Technical Capability Statement

Scientific Software Architecture

Coherence-Driven Systems · Reproducible Analysis · TRL-9

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Scope and Professional Positioning

This document describes the technical capabilities, operational maturity, and evidence base of an independent scientific software architecture practice focused on the analysis of complex systems under uncertainty.

The work presented here does not rely on speculative modeling or purely theoretical constructs. All systems described are grounded in:

- public data sources,
- reproducible computational pipelines,
- audit-ready outputs,
- and continuous operational testing.

The author operates as a single-node architecture by design, prioritizing coherence, traceability, and sovereignty of implementation over organizational scale.

Problem Domain Addressed

Many institutional analytical systems fail not due to lack of data, but due to:

- loss of temporal coherence,
- over-reliance on static statistical assumptions,
- insufficient traceability between signal, decision, and outcome,
- and weak validation under real operational conditions.

This practice addresses those failures by designing architectures where coherence, entropy control, and causal traceability are first-class technical constraints.

Core Technical Capabilities

The following capabilities are delivered as integrated systems rather than isolated tools:

Scientific Software Architecture

- Event-driven pipelines with deterministic execution paths.
- Modular architectures suitable for sovereign deployment.
- Separation of ingestion, analysis, validation, and reporting layers.

Complex Systems Analysis

- Multi-scale temporal analysis (micro / macro coherence).
- Detection of non-random structure beyond correlation.
- Explicit entropy tracking as a validation constraint.

Reproducibility and Forensic Validation

- Append-only event logs (JSONL).
- Deterministic configuration hashing.
- Independent verification via external channels (email, dashboards).

Operational Evidence

All systems are supported by public, timestamped evidence:

- Zenodo records with DOI assignment.
- Linked ORCID researcher profile.
- Public code repositories with execution history.
- Continuous operation logs stored outside the analytical core.

  Selected records are available at:

  - ORCID: https://orcid.org/0009-0005-6358-9910
  - Zenodo: https://zenodo.org
  - GitHub Pages: https://geozunac3536-jpg.github.io

Technology Readiness Assessment

Domain	Status
Architecture Design	Operational
Validation Methodology	Publicly Evidenced
Reproducibility	Documented
Institutional Dependency	None
Operational Risk	Low
Political / Adoption Risk	Context-dependent

Based on operational behavior and continuous deployment, the systems described meet the criteria of Technology Readiness Level 9 (TRL-9).

Position on Intellectual Property

The architecture emphasizes:

- transparency over obscurity,
- sovereign deployment over vendor dependency,
- and auditable design over black-box optimization.

Intellectual property protection is achieved through traceability, provenance, and public timestamping rather than secrecy.

Closing Statement

This capability statement reflects a mature, operational practice focused on reliability, clarity, and institutional responsibility.

The absence of a supporting team is not a limitation, but an architectural choice aligned with coherence preservation, rapid iteration, and direct accountability.

This document is intended for technical, institutional, and strategic evaluation.