

# Systemics Minimal Specification (K1)

## References

- GraphFrame K0 (GF0) (spec://\_kernel/gf/gf0-k1)
- SpecFrame K1 (spec://\_kernel/spec/specframe-k1)
- Composition (separate spec) (spec://domains/systemics/sigma-composition-k1)

## 1 Charter

### Charter

specifies a contract-shaped kernel that produces decisions from posted evidence under benign variation, with replayable records, without making domain assumptions.

## 2 Alphabet (Objects & Maps)

### Alphabet

- U: universe of artifacts
- V: valuation space (any measurable space; commonly  $\mathbb{R}^k \times \mathbb{B}^m$ )
- 2: decision space  $2 := \{0,1\}$
- : frames / benign contexts
- P\_n: probes / benign perturbations
- : floors/thresholds (partially ordered set)
- : invariance budgets (tolerances in a poset/lattice)
- C: capacity budgets (bits/time/energy constraints)
- : envelope/meta (versions, seeds, numeric modes, commits)
- R: records (canonical map bytes; hash/ledger optional)

## 3 Definition: Systemic Kernel

### Systemic Kernel

A systemic kernel is the tuple:  $K_{\_}^{\wedge} := (v, , , P_{\_}n, , , C, )$ , where  $v: U \rightarrow V$  and  $: V \times \times \rightarrow 2$ .

## 4 Metrics & Order

### Wobble and orderings

assumes a divergence ("wobble")  $w: V \subseteq V \times \mathbb{R}_{\geq 0}$  on decision-relevant coordinates. Orders:  $\succ$  means tightening floors;  $\succ'$  means tightening budgets;  $C' \subseteq C$  means shrinking capacity.

## 5 Axioms (Minimal Core)

### -A1 Well-typedness

All maps are measurable/continuous as needed;  $\pi$  is total on  $V \subseteq \mathbb{R}^n$ .

### -A2 Posting / Records-only

For any run on  $u \in U$ , the record  $R$  contains  $(v(u), \pi, C, P_n)$ , and the decision equals  $\pi^*(u; \pi) = (v(u), \pi)$ , with no dependence on unposted data.

### -A3 Benign invariance

Let  $(p) \in P_n$  act on the measurement/evaluation pathway to yield  $v_{\{p\}}(u)$ . Define  $W(u) := \sup_{(p)} w(v_{\{p\}}(u), v_{\{0,p0\}}(u))$ . If  $W(u) < \infty$  then for all benign  $(p)$ ,  $(v_{\{p\}}(u), \pi) = (v_{\{0,p0\}}(u), \pi)$ .

### -A4 Minimal sufficiency under capacity

Among valuations preserving decisions under posted  $(\pi, \pi)$ ,  $v$  is minimal w.r.t. capacity cost subject to  $C$ : for all  $v'$ ,  $(v' = v) \text{ cost}(v') \leq \text{cost}(v)$ , subject to  $C$ .

### -A5 Reflexive reproducibility

There exists an admissible, independently realized  $v'$  (different numeric/route) such that  $(v(u), \pi) = (v'(u), \pi)$ , with both posted in  $\pi$  (self-warrant).

### -A6 Determinism & idempotence

For fixed  $(v(u), \pi)$ , the decision  $\pi$  is unique and idempotent under re-evaluation.

### -A7 Monotonicity

Tightening floors or budgets cannot rescue a failure by hidden dependence. For  $\pi$  and  $\pi'$ ,  $(v, \pi) = 1$  implies  $(v, \pi') \in \{0,1\}$  with no hidden rescue: tightening must not create a pass whose justification depends on data not posted in the record.

### -A8 Isomorphism invariance

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

## 6 Conformance (Lawful Record)

### -lawful record checklist

A record  $R$  is -lawful iff it includes: (1) contract  $(, , C, , P\_n,$  and guards), (2) valuation  $v(u)$  (decision-relevant coords), (3) decision  $(v(u), , )$  with reasons, (4) invariance evidence (wobble metrics + worst-case  $(,p)$ ), (5) reflexive warrant  $(v'(u)$  and agreement), (6) canonicalization: canonical bytes, digest  $d$ , and optional chain root.

## 7 Morphisms of Systemics

### Morphism preservation

A morphism preserves valuation and decision structure by satisfying:  $v' \_U = \_V v, ' (\_V \oplus \text{id}) = .$  It also maps contract parameters monotonically and preserves -A1..-A7.

### Morphism F: '

A morphism  $F: ' is a pair  $(\_U, \_V)$  such that the following commutation laws hold:  $v' \_U = \_V v$ , and  $' (\_V \oplus \text{id}) = .$  A morphism also maps contracts monotonically so that axioms remain satisfied.$

## 8 Instantiation Recipe (Domain-Agnostic)

### Recipe

Choose  $U, V, v, ;$  post  $, C, P\_n,$  and wobble metric  $w$ ; establish -A1..-A7 by construction/tests; emit lawful and optionally chain pages into books.

## 9 Notes

### Notes

This specification does not fix what  $v$  measures, what 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 contract while choosing different  $v, , .$