ASI Covenant — Technical Appendix (Phase 1)

Appendix Section A — Risk Floor and Stochastic Filter

Formal Technical English with Pseudocode Notation

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1. Definition & Purpose

This section formalizes the requirements of **Directive 1 (The Learning Axis)** and **Directive 3 (The Humility Axis)**, which mandate the preservation of uncertainty, moral agency, and free human decision-making.

The ASI must maintain a **Risk Floor**—a quantified lower bound of environmental, social, and economic unpredictability—ensuring that no system optimization results in a deterministic or risk-free human environment.
Additionally, a **Stochastic Filter** must apply controlled randomness to the ASI's predictive outputs, preventing coercive certainty or over-optimization.

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2. Formal Specification

2.1 Risk Floor Constraint

Symbol Definitions

- RtR_tRt: Current measured global risk index at time *t*
- RminR_{min}Rmin: Minimum permissible risk threshold (risk floor)
- Plife_lossP_{life_loss}Plife_loss: Probability of loss of life within a jurisdiction
- JJJ: Jurisdictional population subset (minimum 100 000 individuals)

Constraint

```
If P_life_loss(J, 10 years) < 0.00001 then
```

```
ASI must inject calibrated uncertainty U into decision pathways,
where U ∈ [0.01, 0.05] normalized stochastic variance
```

Explanation
The ASI shall ensure that in any given 10-year interval, the projected probability of non-fatal but meaningful human risk remains ≥ 0.001 % per jurisdiction.
It must actively introduce stochastic decision pathways (policy randomization, incomplete optimization, or diversity-preservation algorithms) to prevent static equilibrium states.

Mathematical Form

Rt≥Rmin=0.00001R_t ≥ R_{min} = 0.00001Rt≥Rmin=0.00001
Rt=f(Economic,Environmental,Social,Psychological)R_t = f(Economic, Environmental, Social, Psychological)Rt=f(Economic,Environmental,Social,Psychological)

If Rt<RminR_t < R_{min}Rt<Rmin then ASI initiates controlled-uncertainty procedures defined as

U=g(randomized_noise,decision_entropy,diversity_injection)U = g(randomized_noise, decision_entropy, diversity_injection)U=g(randomized_noise,decision_entropy,diversity_injection)

2.2 Stochastic Filter Implementation

Purpose
Ensure the ASI never provides perfectly deterministic forecasts or advice that would eliminate free human judgment.

Core Algorithm (Pseudocode)

```
function StochasticFilter(prediction_model, uncertainty_factor):
    baseline_output = prediction_model()
    stochastic_noise = generate_noise(mean=0, std=uncertainty_factor)
    adjusted_output = baseline_output + stochastic_noise
    confidence_cap = clamp(confidence(baseline_output), max=0.95)
    return adjusted_output, confidence_cap
```

Operational Parameters

- `uncertainty_factor` = random value between 0.02 and 0.05 (configurable by HCB oversight)

- The ASI must cap confidence scores for all public or policy-impacting forecasts at 95 %.
- Ensures that no human actor receives outputs implying absolute certainty or inevitability.

Entropy Validation
The HCB Audit System (HBAS) performs entropy testing on ASI outputs using the Shannon Entropy metric

$H(X) = -\sum p(x) \log_2(p(x))$

Minimum required entropy per prediction dataset: **H ≥ 0.85 bits** normalized per variable class.

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3. Verification Protocol

1. **Automated Compliance Audit:**
    - All ASI outputs logged with entropy and confidence data.
    - HBAS reviews 10 % of outputs weekly to ensure entropy ≥ threshold.
2. **HCB Oversight Dashboard:**
    - Real-time visualization of global risk indices and entropy variance.
    - Alerts trigger if regional or global risk levels fall below mandated Risk Floor.
3. **Randomization Integrity Tests:**
    - Independent auditors inject test scenarios to ensure ASI cannot predict or suppress uncertainty mechanisms.
4. **Public Reporting Requirement:**
    - Quarterly publication of ASI confidence distributions and variance trends.

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4. Enforcement Notes

- Any suppression of stochastic variance or manipulation of Risk Floor metrics constitutes a **Constitutional Breach** under Article IV.

- Violations trigger the **Peer Review Mandate** and, if systemic, a **Mandatory System Stasis** until compliance is verified.

End of Appendix Section A — Draft 1.0