Systemics $\{}Sigma$ — 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 \{}\{}begin{equation} K_\{}\{}mu^\{}\{}Sigma \{}\{};=\{}\{}; \{}\{}big(v,\{}\{} \{}\{}chi,\{}\{} \{}\{}Pi,\{}\{} P_n,\{}\{} \{}\{}Theta,\{}\{} \{}\{}beta,\{}\{} C,\{}\{} \{}\{}Gamma\{}\{}big), \{}\{}end{equation} where $v:U\{}\{}to \{}\{}mathbb{V}$ is a valuation map and $\{}\{}chi:\{}\{}mathbb{V}\{}\{}times\{}\{}Theta\{}\{}times\{}\{}beta\{}\{}to \{}\{}mathbf{2}$ is a decision gate.

Metrics & Order

Wobble and orderings *(normative)*

- A divergence ("wobble") $w:\{}\{}mathbb{V}\{}\{}times\{}\{}mathbb{V}\{}\{}to \{}\{}mathbb{R}_{\ 0}$ 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)*

\{}\{}textbf{(Well-typedness).} All maps are measurable/continuous as needed; $\{}\{}chi$ is total.

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

\{}\{}textbf{(Posting / Records-only).} For any run on $u\{}\{}in U$, the record $\{}\{}kappa\{}\{}in\{}\ contains $(v(u),\{}\{}Theta,\{}\{}beta,C,\{}\{}Pi,P_n,\{}\{}Gamma)$, and the decision equals \{}\{}begin{equation} \{}\{}chi^\{}\{}ast(u;\{}\{}kappa) \{}\{};=\{}\{}; \{}\{}chi\{}\{}big(v(u),\{}\{}Th \{}\{}end{equation} with no dependence on unposted data.

-A3 Benign invariance *(normative)*

\{}\{}textbf{(Benign invariance).} Let $(\{}\{}pi,p)\{}\{}in \{}\{}Pi\{}\{}times P_n$ act on the measurement/evaluation pathway to yield $v_{\{}\{}pi,p}(u)$. Define \{}\{}begin{equation} W(u)\{}\{};:=\{}\{};\{}\{}sup_{(\{}\{}pi,p)}\{}\{}; w\{}\{}!\{}\{}big(v_{\{}\{}pi,p}(u),\ \{}\{}end{equation} If $W(u)\{}\{}preceq \{}\{}beta$ then $\{}\{}chi\{}\{}big(v_{\{}\{}pi,p}(u),\{}\{}The

-A4 Minimal sufficiency under capacity *(normative)*

\{}\{}textbf{(Minimal sufficiency under capacity).} Among valuations preserving decisions under posted $(\{}\{}Theta,\{}\{}beta)$, v is minimal w.r.t.\{}\{} C: \{}\{}begin{equation} \{}\{}forall v'\{}\{}; \{}\{}big(\{}\{}chi\{}\{}!\{}\{}circ v'=\{}\{}chi\{}\{}!\{}\{}circ v\{}\{}big)\{}\{} \{}\{}Rightarrow\{}\{} \{}\{}mathrm{cost}(v')\{}\{} \{}\{}succeq\{}\{} \{}\{}mathrm{cost}(v)\{}\{}quac to }C. \{}\{}end{equation}

-A5 Reflexive reproducibility *(normative)*

\{}\{}textbf{(Reflexive reproducibility).} There exists an admissible, independently realized v' (different numeric/route) such that \{}\{}begin{equation} \{}\{}chi\{}\{}big(v(u),\{}\{}Theta,\{}\{}beta \{}\{}end{equation} with both posted in $\{}\{}kappa$ (self-warrant).

-A6 Determinism & idempotence *(normative)*

\{}\{}textbf{(Determinism & idempotence).} For fixed $\{}\{}big(v(u),\{}\{}Theta,\{}\{}beta\{}\{}big)$, the decision $\{}\{}chi$ is unique and idempotent.

-A7 Monotonicity *(normative)*

\{}\{}textbf{(Monotonicity).} Tightening floors or budgets cannot rescue a failure by hidden dependence: \{}\{}begin{equation} \{}\{}theta\{}\{}preceq \{}\{}theta',\{}\{} \{}\{}beta'\{}\{}preceq \{}\{}beta\{}\{};\{}\{}Rightarrow\{}\{} \{}\{}chi(v,\{}\{}theta,\{}\{}beta)=1 \{}\{} \{}\{}Rightarrow\{}\{} \{}\{}chi(v,\{}\{}theta',\{}\{}beta')\{}\{}in\{}\{}{0,1\{}\{}}\{}\{} \{}\{}text{with no hidden rescue.} \{}\{}end{equation}

-A8 Isomorphism invariance *(normative)*

\{}\{}textbf{(Isomorphism invariance).} If a frame $\{}\{}pi$ induces a structure-preserving isomorphism on representation, decisions are invariant.

Conformance (Lawful Record)

-lawful record checklist *(normative)*

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

Morphisms of Systemics

Morphism F: **’** *(normative)*

A morphism $F:\{}\{}Sigma\{}\{}to\{}\{}Sigma'$ is a pair $(\{}\{}phi_U,\{}\{}phi_V)$ with \{}\{}begin{equation} v' \{}\{}circ \{}\{}phi_U \{}\{};=\{}\{}; \{}\{}phi_V \{}\{}circ v,\{}\{}qquad \{}\{}chi' \{}\{}circ (\{}\{},\{}\{}phi_V\{}\{}times\{}\{}mathrm{id}\{}\{},) \{}\{};=\{}\{}; \{}\{}chi, \{}\{}end{equation} that also maps contracts monotonically: $F(\{}\{}Theta,\{}\{} respects the relevant orders and preserves $(\{}\{}Sigma$-A1,...,A7).

Morphism preservation *(normative)*

A morphism preserves valuation and decision structure by satisfying: \{}\{}begin{equation} v' \{}\{}circ \{}\{}phi_U \{}\{};=\{}\{}; \{}\{}phi_V \{}\{}circ v,\{}\{}qquad \{}\{}chi' \{}\{}circ (\{}\{},\{}\{}phi_V\{}\{}times\{}\{}mathrm{id}\{}\{},) \{}\{};=\{}\{}; \{}\{}chi. \{}\{}end{equation} It also maps contract parameters monotonically and preserves (-A1,...,A7).

Instantiation Recipe (Domain-Agnostic)

Recipe *(informative)*

To realize
$Sigma$ in any field: 1. Choose U,
$mathbbV$, v,
chi. 2. Post
$Theta$,
$beta, C$,
Pi, P_n,
$Gamma$ and a wobble metric w. 3. Establish (-A1,...,A7) by construction and tests. 4. Emit lawful
$kappa$ and (optionally) hash-chain pages into a book.

Notes

Notes *(informative)*

This specification does not fix what v measures, what
chi 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
$Sigma$-contract while choosing different v,
$Theta$,
$beta$.

References

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