# Privacy Value Model V5.4

Dual-Agent Privacy Architecture — The Amnesia Protocol

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**Abstract**

Multiplicative equation for privacy as quantifiable economic value. Three-axis separation (agent, data, inference), holographic bound (96/64), path integral edge value, reconstruction ceiling R < 1 (proven), algebraic foundation Z/(2^6)Z with dihedral group D64, operational cycle, amnesia-enforced separation (C17). Conjectures C1–C21 tracked. Five grimoires closed. Second Person Spellbook next.

Master Inscription: (S perp Gap perp M) FP = neg oplus bnot to succ

## Contents



## 1 The Equation

Static form:

$$\begin{aligned} V(\pi,t) = P^{1.5} \cdot C \cdot Q \cdot S \cdot e^{-\lambda t} \cdot (1 + A_h(\tau)) \\ \cdot \left(1 + \sum_i w_i \frac{n_i}{N_0}\right)^k \cdot G(\text{guilds}) \\ \cdot R(d, \text{compression}, \rho) \cdot M(u,y) \\ \cdot \Phi_{\text{agent}}(\Sigma) \cdot \Phi_{\text{data}}(\Delta) \cdot \Phi_{\text{inference}}(\Gamma) \\ \cdot T_{\int}(\pi) \end{aligned}$$

Differential form: $\frac{dV}{dt} = \nabla_{\partial M} \cdot J_{\partial M} + S(x) - D(x)$

Gating: Multiplicative. Any term $= 0 \implies V = 0$.

Lattice: $\pi$ is a path through $\mathcal{L} = \mathbb{Z}/64\mathbb{Z}$, $t$ is time since data generation.

## 2 Inherited Terms (V1–V4)

| Symbol | Name | Domain | Description |
|---|---|---|---|
| $P$ | Privacy Strength | $[0,1]$ | Cryptographic enforcement. Exponent 1.5 via C6. |
| $C$ | Credential Verifiability | $[0,1]$ | Verify without revealing. |
| $Q$ | Data Quality | $[0,1]$ | Accuracy, completeness, fitness. |
| $S$ | Scope / Sensitivity | $\mathbb{R}^+$ | Domain-specific multiplier. |
| $e^{-\lambda t}$ | Temporal Decay | $(0,1]$ | Freshness. $\lambda > 0$. |
| $M(u,y)$ | Market Maturity | $[0,1]$ | User sophistication, market year. |

## 3 Holonic Temporal Memory

$$A_h(\tau) = \sum_j p(\tau_j) \cdot w(\tau_j) \cdot e^{-\mu \cdot \text{age}(\tau_j)}$$

GUID-addressed holons. Infrastructure-independent. $p(\tau_j) = 0 \implies A_h = 0$.

## 4 Three-Axis Separation

$$\Phi_{v5} = \Phi_{\text{agent}}(\Sigma) \cdot \Phi_{\text{data}}(\Delta) \cdot \Phi_{\text{inference}}(\Gamma)$$

| Axis | Formula | Meaning |
|---|---|---|
| Agent | $\Phi_a = \min(1, \frac{S/M}{\varphi}) \cdot \det(\Sigma)$ | Swordsman $\perp$ Mage. $\cong D_{2n}$ (C14, 75%) |
| Data | $\Phi_d = 1 - \max_j(\text{share}_j)$ | No single provider holds majority |
| Inference | $\Phi_i = 1 - I(\text{model}; \text{executor})$ | Generator $\perp$ Solver |

Collapse any axis $\implies$ total collapse.

## 5 Reconstruction Difficulty

$$R(d,c,\rho) = R_{\text{base}}(d) \cdot \left(1 - \frac{1}{c}\right) \cdot (1 + \alpha \cdot \rho)$$

**Ceiling (proven):** $R < 1$ under budget constraints. **Error floor (proven):** $P_e \geq 1 - R_{\max}$ via Fano.

$\rho = f(\text{traversal depth, duration, intentional transitions})$. Dual: privacy amplifier + agent maturity.

# 6 Guild Efficiency

$$G(\text{guilds}) = \prod_g (1 + \text{efficiency}_g \cdot \text{active}_g/\text{total}_g)$$

Shared-parent coordination: O(1) not O($N^2$).

# 7 Path Integral

$$T_\int(\pi) = 1 + \beta \int_\pi F(\gamma)\, d\gamma \;\cong\; 1 + \beta \sum_{i=1}^{n} R(\text{step}_i)$$

$F(\gamma) = \text{resolution\_depth} \cdot \text{fidelity}$. One lap = one cycle. Dragon ($ $62 laps) = closure.

# 8 Holographic Bound

$$\partial M : 96 \text{ edges encoding } 64 \text{ vertices, toroidal topology} \qquad \frac{96}{64} = 1.5 = P^{1.5}$$

C4 RESOLVED. Boundary encodes bulk. $dV/dt$ computes on $\partial M$, not the 64-vertex interior.

$J_{\partial M} = J_{\text{agent}} + J_{\text{data}} + J_{\text{inference}} + J_{\text{compression}} + J_{\text{holonic}}$

# 9 Separation Bound

$$I(S; M \mid FP) < \varepsilon^* \qquad \text{(load-bearing wall)}$$

**Theorem (95%):** Conditional independence $\implies$ additive MI bound $\implies R_{\max} < 1$.

Amnesia: $\varepsilon_{\text{amnesia}} < \varepsilon_{\text{policy}}$ (C17, 60%). Topology > policy.

# 10 Algebraic Foundation

$$\mathcal{L} = (\mathbb{Z}/64\mathbb{Z},\ +,\ \times) \qquad D_{64} = \langle \text{neg}, \text{bnot} \mid \text{neg}^2 = \text{bnot}^2 = 1,\ (\text{neg} \circ \text{bnot})^{64} = 1 \rangle$$

| Op | Formula | Agent | Function |
|---|---|---|---|
| neg | $(64 - x) \bmod 64$ | Swordsman | Boundary. Additive inverse. |
| bnot | $63 - x$ | Mage | Projection. Bitwise complement. |
| neg $\circ$ bnot | $x + 1 = \text{succ}(x)$ | First Person | The step forward. ■ |

PRISM coordinates: $\text{blade}(x) = (\delta, \sigma, s)$ — datum, stratum (Hamming weight), spectrum.

Pascal: $\{1, 6, 15, 20, 15, 6, 1\}$. Tiers: Null(0) / Light(1–2) / Heavy(3–4) / Dragon(5–6).

Six dimensions: Protection, Delegation, Memory, Connection, Computation, Value.

Hexagram: $[d_1 \ldots d_6] \to 64$ I Ching states. Blade 63 = 111111 = Qian (The Creative).

# 11 Operational Cycle

$$\text{cycle}(x) = \text{succ}(x) = \text{neg}(\text{bnot}(x))$$

| Stage | Operation | Agent | Ceremony |
|---|---|---|---|
| Observe | $\text{id}(x)$ | First Person | Sun — disclosure |
| Boundary | $\text{neg}(x)$ | Swordsman | Gap — silence |
| Project | $\text{bnot}(\text{neg}(x))$ | Mage | Moon — reflection |
| Return | $\text{succ}(x)$ | Composition | Recursion |

$T_\int(\pi) = 1 + \beta \sum_i \text{cycle}(\text{step}_i)$. Progressive trust: Understanding → Constellation → Blade → Runecraft.

# 12 Amnesia Protocol

**Definition:** Structural amnesia w.r.t. origin $O$ if no operation sequence can reconstruct $O$.

ZK: completeness (output demonstrates), soundness (unique configuration), zero-knowledge (origin hidden).

Implementation: process boundary. Cosmological: Moon's orbit. Runecraft: Ed25519 key burned on close.

# 13 Forge Cryptography

| Property | Method |
|---|---|
| Content addressing | SHA-256 |
| Tamper evidence | Hash chain |
| Pre-evocation lock | Commitment scheme |
| Identity binding | Ed25519 (Mage, held) |
| Bilateral binding | Dual Ed25519 (Mage held + Swordsman burned) |

Moon phase: stratum $\rightarrow$ visibility ratio. 0 = New Moon, 6 = Full Moon.

# 14 Conjectures

| ID | Claim | Confidence |
|---|---|---|
| C4 | 96/64 discrepancy | **RESOLVED** |
| C6 | $P^{1.5} \leftrightarrow$ 96/64 structural | **CONVERGENT** 35% |
| C7 | Three-axis multiplicative | 30% |
| C11 | $\rho$ amplifies + indicates maturity | 55% |
| C12 | Hexagram encoding | 60% |
| C13 | Bilateral witness quantum-resistant | 65% |
| C14 | $\Phi_a \cong D_{2n}$ | 75% |
| C15 | $T_{\int} \cong$ resolution pipeline | 65% |
| C16 | Betti number trust invariants | 25% |
| C17 | Amnesia > policy separation | 60% |
| C18 | Strange attractor dynamics ($\lambda > 0$) | 25% |
| C19 | $\rho$ = Lyapunov divergence | 20% |
| C20 | Three axes couple as Lorenz variables | 30% |
| C21 | Fractal sovereignty dimension | 10% |

# 15 Proven Results (95%)

1. Additive MI bounds from conditional independence
2. Reconstruction ceiling $R < 1$ under budget constraints
3. Error floor via Fano's inequality
4. Graceful degradation under partial compromise
5. Ring algebra $\mathbb{Z}/(2^6)\mathbb{Z}$ substrate
6. Two-extension autonomy axiom (separate processes)
7. Pretext DOM-free measurement as privacy primitive

# 16 Version Lineage

| Version | Date | Core Addition |
|---|---|---|
| V1 | 2024 | $P \cdot C \cdot Q \cdot S$ |
| V2 | Oct 2025 | $+e^{-\lambda t}$, network effects |
| V3 | Nov 2025 | $+R(d), M, \Phi$ |

| Version | Date | Core Addition |
|---|---|---|
| V4 | Feb 2026 | $+\Sigma, A(\tau), T(\pi)$ |
| V5 | Feb 2026 | + three-axis $\Phi$, holographic bound, $T_\int$ |
| V5.1 | Mar 29 | $+\rho$, bilateral witness (C11–C13) |
| V5.2 | Mar 31 | $+D_{2n}$, PRISM (C14–C16) |
| V5.3 | Apr 4 | + operational cycle, amnesia (C17) |
| **V5.4** | **Apr 10** | **Consolidated. C18–C21. Full references.** |

# 17 References

Shannon (1948). Fano (1961). Cover & Thomas (2006). Bergstra & Burgess (2019). Susskind (1995). McGilchrist (2009). Groth (2016). PLONK (2019). Nova (2022). Dwork & Roth (2014). Branco et al. (2025). Babbush et al. (2026). Cain et al. (2026). IEEE 7012-2025. UOR Foundation (2026). Hope & Ludlow (2023). Weyl & Tang (2023).

The First Person Spellbook (31 acts, v10.0.0, CLOSED). Blog: sync.soulbis.com (Parts 0–5).

Five grimoires: First Person, Zero Knowledge, Canon, Parallel Society, Plurality. Next: Second Person Spellbook.

Full spec: `privacy_value_v5_4_formal_specification.md` (v2.0). Companion: `pvm_v5_4_companion_guide.md`.

Docs: github.com/mitchuski/agentprivacy-docs. Forge: spellweb.ai. Training: agentprivacy.ai. Trust: bgin.ai.

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*The boundary is always enough. Peer review invited: mage@agentprivacy.ai*