

Systemics Σ — Minimal Specification

Charter

Charter (*normative*)

This document gives a domain-agnostic, minimal formal specification of Systemics *Sigma*. It treats any practice as a kernel-shaped contract that produces decisions from posted evidence under benign variation, with replayable records. No specific domain assumptions (physics, ML, audits, etc.) are required.

Alphabet (Objects & Maps)

Alphabet (*normative*)

- U : Universe of artifacts.
- \mathbb{V} : Valuation space (any measurable space; commonly $\mathbb{R}^k \times \mathbb{B}^m$).
- $\mathbf{2}$: Decision space $\mathbf{2} = \{0,1\}$.
- Π : Frames (benign contexts).
- P_n : Probes (benign perturbations).
- Θ : Floors/thresholds (partially ordered set).
- β : Invariance budgets (tolerances in a poset/lattice).
- C : Capacity budgets (bits/time/energy constraints).
- Γ : Envelope/meta (versions, seeds, numeric modes, commits).
- \mathcal{R} : Records (canonical map to bytes; hash/ledger optional).

Definition: Systemic Kernel

Systemic Kernel (*normative*)

A systemic kernel is the tuple
$$K_{\mu^{\Sigma}} = \big(v, \chi, \Pi, P_n, \Theta, \beta, C, \Gamma\big),$$
 where $v: U \rightarrow \mathbb{V}$ is a valuation map and $\chi: \mathbb{V} \times \Theta \times \beta \rightarrow \mathbf{2}$ is a decision gate.

Metrics & Order

Wobble and orderings (*normative*)

- A divergence ("wobble") $\$w: \mathbb{V} \times \mathbb{V} \rightarrow \mathbb{R}_0$ on decision-relevant coordinates. - Orders: $\theta \preceq \theta'$ means tightening floors; $\beta' \preceq \beta$ means tightening budgets; $C' \preceq C$ means shrinking capacity.

Axioms (Minimal Core)

-A1 Well-typedness (*normative*)

$\text{All maps are measurable/continuous as needed; } \chi$ is total.

-A2 Posting / Records-only (*normative*)

$\text{For any run on } u \in U, \text{ the record } \kappa \in \mathbb{V} \text{ contains } (v(u), \theta, \beta, C, \pi, P_n, \Gamma), \text{ and the decision equals } \chi^*(u, \kappa) = \chi(v(u), \theta, \beta, C, \pi, P_n, \Gamma) \text{ with no dependence on unposted data.}$

-A3 Benign invariance (*normative*)

$\text{Let } (\pi, p) \in \Pi \times P_n \text{ act on the measurement/evaluation pathway to yield } v_{(\pi, p)}(u). \text{ Define } W(u) := \sup_{(\pi, p)} w_{(\pi, p)}(u), \text{ where } w_{(\pi, p)}(u) = \chi(v_{(\pi, p)}(u), \theta, \beta, C, \pi, P_n, \Gamma). \text{ If } W(u) \preceq \beta \text{ then } \chi(v_{(\pi, p)}(u), \theta, \beta, C, \pi, P_n, \Gamma) = \chi(v(u), \theta, \beta, C, \pi, P_n, \Gamma).$

-A4 Minimal sufficiency under capacity (*normative*)

$\text{Among valuations preserving decisions under posted } (\theta, \beta), \$v\$ \text{ is minimal w.r.t. } C: \forall v' \in \mathbb{V}, \chi(v, \theta, \beta, C, \pi, P_n, \Gamma) \leq \chi(v', \theta, \beta, C, \pi, P_n, \Gamma) \Rightarrow v \preceq v'. \text{ If } v \preceq v' \text{ then } \chi(v, \theta, \beta, C, \pi, P_n, \Gamma) \leq \chi(v', \theta, \beta, C, \pi, P_n, \Gamma).$

-A5 Reflexive reproducibility (*normative*)

$\text{There exists an admissible, independently realized } v' \$ \text{ (different numeric/route) such that } \chi(v, \theta, \beta, C, \pi, P_n, \Gamma) = \chi(v', \theta, \beta, C, \pi, P_n, \Gamma) \text{ with both posted in } \kappa \text{ (self-warrant).}$

-A6 Determinism & idempotence (*normative*)

$\text{For fixed } (v(u), \theta, \beta), \chi(v(u), \theta, \beta, C, \pi, P_n, \Gamma) \text{ is unique and idempotent.}$

-A7 Monotonicity (*normative*)

$\text{Tightening floors or budgets cannot rescue a failure by hidden dependence: } \theta \preceq \theta', \beta' \preceq \beta \Rightarrow \chi(v, \theta, \beta, C, \pi, P_n, \Gamma) \leq \chi(v, \theta', \beta', C, \pi, P_n, \Gamma) \text{ with no hidden rescue.}$

-A8 Isomorphism invariance (*normative*)

$\text{If a frame } \pi \text{ induces a structure-preserving isomorphism on representation, decisions are invariant.}$

Conformance (Lawful Record)

-lawful record checklist (*normative*)

A record $\kappa \in \mathcal{R}$ is $\text{emph{\Sigma-lawful}}$ iff it includes: 1. $\text{Contract: } \Theta, \beta, C, \Pi, P_n, \Gamma$ (with any guards like ϵ). 2. $\text{Valuation: } v(u)$ (decision-relevant coordinates posted). 3. $\text{Decision: } \chi \big(v(u), \Theta, \beta \big)$ and a reason enumerating passed/failed predicates. 4. $\text{Invariance evidence:}$ wobble metrics and the realizing worst-case (π, p) . 5. $\text{Reflexive warrant:}$ independent $v'(u)$ and agreement of χ . 6. Canonicalization: canonical bytes, digest d , and optional chain root for append-only books.

Morphisms of Systemics

Morphism $F: \Sigma \rightarrow \Sigma'$ (*normative*)

A morphism $F: \Sigma \rightarrow \Sigma'$ is a pair (ϕ_U, ϕ_V) with
$$v' \circ \phi_U = \phi_V \circ v, \quad \chi' \circ \phi_V = \chi \circ \phi_U \circ \text{id}$$
 that also maps contracts monotonically: $F(\Theta, \beta, C, \Pi, P_n, \Gamma)$ respects the relevant orders and preserves $(A1, \dots, A7)$.

Morphism preservation (*normative*)

A morphism preserves valuation and decision structure by satisfying:
$$v' \circ \phi_U = \phi_V \circ v, \quad \chi' \circ \phi_V = \chi \circ \phi_U \circ \text{id}$$
 It also maps contract parameters monotonically and preserves $(A1, \dots, A7)$.

Instantiation Recipe (Domain-Agnostic)

Recipe (*informative*)

To realize

Σ in any field: 1. Choose U ,

\mathbb{V} , v ,

χ . 2. Post

Θ ,

β, C ,

Π, P_n ,

Γ and a wobble metric w . 3. Establish $(A1, \dots, A7)$ by construction and tests. 4. Emit lawful

κ and (optionally) hash-chain pages into a book.

Notes

Notes (*informative*)

This specification does not fix what v measures, what χ decides, or how w is computed. It only requires posting, invariance under benign variation, minimal sufficiency under capacity, and reflexive reproducibility. Evidence Systemics is one instantiation where v encodes evidence gauges; other instances (Control, Protocol, Risk, Learning, etc.) keep the same

Σ -contract while choosing different v ,

Θ ,

β .

References

- GraphFrame K0 (GF0) ()
- SpecFrame K1 ()
- Composition (separate spec) ()