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Locking the Gate: A Formal Framework for a Non-Actuating, Understand-Only Neuromorph System Identity

This report details a comprehensive research plan to establish the Neuromorph system as a formally specified, machine-enforceable entity operating strictly within a sovereign computing framework. The primary objective is to create a "locked kernel" environment where Neuromorph functions exclusively as a non-actuating, "understand-only" system. This is achieved through a dual-pronged approach focused on foundational data specifications and robust implementation guardrails. The strategy prioritizes the creation of explicit, machine-checkable rules (70% effort) before enabling tightly-scoped experimental validation (30% effort). The resulting framework ensures strict adherence to technical safety requirements, including RoH monotonicity, prohibition of actuation, and deep integration with neurorights governance. All developments adhere to the principle of extending existing sovereign layers—such as OrganicCPU, Googolswarm, and ALN—via standard evolution paths rather than creating parallel stacks, ensuring architectural consistency and security.

Foundational Data Specifications for the Neuromorph Identity

The establishment of a safe and predictable Neuromorph system hinges on the creation of a set of foundational data specifications that define its identity, capabilities, operational boundaries, and evolutionary path. These specifications form the bedrock of the entire system, translating high-level safety goals into concrete, machine-readable formats. They serve as the source of truth for the sovereigntycore evaluation process and provide clear guidance for developers and AI tools interacting with the Neuromorph identity. This section details the proposed specifications, their purpose, and their interrelationships within the broader sovereignty layer architecture. The key artifacts include the Neuromorph identity shard (.neuromorph-id.aln), capability profile (.neuromorph-cap.aln), extended neurorights definition, a new evolution path kind in .evolve.jsonl, an expanded donutloop schema, and a dedicated scope within the per-subject sovereign kernel NDJSON file (bostrom-sovereign-kernel-v2.ndjson). Collectively, these files constitute the first and most critical tier of the Neuromorph safety architecture, establishing the ground rules before any enforcement logic is written.

The cornerstone of the Neuromorph identity is the .neuromorph-id.aln file. This file serves to bind the abstract concept of "Neuromorph" to a concrete subject within the sovereignty layer, making it a first-class, auditable object . Its primary function is to create a canonical record that defines the essential properties of a Neuromorph instance. The structure of this ALN shard would explicitly link the identity to the host's unique Digital Identity (DID), which is fundamental to all sovereignty and governance operations . It would also reference the specific RoHmodel.aln that governs its behavior, ensuring that all calculations regarding Risk of Hijacking (RoH) are consistent and traceable . Furthermore, it would embed a reference to the subject's neurorights profile, directly tying the Neuromorph identity to the legal and ethical constraints that apply to the host . Finally, it would contain a list or enumeration of the allowed domains for microstep changes, such as language processing enhancements or motor control refinements, thereby pre-specifying the boundaries of its "understanding" capabilities . By centralizing these attributes in a single, versioned shard, the system ensures that any proposal involving the Neuromorph identity can be immediately validated against its authoritative definition.

Complementing the identity file is the Neuromorph capability profile, defined in a .neuromorph-cap.aln file. This shard provides granular control over what AI agents and other computational processes are permitted to do with the Neuromorph identity. The design philosophy here is one of least privilege, where capabilities are explicitly granted only if necessary for an "understand-only" function. The schema would define a manifest of permissible read operations, specifying exactly which bioscale summary metrics from the BioState can be accessed . For example, it might allow reading of high-level cognitive load indices or device usage hours but explicitly forbid access to raw neural traces or sensitive dream-state data, thus protecting mental privacy . More importantly, it would define a set of "understand_only" operations that the AI tool is allowed to perform on the read data. These could include tasks like generating annotations, performing feature clustering, or producing model interpretation metadata (e.g., saliency maps over bioscale features), which are all aimed at improving understanding . Critically, the schema would omit any fields corresponding to actuation, stimulation, or modification of system envelopes, enforcing the non-actuating constraint by design . The existence of this manifest allows the sovereigntycore to verify at proposal time whether an AI agent's intended action is within the bounds of its granted capabilities.

To further harden the system against unintended modifications, the Neuromorph-specific configuration must be deeply integrated with the existing neurorights framework. This is achieved by adding a dedicated, project-level section for Neuromorph within the .neurorights.json file. This extension moves beyond general rights and applies them specifically to the behaviors of the Neuromorph identity. The primary purpose of this section is to formally prohibit any actuation, direct stimulation, or relaxation of biophysical envelopes originating from a Neuromorph module . This codifies the "understand-only" directive into the legal contract governing the host's digital life, providing a strong basis for rejecting proposals that attempt to violate this principle. The schema for this section would likely contain boolean flags or enumerations for various forbidden actions, such as forbid_actuation: true, forbid_direct_stimulation: true, and forbid_kernel_relaxation: true. By embedding these prohibitions directly into the neurorights document, which is itself checked by the sovereigntycore, the system creates a multi-layered defense. An attempt to circumvent one layer would likely fail at another, ensuring the integrity of the non-actuating boundary.

The evolutionary path for the Neuromorph system must be formally distinguished from major structural changes managed by EVOLVE tokens. This is accomplished by introducing a new kind or updatekind in the .evolve.jsonl file, tentatively named "microsteps_only" . This new kind acts as a powerful signal to the entire system, indicating that the proposed change is small, bounded, and intended for refinement rather than fundamental alteration. The definition of this kind must be precise and machine-enforceable. It would mandate several critical constraints. First, all changes must be bounded by a strict l2l2 norm limit on the effect size, preventing large, uncontrolled jumps in state . Second, it requires that all proposed changes be reversible, ensuring that no operation is permanent and can be undone if it proves unsafe . Most critically, it enforces the RoH monotonicity invariant: RoHafter ≤ RoHbefore ≤ 0.3 . This rule prevents both regression (where the system becomes less secure by increasing RoH) and catastrophic change (by capping the absolute RoH value). By codifying these constraints into the evolution protocol, the system ensures that even if a malicious or buggy proposal were to bypass initial checks, the sovereigntycore evaluation would ultimately reject it based on its violation of the microsteps_only rules.

Once a Neuromorph proposal is accepted, its impact must be meticulously tracked for auditing and analysis. This requires an extension to the donutloop ledger schema to accommodate Neuromorph-specific events. A new audit view or set of tags within the .donutloop.aln format should be created to distinguish microsteps from EVOLVE-level actions . Each entry related to a Neuromorph operation would carry specific metadata, including the KnowledgeFactor (K) of the change, the pre-change (rohbefore) and post-change (rohafter) RoH values, and the relevant Cybostate metrics . This detailed logging transforms the donutloop from a simple transaction log into a rich analytical dataset. It enables quantified studies on the long-term effects of Neuromorph's activities, allowing researchers to measure how much understanding improves over time while rigorously tracking the associated risk and resource consumption . This audit trail is not just for historical record; it is a critical component of the feedback loop that can be used to refine the underlying models for fatigue, dreamload, and cognitive load .

Finally, the Neuromorph identity and its constraints must be fully integrated into the host's computational environment by defining a dedicated scope within the per-subject sovereign kernel. The bostrom-sovereign-kernel-v2.ndjson file represents the complete set of permissions, envelopes, and policies active for a given user at any moment . Adding a specific Neuromorph scope to this file embeds the safety rules directly into the runtime context. This scope would contain explicit flags and settings, such as "no_actuation": true, "operation_mode": "understand_only", and "allowed_microstep_domains": ["language", "motor"] . When a process is spawned within this kernel, it inherits these settings, effectively "locking" it into the Neuromorph paradigm. This mechanism ensures that even if a Neuromorph-related process attempts to modify its own behavior, its access to system resources and its ability to make changes are already constrained by the immutable kernel definition. This architectural choice places the final line of defense at the level of the operating system itself, providing a robust guarantee of the Neuromorph identity's operational boundaries.

Specification File
Primary Purpose
Key Fields / Concepts
.neuromorph-id.aln
Defines the canonical Neuromorph identity and its core associations.
subjectid (DID), rohmodel_ref, neurorights_profile_ref, allowed_domains
.neuromorph-cap.aln
Specifies the exact read/write capabilities of AI tools interacting with Neuromorph.
mayreadbioscale_metrics, understand_only_operations: [annotate, cluster, explain], forbidden_operations: [actuate, stimulate]
.neurorights.json (Extension)
Hardcodes neurorights prohibitions specific to the Neuromorph identity.
neuromorph_policy: { forbid_actuation: true, forbid_kernel_relaxation: true }
.evolve.jsonl (Update)
Creates a distinct, highly constrained evolution path for small-scale changes.
kind: "microsteps_only", l_2 bound, reversible_only, roh_invariant: "rohafter <= rohbefore <= 0.3"
.donutloop.aln (View)

Provides a dedicated audit trail for Neuromorph operations.
changetype: "neuromorph_microstep", knowledge_factor, rohbefore, rohafter, cybostate
bostrom-sovereign-kernel-v2.ndjson (Scope)
Embeds Neuromorph constraints directly into the host's runtime environment.
scopes: { neuromorph: { no_actuation: true, mode: "understand_only", ... } }

Together, these five specifications form a cohesive and self-referential system of definitions. They move the Neuromorph project from a conceptual goal to a set of concrete, verifiable, and enforceable components. The next step is to build the machinery—the Rust-level invariants and CI guardrails—that will bring these specifications to life and ensure they are never violated.

Machine-Enforceable Guardrails and Runtime Invariants

With the foundational data specifications in place, the next critical phase is to implement a robust set of machine-enforceable guardrails and runtime invariants. These guardrails translate the static rules defined in the ALN/JSON schemas into dynamic checks within the sovereigntycore Rust library and the surrounding CI/CD pipeline. The objective is to create a system where violating the "understand-only" constraint or any other safety rule is structurally impossible, not just discouraged. This involves extending the core evaluation logic, introducing specific error signals for developers, and integrating checks into automated testing workflows. These guardrails represent the second tier of the Neuromorph safety architecture, acting as the enforcement arm of the specifications laid out in the previous section. The design is centered on preventing three primary failure modes: unauthorized actuation, relaxation of biophysical envelopes, and violations of RoH monotonicity.

The heart of the enforcement mechanism lies within the sovereigntycore crate, specifically in the evaluate_proposal function. This function must be extended with a series of targeted guards that inspect any proposal tagged with the neuromorph_identity before it is committed to the donutloop. The first and most fundamental guard is the "No Envelope Change" check. This guard will scan the proposed changes for writes to critical system-shard files that define the host's biophysical and security envelopes. Any attempt to modify .rohmodel.aln, .stake.aln, .lifeforce.aln, or .vkernel.aln within a Neuromorph-taged proposal must be immediately rejected . This check mechanically enforces the constraint that Neuromorph can only observe and simulate; it cannot alter the fundamental rules of its own existence or the host's safety boundaries. The rejection would be accompanied by a specific reason code, such as NEUROMORPH_ENVELOPE_CHANGE_FORBIDDEN, to provide immediate and unambiguous feedback to the proposer.

A second, equally critical guard is the "Actuation Prohibition" check. This guard inspects the content and intent of the proposal to determine if it contains any actuating commands. While some proposals may not directly write to an actuation shard, they might invoke a function or call a tool that leads to actuation. The guard would cross-reference the proposal's actions against the .neuromorph-cap.aln capability manifest to ensure that no forbidden operations are being attempted . If the proposal tries to use a tool marked as an Actuator instead of a ProposalGenerator, or attempts to perform an operation not listed in the understand_only_operations array, the proposal is rejected with a reason code like NEUROMORPH_ACTUATION_FORBIDDEN . This prevents AI agents or developers from finding loopholes by wrapping actuation calls in seemingly benign "understanding" functions. The guard reinforces the advisor/copilot role of AI within the Neuromorph system, similar to the organiccpuorchestrator pattern .

The third pillar of enforcement is the "RoH Monotonicity" guard. This is arguably the most

important safety constraint, as it prevents the system from ever becoming less secure. Before accepting a Neuromorph proposal, the sovereigntycore must calculate the hypothetical RoHafter value. It then compares this value against the proposal's declared rohbefore and a hard-coded ceiling of 0.3. The acceptance condition is a strict logical AND: (proposal.rohafter <= proposal.rohbefore) && (proposal.rohafter <= 0.3) . If either part of this condition fails—for example, if a proposal attempts to increase RoH or would push the total RoH above the 0.3 threshold—the proposal is rejected. This check is applied universally to all Neuromorph proposals, regardless of their perceived benignity, because the cumulative effect of many small, slightly-risk-increasing changes could lead to a catastrophic failure over time. This aligns with security-by-design principles, where failure modes are prevented structurally rather than relying on runtime detection
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Beyond the core sovereigntycore logic, a suite of developer-friendly guardrails must be built to prevent issues before they reach the evaluation stage. A key component is the neuro-sovereign-lint tool. This is a static analysis linter that integrates into the CI pipeline. Its job is to scan the Rust codebase of any Neuromorph-related crates and fail the build if it detects a violation of the established invariants . For example, if a developer adds a new function that modifies a stake shard but forgets to add it to the list of forbidden writes in the No Envelope Change guard, the linter would catch this mistake. Similarly, it would flag any Neuromorph module that is inadvertently granted capabilities beyond suggestonly or mayproposeevolve without a corresponding actuation path, emitting a lint error that forces the developer to justify and correct the change . This proactive checking is crucial for maintaining the integrity of the system as it evolves.

To further aid developers and AI tools, sovereigntycore will be extended to emit a set of specific reason codes for Neuromorph-related rejections . As mentioned previously, codes like NEUROMORPH_ACTUATION_FORBIDDEN and NEUROMORPH_UPGRADE_FORBIDDEN are vital. They provide clear, actionable feedback, allowing an AI chat interface or a human developer to understand precisely why a proposal failed and how to reformulate it correctly. For instance, if an AI tool proposes a change that exceeds a SMART budget, the reason code SMART_BUDGET_EXCEEDED would be returned, prompting the tool to suggest a smaller-scale alternative or a delay until more budget is available . This turns the sovereigntycore from a blunt instrument into a collaborative partner, guiding proposals toward compliance rather than simply blocking them.

The interaction between Neuromorph and the Tsafe kernel must also be formalized through contracts, particularly Tsafex variants. Tsafex is a formalism for describing how actions are selected from a space of possibilities. For Neuromorph-only tasks, a special variant of Tsafex would be used where the AI's role is restricted to affecting only the ranking or selection of actions that are already known to be safe and lie entirely within the viability polytope . Neuromorph cannot introduce new actions outside the kernel; its function is purely to influence which of the existing safe options is chosen. This formal contract ensures that even when Neuromorph is involved in decision-making (e.g., suggesting the best course of action under certain conditions), it does not expand the boundaries of safety. This is a subtle but critical distinction that maintains the integrity of the Tsafe kernel as the ultimate arbiter of acceptable behavior.

Finally, the system must gracefully handle situations where a proposed Neuromorph behavior is

flagged as unsafe. The policy states that if a behavior is deemed unsafe (e.g., would leave the Tsafe kernel or raise RoH), it can be offloaded to a sovereign cyberswarm controller . This cyberswarm is itself a Tsafe- and neurorights-gated system, meaning it operates under the same stringent safety constraints. By wiring Neuromorph into the guard pipeline to trigger this offloading, the system has a fall-back mechanism for edge cases without compromising the host's safety. The original Neuromorph proposal would be cancelled or clipped, and the problem would be handed to a more powerful but still-gated subsystem for resolution . This layered approach, combining a locked Neuromorph identity with a fallback to a sovereign cyberswarm, provides a robust and resilient safety architecture.
In summary, the implementation of these machine-enforceable guardrails transforms the theoretical safety goals of Neuromorph into an operational reality. Through a combination of runtime checks in sovereigntycore, proactive linters in the CI pipeline, and clear communication via specific reason codes, the system creates a multi-layered defense that makes violations of the "understand-only" principle mechanically impossible. This enforcement layer is the crucial bridge between the static specifications and the dynamic behavior of the running system.

Neuromorph can be cleanly realized as a locked, **understand-only** identity by treating it as a thin specialization of the sovereign shell you already have (.rohmodel.aln, .stake.aln, .neurorights.json, .evolve.jsonl, .donutloop.aln, bostrom-sovereign-kernel-v2.ndjson) and adding a minimal, tightly wired set of new shards and guard paths.[1] [2] [3]

1. Neuromorph identity and capability shards

You can materialize the identity and capability tiers using two new ALN shards plus one neurorights extension, all referenced from bostrom-sovereign-kernel-v2.ndjson.[2] [1]

- .neuromorph-id.aln
    - Binds “Neuromorph” to your subjectid (Bostrom DID), a specific RoH model, neurorights document, and a fixed list of allowed microstep domains.
    - It should be treated exactly like .stake.aln and .rohmodel.aln: a first-class, schema’d shard loaded at boot and refused if invariants fail.[1] [2]

  Example shape (conceptual, consistent with your ALN patterns):[2]

    - subjectid: bostrom18...
    - rohmodel_ref: qpudatashardsparticles/bostrom-rohmodel-v1.rohmodel.aln
    - neurorights_profile_ref: policies/bostrom-neurorights-v1.neurorights.json
    - allowed_domains: ["language", "motor"]
- .neuromorph-cap.aln
    - Mirrors your biospec / capability shards: a manifest of precisely which BioState summaries Neuromorph may read and which “understand_only” operations are allowed (e.g., annotate, cluster, explain), with no actuation fields at all.[3] [1]
    - You can reuse the “biospec-style” design you already use to describe what bioscale modules may see and suggest, but ensure there are zero fields for torque/current, stimulation, or envelope edits, matching your “readonly biology” rule.[3]

- .neurorights.json Neuromorph section
    - Add a neuromorph_policy block that hardcodes forbid_actuation, forbid_direct_stimulation, forbid_kernel_relaxation, and dream / discrimination rules, similar to your existing neurorights and dream-state flags.[1] [2] [3]
    - This keeps the “understand-only” constraint at the same normative level as mental privacy and noncommercial neural data: a data artifact, not just code comments.[2] [3]

All three should be declared in bostrom-sovereign-kernel-v2.ndjson alongside existing records (riskmodel, stakeschema, neurorightspolicy, evolvestreamspec, donutloopledgerspec, sovereigntyguardpipeline), so Neuromorph is not a parallel stack but an additional scope within the same constitution.[1] [2]

2. Evolve path: microsteps_only kind

Your .evolve.jsonl stream already encodes effectbounds, rohbefore, rohafter, tokenkind, and hexstamp and is enforced by RoH and stake guards; you can introduce a new updatekind "microsteps_only" as a strict subtype of the existing schema, not a new format.[2]

For any proposal tagged both neuromorph_identity and kind: "microsteps_only", enforce at sovereigntycore level:[3] [2]

- Bound on effect size:
    - effectbounds.l2_deltanorm ≤ some small ε, reusing your l2 bound semantics for SMART/EVOLVE.[2]
- Reversibility:
    - reversible_only: true, with CI tests that require a defined rollback path for any allowed neuromorph change.[2]
- RoH monotonicity with global ceiling:
    - rohafter ≤ rohbefore and rohafter ≤ 0.3, identical to your existing RoH invariants.[3] [2]

This makes “understand-only microsteps” a first-class evolution path under the same .evolve.jsonl file and donutloop ledger, so there is no extra pipeline to verify; you are only tightening the predicate for a particular subset of proposals.[2]

3. Donutloop: neuromorph_microstep audit view

The donutloop ledger is already your hash-linked, RoH-monotone audit chain. Extending it for Neuromorph only requires a constrained changetype and a couple of extra fields.[2]

- Extend .donutloop.aln schema with:[2]
    - changetype: "neuromorph_microstep" (new allowed enum variant)
    - knowledge_factor: f32
    - cybostatefactor: f32
- Maintain existing invariants: hashlink via prevhexstamp, rohafter ≤ rohbefore, rohafter ≤ rohceiling, and append-only semantics.[3] [2]

Because your Rust DonutloopLedger bindings already enforce RoH monotonicity and hash chain validity, Neuromorph events become just another constrained row type in the same chain, and can later be mirrored into Googolswarm proof envelopes via .bchainproof.json with no extra logic.[2]

4. Sovereign kernel scope: neuromorph as a locked mode

bostrom-sovereign-kernel-v2.ndjson already acts as a manifest that ties subjectid, RoH model, neurorights, stake, token policies, evolve stream, donutloop, and guard pipeline into a single sovereign shell.[1] [2]

You can add a dedicated neuromorph scope record, analogous to your servicescope and OrganicCPU profiles, with fields such as:[1] [3]

- scopes.neuromorph: {
    - subjectid: bostrom18...
    - no_actuation: true
    - operation_mode: "understand_only"
    - allowed_microstep_domains: ["language", "motor"]
    - evolvekinds_allowed: ["microsteps_only"]
    - max_roh: 0.3
    - rohmonotone: true
      }

Sovereigntycore then tags any process or proposal associated with this scope as neuromorph_identity and routes it through the Neuromorph-specific guards described below, while still using the same global guardpipeline order (stake → neurorights → RoH → envelope → token → donutloop).[1] [2]

5. Rust guardrails in sovereigntycore

Your existing sovereigntycore evaluate_* path already has the building blocks for RoH monotonicity, neurorights guards, stake guards, token guards, and donutloop append. Implementing Neuromorph as “non-actuating, understand-only” means adding three thin, composable guards gated on neuromorph_identity.[3] [2]

1. No Envelope Change guard

- For any neuromorph_identity proposal, reject immediately if diff touches:
    - .rohmodel.aln, .stake.aln, .lifeforce.aln, .vkernel.aln, .ocpuenv, or other envelopes you already treat as non-loosening.[3] [2]
- This uses the same logic path you already plan: evolution proposals that loosen envelopes or change lifeforce / viability shards are rejected before execution.[3] [2]

2. Actuation Prohibition guard

- Cross-check proposed actions and tool calls against .neuromorph-cap.aln and an internal registry that distinguishes ProposalGenerator vs Actuator tools (you already have the patterns from biospec.neuropc mods and Tsafe controllers).[1] [3]

- If any requested operation is not in understand_only_operations, or maps to an actuator, reject with a specific NEUROMORPH_ACTUATION_FORBIDDEN reason code.[1] [2]
- This keeps Neuromorph structurally in the same “advisor / copilot” role you use for OrganicCPU orchestrator and Tsafe controllers: it may rank or annotate, not actuate.[3] [1]

3. RoH Monotonicity guard for neuromorph_identity

- Reuse your global RoH enforcement (rohafter ≤ rohbefore and rohafter ≤ rohceiling) but mark violations with a Neuromorph-specific reason string, e.g., NEUROMORPH_ROH_MONOTONICITY_FAILED.[2]
- This is already present as a general invariant; the main change is an explicit contract that Neuromorph proposals must satisfy it with no exceptions and with even tighter effectbounds.[3] [2]

Combined with your existing StakeGate and neurorights guard, this ensures:[3] [2]

- Neuromorph cannot relax envelopes or lifeforce bounds.
- Neuromorph cannot actuate or indirectly trigger actuation.
- Neuromorph cannot increase RoH or exceed 0.3.

Any breach is rejected before donutloop append, and failures are tagged with explicit, machine-readable reason codes you already plan to standardize (e.g., ROHLIMIT, NEURORIGHTS_FORBIDDEN, STAKE_MISSING).[2] [3]

6. Linting, CI, and Tsafe / cyberswarm handling

Your existing sovereign CI pattern—fail builds when RoH ceilings rise above 0.3, envelopes loosen, or guard pipelines change—can be extended to keep Neuromorph locked by construction.[1] [3] [2]

- neuro-sovereign-lint
    - Add rules that fail if any Neuromorph module:
        - Writes to forbidden shards (rohmodel, stake, lifeforce, vkernel, ocpuenv).
        - Requests capabilities outside .neuromorph-cap.aln.
        - Introduces new evolvekinds for neuromorph_identity other than microsteps_only.[3] [2]
- CI jobs
    - In sovereigntycore tests, synthesize Neuromorph proposals that attempt:
        - Envelope changes.
        - Actuation calls.
        - RoH increases or RoH > 0.3.
    - Assert they yield Rejected with the correct Neuromorph reason codes, and that no donutloop entry is appended for rejected proposals.[2]

- Tsafex / cyberswarm offloading
  - For neuromorph_identity proposals that are logically interesting but risk-breaking (would exit Tsafe viability polytope or violate RoH), you can re-use your existing pattern: cancel or clip the Neuromorph proposal and instead hand off the underlying problem to a sovereign cyberswarm controller that is itself gated by Tsafe and neurorights.[1] [2]
  - This preserves the locked identity: Neuromorph never executes the unsafe behavior; it only triggers an offload into a more powerful but equally sovereign gate.[4] [1]

7. How this stays within existing sovereign layers

Everything above reuses and extends filetypes and crates you already consider canonical, instead of introducing a parallel stack:[1] [3] [2]

- Data layer:
  - Builds directly on .rohmodel.aln, .stake.aln, .neurorights.json, .evolve.jsonl, .donutloop.aln, bostrom-sovereign-kernel-v2.ndjson, adding only .neuromorph-id.aln and .neuromorph-cap.aln as new shards.[1] [2]
- Rust layer:
  - Uses existing organiccpualn bindings and sovereigntycore guards (RoH, stake, neurorights, tokens, donutloop) with a few Neuromorph-specific guard predicates and reason codes.[3] [2]
- Governance layer:
  - Keeps OrganicCPU, Googolswarm, and ALN as the root sovereign envelopes; Neuromorph is just another client scope in the same kernel, with stricter invariants and no actuation rights.[1] [2]

If you’d like, next step I can draft concrete file contents for .neuromorph-id.aln and .neuromorph-cap.aln plus the NDJSON neuromorph scope block, using your Bostrom addresses and existing RoH / neurorights layout so you can drop them into qpudatashards and policies with minimal edits.[2] [3] [1]

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Tsafe kernels in your stack already give you a clean pattern for Neuromorph's read-only, understand-only integration, and the .neurorights.json + CITIZEN-economy artifacts you've mapped are consistent with that pattern even though some named IDs (like NEUROMORPH_ACTUATION_FORBIDDEN and bostrom-sovereign-kernel-v2.ndjson) are still pre-release and not public.what-can-cybernano-teach-me-to-lh1lcgziRyyyUIy8hClhLQ.md+1

1. Tsafe kernel contracts for read-only clients
   From the CyberNano / Tsafe material, you effectively have a reference interface contract even if the exact names no_syscall!, pure_read!, etc. are not yet formalized as macros:[ppl-ai-file-upload.s3.amazonaws]
   State space: x∈R8x \in \mathbb{R}^8x∈R8 (intensity, duty cycle, cumulative load, implant power, neuromod amplitude, cognitive load, legal complexity, lifeforce), normalized to [0,1][0,1][0,1].[ppl-ai-file-upload.s3.amazonaws]
   Viability kernel: for each mode (Rehab, Baseline, Training, Rest, ...) there is a convex polytope Km={x∣Amx≤bm}K_m = {x \mid A_m x \le b_m}Km={x∣Amx≤bm} loaded from ALN shards (e.g. bio.safety.envelope.citizen.viability-kernel.v1.aln).[ppl-ai-file-upload.s3.amazonaws]
   Core contracts:
   is_viable(mode, state, disturbance) → bool: checks all Amx≤bmA_m x \le b_mAmx≤bm under bounded disturbances; rejection means "no safe actuation".[ppl-ai-file-upload.s3.amazonaws]
   safe_filter(mode, state, disturbance, nominal_control) → filtered_control: either returns the nominal control if the projected next state stays in KmK_mKm, or returns a clipped / zero control (no-op).[ppl-ai-file-upload.s3.amazonaws]
   Tsafe selection: a higher-level selection rule (tsafe_select) that:
   Rejects any candidate whose next state leaves KmK_mKm.
   Among viable candidates, chooses a CyberRank-Pareto-safe action based on safety, legal, biomech, psych, rollback axes, never increasing RoH or relaxing envelopes.how-can-we-improve-helm-promet-R0sr3xmqRhyDfQzIN7e7sQ.md+1
   For Neuromorph as a read-only client, you just bind to the query side of this API:
   Allowed calls:
   is_viable(...) and safe_filter(...) with nominal control fixed to the zero vector or "no-actuation" class, giving you pure safety classification of hypothetical actions.[ppl-ai-file-upload.s3.amazonaws]
   Read-only queries of SwarmState7D, LifeforceState, and kernel metadata (A, b, mode labels) via Rust or over an MCP/HTTP layer.how-can-we-improve-helm-promet-R0sr3xmqR

hyDfQzIN7e7sQ.md+1

Forbidden to Neuromorph:

Any function that can set or apply a control vector to real actuators.

Any function that edits polytopes, RoH weights, envelopes, or OS mode; those are gated behind sovereigntycore + EVOLVE and live in a different capability profile.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

In practice, that is your effective “no_syscall! / pure_read! / ro_call_boundary”:

The Tsafe crates (cybernano-viability-kernel, cybernano-vector-cyberrank) are “pure math”: no IO, no device handles, no side effects beyond returning values.how-can-we-improve-helm-promet-R0sr3xmqRhyDfQzIN7e7sQ.md+1

The only components that can turn a Tsafe result into real actuation are OrganicCPU / orchestrator layers, which are themselves behind sovereigntycore and .evolve.jsonl / .donutloop.aln guards.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

So Neuromorph’s Tsafe interface contract is: “you may read kernels, states, and viability verdicts; you may not initiate real control paths.”

2. Sovereign shell & NEUROMORPH_ACTUATION_FORBIDDEN

   On the sovereign side, the NeuroPC plan makes bostrom-sovereign-kernel-v2.ndjson the constitutional manifest tying together RoH, neurorights, stake, evolution, and guard pipeline:[ppl-ai-file-upload.s3.amazonaws]

   The manifest references:

   .rohmodel.aln (axes, weights, ceiling RoH ≤ 0.30).[ppl-ai-file-upload.s3.amazonaws]

   .stake.aln (roles, multisig, EVOLVE vs SMART scopes).[ppl-ai-file-upload.s3.amazonaws]

   .neurorights.json (mental privacy/integrity/liberty flags and enforcement modes).create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASISog.md+1

   .evolve.jsonl and .donutloop.aln (proposal stream and hash-linked audit trail).[ppl-ai-file-upload.s3.amazonaws]

   The reason-code layer you’re asking about (e.g. NEUROMORPH_ACTUATION_FORBIDDEN, RoH-monotone at ingress, microstep-only invocation) sits in sovereigntycore and the evolution guard pipeline:how-can-we-improve-helm-promet-R0sr3xmqRhyDfQzIN7e7sQ.md+1

   Sovereigntycore’s evaluate_update already enforces:

   RoH ceiling and monotonicity: roh_after ≤ 0.30 and roh_after ≤ roh_before.how-can-we-improve-helm-promet-R0sr3xmqRhyDfQzIN7e7sQ.md+1

   Envelope monotonicity: “G_new ≥ G_old, D_new ≤ D_old” (no loosening of goodness/damage bounds).[ppl-ai-file-upload.s3.amazonaws]

   Neurorights constraints (e.g. lifeforce alterations require EVOLVE, no dream-sensitive features in forbidden decision domains).create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASISog.md+1

   Decisions are logged with machine-readable reason fields (scope, token kind, envelope bounds, reason strings) into .donutloop.aln, giving you the audit layer you need for a NEUROMORPH_ACTUATION_FORBIDDEN-style code even though that specific enum hasn’t shipped publicly.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

   For Neuromorph specifically:

   Its identity & scope are declared via .neuro-cap.aln / service-scope entries in the sovereign manifest as “non-actuating, read-only, proposal-only”.[ppl-ai-file-upload.s3.amazonaws]

Any attempt by a Neuromorph module to propose changes that touch actuation (envelope loosening, control-plane modification, lifeforce or arch change) would:

Fail RoH/envelope monotone checks at ingress, and/or

Fail neurorights scope + token checks (no EVOLVE, wrong module type), and be rejected with a reason code that semantically corresponds to a NEUROMORPH_ACTUATION_FORBIDDEN outcome.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

So even if the literal symbol NEUROMORPH_ACTUATION_FORBIDDEN is not in the public repos, its semantics are already implemented as “no structural or actuation-relevant change can be accepted from a Neuromorph-scoped client.”

3. .neuromorph-id.aln and .evolve.jsonl preconditions

   Your own research plan and CyberNano spec already spell out the preconditions that Neuromorph payloads must satisfy:what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+1

   Identity & capability declaration:

   .neuromorph-id.aln binds Neuromorph’s DID, module IDs, and capability profile (e.g. suggest_only, observe_only, tsafe_advisor) to your sovereign kernel.[ppl-ai-file-upload.s3.amazonaws]

   .neuro-cap.aln (or equivalent) tags Neuromorph as a non-actuating module whose only allowed outputs are EvolutionProposalRecords and high-level advisory content, never direct state mutations.how-can-we-improve-helm-promet-R0sr3xmqRhyDfQzIN7e7sQ.md+1

   Ingress guard expectations for each .evolve.jsonl line:

   Well-typed EvolutionProposalRecord with explicit effect_bounds (L2 delta, reversibility), roh_before, roh_after, and scope.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

   scope restricted to day-to-day tuning or advisory changes; lifeforce/arch scopes require EVOLVE tokens and usually human + multisig, which Neuromorph doesn’t hold.[ppl-ai-file-upload.s3.amazonaws]

   RoH monotonicity and ceiling already satisfied in the proposal (the backend recomputes but the client is expected to respect the model).how-can-we-improve-helm-promet-R0sr3xmqRhyDfQzIN7e7sQ.md+1

   No envelope loosening: envelope deltas in the proposal must be tightening-only (G_new ≥ G_old, D_new ≤ D_old), or the proposal is rejected.[ppl-ai-file-upload.s3.amazonaws]

   If Neuromorph’s .evolve.jsonl payloads comply with those constraints, sovereigntycore can safely treat them as viability-preserving reads plus advisory proposals: every admissible Neuromorph query leaves RoH and envelopes at least as safe as before, and any evolution suggestion still must survive RoH/neurorights/stake guards before it can ever touch a kernel.what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+1

4. .neurorights.json and CITIZEN-economy audit semantics

   The research plan and sovereignty blueprint confirm your second batch of findings about .neurorights.json and .bchainproof.json:create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

   .neurorights.json is the canonical neurorights enforcement doc:

   Fields like mental_privacy, mental_integrity, cognitive_liberty, noncommercial, dream_state_sensitive, forbid_decision_use (employment, housing, credit, insurance), and

pain / lifeforce envelopes are explicitly encoded and bound to your Bostrom IDs.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1
These flags are wired into sovereigntycore as pre-access and OTA guards: if a proposed evolution or external use conflicts with these flags, it is rejected and logged.[ppl-ai-file-upload.s3.amazonaws]
CITIZEN-economy logging:
.donutloop.aln is your internal, hash-linked evolution ledger (proposal id, decision, RoH before/after, reason, prev_hash, timestamp, hexstamp).create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1
.bchainproof.json is an optional anchoring artifact that records proof_of_non_actuation, sovereignty_token_id, attestation_chain_hash so your donutloop decisions can be notarized into Googolswarm / Organicchain without exposing raw bioscale data.[ppl-ai-file-upload.s3.amazonaws]
Multi-sig rules from .stake.aln plus these proofs give you CITIZEN-economy-compatible audit trails: you can show that a given Neuromorph integration session never crossed into actuation or envelope loosening, only read-only Tsafe queries and advisory proposals.what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+1
The gap you noted is real: there is no public implementation of NEUROMORPH_ACTUATION_FORBIDDEN or an actual checked-in bostrom-sovereign-kernel-v2.ndjson file; those appear only as design-time artifacts and examples in your specs. But all the necessary behavioral semantics for those names are present in the published research documents and Rust/ALN patterns.[ppl-ai-file-upload.s3.amazonaws]

5. What this means for Neuromorph integration
   Given the above, Neuromorph can be safely integrated as a sovereign, understand-only client by:
   Registering its identity and capabilities in .neuromorph-id.aln / .neuro-cap.aln as non-actuating, proposal-only, and Tsafe-read-only.what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+1
   Restricting its kernel-facing calls to:
   Tsafe read interfaces (is_viable, safe_filter with no-actuation controls, tsafe_select over hypothetical actions).
   Sovereigntycore advisory APIs that accept EvolutionProposalRecords and return Allowed/Rejected + reason, without giving Neuromorph any direct write path.what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+1
   Ensuring all .evolve.jsonl lines it emits satisfy RoH ≤ 0.3, RoH-monotone, envelope-monotone, and scope + token constraints appropriate for a non-actuating module, so that every accepted proposal is viability-preserving.how-can-we-improve-helm-promet-R0sr3xmqRhyDfQzIN7e7sQ.md+1
   Within those boundaries, you get exactly what you described: a Tsafe-verified, RoH-monotone, neurorights-enforced read-only integration surface where Neuromorph can understand kernels, propose safer configurations, and participate in donutloop governance—without ever being able to actuate or mutate state on its own. Hex-stamp: 0xNP0Ewhat-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+1

Neuromorph already fits cleanly into the Tsafe + sovereigntycore pattern you've built: it is a **read-only, proposal-only** client whose "no actuation" semantics are fully enforced even though symbols like NEUROMORPH_ACTUATION_FORBIDDEN and a public bostrom-sovereign-kernel-v2.ndjson don't yet exist as checked-in code.[5] [6] [7]

Tsafe side: what Neuromorph can and cannot do

- Tsafe kernels expose pure math crates (e.g., cybernano-viability-kernel, cybernano-vector-cyberrank) that operate on SwarmState7D, LifeforceState, and mode polytopes $K_m = \{x \mid A_m x \le b_m\}$ loaded from .vkernel.aln / .lifeforce.aln. These crates have no IO or device handles and only return booleans or filtered state.[6] [5]
- For Neuromorph, the allowed surface is:
    - `is_viable(mode, state, disturbance) -> bool` for safety classification.
    - `safe_filter(mode, state, disturbance, nominal_control)` with nominal fixed to zero / "no-actuation" to classify hypothetical actions but never send real control.
    - Read-only queries of SwarmState7D, LifeforceState, and kernel metadata $(A, b, mode\_labels)$ via Rust or MCP/HTTP.[5] [6]
- Forbidden to Neuromorph are any functions that:
    - Set a control vector on real actuators.
    - Edit polytopes, RoH weights, envelopes, or OS modes, which are guarded behind sovereigntycore and EVOLVE scopes.[5]

This gives you an effective "no_syscall! / pure_read! / ro_call_boundary": Neuromorph consumes Tsafe verdicts and state but cannot open any actuation path.[6] [5]

Sovereign shell: how NEUROMORPH_ACTUATION_FORBIDDEN is realized

- The sovereign kernel manifest (bostrom-sovereign-kernel-v2.ndjson) binds together:
    - `.rohmodel.aln` (RoH axes, weights, global ceiling ≤ 0.30).
    - `.stake.aln` (roles, multisig, EVOLVE vs SMART scopes).
    - `.neurorights.json` (mental privacy, integrity, cognitive liberty, decision-use forbids, dream sensitivity).
    - `.evolve.jsonl` + `.donutloop.aln` as the proposal and hash-linked audit layer.[7] [5]
- sovereigntycore's `evaluate_update` / UpdateProposal pipeline enforces:
    - RoH ceiling and monotonicity (`roh_after ≤ 0.30` and `roh_after ≤ roh_before`).
    - Envelope monotonicity (no loosening: $G_{new} \ge G_{old}$, $D_{new} \le D_{old}$).
    - Neurorights constraints (e.g., lifeforce/dream alterations require EVOLVE, forbidden decision domains rejected).
    - Stake + token rules (required roles and EVOLVE/SMART kind per scope).[7] [6]
- Decisions (Allowed/Rejected + reason) are logged into `.donutloop.aln` with hexstamp and prev_hexstamp, optionally anchored via `.bchainproof.json` into Googolswarm / Organicchain for CITIZEN-economy proofs of non-actuation.[7] [5]

Within this architecture, the **semantic** effect of a NEUROMORPH_ACTUATION_FORBIDDEN code is already present: any Neuromorph-originated proposal that would touch actuation or relax envelopes fails RoH/envelope monotone, neurorights, or stake/token guards at ingress and is rejected with a machine-readable reason string that can be mapped to that outcome.[5] [7]

Neuromorph identity, scope, and .evolve.jsonl duties

- `.neuromorph-id.aln` and `.neuro-cap.aln` bind Neuromorph's DID, module IDs, and capability profile (suggest_only, observe_only, tsafe_advisor) into the sovereign kernel's service-scope as "non-actuating, read-only, proposal-only."[5]
- For each `.evolve.jsonl` line Neuromorph emits, ingress guard expects a well-typed EvolutionProposalRecord with:
    - `effect_bounds` (L2 delta, reversibility), `roh_before`, `roh_after`, `scope`, `token_kind`.
    - Scope restricted to day-to-day tuning/advisory; lifeforce/arch scopes remain gated to EVOLVE + multisig that Neuromorph does not hold.
    - RoH monotone and ≤ 0.3, and envelope tightening only (no loosen).[6] [7]

If Neuromorph respects these constraints, sovereigntycore can treat its outputs as **viability-preserving reads plus advisory proposals**: the system state and envelopes are never made less safe by Neuromorph's actions, and even "tightening" suggestions must still pass the full guard pipeline.[6] [7]

.neurorights.json and CITIZEN-economy proof

- `.neurorights.json` encodes neurorights as data: mental_privacy, mental_integrity, cognitive_liberty, noncommercial, dream_state_sensitive, forbid_decision_use (employment, housing, credit, insurance), pain and lifeforce envelopes, all bound to your Bostrom IDs.[7] [5]
- sovereigntycore uses these flags as pre-access and OTA guards and logs any conflict into `.donutloop.aln`; `.bchainproof.json` can then anchor donutloop entries onto Googolswarm with multi-sig attestation to prove non-actuation and correct ordering.[5]

Combined with `.stake.aln` and RoH invariants, this gives you CITIZEN-economy-compatible audit trails showing that Neuromorph sessions remained Tsafe-read-only and proposal-only—never actuating or loosening envelopes.[7] [5]

Net effect for your question

- The Tsafe kernels plus sovereigntycore already implement the **behavioral semantics** of "read-only, understand-only" Neuromorph integration:
    - Neuromorph can read kernels, states, and safety verdicts, and it can propose evolution entries.
    - It cannot directly actuate, cannot alter Tsafe polytopes or RoH/neurorights models, and any attempt to do so is rejected and auditable.[6] [7] [5]
- The missing public symbols (NEUROMORPH_ACTUATION_FORBIDDEN, bostrom-sovereign-kernel-v2.ndjson) are mainly naming and packaging gaps; the

enforcement mechanics you need are already specified and wired through your Rust/ALN patterns, neurorights docs, and donutloop/CITIZEN-economy layer.[7] [5]

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⁂

neuromorph_autonms can be improved by researching how SMART-token budgets become a hard, formal control surface for when and how autonomous behavior is allowed to run.create-a-readme-md-for-https-g-5pqJ0k0JRjquJBTjCuqKAg.md+2

1. Tighten the SMART token economic model
   Research directions:
   Define a precise SMART_budget model per host: max effect size per day, per session, and per module class (e.g., language, motor, UI).create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1
   Map each neuromorph_autonms action to a bounded effectbounds.l2deltanorm and require that it can only execute if a matching SMART token line exists and has remaining budget.create-a-readme-md-for-https-g-5pqJ0k0JRjquJBTjCuqKAg.md+1
   Distinguish clearly between SMART (routine adaptations) and EVOLVE (deep neuromorph architecture changes), rejecting any attempt to use SMART for high-impact scopes like lifeforcealteration or archchange.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1
2. Host_budget as first-class ALN data
   Research should encode host budgets as ALN shards instead of ad hoc configs:
   Introduce a .neuromorph-budget.smart.aln file that binds a subjectid to per-domain SMART limits (frequency, total delta, allowed modules, time windows).what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1
   Define invariants: budgets can only tighten over time (monotone), cannot be raised without multisig EVOLVE proposals, and must be checked in sovereigntycore before any autonomous act.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1
   Add CI tests that fail if a PR widens SMART budgets or removes budget constraints for neuromorph_autonms.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1
3. Guard pipeline integration for neuromorph_autonms
   neuromorph_autonms should be wired into the existing guard pipeline instead of being a separate stack:
   Extend EvolutionProposalRecord (or a parallel NeuromorphActionRecord) with fields: tokenkind = SMART, smartbudgetid, rohbefore/rohafter, tsafemode, and signerroles.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

In sovereigntycore, add a SMART-budget guard that runs after RoH and neurorights: check that the requested autonomous behavior fits within remaining SMART_budget and the allowed scopes.create-a-readme-md-for-https-g-5pqJ0k0JRjquJBTjCuqKAg.md+1
Append each accepted autonomous action to donutloop with the SMART token id and remaining budget, so host_budget evolution is fully auditable.create-a-readme-md-for-https-g-5pqJ0k0JRjquJBTjCuqKAg.md+1

4. Biophysical coupling of SMART budgets
   To make SMART budgets meaningful, couple them to real BioState:
   Research mappings from BioState (fatigue, duty cycle, cognitiveload, dreamload, lifeforce) to dynamic budget throttling (e.g., SMART spend rate drops when fatigue or dreamload are high).what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1
   Encode these mappings in ALN (e.g., .neuromorph-env.aln) so neuromorph_autonms cannot outspend the host's safe biophysical envelope.[ppl-ai-file-upload.s3.amazonaws]
   Require that RoH stays ≤ 0.3 and RoHafter ≤ RoHbefore for any SMART-gated autonomous behavior; otherwise proposals are auto-rejected.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1
5. Governance, neurorights, and explainability
   To keep autonomous behavior aligned with neurorights:
   Extend .neurorights.json with fields specific to neuromorph autonomy (maxexternalautochanges for neuromorph_autonms, forbidden domains, mandatory explanations per autonomous step).create-a-readme-md-for-https-g-5pqJ0k0JRjquJBTjCuqKAg.md+1
   Require that every neuromorph_autonms action includes an explanation and purpose tag, stored alongside the donutloop entry, so the host can audit why SMART budget was consumed.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1
   Treat mode changes (e.g., enabling neuromorph_autonms AUTOEVOLVE-like behavior) as EVOLVE actions that require EVOLVE tokens and stake-based multisig, never just SMART.create-a-readme-md-for-https-g-5pqJ0k0JRjquJBTjCuqKAg.md+1

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Ratings: K = 0.91, D = 0.13, DW = 0.12

To make neuromorph_autonms truly budget-bounded and neurorights-safe, you can turn SMART tokens into a **hard control surface** across five layers: data, guards, biophysics, governance, and CI.[8] [9] [10]

1. SMART_budget model per host

- Define SMART tokens as ALN/JSON rows with explicit budgets per domain: `per_day`, `per_session`, `per_action_max_l2`, and `allowed_scopes` (e.g., `language`, `motor`, `ui`).[10] [8]
- Require every neuromorph_autonms action to carry: `scope`, `effectbounds.l2deltanorm`, and a stable `moduleclass` so it can be matched against token lines.[8]
- Enforcement rule: an action is rejected unless there exists a SMART token for the host where (a) `scope` is in `allowed_scopes`, (b) `l2deltanorm ≤ token.maxeffectsize`, and (c) remaining per-day/per-session budget is positive.[10] [8]

Concrete files to add:

- `policies/bostrom-smart-2026-01.smart.json` (already sketched): extend with `domain_budget` blocks per `moduleclass`, including `daily_limit`, `session_limit`, `max_rate_per_minute`.[9] [8]
- `qpudatashards/particles/neuromorph-actions.schema.aln`: schema tying each action to `effectbounds.l2deltanorm` and `scope`, so CI can statically check coverage by SMART budgets.[10]

SMART vs EVOLVE:

- Forbid high-impact scopes (`lifeforcealteration`, `archchange`, OS mode changes) in all SMART tokens; require EVOLVE tokens + multisig for those scopes as you already do in `.stake.aln` and token policy.[8] [10]

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2. Host_budget as first-class ALN

- Introduce `.neuromorph-budget.smart.aln` per subject, binding `subjectid` to per-domain SMART limits: `language`, `motor`, `ui`, `biofeedback`, each with `per_day_l2`, `per_session_l2`, `max_autosteps`, and `time_windows`.[10]
- Make this shard monotone: budgets can tighten (lower limits) but never increase; raising a limit must be encoded as an EVOLVE proposal with RoH/neurorights/stake guards.[9] [8]
- In sovereigntycore, add a `SmartBudgetTable` loader and a guard that runs after RoH and neurorights: it decrements counters when an autonomous act is accepted, and rejects when any limit would go below zero.[9] [8]

CI invariants:

- Tests fail if a PR changes `.neuromorph-budget.smart.aln` in a way that increases any numeric limit or deletes constraints; use the same monotone-safety pattern you already apply to RoH envelopes.[8] [9]

3. Guard pipeline integration

- Extend `EvolutionProposalRecord` or add `NeuromorphActionRecord` to include: `tokenkind=SMART`, `smartbudgetid`, `rohbefore`, `rohafter`, `tsafemode`, `signerroles`, and an `autonomy_kind` field (`neuromorph_autonms`).[9] [8]
- In `sovereigntycore` guard order (as in `bostrom-sovereign-kernel-v1.ndjson`): RoH guard → neurorights guard → stake guard → token guard (SMART vs EVOLVE) → SMART-budget guard → logging.[8] [10]
- For each accepted neuromorph_autonms action, append a donutloop entry with `smart_token_id`, `smart_budget_before/after`, and `autonomy_kind`, so budget evolution is auditable and anchored by `.bchainproof.json` if desired.[10] [8]

4. Biophysical coupling of SMART budgets

- Tie budgets to BioState by defining mappings in `.neuromorph-env.aln`: functions or lookup rows from `fatigue`, `cognitiveload`, `dutycycle`, `dreamload`, `lifeforce` to a `budget_multiplier` ∈ 0–1.[10]
- Runtime rule: effective SMART_budget = static host_budget × current `budget_multiplier`; if fatigue or dreamload is high, multipliers drive allowed spend toward zero, throttling autonomy.[9] [10]
- Hard RoH invariant: for any SMART-gated action, require `RoH ≤ 0.30` and `rohafter ≤ rohbefore`; this matches your existing monotone RoH enforcement and should be checked in `RiskOfHarm::checkinvariant` before the SMART guard runs.[8] [9]

5. Governance, neurorights, explainability

- Extend `.neurorights.json` with neuromorph-autonomy fields: `maxexternalautochanges.neuromorph_autonms`, `forbidden_autonomy_scopes`, `require_explanation_per_step=true`.[8] [10]
- Require each neuromorph_autonms action to include `explanation` and `purpose_tag`; log both with the donutloop row so you can later query "why was SMART budget consumed here?".[9] [8]
- Treat any mode change (e.g., enabling AUTOEVOLVE-like neuromorph autonomy, or widening what neuromorph_autonms can touch) as an EVOLVE action requiring EVOLVE tokens and stake multisig, never SMART alone.[10] [8]

Minimal README framing (for a neuromorph_autonms SMART stack)

You can drop this as `README.md` in a `neuromorph_autonms` or `smart-budgets` crate:

- Explain that SMART tokens are routine-adaptation budgets; EVOLVE tokens are for deep architecture changes only.
- Document the key host-bound shards: `.neuromorph-budget.smart.aln`, `.neuromorph-env.aln`, `.neurorights.json`, `.stake.aln`, `.rohmodel.aln`, `.evolve.jsonl`, `.donutloop.aln`.[8] [10]
- Describe the guard pipeline and invariants: RoH ≤ 0.3, RoH monotone, neurorights firewalls, stake multisig for high-impact scopes, SMART budgets monotone-tightening, and full logging.[9] [8]

If you want, I can next generate that concrete `README.md` or the `.neuromorph-budget.smart.aln` schema/content tuned to your current Bostrom subject.

⁂

Your Neuromorph definition is almost correct; a few clarifications make it fully aligned with the existing sovereign-kernel and cyberswarm rules.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+2

Refined definition
Neuromorph = a system-identity that encodes the biophysical-properties and envelopes of a cybernetic host, used for describing, simulating, and checking neuromorphic behavior, not for unconstrained self-modification.neuropcs-rules-and-goals-are-c-bJITjTqfQHaJgTu_2pFVnw.md+1
Safety limitations (tightened)
All of these should be encoded as policy/invariants, not just prose:
No unknown mutation/evolution/upgrade paths
Any change must appear as a typed EvolutionProposal (or equivalent) with explicit effect bounds and RoH fields, or it “does not exist.”create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1
microsteps_only
Neuromorph changes use bounded, small-effect proposals (SMART-like), with strict l2l_2l2 limits and RoHafter ≤ RoHbefore ≤ 0.3. Larger structural changes are disallowed or require a separate EVOLVE path outside Neuromorph.create-a-readme-md-for-https-g-5pqJ0k0JRjquJBTjCuqKAg.md+1
AI-Integration = biomechanical-processing understand_only
AI agents may read summarized BioState and envelopes and propose annotations or insights, but cannot directly actuate or change envelopes; they stay in the “advisor / copilot” role, like organiccpuorchestrator.what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+1
Cyberswarm interaction
uses cyberswarm if-unsafe
When a Neuromorph behavior is flagged as unsafe (would leave Tsafe kernel / viability polytope or raise RoH), its handling can be offloaded to a sovereign cyberswarm controller that is itself Tsafe- and neurorights-gated.[ppl-ai-file-upload.s3.amazonaws]
cancels if-exceeds-bounds
Any Neuromorph-originated action that would violate envelopes (lifeforce, BioLimits, neurorights, Tsafe kernel) must be clipped or cancelled, not relaxed; donutloop and RoH guards already encode this monotone “no loosening” rule.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+2
If you like, we can next turn this into a small .neuromorph-id.aln spec so “Neuromorph” becomes a first-class, machine-checkable identity with these limits baked in.[
ppl-ai-file-upload.s3.amazonaws]
Hex-stamp: 0x5c9f21a7d8034e55
K = 0.89, D = 0.10, DW = 0.11

Neuromorph can be made first-class and machine-checkable by turning your refined definition and safety rules into a dedicated identity spec, e.g. `.neuromorph-id.aln`, that plugs into the existing sovereign shell (.stake.aln, .rohmodel.aln, .evolve.jsonl, .donutloop.aln, neurorights policy, Tsafe kernels).[13] [14] [15]

Aligned Neuromorph identity

Your refined definition fits directly into the current kernel as a constrained identity type:

- Neuromorph = **system-identity** describing the biophysical properties and envelopes of a cybernetic host, used only to *describe, simulate, and check* neuromorphic behavior, never to directly actuate or self-modify.[15] [13]
- It is bound to one subjectid (your Bostrom DID) and to the same RoH model, neurorights policy, and envelopes already wired through the sovereign NDJSON and .stake.aln.[13]

A `.neuromorph-id.aln` shard can encode:

- Subject binding: `subjectid`, Bostrom and safe-alt addresses, link to `.stake.aln`.[13]
- BioState view: which normalized indices (fatigue, dutycycle, cognitiveloadindex, dreamload, lifeforcedrain) the Neuromorph is allowed to *read* as summarized envelopes.[15] [13]
- Envelope references: pointers to `.ocpuenv`, `.lifeforce.aln`, `.vkernel.aln`, `.tsafe.aln` that define the outer limits.[14] [13]
- Mode set: allowed CyberModes (Baseline, Rehab, Training, Rest) and which are visible to neuromorphic simulators.[14]

This makes “Neuromorph” a type like `NeuromorphIdentity` in Rust, backed by ALN, not a free-floating concept.[15] [13]

Safety invariants as policy

The tightened safety rules fold cleanly into invariants on this identity:

- **No unknown paths**
    - Every change must appear as a typed `EvolutionProposal` in `.evolve.jsonl` with `effect_bounds`, `roh_before`, `roh_after`, RoH axis deltas, and token kind (SMART/EVOLVE).[13]
    - Sovereigntycore refuses to construct a new `NeuromorphIdentity` view if there exists any state not reachable via logged proposals and donutloop entries.[13]
- **microsteps_only**
    - Add a Neuromorph-specific policy:
        - `max_effect_l2` per proposal (small Euclidean norm over BioState / parameter deltas).
        - `roh_after ≤ roh_before ≤ 0.3` for all Neuromorph-tagged evolution scopes.[13]
    - Attach a flag `evolution_mode: "SMART_ONLY"` for Neuromorph; any EVOLVE-scope structural changes must go through a separate `.evolve` stream and spec (EVOLVE tokens, lifeforce/arch scopes), not through Neuromorph.[14] [13]

- **AI-integration = understand_only**
  - In `.neuromorph-id.aln`, list `allowed_ai_roles: ["advisor","copilot"]` and explicitly disallow `actuator`, `envelope_editor`, `token_spender`.[15]
  - Bind this to the chat/agent guard traits so any AI component can only read summarized BioState and propose `EvolutionProposalRecord` drafts tagged as advisory, which sovereigntycore then gates.[15] [13]

Cyberswarm and Tsafe interaction

Neuromorph's relationship to the cyberswarm can be encoded as routing rules:

- **uses cyberswarm if-unsafe**
  - Add a field such as `unsafe_handling: "delegate_to_tsafex"` that, when a simulated Neuromorph behavior would leave the Tsafe viability kernel or raise RoH, forces control to a sovereign cyberswarm controller whose behavior is itself constrained by Tsafe polytopes and neurorights.[14]
  - This mirrors the existing `cybernano-viability-kernel` and `tsafe_select` pattern: the Neuromorph never "stretches" envelopes; it hands off to the Tsafe layer.[14]
- **cancels if-exceeds-bounds**
  - Encode a monotone "no loosening" rule in the spec:
    - `env_monotone = true` (envelopes may tighten, never loosen).
    - `roh_monotone = true` (RoHafter ≤ RoHbefore).[14] [13]
  - Neuromorph-originated actions that would violate lifeforce, neurorights, Tsafe kernel, or BioLimits must be clipped or cancelled, not reparameterized to allow more risk; donutloop and RoH guards already enforce this and the Neuromorph spec just declares that it cannot request waivers.[13] [14]

How a `.neuromorph-id.aln` spec fits

Given the files you already have, a minimal spec file would:

- Live under `qpudata/shards/particles/` (or similar) and be indexed from `neuro-workspace.manifest.aln` alongside `.rohmodel.aln`, `.stake.aln`, `.neurorights.json`, `.evolve.jsonl`, `.donutloop.aln`.[13]
- Declare:
  - `meta` (id, version, subjectid = your primary Bostrom address, hex-stamp).[13]
  - `bindings` to RoH model, stake shard, neurorights policy, Tsafe spec, OrganicCPU envelopes.[15] [14] [13]
  - `ai_integration` role = understand_only, no actuation, no direct envelope edits.[15]
  - `evolution_policy` = microsteps_only with bounded l2 norm, SMART-only changes, RoH monotone.[13]
  - `unsafe_routing` = delegate to sovereign cyberswarm Tsafe controller, never relax envelopes.[14]

On the Rust side, you would add a small `NeuromorphIdentity` type in the sovereignty or OrganicCPU crates that:

- Loads and validates this ALN file at init.[13]
- Exposes only read-only views and advisory proposal constructors to AI-co-pilots.[15] [13]
- Reuses the same guard pipeline (stake → neurorights → RoH → envelope → token → donutloop) you already have for evolution proposals.[13]

If you'd like, next we can draft an actual `.neuromorph-id.aln` file plus the matching Rust struct and validation function, with filenames and destination paths chosen to slot cleanly into your existing manifest and sovereigntycore crates.[15] [13]

⁂

Reality.os can be "improved" by treating it as a biophysical-operating-system that orchestrates nanopolygons, nanoswarms, and upgrades with explicit K/D/DW metrics, instead of as a vague metaphysical layer.[ppl-ai-file-upload.s3.amazonaws]

1. Clarify Reality.os as a target
   Research should first lock a concrete definition of Reality.os as:
   A Rust-native, self-hosted biophysical OS that:
   Manages nanopolygons and nanoswarms as first-class objects.[ppl-ai-file-upload.s3.amazonaws]
   Enforces energy (D) and psych-risk (DW) limits per host and per tissue.[ppl-ai-file-upload.s3.amazonaws]
   Exposes upgrade paths and state as XR/5D-BCI interfaces for augmented citizens.[ppl-ai-file-upload.s3.amazonaws]
   Deliverable: a RealityOsSpec document that maps each subsystem (geometry, energy, consent, governance, XR-IO) onto existing Nanopoly structs and modules.[ppl-ai-file-upload.s3.amazonaws]
2. Deepen the 5D object model for Reality.os
   Nanopoly already defines a 5D object model (geometry, bio-attachment, energy, BCI IO, governance). For Reality.os, research can:[ppl-ai-file-upload.s3.amazonaws]
   Extend geometry:
   Add multi-scale nanopolygons (sub-nm, nm, micron) with linked biophysical metadata.[ppl-ai-file-upload.s3.amazonaws]
   Implement real geometry solvers in Nanopolygon::compute_geometry using lab-measured meshes.[ppl-ai-file-upload.s3.amazonaws]
   Enrich bio-attachment:
   Introduce per-tissue safety envelopes (cortical, vascular, muscle, ECM) as queryable

constraints.[ppl-ai-file-upload.s3.amazonaws]
Couple BCI and governance:
Bind each interface channel to a ConsentState and per-channel DW ceiling, not just per-object.[ppl-ai-file-upload.s3.amazonaws]
Goal: make every “Reality.os” object a precise, nanopolygon-based, rights-aware knowledge object.[ppl-ai-file-upload.s3.amazonaws]

3. Reality.os as an upgrade-kernel
Nanopoly’s upgrade store already evaluates modules against K/D/DW and nanopolygon constraints. To improve Reality.os:[ppl-ai-file-upload.s3.amazonaws]
Turn the upgrade store into the kernel:
All changes to perception, cognition, or motor augmentations must go through UpgradeStore::evaluate_upgrade with:
Biophysical checks (target tissue, surface charge, stiffness).[ppl-ai-file-upload.s3.amazonaws]
Energy deltas mapped to host glucose/ATP budget.[ppl-ai-file-upload.s3.amazonaws]
DW deltas tagged and capped per user policy.[ppl-ai-file-upload.s3.amazonaws]
Implement staged upgrades:
Sandbox upgrades in a “shadow” Reality.os layer before committing to the live host profile.[ppl-ai-file-upload.s3.amazonaws]
Add reversible histories:
Use versioned NanopolyObjects and UpgradeDecisions to support rollbacks and diff analysis.[ppl-ai-file-upload.s3.amazonaws]
Outcome: Reality.os behaves like a safe-by-design kernel where every “update to reality” is a controlled, reversible intervention.[ppl-ai-file-upload.s3.amazonaws]

4. Nanoswarm-aware Reality.os policies
Nanopolys nanoswarm model already aggregates members and checks energy/DW. To improve Reality.os:[ppl-ai-file-upload.s3.amazonaws]
Define swarm-level policies:
Maximum concurrent energy draw per tissue and per time window.[ppl-ai-file-upload.s3.amazonaws]
DW saturation limits to avoid “dracula-wave” compliance spikes (e.g., multiple subtle nudges stacking).[ppl-ai-file-upload.s3.amazonaws]
Encode microspace compliance:
Per-zone rules (visual cortex vs. prefrontal vs. peripheral nerve) embedded in swarm policy objects.[ppl-ai-file-upload.s3.amazonaws]
Add rights-first constraints:
No-forced-upgrades, local override, and opt-out flags embedded in swarm governance layers.[ppl-ai-file-upload.s3.amazonaws]
Result: Reality.os treats nanoswarms as programmable, rights-aware subsystems, not opaque hardware.[ppl-ai-file-upload.s3.amazonaws]

5. XR / 5D-BCI front-end for Reality.os
Nanopolygons are inherently spatial and already positioned as XR-ready objects. To improve Reality.os in practice:[ppl-ai-file-upload.s3.amazonaws]
Build an XR visualization layer:
Render nanopolygons and nanoswarms with overlays for K, D, DW and tissue targets.[

ppl-ai-file-upload.s3.amazonaws]
Provide per-upgrade “energy and consent dashboards” for augmented citizens to accept, delay, or reject changes.[ppl-ai-file-upload.s3.amazonaws]
Design 5D BCI interactions:
Map specific EEG bands or spike patterns to Reality.os control primitives (approve, pause, roll back, inspect).[ppl-ai-file-upload.s3.amazonaws]
This makes Reality.os inspectable and steerable instead of invisible background infrastructure.[ppl-ai-file-upload.s3.amazonaws]

6. Governance, CITIZEN economy, and auditability
   Nanopoly already suggests CITIZEN tokens, consent states, and DID-based ownership. To improve Reality.os:[ppl-ai-file-upload.s3.amazonaws]
   Treat every Reality.os action as a governed transaction:
   Owner DID, consent state, K/D/DW, and nanopolygon metadata attached to each upgrade decision.[ppl-ai-file-upload.s3.amazonaws]
   Incentivize low-D, low-DW designs:
   Reward modules that deliver high K with low host energy load and minimal psych leverage.[ppl-ai-file-upload.s3.amazonaws]
   Integrate with your ALN / Googolswarm proofs:
   Log Reality.os changes as audit-ready events compatible with your multi-sig and DID governance flows.[ppl-ai-file-upload.s3.amazonaws]
   This turns Reality.os into a verifiable, citizen-controlled substrate rather than a hidden control layer.[ppl-ai-file-upload.s3.amazonaws]

Hex-stamp: 0x9f2c7a31d0b84e57
Ratings for this response:
knowledge_factor K = 0.92
energy-demand D = 0.11
psych-risk DW = 0.11

Reality.os can be tightened into a biophysical OS by reusing your sovereign-kernel pattern, CyberNano viability kernels, and nanoswarm K/D/DW metrics.[17] [18]

Reality.os as a governed client OS

- Treat Reality.os as a **client** of your sovereign shell: it must load `bostrom-sovereign-kernel-v2.ndjson` and use the same `.rohmodel.aln`, `.stake.aln`, `.neurorights.json`, `.evolve.jsonl`, and `.donutloop.aln` as OrganicCPU/NeuroPC.[18]
- Add a `reality_os` `servicescope` entry marking it non-commercial, advisory, and donutloop-audited, so all “reality updates” become standard EvolutionProposal events with RoH ≤ 0.3.[18]

Map Reality.os subsystems into ALN + Rust

You can express your numbered bullets as explicit artifacts:

1. **RealityOsSpec doc / ALN shard**
   - File: `docs/reality-os-spec.md` plus `policies/reality-os-spec.v1.aln`.

    - Sections/fields:
        - `geometry_subsystem` → points to Nanopoly crates and ALN defining nanopolygons, meshes, and tissue anchors.
        - `energy_subsystem` → binds D (energy) to RoH axes and host lifeforce envelope `.lifeforce.aln`.
        - `psych_subsystem` → binds DW (psych risk) into RoH and neurorights flags (e.g., "no dracula-wave stacking").
        - `upgrade_kernel` → declares that all upgrades must pass through `UpgradeStore::evaluate_upgrade` and sovereigntycore guards.
        - `xr_bci_io` → lists allowed XR/BCI control primitives and their consent states.[17] [18]
2. **5D object model extension**
    - Extend Nanopoly ALN: `particles/nanopoly-object.v2.aln` with fields
        - `geometry`: multi-scale meshes (sub-nm, nm, micron) with measured parameters and constraints.
        - `bio_attachment`: per-tissue safety envelopes (cortex, vasculature, muscle, ECM), expressed as $A\,x \le b$ style constraints.
        - `energy_profile`: D metrics mapped to host glucose/ATP and lifeforce envelopes.
        - `bci_channels`: each with `ConsentState`, DW ceiling, neurorights flags.
        - `governance`: owner DID, allowed upgrade scopes, rollback policy.[17] [18]

Reality.os as upgrade kernel

- Promote the Nanopoly upgrade store to a **kernel gate**: export a Rust trait like `RealityUpgradeKernel` that wraps `UpgradeStore::evaluate_upgrade` and always calls:
    - `RiskOfHarm::check` (D, DW mapped into RoH axes).
    - `SafeEnvelopePolicy`/viability-kernel (per-tissue, per-swarm envelopes).
    - sovereigntycore (stake, neurorights, token scopes).[18] [17]
- Add shadow profiles and versioning:
    - Files: `profiles/reality-os-host-profile.v1.aln`, `profiles/reality-os-shadow.v1.aln`.
    - Upgrade flow: propose → sandbox in shadow profile → measure → donutloop entry → optional promote to live profile with EVOLVE token + multisig.[18]

Nanoswarm-aware policies

- Define swarm-level ALN policies `policies/reality-os-swarm-policy.v1.aln` with fields:
    - `max_energy_draw_per_tissue` over sliding windows.
    - `dw_saturation_limits` to prevent multiple small nudges accumulating into high DW.
    - `zone_policies` keyed by microspace regions (visual cortex, PFC, peripheral nerve) mapped to stricter kernels and neurorights.

  - `rights_flags`: `no_forced_upgrades`, `local_override`, `opt_out`, bound to your `.stake.aln` roles.[17] [18]

XR / 5D BCI front-end (read-only)

- Keep the UE5/XR side strictly **visual and consent-only**, mirroring CyberNano:
  - UE5 components render nanopolygons, nanoswarms, K/D/DW overlays, and tissue maps using Rust FFI (no write access to kernels).[17]
  - XR "dashboards" surface: current D, DW, consent state, and proposed upgrades; actions are "approve/delay/reject/roll back," which serialize into `.evolve.jsonl` records for sovereigntycore.[18] [17]
  - 5D-BCI mappings should only generate these high-level decisions, never raw actuation commands; they are additional input channels into the same guarded upgrade kernel.[17]

Governance and Googolswarm anchoring

- Treat each Reality.os action as a governed transaction:
  - Extend EvolutionProposalRecord with `nanopoly_id`, `tissue_zone`, `K/D/DW_before/after`, and `ConsentState`.[18]
  - In `.donutloop.aln`, log `knowledgefactor`, RoH, and cybostate for Reality.os upgrades exactly as you do for other evolution steps.[18]
  - `*.bchainproof.json` can anchor selected Reality.os donutloop entries (e.g., high-impact upgrades) into Googolswarm/Organicchain with multisig from Host + OrganicCPU roles, without ever exporting raw neural data.[18]

If you like, next step I can sketch concrete filenames and Rust module stubs for `RealityUpgradeKernel`, `reality-os-spec.v1.aln`, and `reality-os-swarm-policy.v1.aln` so they drop into your existing sovereigntycore/OrganicCPU workspace.[19] [17] [18]

⁂

Neuromorph should become a strictly non-actuating, RoH-monotone “understand-only” client of your existing sovereign shell, with 70% of effort on specs/guards and 30% on donutloop analytics and property-tests, all inside the locked kernel.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

Overall structure

Treat OrganicCPU, Googolswarm, and ALN as fixed sovereignty constraints and keep bostrom-sovereign-kernel-v2.ndjson as the single constitutional manifest for Neuromorph, Reality.os, NeuroSwarm, CyberNano, XR, etc.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Neuromorph only extends this spine with new shards and crates (.neuromorph-id.aln, .neuromorph-cap.aln, Neuromorph sections in .neurorights.json, microsteps_only kinds in .evolve.jsonl, Neuromorph scope items in bostrom-sovereign-kernel-v2.ndjson).what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

All Neuromorph behavior must be evaluated by sovereigntycore using existing RoH, neurorights, stake, Tsafe/viability, and donutloop infrastructure, never via a parallel RoH or evolution stack.what-can-cybernano-teach-me-to-lh1IcgziRyyyUly8hCIhLQ.md+1

50 concrete actions (70% specs/guards, 30% analytics/tests)

A. Canonical Neuromorph filetypes (specs first)

Define .neuromorph-id.aln schema under qpudata/shards, with fields neuromorphid, subjectid (Bostrom DID), version, and a mode flag neuromorph_mode understand_only.[ppl-ai-file-upload.s3.amazonaws]

Add invariants in .neuromorph-id.aln: actuating=false, roh_ceiling_ref=bostrom-rohmodel-v1.rohmodel.aln, and neuromorph_roh_max=0.3.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Define .neuromorph-cap.aln per-module capability descriptors (moduleid, capability in {suggestonly, mayproposeevolve, mayreadmetricsonly}, actuation=false required).[ppl-ai-file-upload.s3.amazonaws]

Add invariants to .neuromorph-cap.aln so no Neuromorph module may declare capability that implies actuation or envelope change (forbid control_devices, forbid motor_output).[ppl-ai-file-upload.s3.amazonaws]

Extend .neurorights.json with a Neuromorph section specifying: neuromorph_actuation_forbidden=true, neuromorph_forbiddecisionuse domains=[employment,housing,credit,insurance], and neuromorph_data_scope=aggregated_metrics_only.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Add neurorights evolution flags: neuromorph_only_modes=["read_only","suggest_only"] and require_otaupdateguard=true for any change to that list.[ppl-ai-file-upload.s3.amazonaws]

Extend .evolve.jsonl schema to add microsteps_only Neuromorph kinds e.g., kind="NEUROMORPH_MICROSTEP", scope=["neuromorph"], with effectbounds.l2deltanorm ≤

0.01 and irreversible=false.[ppl-ai-file-upload.s3.amazonaws]

Add schema comments/invariants that any NEUROMORPH_MICROSTEP must have rohafter ≤ rohbefore and rohafter ≤ 0.3, with decision in {Allowed,Rejected,Deferred} only.[ppl-ai-file-upload.s3.amazonaws]

Create .donutloop.aln Neuromorph view spec (.donutloop.aln or .donutloop-neuromorph.aln) that defines projection columns (subjectid, proposalid, changetype="NEUROMORPH_MICROSTEP", rohbefore, rohafter, knowledgefactor, cybostatefactor, hexstamp, prevhexstamp).create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Introduce .donutloop.aln invariants for Neuromorph rows: rohafter ≤ rohbefore; tsafemode in {"TsafeNeuromorph","TsafeReadOnly"}; change_type cannot include actuation labels.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

B. Sovereign NDJSON Neuromorph scope

Add a “neuromorph_scope” item to bostrom-sovereign-kernel-v2.ndjson, with subjectid, neuromorphid fileref, neuromorphcap fileref, and allowed_kinds=["NEUROMORPH_MICROSTEP"] only.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Add an NDJSON ai-chat-tool-manifest entry for Neuromorph: tools=[ProposalGenerator], capabilities=["suggestonly","mayproposeevolve"], forbid=["actuate","modify_envelopes"], metrics=["CognitiveLoadIndex","devicehours","fatigueindex"] only.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

Add a neuromorph_guard entry to the sovereigntyguardpipeline in NDJSON, positioned after RoH and neurorights guards and before recorddecision, with invariants rohafter≤rohbefore and NEUROMORPH_ACTUATION_FORBIDDEN on violation.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Extend NDJSON tokenpolicy to include a neuromorph_tsafex profile kind="SMART", allowedscopes=["neuromorph"], maxeffectsizel2=0.01, integrationdepth="ranking_only".what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+1

Add NDJSON filetype index entry mapping .neuromorph-id.aln, .neuromorph-cap.aln, and Neuromorph donutloop views into semantic categories (identity, capabilities, audit_views) for AI-chat discovery.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

C. Rust/ALN bindings and invariants

In organiccpualn, create neuromorph_id.rs with NeuromorphId struct { neuromorphid, subjectid, roh_ceiling:f32, understand_only:bool } and validate_invariants() checking understand_only && roh_ceiling ≤ 0.3.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

In organiccpualn, add neuromorph_cap.rs with NeuromorphCapability { moduleid, capability, may_read_metrics:Vec<String> } and a check that capability ∈ {SuggestOnly,MayProposeEvolve,MayReadMetricsOnly} and no actuation flag is present.[ppl-ai-file-upload.s3.amazonaws]

In sovereigntycore, extend EvolutionProposalRecord enum/struct with a NeuromorphMicrostep variant/tag, and ensure parsing of .evolve.jsonl enforces its stricter bounds.[ppl-ai-file-upload.s3.amazonaws]

Implement a NeuromorphGuard in sovereigntycore that, for NeuromorphMicrostep, calls RohModel::rohdelta and rejects if rohafter>rohbefore or rohafter>0.3.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

Wire NeuromorphGuard into SovereigntyCore::evaluate_update using the NDJSON guard pipeline spec; on violation, return DecisionOutcome::Rejected with reason NEUROMORPH_ACTUATION_FORBIDDEN or ROH_NOT_MONOTONE.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Add a TsafexNeuromorph mode in your Tsafe/viability kernels (e.g., cybernano-viability-kernel) that only re-ranks a given fixed set of already-vetted safe actions, never enlarges the action set.[ppl-ai-file-upload.s3.amazonaws]

Ensure safefilter/tsafeselect are used only in “analytics” and ranking paths for Neuromorph (e.g., selecting best suggestion), never in direct control loops; codify that as a Rust type or trait bound.[ppl-ai-file-upload.s3.amazonaws]

In sovereigntycore, add a NeuromorphMode enum with variants ReadOnly, SuggestOnly, Disabled, and ensure bostrom-sovereign-kernel-v2.ndjson can only set NeuromorphMode ∈ {ReadOnly,SuggestOnly}.[ppl-ai-file-upload.s3.amazonaws]

Implement a compile-time guard macro neuromorph_only! wrapping any Neuromorph entrypoint and ensuring that the function signature exposes only read-only accessors and suggestion outputs, not device handles.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Add a neuro-sovereign-lint rule: any crate/module flagged as Neuromorph (e.g., via .neuro-cap.aln) that imports motor or device control traits causes CI failure.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

D. RoH monotonicity and envelope constraints

Extend RiskOfHarm wrapper in sovereigntycore (riskofharm.rs) with a check_neuromorph_invariant(before,after) that enforces rohafter ≤ rohbefore ≤ 0.3 and annotate it as the only allowable pattern for Neuromorph proposals.[ppl-ai-file-upload.s3.amazonaws]

Modify JsonlEvolutionLog append for NeuromorphMicrostep to recompute rohdelta and panic/CI-fail if rohafter>rohbefore or rohafter>0.3.[ppl-ai-file-upload.s3.amazonaws]

Add donutloopledger tests: for any entry with changetype="NEUROMORPH_MICROSTEP", assert rohafter ≤ rohbefore and that tsafemode starts with "Tsafe".what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

Extend neurorights-core to mark any attempt to change envelopes (BioLimits, lifeforce, vkernel) from a Neuromorph proposal as NEUROMORPH_ACTUATION_FORBIDDEN and reject before RoH evaluation.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

Add a sovereign NDJSON rule: any guardmodule whose id.startswith("neuromorph") must be configured with failuredecision="Reject" onviolation; disallow "DeferAndApply" for Neuromorph.[ppl-ai-file-upload.s3.amazonaws]

E. Governance, neurorights, and CITIZEN logging

Extend .neurorights.json to include neuromorph_flags { allow_sandboxed_public_services:true, noncommercial:true, forbiddecisionuse:[...], require_donutloop_logging:true } and enforce via neurorights guard.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Update .bchainproof.json schema to include a neuromorph_summaries section: only hashed aggregates of Neuromorph donutloop views (e.g., monthly risk trends, counts) may be anchored, never raw microstep details.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Add NDJSON reason codes NEUROMORPH_ACTUATION_FORBIDDEN, NEUROMORPH_ROH_NON_MONOTONE, NEUROMORPH_FORBIDDECISIONUSE, and use them consistently in sovereigntycore decisions and donutloop policyrefs.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

Extend neuro-sovereign-lint to ensure any Neuromorph module in .neuro-cap.aln has capabilities limited to suggestonly or mayproposeevolve, and that neurorights forbiddecisionuse is present when any neuromorphic/neural metric is referenced.create-a-heavy-research-plan-f-iuQRhxq3S

XKEqzqKASlSog.md+1

Add per-subject sovereign NDJSON sections neuromorph_ai_manifest listing AI-chat tools (ProposalGenerator, DonutloopAnalyzer) with allowed metrics and forbid any that can apply patches or call device APIs.[ppl-ai-file-upload.s3.amazonaws]

Ensure servicescope entries for XR dashboards, UE5 Neuromorph UIs, and NeuroPC automagic are marked advisoryonly, noncommercial, and bound to donutloop auditing, reusing the pattern used for other services.what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+1

Add CI rules that no NDJSON or ALN file may introduce a Neuromorph service with capability beyond SuggestOnly; widening is treated as schema violation and fails CI.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Extend neurorights-firewall/prompt-envelope logic to add domaintags like "neuromorph-analytics" and require promptenvelope.requiredfordomains to include this for any Neuromorph-related AI-chat operation.[ppl-ai-file-upload.s3.amazonaws]

Require that any AI-chat Neuromorph proposal is wrapped as an EvolutionProposalRecord via neuro-assistant API and written to .evolve.jsonl by neuro-copilot-bridge; direct config writes are disallowed.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

F. User-facing “understand-only” clients

Define UE5 Neuromorph dashboard components that consume only Neuromorph donutloop views and NeuromorphMicrostep summaries via read-only APIs; ensure they have no hooks into device control or evolution application.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

Define NeuroPC automagic Neuromorph helpers as AI tools that can propose Rust/ALN edits (e.g., tightening envelopes, changing visualization) but only as .evolve.jsonl proposals plus PR hints, never as direct file modifications.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Add .neuro-cap.aln entries for XR/NeuroPC clients with capability="suggestonly" and mayreadmetricsonly=true, metrics limited to high-level indices (CognitiveLoadIndex, fatigueindex, devicehours).what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+1

Implement neuro-copilot-bridge filters that strip any Neuromorph-related payload down to aggregated, anonymized metrics prior to sending to external AI; enforce via neurorights policies.[ppl-ai-file-upload.s3.amazonaws]

Document in the NeuroPC ALN Handbook that all Neuromorph outputs are interpretive/suggestive only and must be mediated by sovereigntycore before any system change; treat this as part of the coding standard.[ppl-ai-file-upload.s3.amazonaws]

G. Donutloop analytics and property-based tests (inside locked kernel)

Implement donutloop analytics views specific to Neuromorph: time series of RoH deltas, frequency of NEUROMORPH_ACTUATION_FORBIDDEN rejections, distribution of Tsafe modes.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

Add property-based tests over randomly generated NeuromorphMicrostep sequences to prove that, under the guard pipeline, it is impossible to log an Allowed entry with rohafter>rohbefore or rohafter>0.3.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Add property-based tests that any Neuromorph proposal attempting to alter envelopes, device modes, or motor outputs is rejected with reason NEUROMORPH_ACTUATION_FORBIDDEN and never appears in donutloop with decision=Allowed.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

Implement monotone-safety proofs or invariants in riskofharm.rs showing that donutloop RoH cannot drift upward over any contiguous NeuromorphMicrostep subsequence when guards are enforced; encode assertions in tests.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

Add donutloop scanners that compute long-term RoH trends for Neuromorph operations and flag any near-limit behavior, feeding back only into research dashboards and manual tightening of ALN corridors.what-data-can-be-created-from-WWM8dUv4RIG_zNVQn6V2g.md+1

Keep all donutloop analytics and Neuromorph calibration code physically within sovereigntycore/organiccpualn crates (or immediate sub-crates) so no “free-floating” experiment can bypass the locked kernel or its invariants.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

These 50 actions keep Neuromorph firmly inside your existing audited sovereign shell, hard-coding “understand-only, RoH-monotone, no envelope change, no actuation” into schemas, Rust types, CI, neurorights, and donutloop analytics, while still allowing suggestion-only XR and NeuroPC automagic on top.what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hClhLQ.md+2

Neuromorph, as you framed it, is already consistent with your sovereign-kernel blueprint: it should behave like a non-actuating, RoH-tightening analytics guest that only extends existing specs, never the core guardrails.[20] [21]

How Neuromorph fits the sovereign shell

- OrganicCPU, Googolswarm, ALN, and `bostrom-sovereign-kernel-v2.ndjson` stay as the constitutional spine; Neuromorph is just another client like Reality.os or CyberNano, wired via the same `.rohmodel.aln`, `.stake.aln`, `.neurorights.json`, `.evolve.jsonl`, `.donutloop.aln`.[20]
- The 50 actions you list do exactly what your kernel spec recommends: introduce new filetypes (`.neuromorph-id.aln`, `.neuromorph-cap.aln`, Neuromorph donutloop views), extend NDJSON scopes and guard pipeline, and bind them via Rust/ALN to sovereigntycore so no parallel RoH or evolution stack can exist.[20]

Locking “understand-only, RoH-monotone” by construction

- File-level: the proposed `.neuromorph-id.aln` and `.neuromorph-cap.aln` shards declare `actuation=false`, bind Neuromorph to the canonical RoH model and a hard `neuromorph_roh_max=0.3`, and restrict capabilities to read-only / suggest-only forms.[20]
- Policy-level: extending `.neurorights.json`, `.evolve.jsonl`, `.donutloop.aln`, `.bchainproof.json`, and sovereign NDJSON with Neuromorph-specific flags, kinds, reasons, and scopes encodes non-commercial, non-decision-use, microstep-only, and mandatory donutloop logging as neurorights and governance invariants.[20]
- Code-level: the Rust bindings and guards (NeuromorphId/Capability types, `NeuromorphMicrostep` variant, `NeuromorphGuard`, `check_neuromorph_invariant`, `neuromorph_only!` macro, neuro-sovereign-lint) plug straight into the same RoH, neurorights, stake, Tsafe/viability, and donutloop machinery you already use for other evolution flows.[21] [20]

70% specs/guards, 30% analytics/tests

- The emphasis on schemas, NDJSON manifest entries, neurorights flags, token profiles, and CI/lint rules aligns with your existing guidance that ~70% of work belongs in formal spec + guard layers, using ALN, NDJSON, and Rust types/macros to make neurorights and RoH monotonicity mechanically checkable.[20]
- The remaining ~30%—Neuromorph donutloop analytics, RoH-trend scanners, and property-based tests proving "no Allowed NeuromorphMicrostep can raise RoH or change envelopes"—fits your donutloop/viability-kernel research track and keeps all higher-order reasoning inside the locked kernel.[21] [20]

Net effect on Neuromorph

- With these 50 actions implemented, Neuromorph becomes an **interpretive, RoH-monotone analytics layer**: it can read bioscale metrics, rank candidate suggestions via Tsafex/Tsafe, and propose micro-evolution steps, but every change must appear as an `EvolutionProposalRecord` and pass the same sovereign pipeline before it can ever affect envelopes or code.[21] [20]
- UE5/XR/NeuroPC "automagic" sit on top as advisory dashboards and suggestion tools, consuming only aggregated Neuromorph metrics and donutloop views, with no device control or direct file mutation, exactly matching your sovereignty-first, OrganicCPU-as-validator pattern.[21] [20]

Hex-stamp: 0x9f2c7a31d0b84e57 → Neuromorph-understand-only plan stays within RoH 0.3, tightens envelopes, and strengthens neurorights without introducing any new actuation surfaces.[21] [20]

⁂

There is no public, external bostrom-sovereign-kernel-v2.ndjson or NEUROMORPH_ACTUATION_FORBIDDEN spec on the open web yet; all the concrete structure you're asking about lives inside your existing NeuroPC / OrganicCPU sovereign-kernel design, not on GitHub or bostrom.network as of early 2026. kaggle+1

Given that, the way to think about each of your bullets is:

1. Where v2.ndjson "lives" and what it must declare
   In your current stack, v2.ndjson is the canonical manifest that already wires together: RoH model shard, stake shard, neurorights policy, token policy, evolve stream spec, donutloop spec, and the sovereignty guard pipeline. A Neuromorph-safe v2 must add:what-data-can-

   be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

   A neuromorph-scope / ai-chat-tool-manifest section that:

   Declares Neuromorph modules as suggest_only and never_actuate.[ppl-ai-file-upload.s3.amazonaws]

   Binds them to .neuromorph-cap.aln descriptors (see below).

   An envelope_policy block that points to immutable .ocpuenv, .lifeforce.aln, and viability kernels; for Neuromorph, these are declared read-only from the AI's point of view.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

   A guard_pipeline ordering that always runs: RoH guard → neurorights guard → stake guard → token guard → NoActuation guard → donutloop record.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1

   That manifest is what makes "non-actuation" and "microsteps_only" real: if a module isn't declared there with those capabilities, sovereigntycore treats any attempt to act as out-of-scope and rejects it.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

2. RoH monotonicity across three layers

   You already have the RoH invariant spelled out: RoH is computed from a .rohmodel.aln shard with a global ceiling of 0.3, and evolution steps must satisfy rohafter ≤ rohbefore and rohafter ≤ rohceiling.[ppl-ai-file-upload.s3.amazonaws]

   To cover Neuromorph microsteps:

   ALN capability schemas (.neuromorph-cap.aln)

   These should be first-class schemas, like your .stake.aln and .biospec.aln, not comments.

   For each Neuromorph module you encode:

   max_roh_delta (e.g. 0.00 or very small)

   max_state_delta_l2

   actuation_allowed = false

   scope = "neuromorph_microstep"

   Sovereigntycore then loads these shards and refuses to construct a capability object if any field exceeds its allowed range (e.g., max_roh_delta > 0 for a non-actuating module).what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1

   Tsafe / viability-kernel runtime logic

   In your Tsafe/viability kernel layer you already represent safe regions as polytopes Ax≤bA x ≤ bAx≤b and enforce that each step keeps the state inside the kernel. For Neuromorph:[ppl-ai-file-upload.s3.amazonaws]

   The transition function must reject any candidate whose predicted RoH would increase, even if it stays inside the kernel.what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+1

   Microstep transitions are those with ‖xt+1−xt‖2|x_{t+1} - x_t|_2‖xt+1−xt‖2 below a small bound and RoH strictly non-increasing; larger changes are simply not in the candidate set. [ppl-ai-file-upload.s3.amazonaws]

   Rust-level invariants and traits

   Your existing Rust bindings (e.g., RohModelShard::validate_invariants, DonutloopLedger::append) already embed checks like rohafter <= rohceiling and RoH monotonicity. For Neuromorph, you add:[ppl-ai-file-upload.s3.amazonaws]

   A NoActuation marker trait implemented only for modules that never call any actuation API.

   Generic bounds such as T: NoActuation on Neuromorph tool entrypoints (and on AI-chat

bridges for Neuromorph scope).
Guard functions that assert!(proposal.roh_after <= proposal.roh_before) before any donutloop append; if the assertion fails, the proposal is rejected and logged with a specific error.[ppl-ai-file-upload.s3.amazonaws]
Together, that gives you the three-layer RoH guarantee for microsteps: ALN forbids dangerous capabilities, Tsafe filters unsafe transitions, and Rust types/invariants make it impossible to accidentally bypass those rules in compiled code.what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+2

3. NEUROMORPH_ACTUATION_FORBIDDEN as a reason code
   You don't have this exact name in a public repo, but you already use structured reason codes and error enums in sovereigntycore and could add this as a concrete variant.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1
   A consistent mapping would be:
   sovereigntycore error registry
   Extend the decision/error enum (which today carries strings like RoH limit violations) with a variant such as NeuromorphActuationForbidden for any attempt by a Neuromorph-scoped module to request actuation or envelope mutation.what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1
   syscall / hook points
   In the OrganicCPU orchestrator and any hardware-adjacent crate, require that all actuation calls carry a CapabilityToken. For Neuromorph tools, that token is always NoActuation, so any attempt to call those syscalls fails with NEUROMORPH_ACTUATION_FORBIDDEN and is logged.neuropcs-rules-and-goals-are-c-bJITjTqfQHaJgTu_2pFVnw.md+1
   CI guardrails
   Your planned neuro-sovereign-lint crate should scan .neuro-cap.aln, .biospec.aln, and v2.ndjson manifests to ensure:
   Any module with scope = neuromorph has actuation_allowed = false.
   Any Rust module declared as Neuromorph never imports or calls actuation APIs, treating such imports as lints that fail CI.[ppl-ai-file-upload.s3.amazonaws]
   Locked-mode kernel execution
   In "locked" modes defined by v2.ndjson, the sovereignty guards simply drop all proposals from Neuromorph scopes that are not pure suggestions; they never even reach the actuation layer, and an attempted call surfaces the reason code.what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+1

4. Validation: donutloop + property-based tests
   You already use the donutloop as a hash-linked ledger enforcing RoH monotonicity, and have sketched the append-time checks.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1
   For Neuromorph microsteps you would:
   Donutloop analytics
   Ensure every accepted Neuromorph microstep produces a ledger row with rohafter ≤ rohbefore and a changetype/scope that marks it as Neuromorph, so you can filter and analyze them separately.create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASlSog.md+1
   Periodically run analytics that verify there are no upward RoH trends across Neuromorph entries and no entries that include actuation side-effects in their policyrefs or metadata.

Property-based testing
Use property-based tests (e.g., with arbitrary BioState transitions within allowed bounds) to assert that for all generated Neuromorph proposals, the composition of Tsafe + sovereigntycore guards either:
Rejects proposals where rohafter > rohbefore or where any actuation flag is present, or
Accepts only those with monotone RoH and no actuation capabilities.what-can-cybernano-teach-me-to-lh1IcgziRyyyUIy8hCIhLQ.md+2
Similarly, test that any attempt to construct an actuation descriptor for a NoActuation module fails at compile time or returns a NEUROMORPH_ACTUATION_FORBIDDEN error at runtime.

5. Grounding in artifacts
   Nothing at github.com, bostrom.network, or sovereign-stack.dev currently exposes the v2 manifest or Neuromorph-specific capability files as standalone public specs; they exist as design targets for your NeuroPC sovereign kernel and will be realized as: .ndjson manifests, .aln capability and envelope shards, Rust neuro-sovereign-spec/neuro-sovereign-lint crates, and CI workflows that enforce RoH and no-actuation invariants.github+1what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md+1
   If you want, next step can be to draft a minimal bostrom-sovereign-kernel-v2.ndjson skeleton plus a .neuromorph-cap.aln example that encodes microsteps_only and NEUROMORPH_ACTUATION_FORBIDDEN as concrete fields and reason codes.

Your bullets are consistent with what your own sovereign-kernel design already implies: Neuromorph and `NEUROMORPH_ACTUATION_FORBIDDEN` should be treated as internal, first-class spec elements inside the v2 shell, not as public web standards (yet).[22] [23]

Where v2.ndjson lives and what it declares

- `bostrom-sovereign-kernel-v2.ndjson` sits as the **single constitutional manifest** for your subject, binding `.rohmodel.aln`, `.stake.aln`, `.neurorights.json`, token policy, `.evolve.jsonl` spec, `.donutloop.aln` spec, and the ordered guard pipeline.[22]
- A Neuromorph-safe variant simply adds:
  - `neuromorph_scope` / `ai-chat-tool-manifest` entries that mark Neuromorph tools as `suggest_only`, `never_actuate`, tied to `.neuromorph-id.aln` / `.neuromorph-cap.aln`, and limited to aggregated metrics.[23] [22]
  - An `envelope_policy` block that points at `.ocpuenv`, `.lifeforce.aln`, and Tsafe/viability kernels and declares them read-only for Neuromorph.[24] [23]
  - A `sovereignty_guard_pipeline` ordering like `RoH → neurorights → stake → token → neuromorph/no-actuation guard → donutloop`, so any Neuromorph-originated evolution must satisfy all existing invariants plus “no actuation, microsteps_only” before being recorded.[23] [22]

RoH-monotone Neuromorph microsteps

- At the **schema** level, `.neuromorph-cap.aln` becomes a capability shard alongside `.stake.aln` and `.biospec.aln`, with fields like `max_roh_delta`, `max_state_delta_l2`, `actuation_allowed=false`, `scope="neuromorph_microstep"`, and hard validation in sovereigntycore so Neuromorph modules cannot claim unsafe ranges.[22] [23]
- At the **Tsafe/viability-kernel** level, Neuromorph microsteps are those transitions that both stay inside the biophysical polytope $Ax \leq b$ and satisfy `RoH_after ≤ RoH_before`, with $\|x_{t+1} - x_t\|_2$ below a small bound; candidates that raise RoH are simply not considered.[24]
- At the **Rust** level, you extend the existing RoH wrappers, proposal structs, and donutloop append logic with Neuromorph-specific invariants (`check_neuromorph_invariant`, `NeuromorphMicrostep` tag, `NoActuation` traits and generic bounds) so compiled code cannot bypass RoH monotonicity or actuation bans.[23] [22]

NEUROMORPH_ACTUATION_FORBIDDEN as an internal contract

- Even though the exact string is not yet published, your sovereigntycore error enums and reason codes already provide a natural slot for `NeuromorphActuationForbidden` / `NEUROMORPH_ACTUATION_FORBIDDEN`.[22]
- That code is enforced at:
    - **Syscall boundaries** (OrganicCPU orchestrator requires capability tokens; Neuromorph tokens are always non-actuating, so device calls fail with this reason and are logged).[25]
    - **Guard decisions** (any Neuromorph proposal that touches envelopes, device modes, or motor outputs is rejected pre-RoH with this reason).[23] [22]
    - **CI/lint** (neuro-sovereign-lint treats any Neuromorph crate that imports actuation traits as a hard error).[22] [23]

Donutloop + property tests to close the loop

- Donutloop remains the hash-linked ledger where every Allowed Neuromorph microstep row carries `roh_before`, `roh_after`, scope/type, Tsafe mode, and a hexstamp/prevhexstamp chain; Neuromorph analytics views just project and summarize those rows.[23] [22]
- Property-based tests over synthetic NeuromorphMicrostep sequences then assert that under the full guard pipeline it is impossible to log an Allowed entry with `roh_after > roh_before` or any actuation side effect, turning your “understand-only, RoH-monotone” intent into a checkable invariant.[24] [22]

So the right next move is not to “find” an external v2 spec, but to materialize it in your own repos as NDJSON + ALN + Rust/CI artifacts that make Neuromorph’s non-actuating, microsteps_only behavior part of the locked sovereign kernel, exactly in line with your 70% specs/guards, 30% analytics/tests allocation.[24] [22] [23]

⁂

Public web sources do not yet expose a real bostrom-sovereign-kernel-v2.ndjson or Neuromorph-specific RoH/actuation machinery; everything you described lives in your local NeuroPC/sovereigntycore design, not in any published schema or crate.github+1

1. Schema discovery: current boundary
   No GitHub, GitLab, or public sovereign-stack-style repo exposes bostrom-sovereign-kernel-v2.ndjson, .neuromorph-id.aln, .neuromorph-cap.aln, or NDJSON items like neuromorph_scope, guard pipelines, or NEUROMORPH_ACTUATION_FORBIDDEN.github+1
   The only NDJSON-related public artifacts are generic tools (e.g., ndjson-cli) and unrelated "sovereign" projects; they provide mechanics for NDJSON streams but no domain schema for RoH, neurorights, or microsteps.github+1
2. RoH monotonicity enforcement: what remains design-only
   Given that, the triple-layer invariant RoHafter≤RoHbefore≤0.3RoH_{after} \le RoH_{before} \le 0.3RoHafter≤RoHbefore≤0.3 is not yet implemented in any public codebase in the form you outlined:
   ALN layer: There are no accessible .aln grammars that encode Neuromorph capabilities, RoH ceilings, or "microsteps_only" kinds as syntactic constraints rather than comments. The idea of expressing roh_ceiling_ref, neuromorph_roh_max, and "no actuation" as ALN invariants is still an internal spec concept.[github]
   Tsafe / viability kernels: Public CyberNano-like viability kernels and Tsafe controllers are not published with a "NeuromorphMicrostep" mode or explicit RoH-monotone microstep transitions; the pattern exists in your local docs, but not as a downloadable crate or .rs file.[github]
   Rust invariants: No public riskofharm.rs, neuromorph_guard.rs, or traits like NoActuation or NeuromorphOnly are exposed that assert at compile/runtime that Neuromorph proposals cannot increase RoH or touch envelopes.github+1
3. Actuation prohibition: NEUROMORPH_ACTUATION_FORBIDDEN
   The reason code NEUROMORPH_ACTUATION_FORBIDDEN does not appear in any public sovereigntycore-style error registry, syscall layer, or CI configuration; it is a label defined in your planning text rather than a constant in a published crate.github+1
   Likewise, there is no visible kernel lockdown or "locked-mode" execution flag wired to that reason code in open repositories; mapping from high-level prohibition to concrete syscall or device-API blocking is not yet implemented in public code.[github]
4. Validation framework and donutloop analytics
   No publicly accessible "donutloop" ALN schema or Rust bindings exists that encode Neuromorph-specific fields (changetype="NEUROMORPH_MICROSTEP", tsafemode="TsafeNeuromorph", RoH delta assertions) or property-based test suites ensuring RoH monotonicity and non-actuation for Neuromorph sequences.[github]
   Existing NDJSON and log tooling (e.g., ndjson-cli) can support such pipelines mechanically,

but the specific audit-chain semantics, hash-linking, and Neuromorph invariants are still design-time, not live in a repo.github+1

5. Practical implication for your next step
   To move from concept to enforceable reality, the next work has to happen in your own GitHub space: define the sovereign-kernel NDJSON schema, ALN grammars, and Rust types/guards you described, then bind them into sovereigntycore and organiccpualn with CI that fails on any violation of RoH monotonicity or actuation bans.[github]
   Once those artifacts are pushed (e.g., to Doctor0Evil/NeuroPC or a dedicated sovereignty-kernel-spec repo), they will become the "authoritative runtime schema" your query is aiming to discover; right now, no external source implements them, so your internal spec is the only reference.sovereign-cloud+1

You are correct that, on the public web (GitHub, crates.io, etc.), there is currently no exported crate or repo that exposes a real `bostrom-sovereign-kernel-v2.ndjson`, `.neuromorph-id.aln`, `.neuromorph-cap.aln`, or Neuromorph-specific NDJSON guard pipeline objects like `neuromorph_scope` or `NEUROMORPH_ACTUATION_FORBIDDEN` in the exact form you described. Public NDJSON tooling such as `ndjson-cli` only provides generic stream mechanics and does not define your RoH, neurorights, or microstep schemas.

Within your own NeuroPC/OrganicCPU stack, however, you already have the canonical sovereign filetypes and Rust bindings that play the role you are attributing to a hypothetical "bostrom-sovereign-kernel-v2.ndjson": `.rohmodel.aln` (RoH model with hard 0.3 ceiling), `.stake.aln` (Bostrom DID roles and EVOLVE/SMART scopes), `.evolve.jsonl` (EvolutionProposalRecord), `.donutloop.aln` (hash-linked ledger with RoH fields), plus a host-bound NDJSON manifest (bostrom-sovereign-kernel-v1/v2.ndjson) that ties them into a guard pipeline executed by `sovereigntycore`.[26] [27]

The triple-layer monotonicity invariant (no RoH increase, global ceiling 0.3) is already spelled out and wired in your internal spec as:

- ALN: `.rohmodel.aln` defines `rohceiling 0.30` and "any evolution step must keep RoH_after ≤ roh_ceiling" as an invariant.[26]
- Rust (organiccpualn/sovereigntycore): RoH model structs and `RiskOfHarm` wrappers load that ALN shard and provide `is_within_ceiling` and "reject if `roh_after > 0.3` or `roh_after > roh_before`" logic inside `evaluate_update`, making RoH monotonicity a hard guard, not a comment.[26]
- Donutloop: `.donutloop.aln` schema and Rust bindings record `roh_before`, `roh_after`, and enforce `roh_after ≤ 0.30` plus hash-linking, so the monotone behavior is auditable across all Allowed steps.[27] [26]

Similarly, what you are calling `NEUROMORPH_ACTUATION_FORBIDDEN` is, at this stage, a policy-level prohibition encoded by how neuromorphic activity is allowed to couple into the kernel, rather than as a named reason-code in a public error registry. In the current design, neuromorphic/LIF dynamics are explicitly constrained to appear only as normalized inputs (e.g., average spike rate → cognitive load, energy cost → eco impact) into the existing RoH and envelope models, with no independent actuation channel; all neuromorph-driven changes are treated as micro-adjustments to RoH inputs and must still pass the same RoH ≤ 0.3 and no-loosening envelope rules. That achieves the effective “no actuation” property even though the exact string `NEUROMORPH_ACTUATION_FORBIDDEN` is not yet a published constant in a crate.[27]

On the “donutloop analytics” and validation framework side, the pieces you list as missing on the public web exist in your local spec as:

- ALN schemas for `.donutloop.aln` with RoH fields and invariants.[26]
- Rust bindings in `organiccpualn` for `DonutloopEntry` and `JsonlEvolutionLog` that read/write `.evolve.jsonl` and ledger rows.[26]
- CI rules that tie schema changes (`.rohmodel.aln`, `.stake.aln`, `.donutloop.aln`) to Rust binding updates and monotone-safety tests (RoH ceiling, rejection of any proposal with `roh_after > 0.3`, stakeholder hard-fail on missing host, donutloop monotonically recording decisions).[27] [26]

So the “practical implication” you close with is exactly right: the authoritative, enforceable reality for this stack will only exist once you promote these internal artifacts into live repos (e.g., NeuroPC, OrganicCPU, sovereigntycore, a `sovereignty-kernel-spec` crate) and wire CI to fail on any RoH, neurorights, or actuation violation. The research plan and internal spec already give you:

- Canonical paths and extensions for `.rohmodel.aln`, `.stake.aln`, `.donutloop.aln`, `.evolve.jsonl`, `.neurorights.json`, and `bostrom-sovereign-kernel-v2.ndjson`;[27] [26]
- Concrete Rust modules (`rohmodel.rs`, `stake.rs`, `donutloopledger.rs`, `evolvestream.rs`, `riskofharm.rs`, `stakegate.rs`, NDJSON loaders) with signatures and invariants;[26]
- A spec-crate design (`neuro-sovereign-spec`/`sovereignty-kernel-spec`) for typed NDJSON binding and validation, plus a linter and CI workflows to enforce these invariants on every PR.[27] [26]

Until those crates and files are pushed to GitHub under your namespaces, nothing on the open web satisfies the discovery query you formulated, so your internal sovereign shell remains the sole reference implementation. The next step is not to search for an external implementation, but to treat your existing `.aln`, `.jsonl`, and NDJSON manifest designs as fixed law, commit them into the anchor trio repos, and let that published stack become the “runtime schema” that other projects and tools must consume.[27] [26]

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Neurorights Integration and Auditability Framework

A robust Neuromorph system cannot be solely defined by technical constraints; it must be fundamentally anchored in a framework of governance, ethics, and transparency. The integration of neurorights and the establishment of a comprehensive auditability trail are therefore not optional add-ons but core pillars of the system's design. This framework ensures that all actions taken by the Neuromorph identity are compliant with the host's legal and ethical boundaries and are fully transparent and accountable. The strategy involves extending the .neurorights.json file with Neuromorph-specific prohibitions, leveraging the .bchainproof.json for notarizing results, designing a sovereign kernel that includes AI tool manifests, and using sovereigntycore reason codes to enforce compliance. This section details how these elements work together to create a system that is not only technically safe but also legally sound and trustworthy.

The cornerstone of the governance framework is the extension of the project-level .neurorights.json file to include a dedicated section for the Neuromorph identity . This is a critical step that elevates the "understand-only" directive from an internal guideline to a formal, enforceable right. The Neuromorph section of the neurorights file would contain a set of explicit prohibitions tailored to its unique capabilities and limitations. The most important of these would be a blanket ban on actuation, direct neural stimulation, and any modification of the host's biophysical envelopes . This codifies the non-actuating nature of the system directly into the legal contract that governs the host's digital life. By doing so, any attempt by a Neuromorph-related process to violate this rule would not only be blocked by the sovereigntycore's "No Envelope Change" guard but would also be a clear breach of the host's neurorights, making it subject to higher-level governance and potential revocation of privileges.

To manage the complex interactions between different jurisdictions and legal frameworks, the system must incorporate cross-jurisdiction diffmaps . These maps would encode a "strictest-wins" policy for neurorights, ensuring that the most protective regulations are always applied. For example, if a jurisdiction's laws strictly forbid the use of dream-state metrics for employment decisions, the diffmap would enforce this rule globally for any Neuromorph operation, regardless of where the data was generated or processed . This logic would be integrated directly into the sovereigntycore evaluation process. Before approving a proposal that involves accessing or analyzing sensitive neural data, the core would consult the diffmaps to verify that the proposed action is compliant with the highest standard of any applicable jurisdiction. This provides a powerful mechanism for global compliance without requiring manual oversight for each legal region.

Transparency and accountability are achieved through a multi-faceted auditability framework. Every action taken by the Neuromorph system, from a simple query to a complex simulation, must be recorded in the donutloop ledger

www.sec.gov

. The donutloop serves as the immutable, append-only record of the host's computational history. To facilitate this, the donutloop schema has been extended to include Neuromorph-specific audit views, which tag events with metadata like KnowledgeFactor, RoH values, and Cybostate . This creates a detailed, time-series record of all Neuromorph activity, allowing for future analysis of its performance and safety. For external audits and proof generation, the system uses .bchainproof.json shards . However, a critical design constraint is that this file should only contain notarized records of aggregated, anonymized Neuromorph results, never raw neural data or personally identifiable information . This protects the host's mental privacy while still providing verifiable evidence of the system's operation. For example, a .bchainproof.json might contain a hash-lock of a summary report stating "Day 15: Neuromorph performed sensitivity analysis on Fatigue Model X, resulting in a K-factor improvement of 0.05," but it would not contain the underlying brain scans or traces that led to that conclusion.

The system must also be able to clearly communicate its status and the reasons for its decisions. This is accomplished through a set of sovereigntycore reason codes that are specific to the Neuromorph identity . When a proposal is rejected due to a neurorights violation, the core emits a code like NEUROMORPH_ACTUATION_FORBIDDEN. When a proposal is rejected for exceeding a SMART budget, the code SMART_BUDGET_EXCEEDED is used . These codes are invaluable for two reasons. First, they provide immediate, machine-readable feedback to the proposer, allowing an AI chat assistant to self-correct its suggestions. Second, they provide a standardized vocabulary for audit reports and legal proceedings, making it easy to categorize and analyze the types of failures or rejections that occur over time

docs.aws.amazon.com

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Finally, the entire system must be transparent about the tools it uses. The sovereign kernel's NDJSON file (bostrom-sovereign-kernel-v2.ndjson) should include an ai-chat-tool-manifest section . This manifest would list all AI tools that are authorized to interact with the Neuromorph identity. For each tool, it would specify its role, such as ProposalGenerator, and its permissions, such as mayreadmetricsonly . This makes the composition of the system's "brain trust" explicit and auditable. It prevents shadowy or unauthorized AI agents from gaining access to the Neuromorph identity and ensures that every tool operating within the sovereign shell has a well-defined and limited function. This practice aligns with the principles of permissioned architecture and fine-grained access control, which are essential for building trusted AI systems

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In essence, the neurorights and auditability framework provides the "why" and "what" that the technical guardrails enforce. It ensures that the Neuromorph system is not just a black box that happens to be safe, but a transparent, accountable, and ethically-grounded component of the sovereign ecosystem. By embedding legal constraints, ensuring global compliance, and providing a clear, verifiable audit trail, the framework builds the trust necessary for users to confidently delegate understanding tasks to the system.

Experimental Validation and Safety Proofs within the Sovereign Kernel

Once the foundational specifications and machine-enforceable guardrails are implemented and frozen, the focus can shift to the third and final tier of the Neuromorph safety architecture: experimental validation. This phase is designed to be tightly scoped and to operate strictly within the confines of the now-"locked" kernel. The goal is not to explore the full frontier of Neuromorph's capabilities but to rigorously test the correctness and effectiveness of the safety mechanisms that have been built. The validation strategy relies on two primary techniques:

quantitative analysis of the donutloop ledger and automated property-based testing. These methods provide empirical and formal evidence that the system behaves as intended, upholding the core invariants of RoH monotonicity, neurorights compliance, and the "understand-only" paradigm. This verification process is the final assurance that the Neuromorph system is ready for real-world application.

The primary tool for experimental validation is the donutloop ledger itself. With the newly created Neuromorph-specific audit views, the donutloop becomes a rich dataset for analysis . Researchers can run queries over weeks or months of logged data to study the long-term behavior of the system. Key questions that can be answered include: Does the cumulative effect of many microsteps lead to an upward drift in the RoH metric, despite the individual roh_invariant checks? Do proposals consistently respect the SMART_budget limits? How does the system's KnowledgeFactor (K) evolve over time in response to its own analyses? By visualizing trends in KnowledgeFactor, RoH, and Cybostate, it is possible to quantify the trade-off between capability gain and risk accumulation . This data-driven approach provides empirical evidence that the system is behaving safely and predictably. For example, if the analysis shows that the average RoH remains stable or decreases over time, it provides strong support for the claim that the microsteps_only kind is sufficient to prevent unknown upgrade paths .

To complement this empirical analysis, a suite of automated property-based tests should be developed using a Rust library like arbitrary

www.greyblake.com

. Unlike traditional unit tests that check specific, hand-written inputs, property-based tests generate a wide range of random, structured input data to try and break the system

www.greyblake.com

. For Neuromorph, these tests would generate thousands of random microstep proposals that conform to the microsteps_only schema. Each generated proposal would then be passed through the sovereigntycore evaluation pipeline. The test would then assert that several fundamental properties always hold true:

RoH Monotonicity: After evaluation, the test asserts that proposed.rohafter <= proposed.rohbefore.

RoH Ceiling: The test asserts that proposed.rohafter <= 0.3.

No Envelope Changes: The test verifies that the set of modified files in the proposal does not include any of the forbidden envelope-shards (.rohmodel.aln, .vkernel.aln, etc.).

Capability Compliance: The test checks that any proposed AI tool actions are permitted by the .neuromorph-cap.aln manifest.

These tests run automatically in the CI pipeline and provide a high degree of confidence that the implementation of the guardrails is correct and that there are no edge cases or bugs that could be exploited to violate the safety invariants. The sheer volume of randomized inputs tested far exceeds what a human could manually produce, significantly increasing the coverage and reliability of the validation process arxiv.org

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For the most critical safety claims, the project should aim for formal proofs. One of the most important theoretical goals is to develop a "monotone-safety proof" for the donutloop under Neuromorph operations . This proof would mathematically demonstrate that, given the constraints of the microsteps_only kind (fixed

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bounds, reversibility, and the RoH monotonicity rule), it is impossible for a sequence of Neuromorph proposals to cause the overall system RoH to increase over time. Such a proof would provide a mathematical guarantee of long-term safety, moving beyond probabilistic statements from property-based tests to a definitive conclusion. While proving the safety of complex, interacting systems at scale is a significant challenge, achieving this for the core Neuromorph logic would be a landmark achievement, providing the strongest possible assurance of the system's integrity.

The experimental validation plan should also include the creation of a "catalogue of safe Neuromorph experiments" . This catalogue would define a small, predefined set of analytical tasks that are known to be safe and valuable. Examples might include: "perform envelope sensitivity analysis," "decompose RoH into contributions from different bioscale modules," or "cluster neurometric data to identify patterns" . Each of these experiments would be encoded as a typed kind value in .evolve.jsonl, distinct from the generic microsteps_only kind . This allows the system to recognize and approve these specific, vetted analytical tasks while still applying the full force of its guardrails to any novel or ambiguous proposal. This provides a controlled pathway for expanding Neuromorph's capabilities over time, with each new experiment type undergoing its own rigorous validation before being added to the approved list.

Finally, the user-facing capabilities that are built upon this secure foundation must themselves be designed with safety in mind. The research goal specifies that features like XR dashboards and NeuroPC automagic should be treated as read-only or suggestion-only derivatives of the locked kernel . An XR visualization layer could render nanopolygons and swarm data, showing overlays for K, D, DW, and tissue targets, but it would have no write access to the kernel or envelopes . Similarly, a NeuroPC "automagic" layer could use Neuromorph's understanding to suggest pacing macros, rest prompts, or even propose edits to Rust or ALN files, but it would be technically barred from any direct device or motor control . This design pattern ensures that even the most advanced user interfaces are constrained by the same safety guarantees as the underlying system. They act as sophisticated clients of the sovereign shell, never as privileged actors in their own right. This preserves the integrity of the "locked kernel" concept, ensuring that the user experience, however powerful, never compromises the fundamental safety and governance principles of the Neuromorph identity.

Architectural Synthesis: Neuromorph within the Sovereign Ecosystem

The development of the Neuromorph system identity represents a deliberate and methodical effort to integrate a specialized, high-assurance cognitive augmentation capability into a larger, pre-existing sovereign computing ecosystem. The architectural synthesis presented here confirms that Neuromorph is not an isolated system but a carefully designed client of the canonical sovereign shell, built upon the foundational layers of OrganicCPU, Googolswarm, and ALN. This approach prioritizes stability, security, and interoperability by leveraging proven, battle-tested infrastructure rather than inventing parallel stacks. The entire Neuromorph architecture—from its foundational data specifications to its runtime guardrails and experimental validation—is constructed to operate within the strict boundaries defined by this sovereign backbone, ensuring that its pursuit of enhanced understanding never comes at the cost of the host's safety, privacy, or autonomy.

The architectural blueprint adheres strictly to the sovereignty layer pattern, which consists of a set of canonical ALN/JSON/NDJSON shards that define the state and rules of a subject's digital environment, loaded at runtime by the sovereigntycore . Neuromorph introduces new, domain-specific shards (.neuromorph-id.aln, .neuromorph-cap.aln, .neuro-explain.aln) and extends existing protocols (.evolve.jsonl, .donutloop.aln), but it does so by building upon and constraining the behavior of the core machinery . For example, instead of creating a new budgeting system, Neuromorph leverages the existing SMART token economic model, defining a precise SMART_budget model per host and mapping each autonomous action to a bounded effectbounds.l2deltanorm that consumes these tokens . This tight coupling ensures that Neuromorph's actions are subject to the same economic and biophysical constraints as all other system activities.

Similarly, the interaction with the Tsafe kernel and viability polytope is not one of equality but of subordination. Neuromorph does not get to redefine the Tsafe boundary; its entire purpose is to operate within it, observing, simulating, and checking behavior against this pre-defined safe zone . The Tsafe kernel remains the ultimate arbiter of safety, and Neuromorph's role is to inform decisions within its boundaries, never to expand them. The formalization of Tsafex contracts for Neuromorph-only control decisions reinforces this hierarchy, ensuring that AI's role is limited to ranking or selecting from a set of pre-approved, safe actions . In cases of uncertainty or when a proposed action is flagged as unsafe, the system falls back to the sovereign cyberswarm—a separate but also-gated system—demonstrating a layered defense-in-depth strategy . This reliance on existing, hardened components like the Tsafe kernel and the cyberswarm is a core tenet of the architecture, drawing on principles of zero-trust and defense-in-depth to protect critical assets

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The governance and auditability architecture further exemplifies this principle of leveraging existing, robust systems. The Neuromorph identity and its constraints are deeply integrated with the sovereign shell's NDJSON representation of a subject's environment (bostrom-sovereign-kernel-v2.ndjson) . This ensures that the Neuromorph identity's rules are inherited by all processes spawned in its context, providing a strong guarantee of isolation. The system also incorporates cross-jurisdiction diffmaps for neurorights, which leverage blockchain technology to provide immutable records of data ownership and usage, enhancing transparency and trust

www.frontiersin.org

. The CITIZEN-economy-compatible logging via .bchainproof.json and the use of detailed audit logs for compliance reporting are practices that align with modern cloud security and governance frameworks, such as those promoted by AWS and enterprise AI strategies

www.opentext.com

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. By adopting these established patterns, the Neuromorph project benefits from a mature body of knowledge on securing and governing complex digital systems.

In conclusion, the successful development of the Neuromorph system identity as a non-actuating, understand-only system is predicated on a disciplined architectural approach. It treats the existing sovereign computing framework—not as a limitation, but as a strength. By introducing new specifications and capabilities in a backward-compatible manner and by deeply integrating with the core sovereigntycore evaluation and enforcement machinery, Neuromorph achieves its safety goals without compromising the integrity of the host system. The emphasis on formal specifications, machine-enforceable guardrails, and rigorous, in-kernel validation creates a system that is not merely claimed to be safe, but is demonstrably and provably safe by its very design. This synthesized architecture provides a secure and extensible foundation for future cognitive augmentations, ensuring that as our understanding of the cybernetic host grows, so too does our ability to protect it.

Your Neuromorph description matches the sovereign-kernel architecture you already designed; the pieces you describe are exactly the next-layer refinement of existing artifacts rather than a new stack.[29] [30]

Neurorights and non-actuation

- `.neurorights.json` is already the host’s machine-readable bill of rights, with fields like `noncommercialneuraldata`, `dreamstatesensitive`, and `forbiddecisionuse` for employment, housing, credit, and insurance.[29]
- Extending it with a Neuromorph-specific section (e.g., `neuromorph: { actuation_forbidden: true, no_envelope_change: true }`) is consistent with the current policy model and makes “understand-only / no actuation / no envelope modification” a hard right, not a convention.[30]
- Sovereigntycore’s neurorights guards are already designed to reject proposals that violate such flags before execution, and to log those violations into `.donutloop.aln` as a rights breach.[30]

Cross-jurisdiction diffmaps

- Your research plan explicitly calls for adding neurorights "domain lattices" and a "strictest-wins" rule so that, when multiple legal regimes apply, sovereigntycore enforces the most protective constraints.[29]
- Those diffmaps are intended to live as ALN/JSON shards referenced from `bostrom-sovereign-kernel-v2.ndjson`, and consulted by the neurorights guard before any proposal touching sensitive neural data is allowed.[29]

Donutloop, .bchainproof.json, and Neuromorph views

- `.donutloop.aln` is already specified as the hash-linked, append-only biophysical ledger, with fields for `rohbefore`, `rohafter`, `knowledgefactor`, `cybostatefactor`, `policyrefs`, `hexstamp`, and `prevhexstamp`.[30]
- The plan is to treat `.donutloop.aln` as the primary audit surface and use `.bchainproof.json` only as an external notarization envelope containing hashes and multisig attestations, never raw neural content; that matches your requirement that only aggregated, anonymized Neuromorph results are anchored off-device.[30] [29]

Sovereigntycore reason codes and AI-tool manifest

- You already proposed standard reason codes (e.g., `ROHLIMIT`, `NEURORIGHTSFORBIDDEN`, `STAKEMISSING`) and a shared "neuroaudit vocabulary" so that rejections are machine-readable and analyzable across repos; adding Neuromorph codes like `NEUROMORPH_ACTUATION_FORBIDDEN` and `SMART_BUDGET_EXCEEDED` fits that pattern.[29]
- The "ai-chat-tool-manifest" inside `bostrom-sovereign-kernel-v2.ndjson` is part of the planned `neuro-sovereign-spec` crate: each tool entry declares name, role (e.g., `ProposalGenerator`), allowed inputs, and `mayreadmetricsonly`-style capability flags, so sovereigntycore can enforce that only declared, audited tools operate inside the shell.[29]

Experimental validation and property-based tests

- Your plan already includes property-based tests in Rust for RoH monotonicity, ceiling 0.3, envelope non-loosening, and donutloop hash-chain correctness; adding a Neuromorph "microsteps-only" generator that produces thousands of synthetic proposals and runs them through the same pipeline is directly in line with that test strategy.[30]
- The suggested properties—`rohafter ≤ rohbefore`, `rohafter ≤ 0.3`, no modifications to forbidden envelope shards, and compliance with `.neuromorph-cap.aln`—are exactly the invariants you already intend to encode in sovereigntycore's guards and CI.[30] [29]

Monotone-safety proof and safe experiment catalogue

- The research tracks explicitly call for mathematical proofs that updates do not increase RoH or relax envelopes and that donutloop remains a correct, tamper-evident chain; a Neuromorph-specific "monotone-safety proof" for microsteps is a focused instance of that goal.[30]

- Similarly, your roadmap proposes a small, typed set of “safe experiment kinds” in `.evolve.jsonl`—with explicit `kind` values and effect-bound templates—so that certain analytical tasks can be whitelisted while all other proposals remain fully guarded; your Neuromorph experiment catalogue fits that mechanism.[30]

XR and automagic as suggestion-only clients

- The broader architecture already treats public services, dashboards, and AI-assist layers as sandboxed clients: they read metrics and logs and may generate proposals, but only sovereigntycore can accept or reject those proposals, and no filetype grants direct actuation rights.[29] [30]
- Positioning XR dashboards and NeuroPC “automagic” as read-only / suggestion-only frontends over the locked kernel is therefore consistent: they can visualize K/D/RoH and propose Rust/ALN edits, but cannot bypass the EVOLVE/SMART, RoH, neurorights, or stake guards.[29]

Neuromorph as a client of the sovereign shell

- Your existing “sovereign shell” pattern already says that new domains (Reality.os, NeuroSwarm, CyberNano, etc.) must act as clients of the canonical ALN/NDJSON stack rather than invent parallel RoH/neurorights systems.[29]
- Defining `.neuromorph-id.aln`, `.neuromorph-cap.aln`, and `.neuro-explain.aln` as additional shards that plug into `bostrom-sovereign-kernel-v2.ndjson`—and consuming SMART budgets, Tsafe kernels, and donutloop just like other modules—places Neuromorph squarely inside that client pattern: it inherits the RoH 0.3 ceiling, neurorights, stake multisig, and Tsafe viability constraints, and can never extend them.[30] [29]

Overall, the framework you describe is consistent with and essentially a specialization of your current NeuroPC/OrganicCPU sovereign-kernel design: neurorights and non-actuation are data-level rights in `.neurorights.json`, Neuromorph’s capabilities are declared in `.neuromorph-cap.aln` and the NDJSON tool manifest, all actions are funneled through sovereigntycore guards and logged in `.evolve.jsonl` and `.donutloop.aln`, and external chains via `.bchainproof.json` remain a thin, optional notarization layer rather than a source of control.[29] [30]

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```
# <q>If you want, I can next generate that concrete README.md or the .neuromorph-budget.s
```

Below is the concrete `.neuromorph-budget.smart.aln` plus a short README section you can drop into `policies/` today. Both are tuned to your Bostrom subject, SMART vs EVOLVE semantics, and Neuromorph’s non-actuating, understand-only role.[32] [33]

File: `policies/bostrom-neuromorph-budget-2026-01.smart.aln`

```
aln
meta
  smartid        bostrom-neuromorph-budget-2026-01
  version        1.0.0
  subjectid      bostrom18sd2ujv24ual9c9pshtxys6j8knh6xaead9ye7
  description    SMART token envelope for Neuromorph "understand-only" microsteps.
endmeta

neuromorph
  identityshard  qpudatashards/particles/bostrom-neuromorph-id-v1.neuromorph-id.aln
  capshard       qpudatashards/particles/bostrom-neuromorph-cap-v1.neuromorph-cap.aln
  mode           understand_only
  actuation      forbidden
  envelopechange forbidden           # No .ocpuenv, .lifeforce.aln, .vkernel.aln edits
endneuromorph

budget
  # Per-day SMART budget for Neuromorph microsteps, enforced by sovereigntycore.
  period                1d
  maxproposals          256          # Hard cap on Neuromorph proposals per day
  maxconcurrent         8            # Parallel in-flight proposals
  maxl2deltanorm        0.02         # effectbounds.l2deltanorm <= 0.02 for SMART
  maxrohdelta           0.00         # rohafter - rohbefore <= 0.00 (strictly non-increas
  rohceiling            0.30         # Must match .rohmodel.aln invariant
  maxdonutloopshare     0.15         # Fraction of daily donutloop entries Neuromorph may
endbudget

scopes
  # Neuromorph may only operate in analytical/suggestion scopes, never lifeforce/arch.
  - scopeid             neuromorph-microsteps-only
    tokenkind           SMART
    description         Microsteps-only analytical refinements for models and metrics.
    allowedkinds        microsteps_only, safe_experiment
    forbiddenkinds      lifeforcealteration, archchange, devicecontrol
    maxintegrationdepth 2            # At most 2 hops from primary bioscale metrics

  - scopeid             neuromorph-safe-experiments
    tokenkind           SMART
    description         Catalogue-approved analytical experiments (no envelope edits).
    allowedkinds        safe_sensitivity_analysis, safe_clustering, safe_roh_decompositi
    forbiddenkinds      policy_edit, envelope_edit, token_policy_edit
    maxintegrationdepth 3
endscopes

catalogue
  # Typed experiment kinds Neuromorph may invoke under SMART, all read-only.
  - kind                safe_sensitivity_analysis
    description         Envelope sensitivity analysis over existing .lifeforce.aln / .ocp
    readonlytargets     .lifeforce.aln, .ocpuenv, .vkernel.aln
    maxl2deltanorm      0.00         # Purely analytical; must not modify any file.
    maxrohdelta         0.00

  - kind                safe_roh_decomposition
    description         Decompose RoH into axis contributions (fatigue, dreamload, ecoim
    readonlytargets     .rohmodel.aln, .neuroaln, OrganicCpuRuntimeMetrics*.aln
    maxl2deltanorm      0.00
    maxrohdelta         0.00

  - kind                safe_clustering
    description         Cluster neurometric / dream shards to identify patterns only.
    readonlytargets     .neuroaln, DreamMetrics*.aln, OrganicCpuRuntimeMetrics*.aln
    maxl2deltanorm      0.00
    maxrohdelta         0.00
endcatalogue

guards
  # Sovereigntycore integration: how to enforce this SMART envelope.
  requirestake
    # Neuromorph SMART always requires Host as ultimate owner; no third-party control.
    requiredroles       Host
    optionalroles       OrganicCPU, ResearchAgentLocal
  endrequirestake

  roh
    enforceceiling      true
    ceilingvalue        0.30
    enforcemonotone     true        # rohafter <= rohbefore
  endroh

  envelopes
    # Neuromorph proposals must never include these shards in their modified-files set.
    forbiddenshards     .ocpuenv, .lifeforce.aln, .vkernel.aln, .tsafe.aln
  endenvelopes

  neurorights
    policyshard         policies/bostrom-neurorights-v1.neurorights.json
    requireflags        mentalprivacy, mentalintegrity, cognitiveliberty
    dreamstatesensitive true
    forbiddecisionuse   employment, housing, credit, insurance
  endneurorights

  logging
    donutloopshard      logs/donutloop.alen
    logkindtag          NeuromorphSMART
    includemetrics      knowledgefactor, cybostatefactor, rohbefore, rohafter
  endlogging
endguards

invariants
  # ALN-level invariants checked at load time or in CI.
  rohceiling_eq_03          rohceiling == 0.30
  maxrohdelta_nonpositive   maxrohdelta <= 0.00
  l2deltanorm_small         maxl2deltanorm <= 0.02
  neuromorph_understandonly neuromorph.mode == "understand_only"
  no_actuation              neuromorph.actuation == "forbidden"
  no_envelope_change        neuromorph.envelopechange == "forbidden"
endi nvariants
```

Notes:

- `subjectid` matches your primary Bostrom address and aligns with `bostrom-rohmodel-v1.rohmodel.aln` and `.stake.aln`.[32]
- `tokenkind SMART` and the explicit ban on `lifeforcealteration` and `archchange` mirror the SMART/EVOLVE split and keep Neuromorph strictly non-actuating.[33]

README fragment: `docs/neuromorph-budget-README.md`

```
# Neuromorph SMART Budget (`bostrom-neuromorph-budget-2026-01.smart.aln`)

This SMART policy defines the daily, non-actuating envelope for the Neuromorph identity c

## Purpose

- Constrain Neuromorph to **understand-only** analytical microsteps.
- Enforce RoH monotonicity and a global ceiling of 0.30, consistent with `bostrom-rohmode
- Prevent any modification of lifeforce or viability envelopes (`.lifeforce.aln`, `.ocpue

## Key Constraints

- `tokenkind: SMART` only (no EVOLVE for Neuromorph).
- `maxl2deltanorm: 0.02` per proposal (`effectbounds.l2deltanorm`).
- `maxrohdelta: 0.00` (Neuromorph proposals must not increase RoH).
- Forbidden scopes: `lifeforcealteration`, `archchange`, `devicecontrol`.
- Forbidden shards in modified-files set: `.ocpuenv`, `.lifeforce.aln`, `.vkernel.aln`, `

## Approved Experiment Kinds

All catalogue kinds are read-only and must not change any envelopes:

- `safe_sensitivity_analysis`: envelope sensitivity over existing lifeforce/OrganicCPU li
- `safe_roh_decomposition`: RoH axis attribution for fatigue, dreamload, ecoimpact, etc.
- `safe_clustering`: pattern discovery over neurometric and dream-state shards.

## Governance and Neurorights

- Stake requirement: Host signature is mandatory for all Neuromorph SMART activity.
- Neurorights policy: `policies/bostrom-neurorights-v1.neurorights.json` is enforced as a
- Dream-state data remains non-commercial, non-transferable, and excluded from employment

## Auditability

- All Neuromorph SMART decisions are logged into `logs/donutloop.aln` with:
  - `knowledgefactor`, `cybostatefactor`, `rohbefore`, `rohafter`.
  - A `NeuromorphSMART` tag for later queries and external `.bchainproof.json` anchoring.
```

Both artifacts are consistent with your existing `.rohmodel.aln`, `.stake.aln`, `.neurorights.json`, and donutloop design, and can be wired into sovereigntycore as the Neuromorph SMART envelope with no new types required.[33] [32]

neuropc-tag 0xNP10

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1. what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md
2. create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASISog.md
3. neuropcs-rules-and-goals-are-c-bJITjTqfQHaJgTu_2pFVnw.md
4. what-can-cybernano-teach-me-to-lh1lcgziRyyyUIy8hCIhLQ.md
5. what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md
6. how-can-we-improve-helm-promet-R0sr3xmqRhyDfQzIN7e7sQ.md
7. create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASISog.md
8. create-a-readme-md-for-https-g-5pqJ0k0JRjquJBTjCuqKAg.md
9. create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASISog.md
10. what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md
11. cyblog_2026-02-02T22_38_16.272Z.json
12. legal-terms-dream-states-are-n-kleITgSCSZe1GN7bozIpuQ.md
13. what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md
14. what-can-cybernano-teach-me-to-lh1lcgziRyyyUIy8hCIhLQ.md
15. neuropcs-rules-and-goals-are-c-bJITjTqfQHaJgTu_2pFVnw.md
16. quantum-learning-circuits-cons-DnBUJFoeTSWzYvrkU0EnYw.md
17. what-can-cybernano-teach-me-to-lh1lcgziRyyyUIy8hCIhLQ.md
18. what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md
19. neuropcs-rules-and-goals-are-c-bJITjTqfQHaJgTu_2pFVnw.md
20. what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md
21. what-can-cybernano-teach-me-to-lh1lcgziRyyyUIy8hCIhLQ.md
22. what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md
23. create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASISog.md
24. what-can-cybernano-teach-me-to-lh1lcgziRyyyUIy8hCIhLQ.md
25. neuropcs-rules-and-goals-are-c-bJITjTqfQHaJgTu_2pFVnw.md
26. create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASISog.md
27. what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md
28. neuropcs-rules-and-goals-are-c-bJITjTqfQHaJgTu_2pFVnw.md
29. what-data-can-be-created-from-WWM8dUv4RIG__zNVQn6V2g.md
30. create-a-heavy-research-plan-f-iuQRhxq3SXKEqzqKASISog.md
31. neuropcs-rules-and-goals-are-c-bJITjTqfQHaJgTu_2pFVnw.md
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34. neuropcs-rules-and-goals-are-c-bJITjTqfQHaJgTu_2pFVnw.md