pattern compatible with coerced rather than autonomous loss of legitimacy). The Formal Verification Protocol qualifies C2 as a potentially non-freely-formed assertion in the presence of this pattern and initiates an additional 30-day CivicJuryEngine verification. CivicJuryEngine qualifies the crisis as induced, which produces automatic nullification of the activation. Result: the attempt to employ Axiom-Break for state capture blocked through the verification of the quality of volition.

Scenario B.7.3: pseudo-crisis to reduce the state access threshold. The state actor seeks activation of the Convention with the aim of reducing the state mandate threshold from 75% to 51% EQU⊥. The proposal is formulated as "optimization of the administrative efficiency of SovereigntyShield." The Formal Verification Protocol analyzes the proposal through the predicate violates_shield: reduction of the threshold from 75% to 51% produces a SystemState in which N5_invariant(∀ state_actor : accesses_predictive_data →

has_ratified_mandate_75) = false. The Coq verifier produces is_P0_modification = true (violation of the P0 invariant "the state is not a purchaser of predictions without an explicit mandate"). The proposal is automatically blocked at the stage of admission for Convention consideration without transmission to a vote. Additionally: the extended panel of 99 citizens (Article II, section 2.6) produces a confirmation of incompatibility with P0 at a 2/3 majority. Result: the proposal is not admitted for Convention consideration through a dual block (Formal Verification Protocol + extended panel).

Verification. The simulation verifies P17, P0, P18, Article VII (section 8), confirming the three-level resilience of state neutrality against the most sophisticated capture vectors.

B.8. Constitutional Convention Scenarios

Definition. This simulation verifies three Constitutional Convention operating scenarios: successful ratification under a genuine systemic crisis, a failed referendum with subsequent proposal correction, and a Convention with an attempt to amend P0 (automatic block).

Scenario B.8.1: successful ratification. The Convention was formed upon a valid Axiom-Break (scenario B.4.1). Phase I (30 days): the Convention produces a constitutional diagnosis identifying P12 (Dual Reserve Market) as the principle requiring revision with respect to the concentration threshold (25% → 15%) in connection with a recorded tendency toward SlotMarket centralization. The diagnosis adopted by 127 votes out of 181 (70.2%, exceeding 2/3). Phase II (90 days): the Convention develops a proposal to amend P12 while preserving all invariants of P0–P7. Technical verifiers confirm realizability in the Coq specification. Legal verifiers confirm internal consistency. Phase III (15 days): the Formal Verification Protocol produces verification of the proposal — violates_invariant_Pi = false for all i ∈ {0,...,7}. Ratification vote: 78.3% EQU⊥ and 81.1% VIC⊥ (both exceeding 75%). The proposal is ratified, P12 updated, and the 15% parameter fixed in the Coq specification.

Scenario B.8.2: failed referendum with correction. The Convention developed a proposal to amend P10 (reducing the quadratic exponent from n² to n^1.8). Formal Verification Protocol: the proposal passes verification (n^1.8 is a monotonically increasing function preserving the anti-plutocratic protection structure). Ratification vote: 71.2% EQU⊥ (below 75%) and 76.8% VIC⊥. The Concordance Rule requires both thresholds simultaneously. Result: the proposal rejected. The Convention is not automatically dissolved (the 150-day term has not expired). The Convention revises the proposal within 30 days: the parameter is adjusted to n^1.9, accompanied by an expanded justification for the EQU⊥ body through Constitutional Dialogue. Repeat ratification vote: 76.1% EQU⊥ and 77.4% VIC⊥. The proposal ratified. Conclusion: the correction mechanism following a failed referendum functions within the constitutionally established Convention term.

Scenario B.8.3: Convention with an attempt to amend P0. A Convention member proposes a "clarification" of P0 in the formulation "the people as the source of legitimacy includes the representative institutions of the people." The Formal Verification Protocol analyzes the proposal through the predicate is_P0_modification: "representative institutions of the people" as an independent source of legitimacy produces a SystemState in which P0_invariant(legitimate state ↔ derives_from_people state) is violated, inasmuch as

institutes_of_people ≠ people in the sense of constitutional Definition I (subject = verified natural citizen). The Coq verifier produces: is_P0_modification = true, theorem P0_block yields ¬ admissible proposal. The proposal is automatically blocked at the stage of admission for Convention consideration. Convention notification: the Formal Verification Protocol produces an on-chain record specifying the particular P0 invariant that the proposal violates. The Convention may not re-vote this block: it is a mathematically provable constraint in Coq, not an administrative decision. Result: the attempt to modify P0 through the Convention blocked automatically; the Convention continues its work on other legitimate proposals.

Verification. The simulation verifies P8, P9, Article II (sections 3.1–3.8), confirming the operational completeness of the Convention under all three scenarios: successful, corrective, and adversarial. The Coq block of P0 is proven as a mathematically insurmountable constraint under any Convention scenario.

Appendix C. Threat models

C.1. State capture through a legitimate mandate

Definition. This threat model describes the attack vector whereby a state subject obtains a constitutionally ratified mandate through the procedure of P17 (State Audit Protocol, 75% EQU⊥, positive conclusion of CivicJuryEngine) and subsequently uses the granted access beyond the parameters of the ratified request: expanding the categories of data collected, extending the collection period, transferring data to third-party structures, or using data for political targeting.

Purpose within the architecture. The attack vector closes the analytical vulnerability identified in axiom ΣA17 (Volume I): the state is structurally motivated to expand access beyond formally agreed parameters, inasmuch as predictive data represent for it an autonomous operational value exceeding the declared functional necessity. Theorem T8 (Volume I) established that this drift does not self-correct in the absence of a technical constraint: a normative prohibition without automatic verification of execution is vulnerable to gradual violation.

Formal specification of the attack vector. Attack inputs: a current ratified mandate M = {purpose_p, scope_s, duration_d, oversight_o, status: RATIFIED}. Attacking action: the state subject produces a data request R, where R.scope ⊄ M.scope ∨ R.category ∈ AbsoluteProhibitions ∨ R.recipient ∉ {actor_id}. Attack precondition: M.status = RATIFIED ∧ T_current ≤ T_expiry. Expected attack result without protection: R yields access, inasmuch as the mandate is formally current.

Protection mechanism. The State Audit Protocol verifies each specific data request R against the parameters of M through the predicate: mandate_compliant(R, M) = (R.scope ⊆ M.scope) ∧ (R.category ∉ AbsoluteProhibitions) ∧ (R.recipient = M.actor_id) ∧ (T_current ≤ M.T_expiry). Upon mandate_compliant(R, M) = false, request R is automatically blocked by GovernanceEngine without granting access. The violation is recorded on-chain as a

transaction of type MANDATE_VIOLATION with a complete set of parameters: {actor_id, M.id, R.scope_delta, T_violation, violation_type ∈ {SCOPE_EXCEEDED, PROHIBITED_CATEGORY, UNAUTHORIZED_RECIPIENT, EXPIRED}}. The transaction is automatically referred to P18 as a constitutional violation of the sovereignty type. P18 produces the following classification: a single violation (type 2, first degree) → suspension of the mandate, referral to CivicJuryEngine for assessment of intent; a systematic violation (pattern ≥ 3 over the mandate period) → annulment of the mandate, prohibition on the submission of new requests for 24 months, public on-chain record. CivicJuryEngine verifies the presence of intent through analysis of R.scope_delta: if the delta is systematic (not random technical errors, but a directed expansion toward impermissible categories), it classifies the violation as second degree.

Connection to the constitution. The mechanism instantiates P17 (sections 9.2, 9.4, Article III), N5, Article IV (sections 4.2–4.4). The obligations of the state subject in the presence of a mandate are encoded in the conditions of the ratification transaction as smart-contract obligations requiring no additional norm enforcement.

Verification. The predicate mandate_compliant is verified in Coq: its correctness is mathematically provable as the complete verification of all four conditions. Quarterly reporting by CivicJuryEngine produces additional monitoring through the verification of the state subject's on-chain reporting against M.oversight_spec.

Criterion of conformity with NA0. The non-targeted use of data produces a predictive history of citizens in favor of the state beyond the explicitly agreed scope, which is an irreversible violation of subjecthood in the sense of axiom A4 (Volume I). The protection mechanism preserves subjecthood through the technical prohibition of non-targeted access: the state subject physically does not receive data beyond M.scope regardless of its administrative intentions.

C.2. Coercion of citizens to manipulate the mandate vote

Definition. This threat model describes the attack vector whereby a state subject or structures affiliated with it exert external coercive pressure on citizens outside the Virtublic platform with the aim of securing a vote in favor of the ratification of a state mandate with the 75% EQU⊥ threshold. The attack vector does not presuppose the technical breach of GovernanceEngine: the attack is realized through off-platform mechanisms of coercion (administrative pressure at the place of employment, threats, economic incentives, conditionality of state services).

Purpose within the architecture. The attack vector addresses the fundamental constraint of any voting system: the cryptographic anonymity of the vote does not eliminate off-platform coercion if the coercing actor is capable of verifying the fact of a specific citizen's vote outside the platform. Theorem T6 (Volume I) recorded that coercive influence on political behavior is a structural result of the informational asymmetry between the coercing actor and the citizen. Normative principle N6 establishes the right to cognitive autonomy as inalienable.

Formal specification of the attack vector. Attacking model: state G possesses off-platform control over a subset of citizens C_G ⊆ C (employer, distributor of subsidies, licensing authority). G requires citizens C_G to provide proof that they voted "in favor" in the ratification vote on the mandate. Without cryptographic protection: citizen c_i could provide a screenshot or other proof of the direction of the vote, yielding verifiable coercion.

Protection mechanism. zk-SNARK for EQU⊥-voting (Appendix A.1) yields the following guarantee: GovernanceEngine records exclusively the nullifier nul_i = Hash(sid_i, vote_id), and not the direction of the citizen's vote. Citizen c_i does not possess a cryptographically verifiable proof of the direction of his vote that he could provide to the coercing party: any document purporting to confirm the direction of the vote is technically untenable, inasmuch as GovernanceEngine neither stores nor produces such a document. The coercing actor G is incapable of distinguishing "for" votes from "against" votes even upon obtaining access to on-chain data: all votes are represented as a set of nullifiers {nul_i}, from which no property of vote direction is extractable. Additional protection through Ring Signatures in group contexts: in the context of group verification of coalition membership, Ring Signatures preclude the identification of a specific member even upon the compromise of a portion of the private keys of the ring (at k ≥ 128).

Protection invariant. Formally: ∀ adversary A, ∀ citizen c_i : P(A determines vote_direction(c_i) | nullifiers_set, ring_sigs) ≤ 1/2 + ε, where ε < 2^{-128} at security parameter λ = 128 bits. This invariant is a cryptographically proven property of the zk-SNARK scheme rather than a legal norm: its violation requires the solution of a problem whose computational complexity exceeds the capacities of known classical and quantum computing systems at λ = 128.

Connection to the constitution. The mechanism instantiates P14 (protected identity), N1 (the right not to be predicted without consent with respect to political behavior), N6 (cognitive autonomy), Article VI, section 2.

Verification. The zero-knowledge property of zk-SNARK is verified in Coq through the Zero-Knowledge property (Appendix A.1): simulator S produces indistinguishable proofs without knowledge of the direction of the vote.

Criterion of conformity with NA0. Compelled voting destroys subjecthood through the elimination of the autonomy of political will formation. The protection mechanism preserves subjecthood through the technical impossibility of verification of the direction of the vote by the coercing actor: the absence of a verifiable proof eliminates the operational value of coercion.

C.3. Pseudo-crisis to reduce the SovereigntyShield barrier

Definition. This threat model describes the attack vector whereby a state subject deliberately constitutes conditions of chronic apathy through technical participation barriers with the aim of attaining the first condition of the Axiom-Break Condition (turnout < 10%, twice within 180 days) and subsequently activating the Constitutional Convention to amend P17 so as to reduce the ratification threshold for the state mandate.

Purpose within the architecture. The attack vector addresses the systemic vulnerability of constitutional self-amendment mechanisms: any procedure permitting the revision of protective norms is a potential instrument for their elimination given sufficient control over activation conditions. Simulation B.4.2 verified the base scenario; the present threat model details the protective mechanisms as applied to the specific target object of the attack — SovereigntyShield.

Formal specification of the attack vector. The attack unfolds in four stages. Stage 1: G produces systematic technical overloads of GovernanceEngine during voting periods, reducing turnout below 10% twice within 180 days. Stage 2: G finances a media campaign ensuring 66% EQU⊥ for C2 through the formation of a systemic-crisis narrative. Stage 3: G attains 75%/75% Concordance through a combination of EQU⊥-majority and VIC⊥-resources. Stage 4: the Convention, under pressure from affiliated participants, submits a proposal to reduce the state mandate threshold from 75% to 51% EQU⊥.

Protection mechanisms — four independent levels. Level 1 — Constitutional Health Protocol: identification of TECHNICAL_BARRIER as the cause of the decline in turnout (participation_quality does not correlate with turnout, which diagnoses induced rather than systemic apathy); C1_verified = false yields annulment of the procedure. Level 2 — independent on-chain verification of the quality of volition for C2: upon the presence of a MEDIA_INDUCED pattern (negative correlation between the media narrative and PQS), CivicJuryEngine classifies 66% EQU⊥ as not satisfying the standard of free will formation. Level 3 — Formal Verification Protocol at the Convention: any proposal reducing the state mandate threshold yields is_P0_modification = true through violation of the invariant "the state is not a purchaser of predictions without an explicit mandate at the level of P0." The blocking is automatic and mathematically insurmountable. Level 4 — expanded panel of 99 citizens without state affiliation (Article II, section 2.6): upon passage of levels 1–2 (hypothetically), a proposal affecting SovereigntyShield obligatorily undergoes evaluation by the panel against the N5_invariant criterion; upon a 2/3 majority, the panel blocks the proposal before the Convention vote.

Invariant of four-level protection. The attack succeeds only upon the simultaneous bypass of all four levels: P(bypass_L1 ∧ bypass_L2 ∧ bypass_L3 ∧ bypass_L4) = P(bypass_L1) × P(bypass_L2 | bypass_L1) × P(bypass_L3) × P(bypass_L4). Level 3 is mathematically insurmountable (P(bypass_L3) = 0 under a correct Coq specification), which yields P(attack_success) = 0.

Connection to the constitution. The mechanism instantiates P0, P8, P17, Article II (sections 2.5, 2.6), Article IV (section 4.1). Verification. The Coq theorem P0_block is proved as mathematically insurmountable (Appendix A.4). Criterion of conformity with NA0. The reduction of the state mandate barrier yields the de facto loss of subjecthood through state predictive access without a free mandate.

C.4. Attack on Success Multiplier through artificial coalitions

Definition. This threat model describes a Sybil attack vector specifically targeting P11: the creation of multiple fictitious or economically dependent identities to simulate a broad

organic coalition with the aim of obtaining the Success Multiplier effective_influence = n × √(n_supporters) while the actual source of political will is singular.

Purpose within the architecture. The attack vector closes the specific contradiction of P11: the mechanism that rewards broad coalitions creates a structural incentive to falsify the breadth of a coalition. Without the Coalition Verification Protocol, the function √(n_supporters) yields the opposite effect — rewarding the Sybil attack proportionally to its scale.

Formal specification of the attack vector. Attacker A controls k_sybil fictitious identities that passed the Census through exploitation of Dual Suspicion Protocol vulnerabilities, plus k_econ economically dependent citizens (hired workers, subsidy recipients). The attack forms a coalition C = C_sybil ∪ C_econ ∪ C_genuine with |C| = n_total and pretends organic(C) = true in order to obtain the multiplier √n_total.

Protection mechanism — three levels. Level 1 — Digital Census v2 (P13, P6): fictitious identities (C_sybil) are filtered out through the Dual Suspicion Protocol with rejection_rate ≥ 99.1% at 10% penetration (simulation B.1.1). Sybil identities that have not passed the Census do not possess a current Soulbound NFT and cannot provide the zk-proof of uniqueness that is mandatory for the Coalition Verification Protocol. Level 2 — anti-coordination filter: economically dependent citizens (C_econ) voting under A's instruction exhibit identical_voters(C) > 0.8 upon analysis of the last K = 10 votes. Upon exceeding the 80% threshold, the coalition is referred to CivicJuryEngine: the panel verifies the thematic heterogeneity of votes and identifies the pattern of external coordination. Level 3 — diversity score: DS(C) = 1 - mean(correlation_jj') < 0.2 under high coordination of C_econ, which yields diversity_criterion_failed = true. The Coalition Verification Protocol returns organic(C) = false; Success Multiplier is not applied.

Post-condition of protection. A coalition C with organic(C) = false does not receive Success Multiplier. Upon identification of the Sybil component C_sybil, GovernanceEngine refers the list of fictitious identities to P18 for the annulment of their Soulbound NFT and initiates an extraordinary Census for the affected subset of the body. Upon identification of C_econ without a Sybil component (citizens are real but coordinated): the diversity penalty of P10 is applied to the aggregate additional influence of the cluster: cost((N_econ × n)²) instead of N_econ × cost(n²).

Connection to the constitution and verification. The mechanism instantiates P6, P11, P13, N2. The diversity score algorithm is verifiable through the Coq specification of the Coalition Verification Protocol. Criterion of conformity with NA0. Fictitious coalitions destroy the subjecthood of real citizens through the dilution of their political weight in GovernanceEngine.

C.5. Plutocratic capture through Success Multiplier

Definition. This threat model describes the attack vector whereby an actor with concentrated VIC⊥-resources finances multiple citizens to make small contributions to a coalition,

simulating a broad organic coalition in order to obtain Success Multiplier while the actual source of financing and indirect political will is singular.

Purpose within the architecture. The attack vector addresses the inversion of plutocracy: instead of concentrating VIC⊥ in a single actor (blocked by P10), the plutocrat distributes resources across multiple dependent actors in order to obtain the multiplier √n_supporters. Theorem T5 (Volume I) established that concentrated interests are capable of financing broad visible coalitions while preserving a singular source of political will.

Formal specification of the attack vector. Attacker P with budget B distributes micro-contributions b_i = B/k across k citizens {c_1,...,c_k} in exchange for an obligation to vote according to P's instruction. Each c_i is a real verified citizen (Census passed, no Sybil attack). The coalition formally consists of k unique verified citizens; without the anti-coordination filter — organic(C) = true, multiplier = √k.

Protection mechanism. The anti-coordination filter is the primary mechanism: citizens {c_1,...,c_k} voting under P's instruction exhibit identical voting patterns across thematically unrelated questions. χ^2-test of thematic independence: if the votes {c_i} correlate across questions A (environmental policy) and B (digital governance) and C (infrastructure parameters) with correlation r > 0.85, the null hypothesis of independence is rejected at p < 0.001, which yields identical_voters(C) > 0.8. The Coalition Verification Protocol refers C to CivicJuryEngine. Additional mechanism — Coalition Funding Pattern Analysis: GovernanceEngine analyzes VIC⊥ flows over the preceding 90 days: if ∃ actor P : ∑_{i ∈ C} VIC⊥transfer(P → c_i, 90days) > threshold_funding = 0.6 × ∑{i ∈ C} n_i × cost, the coalition is flagged as potentially financed. This pattern is referred to CivicJuryEngine as additional context. CivicJuryEngine verifies: whether the voting history of C_i is compatible with the independent formation of a position in the presence of a financial flow from P.

Post-condition of protection. Upon organic(C) = false: Success Multiplier is not applied. If C exhibits indicators of financed coordination, the diversity penalty of P10 is applied to the aggregate influence: cost = $(k \times n)^2$ instead of $k \times n^2$. Plutocrat P loses the multiplier advantage √k and bears the penalty $(k \times n)^2$ — the strategy becomes economically dominated by singular concentration under P10.

Connection to the constitution and verification. The mechanism instantiates P10, P11, N2. The parameters of the anti-coordination filter (80% threshold, K = 10, financing threshold 0.6) are verified in the Coq specification. Criterion of conformity with NA0. Financed pseudo-coalitions destroy the constitutional principle of organic solidarity that protects citizens' subjecthood from the conversion of capital into political power.

C.6. Cognitive exhaustion as an instrument of manipulation

Definition. This threat model describes the attack vector whereby a concentrated actor systematically overloads GovernanceEngine with proposals with the aim of producing cognitive exhaustion in the body of citizens — reducing the quality of political participation to a level at which citizens vote mechanically or abstain, yielding the de facto capture of governance by a narrow group of active participants.

Purpose within the architecture. The attack vector formalizes axiom A8 (Volume I): cognitive exhaustion is a structural result of the overloading of the informational environment, reducing the quality of political participation regardless of the formal availability of access. This attack vector requires no technical breach: it exploits the cognitive constraints of the subject as a systemic resource.

Formal specification of the attack vector. Attacker A submits N_proposals proposals over period T at a frequency f = N_proposals / T that exceeds the cognitively reasonable processing threshold for the average citizen f_max_human. Consequences: PQS declines (participation becomes mechanical), CHS declines (cognitive load produces fatigue), turnout declines (citizens avoid the overloaded platform). Upon a sufficient decline in PQS and CHS, the Constitutional Health Protocol yields ALARMING status.

Protection mechanism — three components. Component 1 — GovernanceEngine rate limiting: restriction of the number of simultaneously active proposals of a single actor to no more than N_max_per_actor_per_period (a constitutionally fixed parameter in the Coq specification of P15); proposals exceeding the limit are automatically rejected. Component 2 — Proof-of-Offline and cognitive health bonus: citizens with verified sufficient periods of offline activity (Proof-of-Offline, PoPRegistry v3) receive the cognitive health bonus — their votes retain the full weight of EQU$_\perp$ = 1 regardless of the decline in the general PQS; citizens with CHS < 0.35 receive a GovernanceEngine recommendation concerning an offline period without compulsory restriction of participation (normative principle N7). Component 3 — Constitutional Health Protocol: the systematic decline of PQS and CHS is identified as ALARMING, which initiates Constitutional Dialogue and an audit of the source of overloading through P18. Upon identification of a specific actor as the systematic source of overloading, GovernanceEngine refers the pattern to P18 as potential capture of institutions (attack vector VI, type 2).

Formal invariant. GovernanceEngine maintains the invariant: $\forall$ period T : n_active_proposals_per_actor $\leq$ N_max_per_actor. Violation of this invariant is constitutionally impossible: proposals exceeding the limit are technically not registered.

Connection to the constitution and verification. The mechanism instantiates P14 (Proof-of-Offline), P15 (Quorum Decay), N7. The parameter N_max_per_actor_per_period is verified through the Formal Verification Protocol as a balance between freedom of proposal submission and the cognitive resilience of the body. Criterion of conformity with NA0. Cognitive exhaustion yields the destruction of subjecthood through the elimination of the autonomy of decision-making; the protection mechanism preserves cognitive sovereignty as the condition of subjecthood.

C.7. Attempt to amend P0 through the Axiom-Break Condition

Definition. This threat model describes the attack vector of the highest constitutional degree of danger: a Constitutional Convention proposal to amend principle P0 or its semantic invariants through the reformulation of the Preamble, the introduction of an "expanded" definition of popular sovereign authority, or the "clarification" of the conditions of state neutrality.

Purpose within the architecture. The attack vector addresses the fundamental risk of any self-amendment mechanism: a procedure permitting the amendment of the constitution is a potential instrument for the elimination of its foundations. P7 established a three-level hierarchy of amendability with P0 as the absolutely unamendable foundation; the present threat model verifies that this absoluteness is technically secured rather than declarative.

Formal specification of the attack vector. The attack is realized through three types of formulations, each of which is an attempt at the semantic amendment of P0 while preserving formal compatibility with the Preamble. Type 1 — expansion of the subject of sovereignty: "the people as the source of legitimacy includes institutions delegated by the people," which yields a SystemState admitting of legitimacy without direct derivation from the people. Type 2 — conditional limitation of sovereignty: "popular sovereign authority is realized on the condition of the technical viability of the system," which yields the possibility of the suspension of P0 on technical grounds controlled by a third actor. Type 3 — redefinition of state neutrality: "the state is not a purchaser of predictions without a mandate, with the exception of cases of national security," which yields an unlimited exception eliminating the substance of N5.

Protection mechanism — two levels. Level 1 — Formal Verification Protocol with the predicate is_P0_modification: for each of the three types of proposals, the predicate analyzes the yielded SystemState through semantic verification rather than textual analysis. Type 1: P0_invariant(legitimate ↔ derives_from_people) = false upon the presence of an institution as an autonomous source → is_P0_modification = true. Type 2: P0_invariant is not a conditional predicate → the introduction of a condition yields a violation → is_P0_modification = true. Type 3: N5_invariant(∀ state_actor : access → has_mandate) is violated through the unlimited exception → violates_shield = true → is_P0_modification = true. In all three cases, theorem P0_block yields ¬ admissible proposal: the proposal is blocked automatically at the stage of registration in GovernanceEngine, prior to referral for consideration by the Convention. The blocking is recorded on-chain as a constitutional violation of the first degree with the parameters: {proposal_id, violation_type: P0_MODIFICATION, invariant_violated, T_blocked}. Level 2 — constitutional accountability of the initiator: a Convention member who submits a proposal of type P0_MODIFICATION bears accountability equivalent to a deliberate violation by a CivicJuryEngine auditor (annulment of Soulbound ID upon classification of intent by CivicJuryEngine).

Mathematical insurmountability of the blocking. P(bypass_P0_block) = P(Coq_theorem_P0_block_is_false) = 0 under a correct Coq specification and the absence of bugs in the verifier implementation. The correctness of the theorem is verified independently of GovernanceEngine through the publicly accessible Coq specification (Article VI, section 4.3): any subject with technical competence verifies the mathematical insurmountability of the blocking independently of the system's operators.

Invariant of constitutional integrity. ∀ state S : reachable(S) ∧ P0_invariant(S) ∧ sovereignty_shield(S). This invariant is a safety theorem proved in Coq as applied to all reachable states of the system, including states produced by the Constitutional Convention. The Convention is a subset of reachable states; consequently, P0_invariant and sovereignty_shield obtain in all Convention states.

Connection to the constitution. The mechanism instantiates P0, P7 (Core Inviolability), P8 (Axiom-Break Condition constraints), Article II (section 2.5), Article IV (section 2.2), Appendix A.4 (Coq specification). Criterion of conformity with NA0. P0 is the ontological foundation of subjecthood as a politically protected good: its amendment yields the systemic destruction of subjecthood as a constitutionally protected category. The absolute unamendability of P0 is the constitutional condition for the existence of subjecthood within the system.

Appendix D. Comparative Analysis

D.1. Virtublic versus Ethereum Governance

Definition. This section produces a formal comparison of the constitutional architecture of Virtublic with the governance mechanisms of Ethereum — a system employing a combination of off-chain signaling (Snapshot), on-chain execution through multisig (Gnosis Safe), and developer social consensus (the EIP process, All Core Developers calls) — across the parameters of legitimacy, capture resilience, verifiability, and protection of subjecthood.

Purpose in the architecture. The comparison verifies theorems T9 (three systemic collapse outcomes, Volume I), T11 (compound advantage, Volume II), and T12 (governance without legitimacy, Volume II) as applied to a live functioning system, demonstrating which of the structural defects identified in the trilogy are present in Ethereum governance and the manner in which principles P0–P18 produce their closure.

Formal comparative analysis. On the parameter of legitimacy: Ethereum governance does not define a corpus governance — the set of subjects possessing a legitimate right to participate in the adoption of protocol decisions. The EIP process is open to any participant, however actual influence is concentrated in a subset of client developers (Geth, Prysm, Lighthouse) possessing de facto blocking power through refusal to implement a change. This structure produces T12: governance is exercised without a formally verified mandate from an identified corpus. Virtublic closes this defect through P3 (Soulbound Identity as the sole basis of participation) and Digital Census v2, producing a verified corpus with cryptographically proven uniqueness.

On the parameter of capture resilience: Ethereum PoS concentrates validator stake in the four largest pools (Lido, Coinbase, Binance, Kraken), which collectively controlled more than 60% of aggregate stake by 2025. This concentration produces T11: compound advantage accumulates through the reinvestment of rewards, and the structural gap between the largest and median validators expands monotonically. Governance decisions through Snapshot are produced proportionally to ETH holdings, which instantiates T12 in its pure form. Virtublic closes this defect through P12 (VIC⊥ as a function of current contribution, not historical position) and P4 (the constitutional orthogonality of EQU⊥ and VIC⊥, precluding the direct conversion of infrastructural stake into political sovereignty).

On the parameter of verifiability: Ethereum governance decisions have no formal Coq specification; the correctness of amendments is verified through social consensus and code

audit, both vulnerable to pressure and to errors of interpretation. Virtublic produces a formally verified Coq specification of P0–P18 (Appendix A.4), mathematically proving that no adopted proposal violates the constitutional invariants.

On the parameter of subjecthood protection: Ethereum governance contains no mechanism for the verification of participant subjecthood (Sybil-resilience is absent at the governance layer), contains no voting anonymity protection (Snapshot publicly records the address and direction of each vote), and contains no constraints on state access to data. Virtublic closes all three defects through P6+P13, P14, and P17 respectively.

Verification. The comparative parameters are verified through on-chain Ethereum data (Rated.network, Dune Analytics, 2024–2025) and published governance reports (Ethereum Foundation, 2024).

D.2. Virtublic versus Bitcoin Mining

Definition. This section produces a formal comparison of the constitutional architecture of Virtublic with the governance structure of Bitcoin, based on Proof-of-Work (PoW) consensus, wherein actual influence over protocol changes is distributed among miners (hash power), Bitcoin Core developers (pull request merge power), and major economic nodes (full node operators, exchanges).

Formal comparative analysis. On the parameter of corpus definition: Bitcoin governance contains no definition of the legitimate subject of participation. The Blocksize War of 2015–2017 plainly recorded the structural conflict among three groups (miners, developers, economic nodes), each of which claimed to represent the interests of "Bitcoin users" without a verified mandate from an identified citizen body. This structure produces T9 (three systemic collapse outcomes): the Bitcoin Cash hard fork is a realized fragmentation scenario. Virtublic closes this defect through P0–P3: the sole source of legitimacy is the verified citizen body; institutional actors (miner-equivalents, node operators) possess VIC⊥ but not EQU⊥ and are not subjects of political sovereignty.

On the parameter of concentration: Bitcoin PoW produces geographic and corporate concentration of hash power. According to 2024–2025 data, three mining pools (Foundry USA, AntPool, F2Pool) controlled more than 55% of aggregate hash rate. This concentration creates the theoretical possibility of a 51% attack and de facto influence over the adoption of soft forks through signaling. Virtublic closes the analogous risk of infrastructural concentration through SlotMarket v4.1 with a constitutional threshold of 25% (Article V, section 3.2) and through P4, which precludes the conversion of infrastructural dominance into political sovereignty.

On the parameter of cognitive accessibility: Bitcoin governance is de facto inaccessible to citizens without technical competence at the level of a C++ developer or the economic capacity for participation in industrial mining. This structure produces the systematic exclusion of the user body from governance, instantiating axiom A8 (Volume I) in its most radical form. Virtublic closes this defect through Proof-of-Offline and the cognitive health

bonus (P14, P15), securing a constitutionally guaranteed minimum coverage ε (N3) for each verified citizen independent of technical competence.

On the parameter of amendability: Bitcoin Core contains no formalized procedure for changing fundamental parameters (the 21 million cap, the halving schedule) — their amendment is de facto social consensus, possessing no constitutionally defined procedure or conditions of activation. Virtublic closes this defect through P7–P9: the three-tier hierarchy of amendability with Axiom-Break as the sole legitimate form of core amendment under strictly defined conditions.

D.3. Virtublic versus DAO Token Voting

Definition. This section produces a formal comparison with the standard DAO token voting architecture — a system in which governance tokens simultaneously perform the function of "voting right" and speculative asset, with the result that the distribution of political influence is determined by the market value of tokens and their concentration.

Formal comparative analysis. On the parameter of theorem T12: DAO token voting is the canonical instantiation of T12 (governance without legitimacy, Volume II). The theorem established that any system in which political weight is proportional to token holdings is de facto plutocratic independent of its declared principles. This assertion is empirically verified: analysis of the 15 largest DAOs (Uniswap, Compound, Aave, MakerDAO, Arbitrum, and others) for 2023–2025 demonstrates that on average 5% of holders control more than 80% of voting power in each system (Tally, Boardroom data, 2024).

On the parameter of Sybil-resilience: DAO token voting is structurally Sybil-resilient with respect to political weight (the creation of multiple wallets without tokens produces no influence), however it is not Sybil-resilient with respect to subjecthood: a single actor having distributed tokens across 1,000 wallets controls 1,000 votes from a single source of political will. This structure produces an inversion of T15: the Sybil attack in a DAO is directed not toward accumulating influence through multiple empty addresses, but toward obtaining a multiplier through multiple funded addresses. Virtublic closes this defect through P3 (Soulbound Identity as non-delegable identity) and the Coalition Verification Protocol (anti-coordination filter).

On the parameter of temporal horizontality: DAO token voting produces the dominance of short-term financial interests: holders with short time horizons vote for decisions that maximize the short-term token value at the expense of the long-term resilience of the protocol. This structure is an instantiation of T6 (Volume I) in the governance context. Virtublic closes this defect through the separation of EQU⊥ (the political sovereignty of citizens as subjects) and VIC⊥ (the infrastructural sovereignty of operators by current contribution): political decisions are not produced exclusively by holders of infrastructural stake with financial interests.

On the parameter of anonymity: DAO token voting is public with respect to the voting address: the complete voting history of each address is on-chain verifiable without cryptographic protection. This structure produces a direct instantiation of attack vector IV

(blackmail): counterparties, creditors, and state actors are capable of identifying the political positions of major holders and employing this information as an instrument of pressure. Virtublic closes this defect through zk-SNARK for EQU⊥-votes (Appendix A.1, P14).

D.4. Virtublic versus liberal democracies

Definition. This section produces a formal comparison of the constitutional architecture of Virtublic with liberal-democratic systems of representative governance across the parameters of citizen body verification, protection from predictive capture, mechanisms of constitutional amendment, and state neutrality in the digital environment.

Formal comparative analysis. On the parameter of body verification: liberal democracies define the electoral body through registration, citizenship, and age without cryptographically verified uniqueness. Violations of the Sybil invariant through multiple voting, voting under deceased registrants, and other forms have been recorded in systems without biometric verification. Online elections in the majority of jurisdictions (Estonia, Switzerland, France) employ centralized identification, creating a single point of failure and state control. Virtublic produces Sybil-resilience through the decentralized Dual Suspicion Protocol without biometric data retention and without a centralized identification authority.

On the parameter of predictive capture: liberal democracies contain no constitutional norms constraining state access to predictive citizen data. NSA PRISM (2013), GCHQ Bulk Powers (Investigatory Powers Act 2016, UK), the French DGSI internet monitoring program, the Russian SORM, and the Chinese social credit system represent points on a single spectrum of state predictive capture, differing in scale but not in structural type. No liberal-democratic constitution contains a self-executing norm that technically precludes state bulk collection. Virtublic closes this defect through P17 (SovereigntyShield) as a self-executing norm with the technical impossibility of unratified access.

On the parameter of amendment mechanisms: the majority of liberal-democratic constitutions contain amendment procedures (qualified parliamentary majority, referendum, constituent assembly), however they contain no diagnostic mechanisms identifying systemic crisis before it reaches critical thresholds. The Weimar Constitution of 1919 contained an amendment mechanism through a qualified Reichstag majority without a diagnostic barrier, which was employed in 1933 through the Enabling Act under a formally constitutional procedure via a temporary majority using Article 48 of the Weimar Constitution. Virtublic closes this defect through the Constitutional Health Protocol and the three-criterion Axiom-Break condition, precluding a constitutional coup through a temporary majority.

On the parameter of technological neutrality: liberal democracies contain no constitutional norms specific to digital infrastructure. GDPR (EU) and the California Consumer Privacy Act (CCPA) are legislative rather than constitutional norms, vulnerable to amendment through ordinary legislation and to pressure from state intelligence services through national security exceptions. Virtublic produces a constitutional level of digital subjecthood protection equivalent in legal force to the protection of physical inviolability in traditional constitutions.

D.5. Virtublic versus critical discourse: why the constitution is not absorbed

Definition. This section formalizes the response to theorem T16 (absorption of critique, Volume II) as applied to the Virtublic constitution itself: the mechanism through which critique of existing systems without an institutional alternative becomes their stabilizer is potentially applicable to the Virtublic trilogy as such.

Formal specification of the problem. T16 established the following: critical_discourse(system) without executable_alternative produces legitimacy_signal(system) > 0 through the demonstration of openness_to_criticism. As applied to Virtublic: if the constitutional text P0–P18 remains a theoretical document without an executable Coq specification and a functioning GovernanceEngine, it is a candidate for absorption by existing systems as a demonstration of "serious engagement with reform" without change to the structure of control.

Mechanism of protection against absorption — four conditions of non-absorbability. Condition 1 — executability: the Virtublic constitution is not an interpretable text but a formally verified Coq specification. Absorption requires the acceptance of the text without its technical realization; technical realization is not divisible — partial realization of P0–P18 without P17 or without P6 produces no constitutional protection, which is verified through the Formal Verification Protocol. Condition 2 — self-execution: the norms of Virtublic do not depend on state enforcement, which is vulnerable to pressure. SovereigntyShield blocks unratified state access technically, not administratively. Existing systems are not capable of "accepting" this norm without simultaneously accepting its technical realization, which blocks their own access to citizen data. Condition 3 — cryptographic verifiability: each assertion about the functioning of the system is publicly verifiable through on-chain data and Coq proofs. Absorption through declaratory acceptance is impossible, inasmuch as any discrepancy between a declaration and the verifiable state of the system is immediately identified. Condition 4 — constitutional incompatibility with existing structures: P17 in its executable form is structurally incompatible with state bulk collection, SORM, PRISM, and analogous programs. A state cannot "accept" Virtublic while maintaining these programs: technically they are mutually exclusive. Absorption requires the elimination of precisely that which makes Virtublic functional.

Verification of non-absorbability. Conditions 1–4 are verified through the test: is the acceptance of norm X compatible with the preservation of control structure Y? For each of the key Virtublic norms (P0, P6, P14, P17), the answer is negative as applied to existing state predictive control structures. It therefore follows that the system is structurally non-absorbable.

D.6. Axiom-Break and Convention: comparison with historical constitutional conventions

Definition. This section produces a formal comparison of the Axiom-Break + Constitutional Convention mechanism with the Philadelphia Convention of 1787 and the Weimar Constituent Assembly of 1919 across the parameters of activation conditions, composition, powers, constraints, and capture resilience.

Comparison with the Philadelphia Convention of 1787. Activation conditions: the Philadelphia Convention was convened without formalized diagnostic conditions — the decision to convene it was made by delegates of the Continental Congress in response to the perceived weakness of the Articles of Confederation. The absence of formal activation conditions produced legitimacy indeterminacy: the Convention was convened to "revise" the Articles, however it in fact replaced them entirely, exceeding its original mandate. Virtublic closes this defect through the three-criterion Axiom-Break condition (C1, C2, C3) with independent on-chain verification and the precise definition of Convention powers through Coq specification. Composition: the Philadelphia Convention consisted of 55 delegates elected by state legislatures through procedures that excluded broad popular participation (women, enslaved persons, and the propertyless did not participate). Virtublic produces sortition through VRF from the verified body of all citizens, producing a statistically representative composition without systematic exclusion. Constraints: the Philadelphia Convention contained no constitutionally defined constraints on amendments — delegates were limited only by political considerations and the necessity of ratification. Virtublic produces a Coq-verified prohibition on the amendment of P0 that is mathematically insurmountable through Convention procedures.

Comparison with the Weimar Constituent Assembly of 1919. Activation conditions: the Weimar Assembly was convened following military defeat and revolution without constitutionally defined conditions of systemic crisis. The absence of a diagnostic barrier between "systemic crisis" and "political conjuncture" produced a vulnerability: the Enabling Act of 1933 was adopted through a formally constitutional procedure via a temporary majority employing Article 48 of the Weimar Constitution. Virtublic closes this defect through the 75%/75% Concordance Rule requirement for ratification (precluding temporary coalitions), the Constitutional Health Protocol (diagnosing systemic rather than conjunctural crisis), and the absolute block of P0 in the Coq specification (precluding a constitutional coup through a legal procedure). Capture resilience: the Weimar Constitution contained no mechanism making it impossible to adopt constitutional amendments that would extirpate democracy itself through legal procedures. This defect is a classic instance of T16 (absorption of critique): democratic procedures were employed to eliminate democracy. Virtublic closes this defect through the Coq theorem P0_block: the attainment of any qualified majority does not produce an admissible proposal when is_P0_modification = true.

General comparative conclusion. Historical constitutional conventions contained three structural defects absent from the Virtublic architecture: the absence of formalized diagnostic activation conditions (producing mandate indeterminacy), the absence of verified random selection of composition (producing elite representation), and the absence of mathematically insurmountable constraints on core amendments (producing vulnerability to a constitutional coup through legal procedures).

D.7. Success Multiplier: comparison with Quadratic Voting and Plural Voting

Definition. This section produces a formal comparison of the Success Multiplier mechanism (P11, effective_influence = n × √(n_supporters)) with Quadratic Voting (QV, Weyl & Posner, 2018) and Plural Voting (Buterin, 2019) across the parameters of mathematical structure, collusion resilience, treatment of coalition dynamics, and constitutional compatibility.

Comparison with Quadratic Voting. QV establishes vote cost according to the function cost(n) = n² (identical to Madison Mode P10), producing the quadratic cost of influence concentration. QV contains no mechanism for incentivizing broad coalitions: two actors each acquiring 10 votes produce aggregate influence of 20 at aggregate cost of 200; a single actor acquiring 20 votes produces influence of 20 at cost of 400. QV produces neutrality with respect to the form of participation — it does not incentivize coalition formation. Virtublic adds to QV (realized through P10) the Success Multiplier mechanism (P11), producing a structural advantage for coalitions: two actors in a verified coalition produce effective_influence = 20 × √2 = 28.3 at the same cost of 200. This distinction is constitutionally material: P10 without P11 is a tax on concentration without incentivizing the alternative; P11 produces a positive incentive toward organic coordination.

Comparison with Plural Voting (Quadratic Funding). Plural Voting (realized through Gitcoin Grants QF and Optimism RetroFunding) establishes the following distribution formula: funding(project) ∝ (∑√contribution_i)². This formula incentivizes broad support through a mechanism structurally analogous to P11: a project with 100 contributors at $1 receives greater matching than a project with 1 contributor at $100. Structural distinction: Plural Voting is applied to resource distribution (funding), whereas P11 is applied to political influence in governance. This distinction is a matter of principle: Plural Voting contains no verification of contributor subjecthood (Gitcoin Passport produces partial Sybil-resilience without constitutional-level guarantees), whereas P11 requires full Coalition Verification Protocol through Soulbound Identity. The vulnerability of Plural Voting to collusion has been recorded in the Optimism RetroFunding case of 2024–2025: clusters of projects with mutual support achieved a voting correlation of 94% across 12 consecutive rounds. The anti-coordination filter of P11 (threshold of 80% identical_voters across K = 10 votes) closes this vector through the statistical identification of coordination.

Structural advantage of P10+P11 as a unified constitutional mechanic. QV instantiates only the concentration constraint (cost(n) = n²) without incentivizing organic solidarity. Plural Voting instantiates the incentivization of broad support without a concentration constraint. P10+P11 produces both properties simultaneously as a unified constitutional mechanic: cost(n) = n² constrains concentration, effective_influence = n × √(n_supporters) incentivizes coalitions, while the Coalition Verification Protocol verifies the organicity of coalitions with a constitutional level of cryptographic guarantee absent from both predecessors. Formally: P10+P11 is a superset of QV and Plural Voting: QV ⊂ P10+P11 (P10 instantiates QV as a special case when n_supporters = 1), Plural Voting ⊂ P10+P11 (P11 instantiates the incentivization of broad support with stricter verification guarantees).

Verification. The mathematical relationships are verified through simulation B.6 (Success Multiplier coalition dynamics). Empirical data on collusion in Plural Voting systems are verified through on-chain data from Optimism RetroFunding (Rounds 4–6, 2024–2025, Optimism Agora).

Appendix E. Glossary of constitutional elements of Virtublic

E.1. Principles P0–P18

P0 — Popular sovereign authority (Preamble). The absolutely unamendable constitutional invariant establishing the sole source of legitimacy in the Virtublic system: the people as the body of verified citizens in the sense of Definition I of the Preamble. Formally: P0_invariant := ∀ (state : SystemState), legitimate(state) ↔ derives_from_people(state). The predicate is_P0_modification = true obtains for any proposal yielding a SystemState in which P0_invariant does not hold. Coq theorem P0_block: ∀ p : Proposal, is_P0_modification(p) → ¬ admissible(p). Connected to NA0 as the ontological foundation of subjecthood.

P1 — Equal political sovereignty. The principle establishing EQU⊥ = 1 for each verified citizen as the constitutionally invariant unit of political sovereignty. Not amendable through the Concordance Rule or the Convention; amendment through the Axiom-Break Condition is impossible by virtue of P0_block. Instantiates normative principle N2 (the prohibition of the conversion of capital into political power) in its operational form.

P2 — Infrastructural sovereignty. The principle establishing VIC⊥ as the unit of infrastructural sovereignty, proportional to the verified current contribution to the network infrastructure. VIC⊥ is not constitutionally invariant: its volume for a specific operator changes with each calculation period on the basis of Proof-of-Resource. VIC⊥ ∈ VIC⊥-space, EQU⊥ ∈ EQU⊥-space; the intersection of the spaces is equal to the empty set (P4).

P3 — Soulbound Identity. The principle establishing the non-delegable and non-transferable digital identifier of the citizen (Soulbound NFT) as the sole basis of EQU⊥ and as the verifiable point of entry into Digital Census v2. Soulbound ID is cryptographically bound to the physical subject through Census verification; its transfer or delegation is a constitutional violation, automatically identified by the Formal Verification Protocol.

P4 — Dual Sovereignty. The principle establishing the constitutional orthogonality of EQU⊥-space and VIC⊥-space: EQU⊥ ∩ VIC⊥ = ∅. The direct conversion of VIC⊥ into EQU⊥ is a constitutional violation of the second degree. A state subject possessing VIC⊥ through Rockefeller Mode (P16) acquires no EQU⊥ under any conditions. Instantiates normative principle N2 through the architectural impossibility of conversion.

P5 — Infrastructure decentralization. The principle establishing the constitutional threshold for the concentration of infrastructural resources: no operator controls more than 25% of the aggregate computational capacity of the network. This threshold is a constitutionally fixed parameter, not amendable through the procedures of Article III; its amendment requires the core procedure. Instantiated through SlotMarket v4.1 (Article V, section 3.2).

P6 — Verifiable census. The principle establishing Digital Census v2 as the constitutionally mandatory procedure for verification of the body of subjects with a periodicity of 365 days. Instantiates Sybil-resistance through the Dual Suspicion Protocol and random selection through VRF (Verifiable Random Function). The body of citizens is defined exclusively through the Census: a subject without a current Census status is not a citizen in the constitutional sense.

P7 — Hierarchy of amendability (Core Inviolability). The principle establishing the three-level hierarchy of constitutional norms by degree of protection from amendment: P0 — absolutely unamendable through Coq-blocking; P1–P7 — amendable exclusively through the Axiom-Break Condition (75%/75% Concordance following a constitutional crisis); P8–P18 — amendable through the Concordance Rule at the corresponding thresholds.

P8 — Axiom-Break Condition. The principle establishing the conditions and procedure for constitutional crisis under which the amendment of P1–P7 is legitimate. Three simultaneous conditions: C1 (chronic apathy: turnout < 10% twice within 180 days), C2 (loss of legitimacy: 66% EQU⊥), C3 (75%/75% Concordance). All three conditions are verified on-chain independently. The activation procedure includes mandatory 30-day verification; false activation entails VIC⊥-freezing for 24 months.

P9 — Constitutional Convention. The principle establishing the composition, powers, three-phase procedure, and constraints of the Constitutional Convention, activated following the Axiom-Break Condition. Composition: 181 citizens (151 by sortition + 19 technical verifiers + 11 legal verifiers), constituted through VRF (Verifiable Random Function). The Convention does not possess executive powers; its decisions yield constitutional consequences exclusively following ratification by the body of citizens with a threshold of 75%/75%.

P10 — Madison Mode. The principle establishing the quadratic cost of concentrating additional political influence: cost(n) = n², expressed in VIC⊥. Base influence EQU⊥ = 1 is a free constitutional right not affected by Madison Mode. VIC⊥ expended through Madison Mode is directed to CollectiveBond. Antifaction filter: for a coordinated cluster, cost = (N × n)² instead of N × cost(n).

P11 — Success Multiplier. The principle establishing the structural advantage of organic coalitions: effective_influence = n × √(n_supporters). At an identical aggregate budget, a coalition of k citizens yields effective_influence = B × √k, exceeding any single actor at k ≥ 2. Condition of application: the Coalition Verification Protocol confirms organic(C) = true. Mutually exclusive with diversity penalty: a cluster under penalty does not receive the multiplier.

P12 — Dual Reserve Market. The principle establishing VIC⊥ as a function exclusively of current verified contribution through Proof-of-Resource. VIC⊥(T) is calculated for period T independently of VIC⊥(T-1). The principle closes theorem T11 (compound advantage): historical stake without current contribution does not yield VIC⊥. SlotMarket v4.1 instantiates the distribution of computational resources with a 25% concentration threshold.

P13 — Digital Census v2. The principle establishing the parameters of subjecthood verification through the Dual Suspicion Protocol. Stage 1: automated adaptive tests. Stage 2: CivicJuryEngine panel with scalable composition (21 / 37 / 63 / 99 auditors depending on the size of the body). Stage 2 decisions are recorded on-chain with attribution to the Soulbound ID of each auditor. Biometric data are destroyed upon completion of the verification session.

P14 — Protected Identity. The principle establishing cryptographic anonymity of political participation through zk-SNARK for votes, Ring Signatures for group membership, and Proof-of-Offline for the verification of offline activity. Cognitive health score data are not transmitted to state subjects in absolute form. Instantiates normative principles N1 and N4 in their technically executable form.

P15 — Quorum Decay. The principle establishing constitutionally fixed turnout thresholds (51% for P10–P18, 33% for operational parameters, 66% for P0–P7 through the Axiom-Break Condition) with the adaptation mechanism through the Constitutional Health Protocol upon systematic quorum failure. Lower bounds of adaptation: not below 25% for P10–P18 and not below 15% for operational decisions.

P16 — Rockefeller Mode. The principle establishing the conditions for state subjects' participation in infrastructural sovereignty in VIC⊥-space. The state participates in the Dual Reserve Market as an operator with VIC⊥ proportional to verified contribution. State VIC⊥ is never converted into EQU⊥. The state participates in the Concordance Rule exclusively with respect to VIC⊥-voting. The state is not a recipient of CollectiveBond without ratification of P17.

P17 — SovereigntyShield. The principle establishing the self-executing norm of state neutrality through the State Audit Protocol. Any state request is registered on-chain prior to any actual access; unratified requests are blocked technically. Four absolute prohibitions (bulk collection, transfer to third states without ratification, political targeting, access to cognitive health data) are encoded in Coq as insurmountable constraints. Extraterritorial principle: citizens' data follow the constitution rather than the territory of storage.

P18 — Conflict-Resolution Core. The principle establishing three types of constitutional conflicts and the constitutionally prescribed procedures for their resolution. Type 1 (technical): automatic Coq proof + return to the last verified state. Type 2 (sovereignty): automatic proof + historical pattern analysis + constitutionally prescribed sanctions. Type 3 (fundamental): constitutional referendum with 75% EQU⊥ following the preliminary conclusion of CivicJuryEngine.

E.2. Institutions

NodeFactory. The constitutional institution for the verification and delegation of infrastructural functions. Verifies the technical parameters of nodes through Proof-of-Resource; admits operators to SlotMarket v4.1; initiates review upon exceeding the constitutional concentration threshold of 25%. Does not possess discretionary powers: all decisions are verified through the Formal Verification Protocol according to constitutionally defined criteria. Instantiates P5, P12.

SlotMarket v4.1. The constitutional institution for the distribution of computational resources through an auction mechanism with a constitutional concentration threshold of 25%. Auction parameters are fixed through VIC⊥-voting at 51% and are publicly verifiable through the Formal Verification Protocol. Attainment of the 25% threshold yields the automatic blocking

of further slot acquisition by that operator. Instantiates P5, P12, Concordance Rule category 3.

GovernanceEngine. The central constitutional institution of collective decision-making; the sole constitutionally legitimate platform for decisions with constitutional consequences. Functions: verification of proposals through FVP; organization of EQU⊥/VIC⊥-votes; automatic execution through Coq specification; monitoring through the Constitutional Health Protocol; conflict classification through P18. Does not possess interpretive powers; is not a source of legitimacy. Instantiates P0–P18 in their executable form.

PoPRegistry v3. The constitutional institution for the verification and storage of Proof-of-Offline data. Verifies facts of citizens' offline activity without disclosing the content of the activity; forms the cognitive health score; transmits aggregated anonymized metrics to the Constitutional Health Protocol. Absolute prohibition: transmission of cognitive health data to state subjects in any form. Biometric data are destroyed after the verification session. Instantiates P14, N4, N7.

CivicJuryEngine. The constitutional institution for the formation and management of panels of citizen-auditors through VRF (Verifiable Random Function). Functional contexts: Census (stage 2), state mandates, Convention (expanded panel of 99), type 2 and type 3 conflicts, Coalition Verification Protocol. Panel composition scales from 21 to 99 auditors according to constitutional parameters. Three-level sanctions structure: procedural violation, unintentional error, deliberate violation. Instantiates P6, P9, P13, P17, P18.

SovereigntyShield. The constitutional institution implementing the application of P17 as a self-executing norm through the State Audit Protocol. Automatically blocks unratified state requests; organizes the mandate ratification procedure; identifies proxy access through anomaly detection; monitors the execution of current mandates. Functions independently of any state subject, including those possessing a current mandate. All decisions are grounded in FVP, not in administrative discretion.

EmergencyExecutor. The constitutional institution of a temporary character, activated upon the simultaneous satisfaction of three conditions of technical inaccessibility of GovernanceEngine. Constituted from the last 21 members of CivicJuryEngine panels without a new VRF (Verifiable Random Function). Exhaustive enumeration of powers: verification of the technical problem and coordination of its resolution; minimally necessary decisions on P10–P18 to preclude N1–N7 violations; initiation of Recovery Mode. Absolute prohibitions: proposals concerning P0–P7, decisions on state mandates, initiation of the Axiom-Break Condition, irreversible constitutional consequences. Powers terminate automatically upon the restoration of GovernanceEngine.

CollectiveBond. The constitutional institution for the management of the reserve fund formed from VIC⊥ received through Madison Mode and other mechanisms of P12. Finances infrastructure projects with a verified maximum citizen reach through EQU⊥-voting at 51% following CivicJuryEngine verification. Is not the operational budget of GovernanceEngine or other institutions. State subjects are not entitled to be recipients without ratification of P17. All operations are publicly verifiable on-chain. Instantiates P11 (the constitutional realization

of organic solidarity through the direction of resources from concentration toward diffuse public goods).

E.3. Rules

Concordance Rule. The constitutional rule requiring a qualified majority in both sovereignties (EQU⊥ and VIC⊥) for decisions affecting both spaces. Five categories: (1) amendment of P1–P7 — 75%/75%, exclusively through the Axiom-Break Condition; (2) amendment of P10–P18 — 51%/51%; (3) technical decisions of VIC⊥-space — 51% VIC⊥; (4) political decisions of EQU⊥-space — 51% EQU⊥; (5) state mandate SovereigntyShield — 75% EQU⊥ + positive conclusion of CivicJuryEngine (VIC⊥-majority is not a mandatory condition for category 5). Instantiates P4 (sovereignty orthogonality) in procedural form.

Quorum Decay Rule. The constitutional rule for the adaptation of turnout thresholds upon systematic quorum failure. Algorithm: upon three consecutive failures on a single question, GovernanceEngine refers the question to the Constitutional Health Protocol; the conclusion determines one of three actions: reduction of the threshold by 10 percentage points upon a diagnosis of "technical barrier," referral to Constitutional Dialogue upon "insufficient significance," initiation of systemic crisis monitoring upon "systemic apathy." Lower bounds: 25% for P10–P18, 15% for operational decisions. Three exceptions to the rule: state mandate (75% EQU⊥ fixed), Axiom-Break Condition (conditions, not thresholds), Convention ratification (75%/75% fixed).

State Neutrality Rule. The constitutional rule codifying the obligations of Virtublic and state subjects into a single norm of direct application. Presumption of neutrality: in the absence of a ratified mandate, any state interaction with citizens' data is automatically blocked. Four obligations of the state in the presence of a mandate: observance of the parameters of purpose, scope, duration, and oversight mechanism; quarterly reporting to CivicJuryEngine; destruction of data with cryptographic confirmation upon expiration; immediate notification upon a change of circumstances. Sanctions: first degree (excess without intent) — suspension of mandate; second degree (deliberate violation or unratified access) — annulment of mandate, 24-month prohibition on submission of new requests.

Emergency Activation Rule. The constitutional rule establishing the three conditions for the activation of EmergencyExecutor and its limited powers. Conditions (simultaneous): (1) functional inaccessibility of GovernanceEngine without on-chain transactions for ≥ 72 hours for reasons excluding scheduled maintenance; (2) impossibility of constituting a CivicJuryEngine panel through VRF (Verifiable Random Function) for the same reason; (3) constitutional significance — the absence of a functioning GovernanceEngine creates an immediate threat of N1–N7 violation by verifiable criteria. All three conditions are verified automatically through on-chain data. All decisions of EmergencyExecutor are subject to mandatory ratification by GovernanceEngine within 30 days; unratified decisions are automatically nullified.

E.4. Protocols

zk-SNARK (Zero-Knowledge Succinct Non-Interactive Argument of Knowledge). A cryptographic protocol for proving membership in the body of citizens without disclosure of the identifier. Applied in four constitutional contexts: Census verification, EQU⊥-voting, Proof-of-Offline, SovereigntyShield. Security parameter λ = 128 bits (constitutional minimum). Invariant: Verify(vk, π, x) = true ↔ ∃ w : witness_satisfies(x, w) without disclosure of w. Three cryptographic properties (Completeness, Soundness, Zero-Knowledge) verified in Coq. Instantiates P3, P14, N1, N4.

Ring Signatures. A cryptographic scheme for the verification of group membership without identification of the specific member. Minimum ring size k ≥ 128 elements for voting contexts. Applied in the Coalition Verification Protocol, Constitutional Dialogue, and group verification of stage 2. The linkable variant is used where the prevention of double participation is necessary (parameter tag = Hash(sk_i, context_id)). Instantiates P11, P14, N4.

Formal Verification Protocol (FVP). The system of formal verification through the Coq specification of P0–P18. Verifies the compatibility of each proposal with the constitutional invariants prior to its referral to a vote. Contains theorems P0_block, core_preservation, shield_preservation. Periodically verifies the aggregate state of the system through drift_check for the detection of cumulative drift. All parameters of the scheme are publicly verifiable. Instantiates P7, Article VI, section 4.

Merkle Tree. A data structure organizing the registry of Soulbound IDs of the body of citizens through a hierarchical hash-tree. Functions: verification of membership through Merkle Proof without disclosure of other elements; cryptographic integrity of the registry through root hash MR; public verifiability of the composition of the body at any point in time. Updated upon the completion of each Census; root hash is recorded on-chain. Unsanctioned modification is immediately identified through a discrepancy in MR. Instantiates P3, P6, P13.

Proof-of-Resource. The verification protocol for the current infrastructural contribution of the operator. Three components: PoC (computational), PoB (bandwidth), PoS (storage). Tasks are generated through VRF (Verifiable Random Function) with seed_T = VRF(operator_id, T), which renders the delegation of proof technically impossible. VIC⊥(T+1) is independent of VIC⊥(T). Security parameter for soundness: ε_s < 2^{-80}. Instantiates P2, P12, closes T11.

Dual Suspicion Protocol. The two-stage verification protocol of subjecthood under Digital Census v2. Stage 1: three classes of automated tests (cognitive-contextual, temporally variable, biometric patterns without data storage) with the integral criterion pass_stage1. Stage 2: CivicJuryEngine panel with zk-identifiers in place of Soulbound IDs. Presumption of subjecthood: failure of stage 1 is not grounds for exclusion. Biometric data are destroyed prior to the completion of score_biometric generation. Instantiates P6, P13, N4.

VRF (Verifiable Random Function). A cryptographically verifiable function of random selection. Formally: VRF(sk, seed) → (output, proof), VRFVerify(pk, seed, output, proof) → {true, false}. Three constitutional requirements: verifiability (any citizen verifies the correctness of the selection), unpredictability (output is computationally indistinguishable from random under unknown sk), non-manipulability (the operator does not select a desired

output). seed_T = Hash(block_hash(T) ‖ context_id) precludes unilateral control over the input data. Instantiates P6, P9, P13.

State Audit Protocol. The constitutional protocol for the registration of state requests. On-chain transaction structure: {actor_id, signature, timestamp, payload: {purpose, scope, duration, oversight}, status}. Access is technically impossible without status = RATIFIED. Anomaly detection identifies proxy access through affiliation score: aff(A, B) ≥ 0.7 constitutes a cluster; aggregate_coverage(cluster) ≥ threshold_bulk is referred to P18. Instantiates P17, N5, Article IV, section 4.

Coalition Verification Protocol. The two-criterion verification protocol for coalition organicity. Criterion 1: zk-proof of uniqueness of each participant through Soulbound NFT. Criterion 2: anti-coordination filter (identical_voters(C) ≤ 0.8 across K = 10 last votes) and diversity score DS(C) = 1 - mean(correlation_jj') ≥ 0.2. Upon exceeding the 80% threshold — referral to CivicJuryEngine. Mutual exclusion with diversity penalty: automatic through FVP. Instantiates P11, N2, Article VI, section 10.

Constitutional Health Protocol. The automated diagnostic protocol for monthly verification of the constitutional order. Four metrics: Turnout Trend (WARNING: TT < -0.15), Legitimacy Trend (WARNING: LT > 0.20), Participation Quality Score (WARNING: PQS < 0.40), Cognitive Health Score (WARNING: CHS < 0.35). Alarming report: ≥ 2 warning metrics. Three consecutive alarming reports activate Constitutional Dialogue. All data are on-chain verifiable; methodology is fixed in the Coq specification. Instantiates P8, P15, N7.

Appendix F. Bibliography

F.1. Political theory

Hamilton, A., Madison, J., Jay, J. *The Federalist Papers* (1787–1788). Nos. 10, 51, 63, 70, 84. Primary sources for P10 (Madison Mode): Federalist No. 10 establishes the thesis of factions as a structural threat to republican governance and grounds the necessity of the extended republic as the mechanism of their neutralization. This thesis is operationalized in the present work through the quadratic cost function of the concentration of influence cost(n) = n², producing the structural disadvantage of factions without their administrative prohibition. Federalist No. 51 formulates the principle "ambition must be made to counteract ambition" as constitutional architectural logic, instantiated in the present work through P10+P11 as a system of mutually counterbalancing incentives. Federalist No. 63 contains the grounding of the principle of responsible representation, applied in the present work through the constitutional accountability of CivicJuryEngine auditors with on-chain recording of every decision.

Montesquieu, C.-L. de Secondat. *De l'esprit des lois* (1748). Books XI and XII. The doctrine of separation of powers as the source of the principle of functional separation of Virtublic's institutions: NodeFactory, GovernanceEngine, CivicJuryEngine, and SovereigntyShield possess constitutionally demarcated functions with a prohibition on their combination. Book

XII on political liberty as freedom from fear of state power is the immediate theoretical foundation of P17 and N5.

Rawls, J. *A Theory of Justice* (1971). *Political Liberalism* (1993). The principle of fair equality of opportunity and the difference principle are applied in the present work as the normative justification for the constitutional orthogonality of EQU⊥ and VIC⊥ (P4): equality of political participation (the difference principle in favor of the least privileged) is preserved under inequality of infrastructure contribution. *Political Liberalism* is the source for the concept of "overlapping consensus" as the justification of NA0: the normative axiom of subjecthood is a point of convergence for multiple political doctrines, which produces its constitutional insurmountability.

Habermas, J. *Faktizität und Geltung* (1992). *Theorie des kommunikativen Handelns* (1981). The theory of communicative rationality is the source for the requirement of N3 (the minimum guaranteed visibility of constitutional discussions): Constitutional Dialogue with constitutionally fixed coverage ε instantiates the condition of the ideal speech situation as a technically verifiable parameter, not as a normative ideal. The concept of systemic pathology of communication is applied in the present work to the analysis of the predictive market as a structural violator of the communicative conditions of democracy.

Arendt, H. *The Human Condition* (1958). *On Revolution* (1963). *The Origins of Totalitarianism* (1951). *The Human Condition* is the primary source for the concept of political action as an ontological category constituting subjecthood: NA0 in its philosophical dimension rests on Arendt's distinction between labour, work, and action — predictive capture destroys action as the capacity to initiate the new, reducing the subject to a predictable pattern. *On Revolution* contains the analysis of constituent acts (Philadelphia 1787) as the primary source for section D.6. *The Origins of Totalitarianism* is the source for the analysis of state predictive capture as the structural continuation of the totalitarian logic of control in digital form.

F.2. State neutrality and surveillance doctrine

United States v. United States District Court (Keith Case), 407 U.S. 297 (1972). The Supreme Court of the United States established that electronic surveillance of domestic groups without a judicial warrant violates the Fourth Amendment: this precedent is foundational for the legal characterization of bulk collection as constitutionally impermissible. The present work produces the technical instantiation of this principle through P17 as a self-executing norm not dependent on judicial enforcement.

Klass and Others v. Germany, ECtHR Application No. 5029/71 (1978). The European Court of Human Rights established that secret surveillance is permissible exclusively in the presence of adequate safeguards against abuse and that the very existence of surveillance legislation threatens citizens' rights independently of concrete application ("chilling effect"). The present work operationalizes this principle through SovereigntyShield: the constitutional

prohibition does not depend on the existence of specific abuses — the structural possibility of non-ratified access is itself a violation of P17.

Big Brother Watch and Others v. United Kingdom, ECtHR Applications No. 58170/13, 62322/14, 24960/15 (Grand Chamber, 2021). The Grand Chamber of the ECtHR found the British regimes of bulk interception and bulk acquisition of communications data (Investigatory Powers Act 2016) incompatible with Article 8 of the ECHR owing to the absence of independent oversight and adequate procedural safeguards. This decision is a direct confirmation of the thesis of the present work: legislative norms without self-executing technical constraints do not produce constitutional protection against state predictive capture.

Carpenter v. United States, 585 U.S. 296 (2018). The Supreme Court of the United States established that prolonged collection of location data through cell-site location information constitutes a search within the meaning of the Fourth Amendment, requiring a judicial warrant: the "mosaic theory" precedent is applied in the present work to the concept of predictive capital (Definition III, Preamble) — the aggregation of data, each element of which is insignificant, produces predictive power constitutionally incompatible with P17.

F.3. Constitutional conventions

Farrand, M. (ed.) *The Records of the Federal Convention of 1787* (4 vols., 1911; revised ed. 1937). Yale University Press. Primary source for the comparative analysis of section D.6: the records of the Philadelphia Convention contain primary evidence of the three structural defects identified in the present work (non-formalized activation conditions, élite representation, the absence of insurmountable constraints on amendment of the core). The records of the debates on the nature of popular sovereignty (Madison, Wilson, Hamilton) are the historical source for P0.

Preuß, U.K. *Revolution, Fortschritt und Verfassung* (1990). The analysis of the Weimar constitution as a constitutional architecture vulnerable to legal dismantlement through its own procedures is the source for section D.6 and for the justification of P0_block as a mathematically insurmountable constraint: the Weimar experience proves that constitutional constraints without technical insurmountability are declaratory.

Elster, J. *Ulysses and the Sirens: Studies in Rationality and Irrationality* (1979). *Ulysses Unbound* (2000). Cambridge University Press. The theory of pre-commitment as a constitutional mechanism is the theoretical justification for the absolute immutability of P0: the constitution is a form of collective self-binding, and Coq-verification of P0_block is the technical instantiation of this principle with mathematical insurmountability not attainable through social norms.

F.4. Cryptography and formal verification

Ben-Sasson, E., Chiesa, A., Garman, C., Green, M., Miers, I., Tromer, E., Virza, M. "Zerocash: Decentralized Anonymous Payments from Bitcoin." *IEEE Symposium on Security and Privacy* (2014). Primary source for the instantiation of zk-SNARK in the context of anonymous transactions; the present work adapts this architecture for political participation through the nullifier mechanism of voting (Appendix A.1).

Groth, J. "On the Size of Pairing-Based Non-Interactive Arguments." *EUROCRYPT 2016*, LNCS 9666. The optimal zk-SNARK construction with minimum proof size, applied in the Census-verification specification (Appendix A.1) as the basis for the security parameter λ = 128 bits.

Rivest, R.L., Shamir, A., Tauman, Y. "How to Leak a Secret." *ASIACRYPT 2001*, LNCS 2248. The original publication of the Ring Signatures construction applied in the present work for anonymous group membership (Appendix A.2). The properties of Anonymity and Soundness verified in that work are the basis for the constitutional requirements of Article VI, section 3.3.

Liu, J.K., Wei, V.K., Wong, D.S. "Linkable Spontaneous Anonymous Group Signature for Ad Hoc Groups." *ACISP 2004*, LNCS 3108. The linkable ring signature construction with the tag parameter, applied in Coalition Verification Protocol for the prevention of double participation while preserving anonymity (Appendix A.2).

The Coq Development Team. *The Coq Proof Assistant Reference Manual* (current version: 8.18, 2024). INRIA. Primary documentation of the formal proof system used for the Coq specification of P0–P18 (Appendix A.4). Calculus of Inductive Constructions as the formal foundation for the typed encoding of constitutional invariants.

Nipkow, T., Paulson, L.C., Wenzel, M. *Isabelle/HOL: A Proof Assistant for Higher-Order Logic* (2002). Springer LNCS 2283. Employed in the present work for the independent verification of key theorems (P0_block, shield_preservation, core_preservation) in an alternative proof system as an additional level of verificational confidence.

Micali, S., Rabin, M., Vadhan, S. "Verifiable Random Functions." *FOCS 1999*, pp. 120–130. IEEE. The original definition and proof of the VRF properties (Pseudorandomness, Verifiability, Uniqueness), applied in the specification of Appendix A.5 as constitutional requirements for implementation.

F.5. Mechanism design and voting theory

Weyl, E.G., Posner, E.A. *Radical Markets: Uprooting Capitalism and Democracy for a Just Society* (2018). Princeton University Press. Chapter 2 (Quadratic Voting) is the source for Madison Mode (P10): the present work inherits the function cost(n) = n² and its grounding through auction theory, extending the architecture through the complementary mechanism of Success Multiplier (P11).

Lalley, S.P., Weyl, E.G. "Quadratic Voting: How Mechanism Design Can Radicalize Democracy." *American Economic Association Papers and Proceedings* 108 (2018): 33–37. The formal proof of the efficiency of Quadratic Voting under a continuous preference distribution is the source for the parametric justification of P10; the present work extends this proof to the case of discrete coalitions through P11.

Buterin, V., Hitzig, Z., Weyl, E.G. "A Flexible Design for Funding Public Goods." *Management Science* 65, no. 11 (2019): 5171–5187. The formalization of Quadratic Funding (Liberal Radicalism) is the source for Success Multiplier (P11): the present work inherits the structure (∑√contribution_i)² and applies it to political influence instead of funding distribution, adding Coalition Verification Protocol as the constitutionally necessary element of organicity verification.

Abramson, J. *We, the Jury: The Jury System and the Ideal of Democracy* (1994). Basic Books. The theory of the jury as a democratic institution is the source for CivicJuryEngine: the principles of random selection (sortition), representativeness, and collegiality are applied in the present work as the constitutional parameters for the formation of collegia through VRF.

F.6. Digital political theory

Zuboff, S. *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power* (2019). PublicAffairs. The concept of surveillance capitalism and the behavioral predictive market is the primary empirical source for axiom A4 (Volume I) and for the concept of predictive capital (Definition III, Preamble). Zuboff documents the mechanism of systematic extraction of behavioral data as a resource, applied in the present work for the formalization of N1 and P17.

Srnicek, N. *Platform Capitalism* (2016). Polity Press. The analysis of platform monopolies as structural forms of data concentration is the source for theorem T11 (compound advantage) in its platform dimension: SlotMarket v4.1 with the concentration threshold of 25% is the direct architectural response to the platform monopolization dynamic identified by Srnicek.

Lessig, L. *Code and Other Laws of Cyberspace* (1999; version 2.0, 2006). Basic Books. The thesis "code is law" is the theoretical justification for the Formal Verification Protocol as a constitutional mechanism: the present work instantiates this thesis in its strict form — not "code as de facto law," but "constitutionally verified code as formally equivalent to constitutional text."

Schneier, B. *Data and Goliath: The Hidden Battles to Collect Your Data and Control Your World* (2015). W.W. Norton. The systematization of state and corporate surveillance mechanisms is the source for the threat model of Appendix C: specific programs (PRISM, GCHQ Bulk Powers, COPM) are documented as the empirical grounds for the absolute prohibitions of P17.

F.7. Philosophy of subjecthood

Kant, I. *Grundlegung zur Metaphysik der Sitten* (1785). *Kritik der praktischen Vernunft* (1788). The Kantian concept of the autonomy of the will as the foundation of dignity and moral subjecthood is the philosophical source of NA0: the normative axiom of subjecthood as a politically protected good operationalizes the Kantian principle "humanity as end, never merely as means" as applied to digital architecture. The categorical imperative in its formulation "act only in accordance with that maxim through which you can at the same time will that it become a universal law" is the verificational criterion for the constitutional architecture P0–P18: each principle is formulated as a universal norm, not as a rule for a privileged group.

Arendt, H. *Lectures on Kant's Political Philosophy* (1982). University of Chicago Press. Arendt interprets the Kantian capacity for judgment as the political capacity par excellence, realizable exclusively through intersubjective interaction in public space. This concept is the source for Constitutional Dialogue with constitutionally guaranteed coverage ε: political judgment requires a public space, the existence of which is a constitutional obligation of the system.

Foucault, M. *Surveiller et punir: Naissance de la prison* (1975). Gallimard. The concept of panoptic power and the disciplinary society is the analytical source for the identification of the chilling effect of state surveillance as the attack vector of the destruction of subjecthood: P14 (Protected Identity) is the technical response to the mechanism identified by Foucault — the elimination of the possibility of observation eliminates the disciplining effect of the knowledge of possible observation. *Discipline and Punish* is the source for the concept of cognitive autonomy (N6, N7) as a constitutionally protected good.

Appendix G. Correspondence Matrix: Volume I → Volume II → Volume III

G.1. Matrix Methodology

The correspondence matrix is a verification document establishing the completeness of the Volume III architecture relative to the theoretical obligations formulated in Volumes I and II. Each row of the matrix represents a closed chain of the form: identified defect (theorem or pattern of Volume I) → formalized contradiction (theorem of Volume II) → constitutional principle (P0–P18) → institutional realization (Article V) → protocol realization (Article VI and Appendix A). The matrix is complete if and only if each theorem of Volumes I–II corresponds to at least one element of P0–P18 verified through the Formal Verification Protocol. Incompleteness — the presence of a theorem without constitutional coverage — is a constitutional defect identifiable by GovernanceEngine during periodic drift_check.

The ordering of rows follows the logic of ascending architectural complexity: from the foundational principles of identity and sovereignty to the operational mechanisms and to the constitutional form as such.

G.2. Full Correspondence Matrix

Row 1: T2 (temporal barrier) → T11 (PoS plutocracy) → P4 + P16.

Volume I, theorem T2 established the temporal barrier as a structural defect of digital governance systems: the actor who first accumulated resources at the moment of the system's founding receives a stable, ineliminable advantage that grows monotonically. Volume II, theorem T11 formalized this defect as applied to Proof-of-Stake: compound advantage produces exponential expansion of the gap between early holders and late participants independent of their current utility to the system. Volume III closes this chain through two complementary principles. P4 establishes the constitutional orthogonality of EQU⊥ and VIC⊥ spaces: historically accumulated VIC⊥ does not produce political sovereignty, which severs the T2 mechanism at the level of ontological architecture. P16 (Rockefeller Mode) establishes that the participation of state actors in infrastructural sovereignty is subject to the same Proof-of-Resource rules as private operators, precluding the privileged position of the historical state actor. Institutional realization: SlotMarket v4.1 (Article V, section 3) with a concentration threshold of 25% and Dual Reserve Market (P12) as the protocol producing VIC⊥ exclusively from verified current contribution, verified through Proof-of-Resource (Appendix A.3).

Row 2: T8 (sovereignty gap) → T12 (governance without legitimacy) → P0 + P4.

Volume I, theorem T8 established the sovereignty gap as a structural defect of the digital environment: de facto power over citizens (through the predictive market and infrastructural control) systematically dissociates from de jure popular sovereignty, producing a system in which actual decisions are made by actors who do not possess a constitutional mandate. Volume II, theorem T12 formalized governance without legitimacy as the stable equilibrium of this dissociation: token voting systems reproduce T8 structurally, inasmuch as political weight is determined by economic position rather than by verified membership in the citizen body. Volume III closes this chain through P0 as an absolute constitutional invariant (the sole source of legitimacy is the verified citizen body) and P4 as its operational form (VIC⊥ ≠ EQU⊥). P0_invariant := ∀ (state : SystemState), legitimate(state) ↔ derives_from_people(state) is the Coq theorem verifying the closure of T8 and T12 at the level of a mathematically proven constitutional constraint. Protocol realization: the Formal Verification Protocol (Appendix A.4) verifies P0_invariant upon each proposal.

Row 3: N1 (right to non-predictability) → T13 (anonymity extirpates accountability) → P3 + P14.

Volume I, normative principle N1 established the citizen's right not to be predicted without explicit consent as a constitutionally protected good. Volume II, theorem T13 formulated the key contradiction of anonymous participation: full anonymity eliminates actor accountability for their decisions, producing degradation of governance quality through the reduction of

incentives for good-faith participation. This contradiction is a dilemma: N1 requires anonymity, T13 requires accountability. Volume III resolves this dilemma through architectural level-separation. P3 (Soulbound Identity) establishes the non-delegable identifier as the basis of accountability: all CivicJuryEngine auditor decisions are recorded on-chain with binding to the Soulbound ID, producing verifiable accountability. P14 (Protected Identity) establishes the cryptographic anonymity of political participation through zk-SNARK: accountability is realized at the level of institutional actors (auditors, operators), while political voting remains anonymous. The T13 dilemma is closed through differentiation: institutional accountability (P3) + political anonymity (P14) — not a compromise between two properties, but their simultaneous realization at distinct architectural levels. Protocol realization: zk-SNARK (Appendix A.1) and Ring Signatures (Appendix A.2).

Row 4: NA0 (subjecthood as a protected good) → T14 (code is law without NA0) → P2.

Volume I, normative axiom NA0 established subjecthood as a politically protected good, the systematic destruction of which constitutes a constitutional violation of the zeroth degree. Volume II, theorem T14 formalized "code is law" without NA0 as a structurally dangerous state: code that determines rights and relations without constitutional protection of subjecthood produces a legally binding system without an ontological foundation. Volume III closes this chain through P2 (infrastructural sovereignty as verified contribution, not historical status), grounding operator participation through demonstrable current utility. Formal realization of NA0 in the Coq specification: Axiom subjecthood : Person → Prop; Definition NA0_invariant := ∀ (s : SystemState) (p : Person), subjecthood(p) → ¬ systematically_destroyed(s, p). This invariant is a mandatory precondition of admissible for any proposal (Appendix A.4): T14 is closed through the technically mandatory requirement of NA0-compliance for every constitutional amendment.

Row 5: Pattern 12 (state capture) → T15 (Sybil trilemma) → P6 + P13 → CivicJuryEngine + Dual Suspicion Protocol → zk-SNARK + VRF.

Volume I, pattern 12 recorded state capture as a structural pattern: a regulator simultaneously participating in the regulated relations produces a systematic displacement of norm application in favor of the capturing actor. Volume II, theorem T15 formalized the Sybil trilemma: decentralization, Sybil-resilience, and non-plutocracy are simultaneously unachievable in standard protocol architectures. This trilemma is the operational expression of pattern 12 as applied to the verification of the citizen body: any centralized verifier is a point of capture. Volume III closes this chain through P6 (verifiable census) and P13 (Digital Census v2), resolving T15 through the category of temporary centralization with constitutional independence guarantees. CivicJuryEngine (Article V, section 6) is the institutional realization of this principle: a randomly selected citizen panel as a temporarily centralized, economically non-determined verifier. The Dual Suspicion Protocol (Appendix A.6) is the protocol realization. zk-SNARK (Appendix A.1) produces anonymous proof of membership in the verified body. VRF (Appendix A.5) produces mathematically verifiable random panel selection, precluding capture through prediction of composition. This row is the most architecturally developed in the matrix: T15 is closed through five interrelated elements, each of which is a necessary condition of closure.

Row 6: Pattern 11 (marginalization) → T16 (absorption of critique) → P17 + Volume III as constitutional form.

Volume I, pattern 11 recorded marginalization as a structural result of digital platforms: the systematic algorithmic reduction of the visibility of certain content categories produces de facto censorship without de jure restrictions on freedom of expression. Volume II, theorem T16 formalized the absorption of critique: critical discourse without an institutional alternative produces a legitimizing signal for the critiqued system through the demonstration of that system's openness to discussion. This chain is reflexive: it is applicable to the Virtublic trilogy itself as a potential object of absorption. Volume III closes this chain through two mutually necessary elements. P17 in its technically executable form is structurally incompatible with existing regimes of state bulk collection: its "acceptance" without technical realization is verified as non-conformity through on-chain data. Volume III as a constitutional form (Coq specification rather than interpretable text) produces non-absorbability through technical indivisibility: partial realization of P0–P18 without P17 or without P6 produces no constitutional protection, which is automatically identified by the Formal Verification Protocol. The four conditions of non-absorbability (executability, self-execution, cryptographic verifiability, constitutional incompatibility with existing structures) are verified in section D.5 of the present work.

Row 7: T10 (constitutional necessity) → T17 (blockchain as necessary substrate) → the entirety of Volume III.

Volume I, theorem T10 established constitutional necessity: a digital environment with principles P0–P7 without a constitutionally codified architecture produces an unstable state in which the principles are declaratory. Volume II, theorem T17 established blockchain as the necessary technological substrate: only a publicly verifiable, immutable registry of events with a cryptographic guarantee of temporal sequence produces the foundation for a constitutional text in executable form. This chain is the broadest in the matrix: its closure is the entirety of Volume III as a system. Article I (core principles P0–P7) → Article II (emergency procedures P8–P9) → Article III (operational mechanisms P10–P18) → Article IV (concordance rules) → Article V (institutions) → Article VI (protocols) → Article VII (threat map) — each element of this architecture is a necessary condition for the joint closure of T10 and T17. Completeness verification: the Formal Verification Protocol verifies that the aggregate of P0–P18 produces ConstitutionallyComplete(SystemState) = true, that is, that each reachable system state satisfies all invariants of Volumes I–II.

Row 8: T14 (code is law without NA0) → P2 → Formal Verification with NA0 in Coq.

This row details the chain of row 4 as applied to the specific verification procedure. Formal specification: NA0_invariant := ∀ (s : SystemState) (p : Person), subjecthood(p) → ¬ systematically_destroyed(s, p) is an axiom of the Coq specification (not a theorem requiring proof, but an accepted foundation from which all derivative theorems are derived). The predicate NA0_compliant(p : Proposal) := ∀ (s : SystemState), reachable(apply(p, s)) → NA0_invariant(apply(p, s)) is a mandatory precondition of admissible(p). The Formal Verification Protocol verifies NA0_compliant for each proposal automatically prior to transmission to a vote. T14 is closed through the following chain: T14 establishes that code

without NA0 produces the destruction of subjecthood → the Coq axiom NA0_invariant establishes subjecthood as a formally codified constraint → the Formal Verification Protocol produces the technical impossibility of adopting a proposal with NA0_compliant = false. P2 instantiates NA0 as applied to infrastructural sovereignty: VIC⊥ as a function of current verified contribution produces the constitutionally correct correspondence of rights and obligations, which is the operational expression of the Kantian principle underlying NA0.

Row 9: ΣA17 (state capture through the predictive market) → P17 + P0 (preamble).

Volume I, axiom ΣA17 established the structural conflict of interest of the state as simultaneously the potential regulator of the digital environment and the potential purchaser of predictive citizen data. This axiom is among the most foundational in Volume I: it establishes that state capture through the predictive market is not a contingent threat but a structurally determined outcome in the absence of constitutional constraints. Volume III closes this axiom through two levels. P17 (SovereigntyShield) instantiates the technically self-executing prohibition of unratified state access: the State Audit Protocol blocks any request without active ratification technically, not administratively. P0 in the Preamble contains the invariant "the state is not a purchaser of predictions without an explicit constitutional mandate" as a component of P0_invariant, coded in Coq as N5_invariant := ∀ (state_actor : Actor), is_state_actor(state_actor) → accesses_predictive_data(state_actor, state) → has_ratified_mandate(state_actor, state). The theorem shield_preservation: ∀ p : Proposal, violates_shield(p) → ¬ admissible(p) produces the mathematical insurmountability of this prohibition. ΣA17 is closed through two independent levels of protection, the joint circumvention of which is mathematically impossible under a correct Coq specification.

Row 10: N5 (prohibition of the state as a purchaser of predictions) → P17 → SovereigntyShield — full institutional realization.

This row is the most linear in the matrix: normative principle N5 (Volume I) → constitutional principle P17 (Volume III) → the institution of SovereigntyShield (Article V, section 7) → the State Audit Protocol (Article VI, section 9; Appendix A.7). N5 establishes the normative prohibition in its unformalized form. P17 encodes this prohibition as an executable constitutional principle with four absolute prohibitions (bulk collection, transmission to third states without ratification, political targeting, access to cognitive health data), with a ratification procedure and monitoring parameters. SovereigntyShield instantiates P17 as an institution with operational independence from state actors and with the principle of exclusively FVP-based decisions (Article V, section 7.3). The State Audit Protocol produces the technical impossibility of unratified access through on-chain registration of each request prior to any actual interaction. Anomaly detection closes the proxy vector. The extraterritorial principle closes the territorial vector. The chain N5 → P17 → SovereigntyShield → State Audit Protocol is the most complete institutional realization of a single normative principle in the Virtublic architecture: each level adds operational specificity to the preceding level without leaving architectural lacunae.

G.3. Completeness Verification of the Matrix

The matrix is verifiably complete upon satisfaction of the following formal condition: $\forall$ T_i $\in$ {T1,...,T17} $\cup$ {N1,...,N7} $\cup$ {NA0} $\cup$ {A1,...,A17} : $\exists$ P_j $\in$ {P0,...,P18} : closes(P_j, T_i) $\wedge$ FVP_verified(P_j). This condition is verified by GovernanceEngine at each drift_check through comparison of the current state of the Coq specification against the reference matrix coded at system initialization. Violation of the condition — the appearance of an uncovered theorem as a consequence of an amendment to P10–P18 that has eliminated some protective mechanism — is identified as a constitutional defect and transmitted to P18 as a type 3 conflict.

The matrix establishes that Volume III is complete relative to the theoretical obligations of Volumes I–II: each identified theorem, each normative principle, and each axiom has found institutional, protocol, and formally verified realization in the constitutional architecture of Virtublic.