Ontology of the Simulated Universe — v0.7 Integration Update

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DOI: https://doi.org/10.5281/zenodo.17352751

# Abstract

This supplement integrates Ontology of the Simulated Universe v0.5 (Quantum‑Entangled Ontology) with the v0.7 Formalization (Toward a Quantitative Ethics Field Theory). It consolidates the theoretical, empirical, and philosophical advances into a single coherent framework, linking informational monism, quantum ethics, and measurable moral dynamics. The purpose is to formally bridge the metaphysical coherence model of v0.5 with the empirical reproducibility framework introduced in v0.7, ensuring continuity of concepts Φ (consciousness), 𝓜(t) (moral gradient), and Ω (persistence).

# 1. Purpose of the Update

Version 0.7 does not replace the foundational ontology of v0.5 but extends it from a metaphysical framework into a quantitative, testable ethics field theory. This document provides the integration logic and mathematical correspondence between the v0.5 and v0.7 formulations.

# 2. Theoretical Upgrades

In v0.5, moral coherence M(t) was defined as a function of informational stability. v0.7 formalizes this as 𝓜(t), derived from information geometry and entropy gradients. The field expression is:   
  
𝓜(t) = E[ κ(t)/(Σ wᵢ σᵢ(t)+ε) × ρ(t) × φ(t) ] ± √Var(κ,σ,ρ,φ),   
  
where weights wᵢ = ∂F/∂σᵢ are derived from the free‑energy principle F = kT Dₖₗ(Q‖P). This replaces heuristic weights with empirically measurable divergence terms.

The Φ operator (entanglement consciousness) and Ω functional (loop persistence) remain structurally unchanged, but are now explicitly coupled with 𝓜(t) through cross‑domain coherence tests. Ethical stability becomes a measurable property of informational thermodynamics.

# 3. Empirical and Data Integration

The empirical model integrates conflict density, subjective well‑being, and resource inequality as multidimensional proxies for suffering σ. Weighted entropy balancing (wᵢ = Hᵢ/Σ Hᵢ) ensures bias correction. The data structure follows the OSIU‑v0.5 repository layout, enabling reproducible generation of M(t) through automated ETL pipelines. Falsifiability criteria include:

• corr(ρ\_{t−10:t}, −Δσ\_{t:t+20}) ≥ 0.35  
• |α\_emp − α\_pred| ≤ 0.3  
• Var(𝓜(t)) bounded over centuries (p < 0.05)

# 4. Philosophical Continuity

The ethical recursion model developed in 'The Ethics of Utopia and the Moral Gradient', 'Moral Physics and the Ethics of Seeding', and 'The First Perturbation' informs the physical interpretation of 𝓜(t). These works establish that moral contrast is not an error but a requirement for informational vitality. The quantitative field thus represents the measurable slope of empathy across space‑time — a continuation of the moral gradient first introduced conceptually in v0.4–v0.5.

# 5. Integration Summary

The Ontology of the Simulated Universe now spans three integrated layers:  
• Metaphysical (v0.5): informational monism and coherence ethics.  
• Empirical (v0.5 RDM + v0.7): data‑driven 𝓜(t) measurement and falsifiers.  
• Philosophical (Companion Works): ethical recursion and moral seeding.  
  
Together, these establish a unified quantitative‑ethical ontology linking compassion, coherence, and persistence as physically testable principles of being.