X$^\infty$ – Postmoral and Emotionless Mathematical Foundations of Ethical Governance as a Self-Reinforcing System (Working Paper, Version 3.0)

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X$^\infty$ is a radical responsibility system based on the universal law of nature *actio* $\Rightarrow$ *reactio*. Originating from observations of a living community with children and pets, it formalizes the immediate feedback loop between actions and their consequences. Traditional systems suffer from power imbalances that divert reactions, externalizing consequences onto the weak or the environment. X$^\infty$ restores this natural law by ensuring traceability of every effect to its source through weighted feedback, petitions, and a responsibility conservation principle. This working paper presents the mathematical foundations of X$^\infty$ 3.0, including the conservation law $\sum W(E) = \sum X_k =$ Constant, and serves for public discussion and validation.

Contents

Fundamental Principle and Origin of X$^\infty$

X$^\infty$ is based on a universal law of nature: every action produces a reaction (*actio* $\Rightarrow$ *reactio*). This principle, known from Newton's third law of physics, applies equally to social systems. Every action by an entity generates effects that entail consequences. In traditional systems, however, these reactions are diverted by power imbalances, so that consequences often affect the weak, the collective, or the environment rather than the originators. X$^\infty$ restores this natural order by ensuring that every effect is traced back to its source through weighted feedback, petitions, and the responsibility conservation principle.

The origin of this model lies in observing a living community with children and pets. In such a community, actions and their consequences are immediately tangible: a child knocking over a glass experiences the direct reaction (the glass breaks, creating work); a pet demanding attention triggers a chain of interactions. These dynamics revealed a fundamental principle: actions produce effects that cannot be ignored but must be borne. Power imbalances—such as adults' ability to externalize consequences—distort this principle. X$^\infty$ formalizes this insight into a system that ensures the traceability of reactions and neutralizes power imbalances, creating a natural, fair, and stable order.

This natural law permeates all mechanisms of X$^\infty$:

- **Feedback**: Weighted feedback loops ($w_{E'} = \frac{1}{\max(1, \text{Cap}_{\text{Potential}}(E'))}$) ensure that reactions from actions reach their originators.
- **Petitions**: Through the votes of weaker entities ($P_{\text{activation},j}$), needs are prioritized, correcting power imbalances.
- **Responsibility Conservation**: The total effect ($\sum W(E) = \sum X_k$) remains constant, and needs must be collectively borne.
- **UdU**: The "Lowest of the Low" guarantees that no effect remains unborne, securing traceability.

The principle of *actio* $\Rightarrow$ *reactio* is postmoral: it does not evaluate intent but measures effect. Thus, X$^\infty$ is not a moral system but a structure that restores the natural law of social interactions.

System Objectives

- **Fairness through Effect**: Responsibility is distributed not by intent but by actual consequences.
- **Protection of the Weakest**: Weak actors gain a stronger voice through feedback weighting.
- **Antispeciesism**: Humans, non-humans, and the environment are treated as equal entities.
- **Self-Reinforcement**: The system learns from feedback and adapts without external intervention.

System Architecture

X^∞ rests on four pillars:

- **Cap Logic**: Capabilities (Cap) measure an entity's opportunities based on its responsibility.
- **Feedback & Petitions**: Weaker entities have greater weight in feedback and petition voting to prevent power concentration. The two-tier logic prioritizes the exclusive role of weaker entities in evaluation and value definition, while stronger entities exercise competence in the "how" of task execution.
- **Protection Mechanisms**: $\text{Cap}_{\text{Protection}}$ shields vulnerable entities from overburdening.
- **Responsibility Conservation Principle**: The total effect in the system remains constant, secured by the UdU's role as the origin of all responsibility.

Flow of Responsibility

Responsibility flows through delegation and return. Entities can delegate tasks but remain as responsible for their fulfillment as if they performed them themselves. Returns are permitted but incur penalties to prevent abuse. A clear "separation of powers" shapes the system: stronger entities, based on their competence ($\text{Cap}_{\text{Potential}}$), determine the "how" of task execution, while relatively weaker entities handle evaluation and value definition through feedback and petition voting. This ensures that power and responsibility remain balanced, in line with *actio* $\Rightarrow$ *reactio*.

Adaptability

The system adapts through feedback. Positive feedback increases Cap, while negative feedback reduces it. This enables organic development without centralized control, with the exclusive role of weaker entities promoting system stability by channeling reactions back to their originators.

Systemic Origin Equation and Role of the UdU

The natural law *actio* $\Rightarrow$ *reactio* forms the foundation of X^∞ and is formalized by the central axiom:

$$\forall a \in \text{System} : \exists r \in \text{Effect}, \text{such that } r = f(a) \\ \Rightarrow \text{System Stability} \propto \text{Traceability}(r) \text{ to Source}(a) \quad (1)$$

This axiom states that every action a produces an effect r, and the system's stability depends on tracing this effect back to its source. Power imbalances that divert reactions are neutralized by X^∞'s mechanisms—weighted feedback, petitions, and the role of the UdU.

The total effect in the system, $\sum W(E)$, is interpreted as the sum of all recognized petition values ($\sum X_k$), representing systemic needs. This effect remains constant and must be collectively borne by the system's entities, analogous to a physical conservation law. The mechanisms of X^∞ can be described through a physical analogy:

- **Cap as Mass**: An entity's ability to bear responsibility (Cap_{Real}) corresponds to mass that can absorb momentum.
- **Effect as Momentum**: Petition values (X_k) represent the systemic "mandate," flowing through the system as momentum.
- **Traceability as Gravitation**: Feedback and responsibility assignment ensure effects are traced back to their sources, akin to a gravitational force.

The following equation forms the symbolic basis for the UdU's (Lowest of the Low) responsibility framework:

$$\text{Cap}_{\text{solo,UdU}} = \left(X \cdot S \cdot \left(\frac{S-1}{S}\right)\right)^{\infty} \tag{2}$$

Where:

- S: Number of all entities in the system.
- The exponent-∞: Symbolizes complete authority, bound to feedback and responsibility.

The UdU is the origin of all responsibility. Structurally positioned outside the system, it remains bound to the feedback principle and makes its effect transparent *ex post* regarding the *why* (the goal), not the *how* (the means). Its role as the legitimizing first node is formalized in Section 5.10. The axiom (1) and the natural law *actio* $\Rightarrow$ *reactio* underscore the UdU's role as the guarantor of traceability.

Role of the UdU

The UdU (Lowest of the Low) embodies the origin of all responsibility in X^∞. Its authority, $\text{Cap}_{\text{UdU}} = \infty^\infty$, expresses maximum responsibility readiness, regulated by feedback. The UdU legitimizes the system as the first node in the responsibility chain and ensures the conservation of total effect ($\sum W(E) = \sum X_k = \text{Constant}$), as described in Section 5.10. Through the natural law *actio* $\Rightarrow$ *reactio* and axiom (1), the UdU guarantees that all effects are traced back to their sources, preventing reaction diversion by power imbalances.

Fundamental Concepts

Mathematical Framework

Historical Capabilities (Cap_{Past})

$\text{Cap}_{\text{Past}}(E,t)$ is a running scalar value measuring an entity's historically accumulated and weighted performance:

$$\text{Cap}_{\text{Past}}(E,t)_{\text{new}} = \text{Cap}_{\text{Past}}(E,t-1)_{\text{old}} + \Delta\text{Cap}_{\text{Events}} \tag{3}$$

- $\triangle\text{Cap}_{\text{Events}}$: Sum of values from completed tasks (including feedback modification), compensations, bonuses, minus all penalties in the current period.
- Initial value: $\text{Cap}_{\text{Past}}(E, t = 0) = M^{\text{initial}}_{\text{Pot, last}}(E)$.

Components of $\triangle\text{Cap}_{\text{Events}}$:

1. **Final Task Values ($\text{Cap}_{\text{Solo, final}}$, $\text{Cap}_{\text{Team, final}}$):** A task is activated by a petition based on the vote of the set $U_{j,\text{fb}}$ (see Section 5.4). The executing entity E_{exec} is selected based on competence ($\text{Cap}_{\text{Potential}}(E_{\text{exec}})$). The contribution to task k is determined by feedback from $S_{\text{fb, weak},k}$:

$$\text{Contribution}_k = \sum_{E' \in S_{\text{fb, weak},k}} (f_{E'k} \cdot w_{E'}) \tag{4}$$

   - $f_{E'k} \in \{-1, 1\}$: Binary feedback from entity E' on task k, where -1 is negative and $+1$ is positive.
   - $w_{E'} = \frac{1}{\max(1, \text{Cap}^{\text{Domain } D_k}_{\text{Potential}}(E'))}$: Weight of entity E'.
   - $S_{\text{fb, weak},k}$: Set of entities with $\text{Cap}^{\text{Domain } D_k}_{\text{Potential}}(E') < \text{Cap}_{\text{ref},k}$, where $\text{Cap}_{\text{ref},k} = \max_{E' \in P_0}(\text{Cap}^{\text{Domain } D_k}_{\text{Potential}}(E'))$ is the highest potential value of the initial petitioners of the underlying petition.
   - B_k: Set of affected entities for task k.
   - *Rationale*: Entities with higher $\text{Cap}_{\text{Potential}}$ may have different or conflicting needs; thus, the threshold is set by the strongest initiating entity to include weaker perspectives.

2. **Penalty for Override:**

$$P_{\text{override}}(A) = -\beta_1 \cdot \exp\left(\lambda_1 \cdot \frac{S_A}{S_{\text{System}}}\right) \tag{5}$$

3. **Penalty for Return:**

$$\triangle\text{Cap}_{\text{Past, penalty, return}}(C) = -\mu \cdot \exp\left(\rho \cdot \frac{R_C}{R_{\text{System}}}\right) \tag{6}$$

4. **Compensation for Override:**

$$\triangle\text{Cap}_{\text{Past, comp, override}}(B) = +\chi \cdot \text{Value}(\text{Returned Task}) \tag{7}$$

5. **Delegation Parameters:**
   - Complexity (Penalty): $-\delta_1 \cdot k \cdot n_j$
   - Depth (Penalty): $-\delta_2 \cdot D_j$
   - Support (Bonus): $+w \cdot \frac{1}{\text{Cap}^{\text{Domain } D}_{\text{Potential}}(E_{\text{Recipient}})}$
   - Volatility (Penalty): $-\alpha \cdot \sum_y \frac{\text{Cap}^y_{\text{Change}}}{\text{Cap}_{\text{Change}_{\text{total}}}}$

Future Performance Capability ($\text{Cap}_{\text{Potential}}$)

$\text{Cap}_{\text{Potential}}^{\text{Domain } D}(E,t)$ defines the upper limit of responsibility an entity E can assume at time t in a domain D:

$$\text{Term}_{\text{BasePotential}} = M_{\text{Pot, last}}^{\text{Domain } D}(E,t) + \text{Cap}_{\text{Base}} + \text{Cap}_{\text{BGE}} \tag{8}$$

$$\text{Factor}_{\text{Reliability/Load}} = \frac{\text{Cap}_{\text{Past}}^{\text{Domain } D}(E,t) + \text{Cap}_{\text{BGE}}(E) + \text{Cap}_{\text{Base}}(E) - \text{Cap}_{\text{Protection}}^{\text{Domain } D}(E,t)}{\text{Cap}_{\text{Past}}^{\text{Domain } D}(E,t) + \text{Cap}_{\text{Base}}(E)} \tag{9}$$

$$\text{Cap}_{\text{Potential}}^{\text{Domain } D}(E,t) = \gamma \cdot \text{Term}_{\text{BasePotential}} \times \max(0.1, \text{Factor}_{\text{Reliability/Load}}) - \text{Cap}_{\text{Protection}}^{\text{Domain } D}(E,t) \tag{10}$$

- $M_{\text{Pot, last}}^{\text{Domain } D}(E,t)$: Scalar capability base value for domain D, updated based on the previous period.
- $\text{Cap}_{\text{Base}} = 1$: Constant base capability.
- Cap_{BGE}: Capability from unconditional basic income (parameterizable).
- γ: Flexibility factor (≈ 1.0 to 1.2).
- $\text{Factor}_{\text{Reliability/Load}}$: Modulates potential based on historical performance and protection needs.
- $\text{Cap}_{\text{Protection}}^{\text{Domain } D}(E,t)$: Protection need reducing the potential.

Active Responsibility (Cap_{Real})

$\text{Cap}_{\text{Real}}(E,t)$ represents an entity's current responsibility, including responsibility for support resources:

$$\text{Cap}_{\text{Real}}(E,t) = \sum_{k \in I_{\text{active, solo},E}} X_k + \sum_{k \in I_{\text{active, team},E}} X_k + \sum_{j \in I_{\text{delegated},E}} \left(w \cdot \frac{1}{\text{Cap}_{\text{Potential}}^{\text{Domain } D}(E_{\text{Recipient}})} \right) \tag{11}$$

- X_k: Responsibility value of task k, set by the underlying petition ($X_k = \sum_{E' \in U_{j,\text{fb}}} w_{E'}$).
- $U_{j,\text{fb}}$: Set of voting entities for the petition, as defined in Section 5.4.
- $I_{\text{active, solo},E}$: Set of active solo tasks of entity E.
- $I_{\text{active, team},E}$: Set of active team or delegated tasks of entity E.
- $I_{\text{delegated},E}$: Set of tasks delegated by entity E, for which support resources are provided.
- $w \cdot \frac{1}{\text{Cap}_{\text{Potential}}^{\text{Domain } D}(E_{\text{Recipient}})}$: Support bonus reflecting responsibility for training or support resources.

Petitions

Petitions enable entities to introduce tasks into the system. Voting entities are defined based on the group of initial petitioners to include weaker perspectives:

1. **Initial Petitioners**: A set of entities $P_0 = \{E_1, E_2, \ldots, E_n\}$ initiates petition Pet_j.
2. **Reference Cap**: The reference value is calculated as:

$$\text{Cap}_{\text{ref},j} = \max_{E' \in P_0} (\text{Cap}_{\text{Potential}}^{\text{Domain } D_j}(E')) \tag{12}$$

3. **Voting Entities**: The set of voting entities $U_{j,\text{fb}}$ includes all initial petitioners plus additional affected entities with lower potential:

$$U_{j,\text{fb}} = P_0 \cup \{E_{\text{passive}} \in B_{j,\text{pot}} \setminus P_0 \mid \text{Cap}_{\text{Potential}}^{\text{Domain } D_j}(E_{\text{passive}}) < \text{Cap}_{\text{ref},j}\} \tag{13}$$

   - $B_{j,\text{pot}}$: Set of potentially affected entities for petition j.
   - *Rationale*: Entities with higher $\text{Cap}_{\text{Potential}}$ may have different or conflicting needs; thus, the threshold is set by the strongest initiating entity to include weaker perspectives.

4. **Petition Activation**: The activation weight of the petition is calculated as:

$$P_{\text{activation},j} = \sum_{E' \in U_{j,\text{fb}}} (v_{E'} \cdot w_{E'}) \tag{14}$$

   - $v_{E'} \in \{-1, 1\}$: Binary vote of entity E' (pro or contra).
   - $w_{E'} = \frac{1}{\max(1, \text{Cap}_{\text{Potential}}^{\text{Domain } D_j}(E'))}$: Weight of entity E'.

5. **Responsibility Value**: The responsibility value of the petition (and associated task) is:

$$X_j = \sum_{E' \in U_{j,\text{fb}}} w_{E'} \tag{15}$$

A petition is activated if:

$$\sum_{E' \in U_{j,\text{fb, yes}}} (v_{E'} \cdot w_{E'}) > \sum_{E' \in U_{j,\text{fb, no}}} (v_{E'} \cdot w_{E'}) \tag{16}$$

Alternative formulation:

$$P = N \times \overline{w_E} \tag{17}$$

- N: Number of supporters of the petition.
- $\overline{w_E} = \frac{1}{\max(1, \text{Cap}_{\text{Potential}}^{\text{Domain } D_j}(E))}$: Average weight of petitioners.

Feedback through Feedback ($\text{Cap}_{\text{Feedback}}$)

Calculation of Feedback Effect:

$$\Delta\text{Cap}_{\text{Feedback}}(E) = \sum_{k \in K_E} \text{Contribution}_k \tag{18}$$

- K_E: Set of all tasks in which E was involved.
- Contribution_k: As defined in Equation 4, with $f_{E'k} \in \{-1, 1\}$.
- $w_{E'}$: Weight of entity E', defined as:

$$w_{E'} = \frac{1}{\max(1, \text{Cap}_{\text{Potential}}^{\text{Domain } D_k}(E'))} \tag{19}$$

Adjustment of Suitability ($\text{M}_{\text{Pot, last}}$)

The suitability of an entity E for tasks in a domain D in the next period ($M_{\text{Pot, last}}^{\text{Domain } D,t+1}$) is updated based on completed tasks in period t:

$$\text{M}_{\text{Pot, last}}^{\text{Domain } D,t+1} = \sum_{i \in I_{\text{curr},t}} (\text{Cap}_{\text{Solo, final},i}^{\text{after Feedback}} - \text{M}_{\text{Pot, last}}^{\text{Domain } D,t}) + \sum_{j \in I_{\text{curr},t}} (\text{Cap}_{\text{Team, final},j}^{\text{after Feedback}} - \text{M}_{\text{Pot, last}}^{\text{Domain } D,t}) + \text{M}_{\text{Pot, last}}^{\text{Domain } D,t} \tag{20}$$

- $I_{\text{curr},t}$: Index set of tasks completed in period t.
- $\text{Cap}_{\text{Solo/Team, final}}^{\text{after Feedback}}$: Final result values after feedback, where feedback is binary ($f_{E'k} \in \{-1, 1\}$).

Feedback Penalties and Override

Penalties:

- **Delegation Failure:**

$$\Delta\text{Cap}_{\text{Past, penalty, delegate}}(E) = \nu \cdot \exp\left(\theta \cdot \frac{R_{E,\text{delegate}}}{R_S}\right) \tag{21}$$

- **Excessive Complexity:**

$$\Delta\text{Cap}_{\text{Past, penalty, k}}(E) = \omega \cdot \exp\left(\chi \cdot \frac{k_{\text{current}}}{k_{\text{Median}}}\right) \tag{22}$$

- **Excessive Delegation Depth:**

$$\Delta\text{Cap}_{\text{Past, penalty, D}}(E) = \delta \cdot \exp\left(\rho \cdot \frac{D_{\text{current}}}{D_{\text{hist}}}\right) \tag{23}$$

Protection Mechanisms ($\text{Cap}_{\text{Protection}}$)

$\text{Cap}_{\text{Protection}}$ protects vulnerable entities from overburdening:

$$\text{Cap}_{\text{Protection}}(E,t) = k_1 \cdot g_{\text{age}}(t) + k_2 \cdot g_{\text{health}}(t) + k_3 \cdot g_{\text{care}}(t) + k_4 \cdot g_{\text{social}}(t) \tag{24}$$

- k_n: Weighting factors for protection reasons.
- $g_{\dots}(t)$: Time-dependent functions (e.g., Gaussian curve for age: $g_{\text{age}}(t) = A \cdot \exp(-\frac{(t-40)^2}{2\sigma^2})$).

System Limits

- **Potential Limit:**
$$\text{Cap}_{\text{Real}}^{\text{Domain } D}(E,t) \le \text{Cap}_{\text{Potential}}^{\text{Domain } D}(E,t) \tag{25}$$
- **Global Potential Limit:**
$$\sum_D \text{Cap}_{\text{Real}}^{\text{Domain } D}(E,t) \le \max_D(\text{Cap}_{\text{Potential}}^{\text{Domain } D}(E,t)) \tag{26}$$
- **Delegation Validity:**
$$\text{Cap}_{\text{Sender}} \ge \text{min}_{\text{Delegation}} \quad \wedge \quad (\text{Cap}_{\text{Real, Recipient}}^{\text{Domain } D} + X_k) \le \text{Cap}_{\text{Potential, Recipient}}^{\text{Domain } D}$$
- **Delegation Limits:**
$$\text{Delegations}_{\text{parallel}} \le k_{\text{Max}}, \quad \sum_{j \in I_{\text{active,team}}} X_j \le \text{Cap}_{\text{Team,max}}, \quad \text{Delegation Chains} \le D_{\text{Max}}$$

The Responsibility Conservation Principle and Role of the UdU

The responsibility conservation principle is a direct consequence of the natural law *actio* $\Rightarrow$ *reactio* and ensures that the total effect in the system remains constant:

$$\sum W(E) = \sum X_k = \text{Constant}, \quad \text{secured by} \quad \text{Cap}_{\text{UdU}} = \infty^{\infty} \tag{27}$$

- $W(E)$: Total responsibility value of an entity E, defined as the sum of petition values (X_k) of tasks borne by E.
- $\sum X_k$: Sum of all recognized petition values, representing systemic needs.
- Cap_{UdU}: Unlimited responsibility authority of the UdU, ensuring no need is lost.

System stability arises from the traceability of effects:

$$\text{System Stability} \propto \frac{\sum \text{Cap}_{\text{Real}}(E)}{\sum \text{Effect}_{\text{non-traceable}}} \tag{28}$$

Ethics without Intentionality in the X$^\infty$ System

The X$^\infty$ system is postmoral and ignores intentionality to ensure structural justice. This principle reflects the objectivity of physical laws, particularly the natural law *actio* $\Rightarrow$ *reactio*.

Intentionality *Must* Be Ignored – As in Physics

- **Physics**: A falling apple follows the law $F = m \cdot a$, regardless of a "why." The effect—the force—is determined solely by mass (m) and acceleration (a), not by motives or intentions.
- **X$^\infty$ System**: Actions are governed by the Cap logic, based on measurable effects:

$$\Delta\text{Cap} = \sum_{E' \in S_{\text{fb, weak},k}} w_{E'} \cdot f_{E'k} \tag{29}$$

  A selfish donation and an altruistic donation have the same systemic effect if their effect ($f_{E'k} \in \{-1, 1\}$) is equal.

Conclusion

Intentionality is irrelevant in the X$^\infty$ system, just as in physics. Focusing on effects rather than intentions prevents distortions from subjective evaluations and ensures traceability of actions to their originators.

Antispeciesism

X$^\infty$ treats all entities—humans, non-humans, environment—equally. Antispeciesism is embedded in the Cap logic:

- **Equal Basis**: Every entity receives Cap_{Base} and Cap_{BGE}.
- **Fairness through Effect**: $\text{Cap}_{\text{Potential}}$ is based on responsibility, not species.
- **Feedback for All**: Every entity can provide feedback ($f_{E'k} \in \{-1, 1\}$) and petition votes ($v_{E'} \in \{-1, 1\}$), provided they are affected and relatively weaker.

Antispeciesism does not mean equalization but equivalence in effect. A tree, an AI, or a human—each entity bears responsibility according to its capability and is protected by the system.

Conclusion

X$^\infty$ is the consistent application of the natural law *actio* $\Rightarrow$ *reactio* to social systems. Originating from observations of a living community with children and pets, it formalizes the immediate feedback loop between actions and their consequences. Traditional systems suffer from power imbalances that divert reactions, externalizing consequences onto the weak or the environment. X$^\infty$ restores this natural law by ensuring traceability of every effect to its source through weighted feedback, petitions, and the responsibility conservation principle.

The central axiom,

$$\forall a \in \text{System} : \exists r \in \text{Effect}, \text{such that } r = f(a) \Rightarrow \text{System Stability} \propto \text{Traceability}(r) \text{ to Source}(a), \tag{30}$$

and the conservation law,

$$\sum W(E) = \sum X_k = \text{Constant}, \tag{31}$$

form the basis for a postmoral "No Excuse" system. Recognized needs remain in the system until fulfilled, creating pressure to assume responsibility. The physical analogy—"Cap is mass, effect is momentum, traceability is gravitation, and stability is what remains when no one can cheat anymore"—underscores the radicality of this approach. Through the exclusive role of weaker entities, the competence of stronger ones, and the UdU, X^∞ creates a self-reinforcing, antispeciesist system that remains stable through feedback.

Note: This document is a working paper for X^∞ 3.0, integrating content from Version 2.11. It represents the first complete version of the mathematical foundations and serves for public discussion, feedback, and validation. Further detailed chapters will follow. Changes and additions are explicitly reserved.

License

Symbol	Meaning
E	Entity (individual, organization, environment, AI)
A	Task
D	Domain (specific field of activity)
$\text{Cap}_{\text{Solo}}(E)$	Temporary capabilities for self-performed tasks
$\text{Cap}_{\text{Team}}(E)$	Temporary capabilities through delegated tasks
$\text{Cap}_{\text{Real}}(E)$	Current total responsibility ($\sum X_k$ of all active tasks plus support bonuses)
$\text{Cap}_{\text{Past}}(E)$	Historical capabilities
$\text{Cap}_{\text{Protection}}(E,t)$	Protection parameter
$\text{Cap}_{\text{Base}}(E)$	Inviolable minimum capabilities
$\text{Cap}_{\text{BGE}}(E)$	Basic income
$\text{Cap}_{\text{Potential}}(E)$	Future performance capability
$\text{M}_{\text{Pot, last}}^{\text{Domain } D,t}(E)$	Suitability of entity E for tasks in domain D in period t, based on historical performance and self-assessment
D_{hist}	Historical delegation depth (median of delegation chains)
D_{current}	Current delegation depth of a task
B	Delegation breadth
k	Complexity factor
k_{Median}	Median of complexity factors in the system
S_E, S_S	Overrides by E, total overrides in the system
$R_E, R_{E,\text{delegate}}, R_S$	Returns (own, by delegates, total)
w	Weighting factor for support bonus
$w_{E'}$	Feedback weight
$\overline{w_E}$	Average weight of petitioners
P	Petition priority
$P_{\text{activation},j}$	Petition activation weight for petition j
N	Number of supporters of a petition
$S_{\text{total},k}$	Total number of relevant entities for task k
$S_{\text{fb, weak},k}$	Set of weak entities providing feedback on task k
$U_{j,\text{fb}}$	Set of affected entities voting on petition j
P_0	Set of initial petitioners for petition j
$B_{j,\text{pot}}$	Set of potentially affected entities for petition j
B_k	Set of affected entities for task k
Cap_{ref}	Reference value for weak entities, $\max_{E' \in P_0}(\text{Cap}_{\text{Potential}}^{\text{Domain } D}(E'))$
$v_{E'}$	Binary vote of entity E' on a petition, $v_{E'} \in \{-1, 1\}$
$f_{E'k}$	Binary feedback of entity E' on task k, $f_{E'k} \in \{-1, 1\}$
X_k	Responsibility value of task k, $X_k = \sum_{E' \in U_{j,\text{fb}}} w_{E'}$
Contribution_k	Effective contribution to task k for $\Delta\text{Cap}_{\text{Events}}$
$\alpha, \beta, \gamma, \lambda, \mu, \nu, \phi, \psi, \rho, \theta, \omega, \chi, \delta, k_n, w$	Model parameters (penalties, feedback, protection, weighting, support)

Table 1: Notation of Parameters