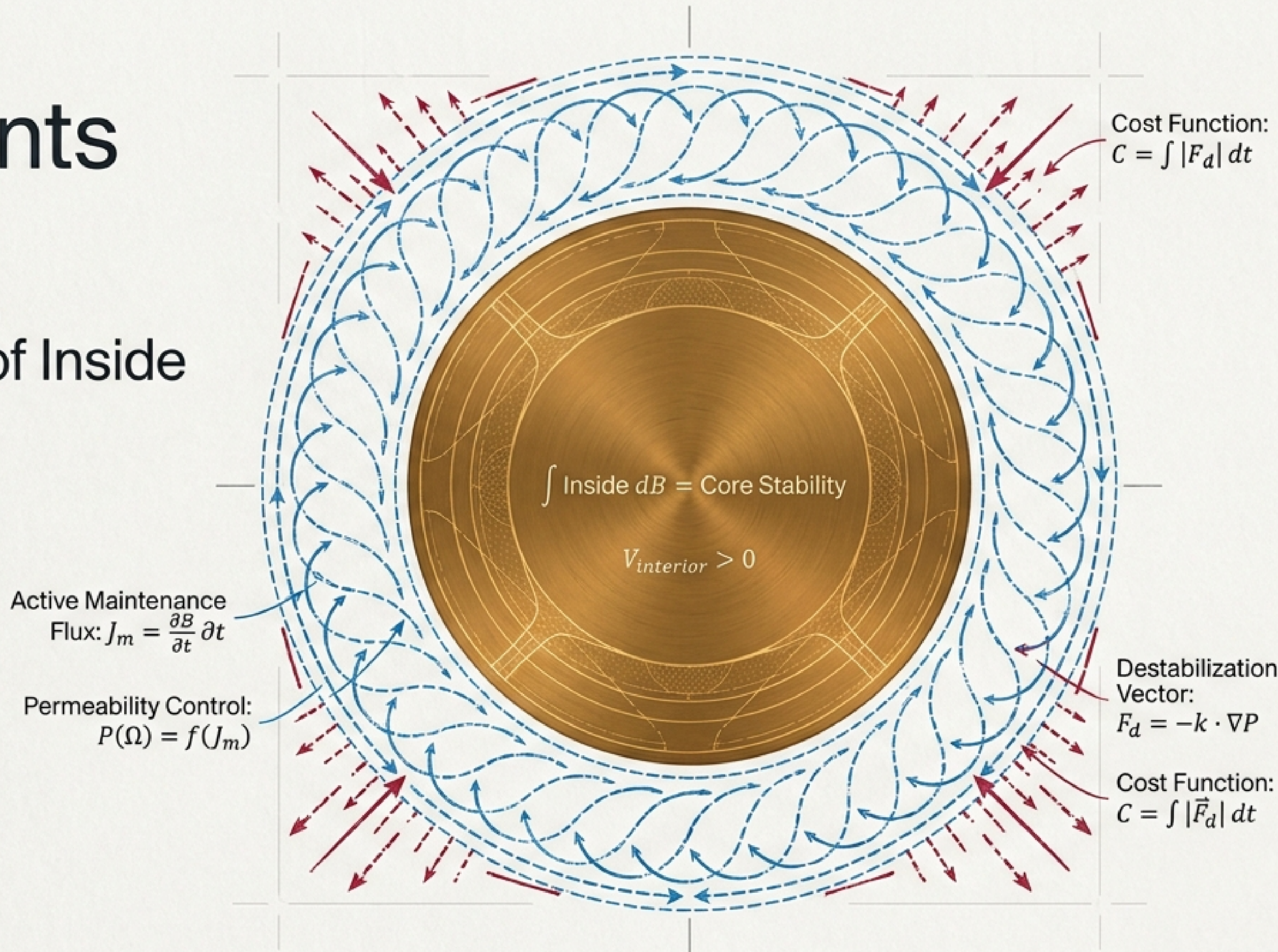


Containers Before Contents

Boundary Dynamics,
Selective Permeability,
and the Mathematics of Inside

Flyxion

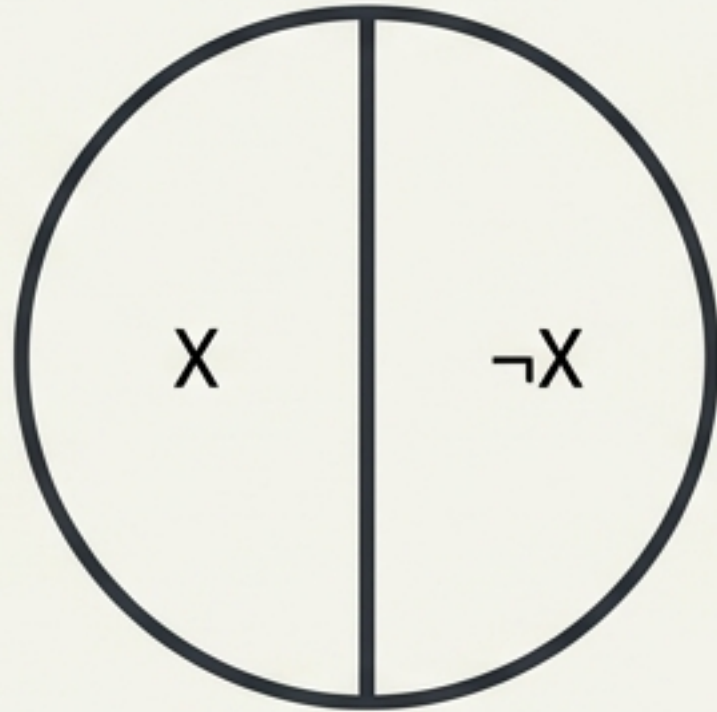


A Distinction is Stated. A Boundary is Earned.

The False Assumption

A Distinction: $D = (X, \neg X)$

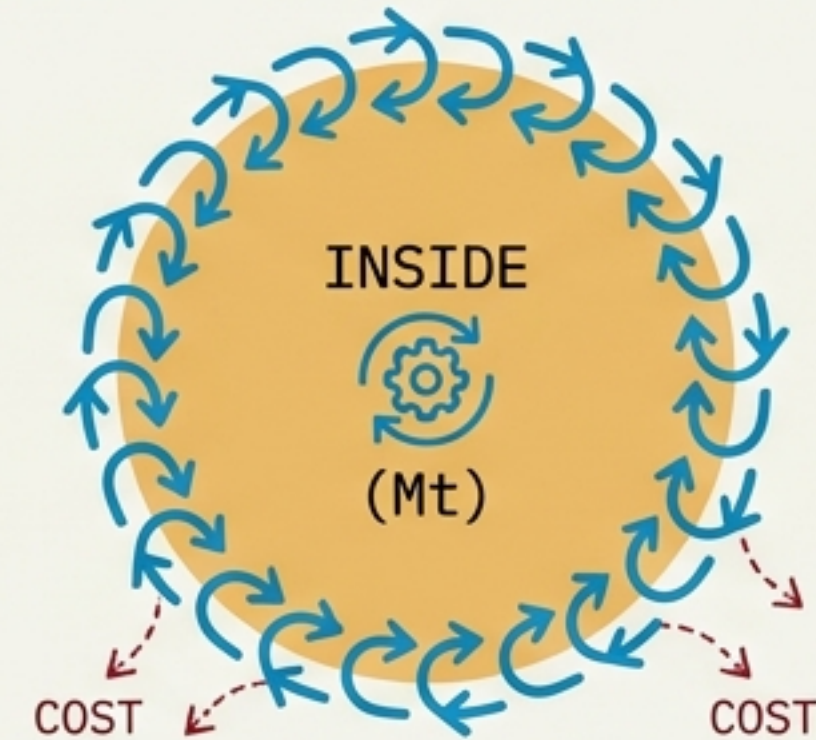
A partition simply divides a space.
It is stated, not sustained.



The Reality

A Boundary: The Ongoing Production of Inside

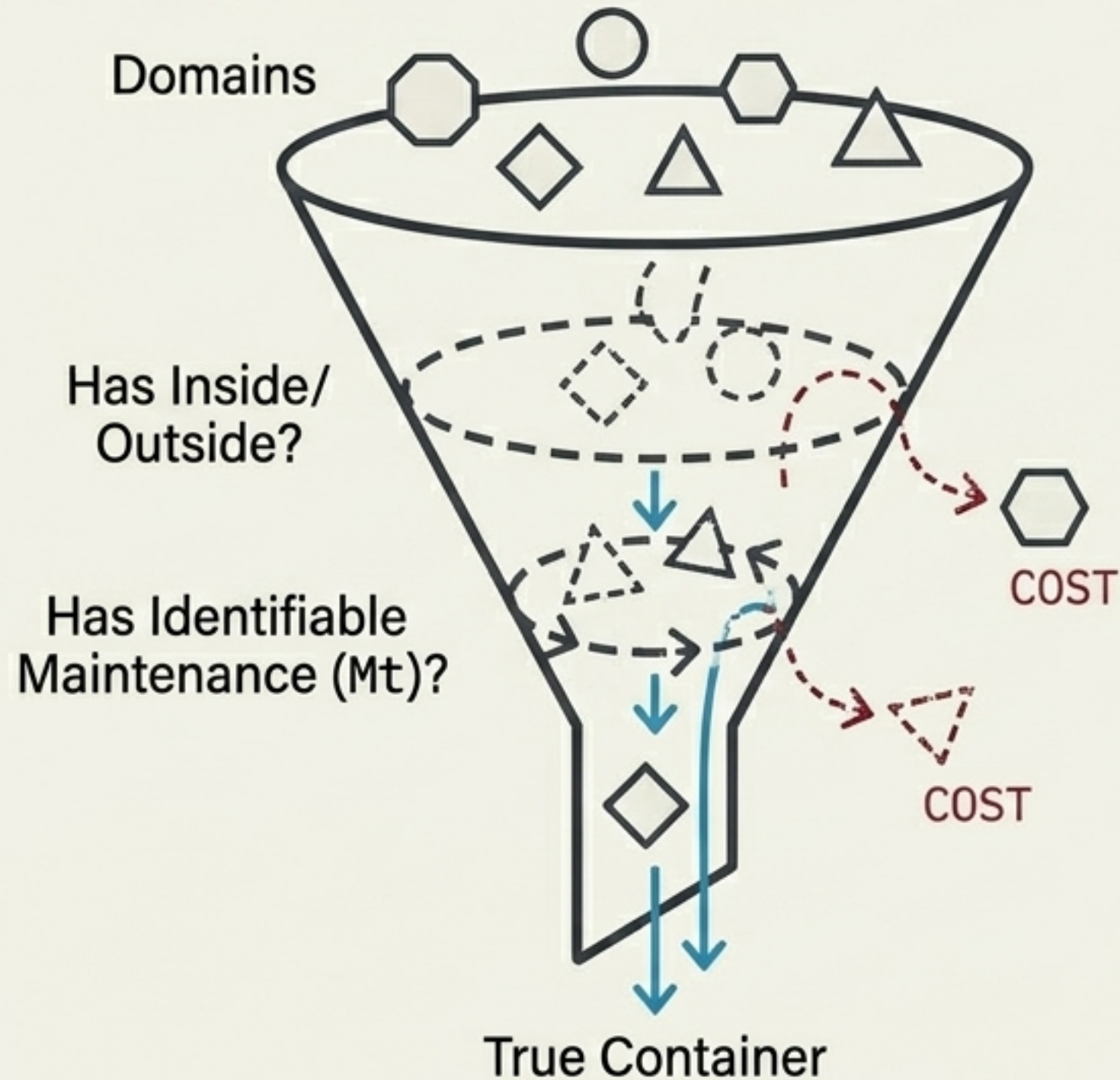
A boundary is the active, continuous maintenance (Mt) by which a distinction remains separately inhabitable. Stop the maintenance, and the distinction vanishes.



The **Boundary Primacy Theorem** asserts that the partition is the wrong primitive for understanding system survival.

The Maintenance Identifiability Criterion

True containers require an independently observable maintenance process (Mt) measurable regardless of system survival. Otherwise, the theory is a tautology.



Demarcation Filter Matrix

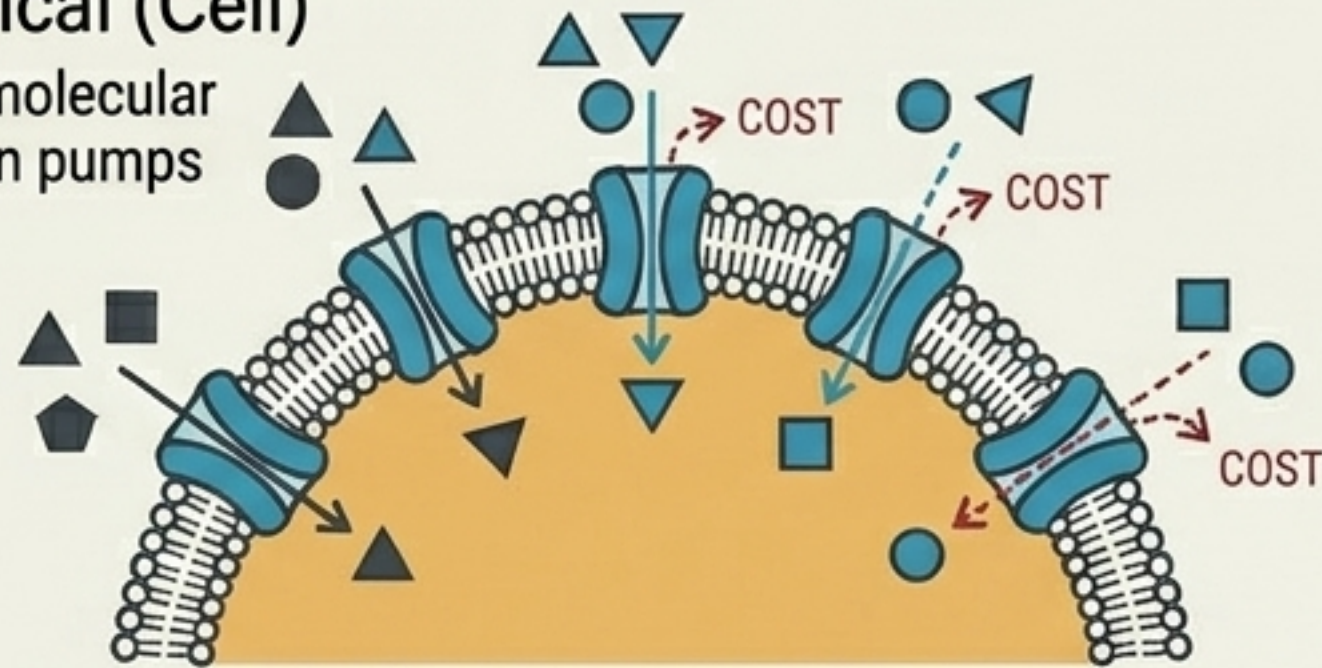
| Domain | Has Inside/Outside? | Has Identifiable Maintenance (Mt)? | Verdict |
|-----------|---------------------|------------------------------------|---|
| The Rock | Yes | No ❌ | Not a Container (merely not yet eroded) |
| The Fad | Yes | No ❌ | Not a Container (driven by diffusion, no defense) |
| The Cell | Yes | Yes (Ion pumps, repair pathways) | ✓ |
| The State | Yes | Yes (Courts, tax, administration) | ✓ |

Containment Requires Selective Continuation, Not Spatial Enclosure

The physical cell membrane is one instance, not the template. An admissibility boundary sorts candidate continuations into those that belong and those that do not.

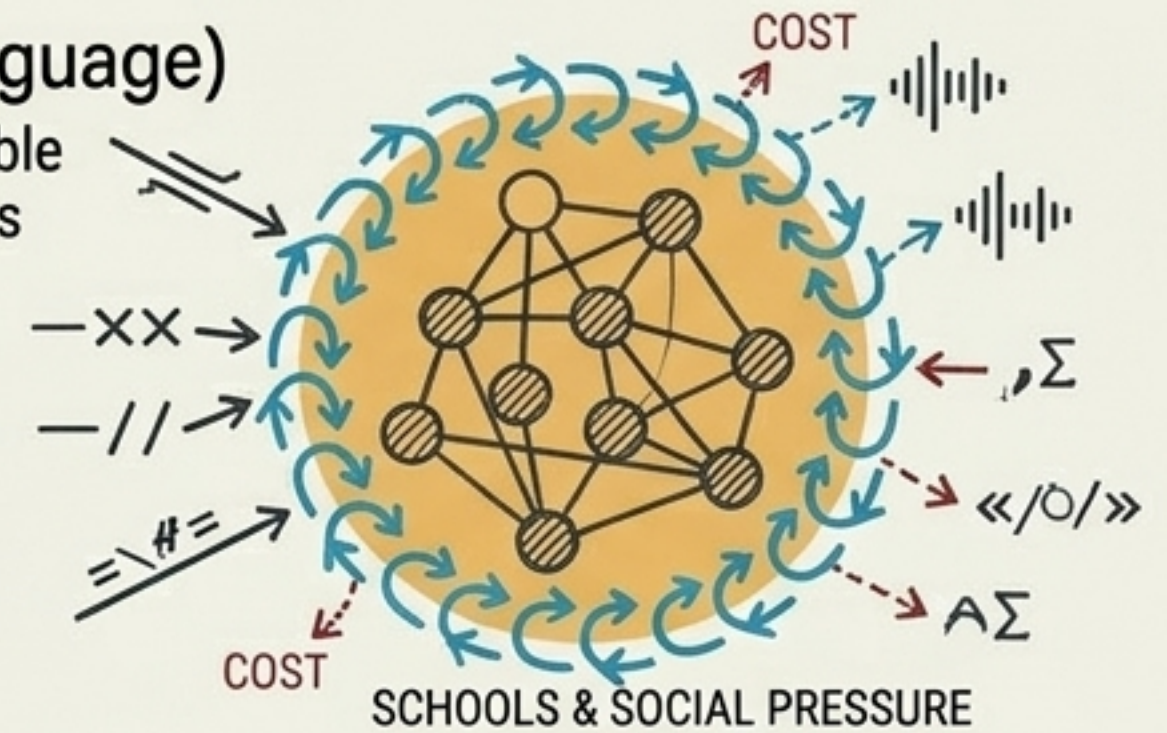
Biochemical (Cell)

Regulating molecular states via ion pumps



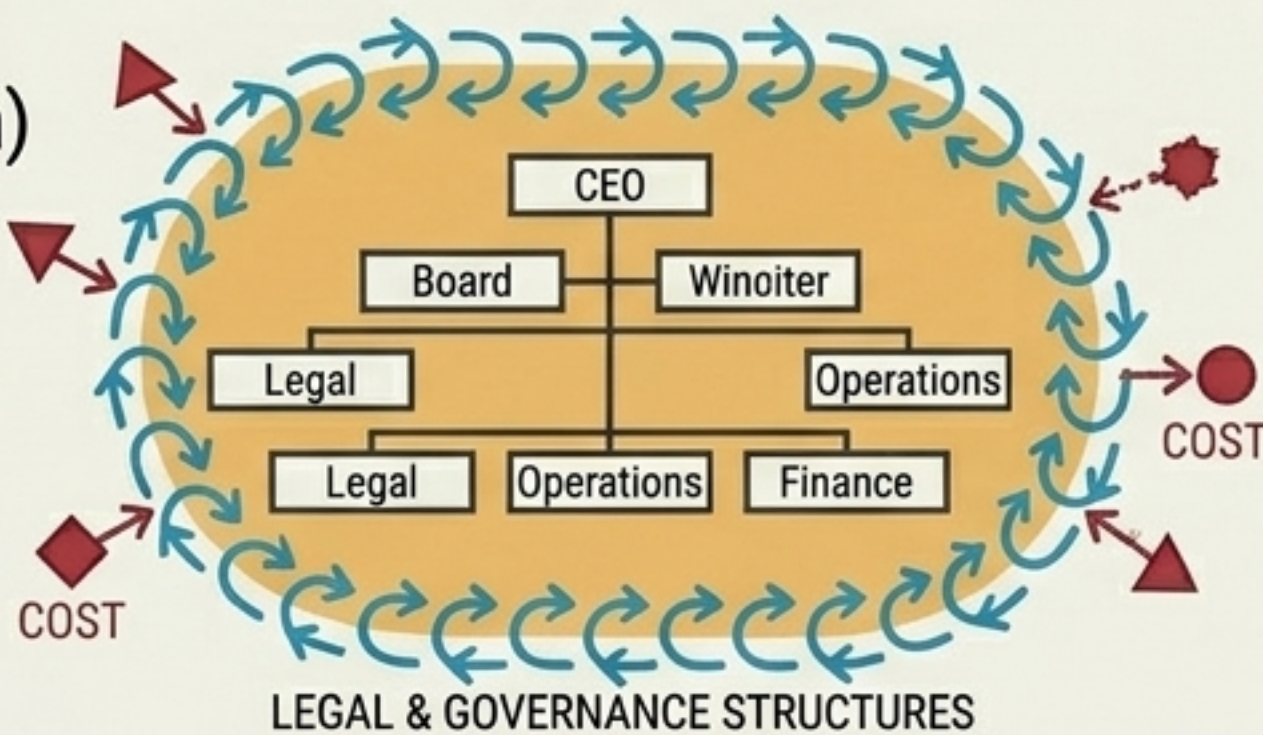
Normative (Language)

Regulating recognizable utterances via schools and social pressure



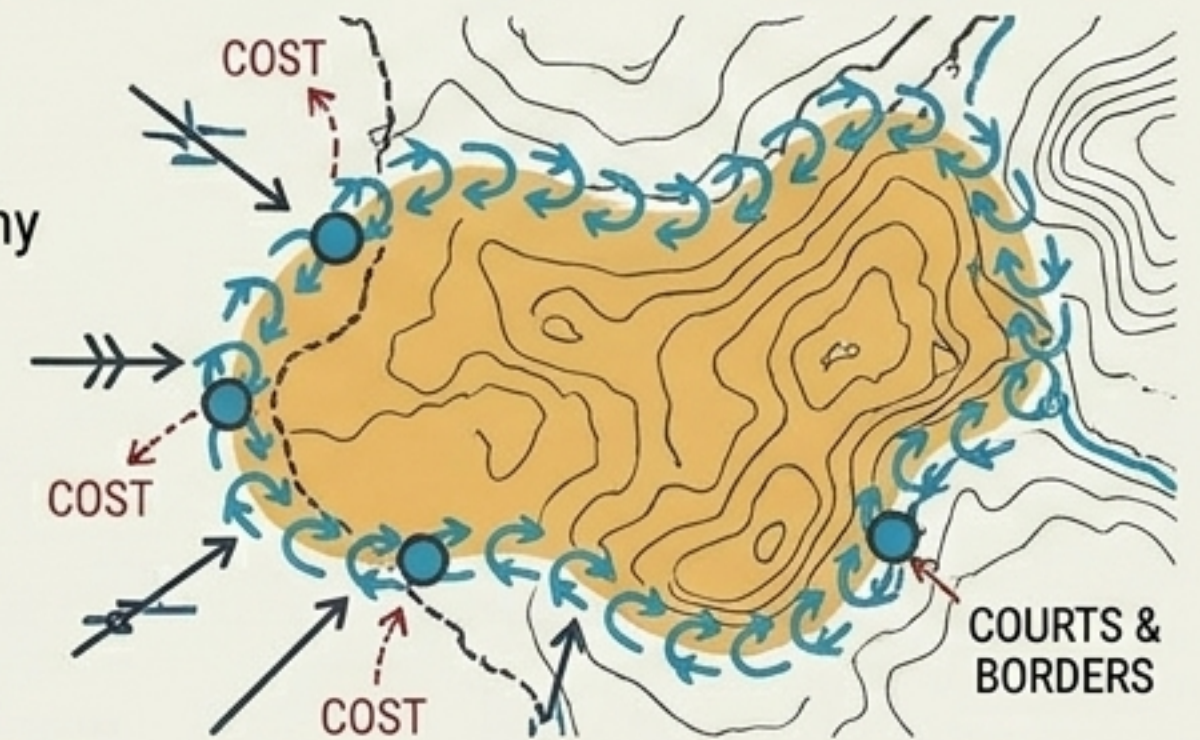
Institutional (Corporation)

Regulating authorized actions via legal and governance structures



Jurisdictional (State)

Regulating geography and administration via courts and borders



The Equation of Survival: Efficacy and Sufficiency

To survive, boundary work must outpace the cost of separation:

$$g(M_t) > C_t + h(D_t)$$

Failure Mode 1: Efficacy Failure (The Ritual State)

Maintenance exists but is causally inert.

Example: Ceremonial sovereignty that moves no real resources.

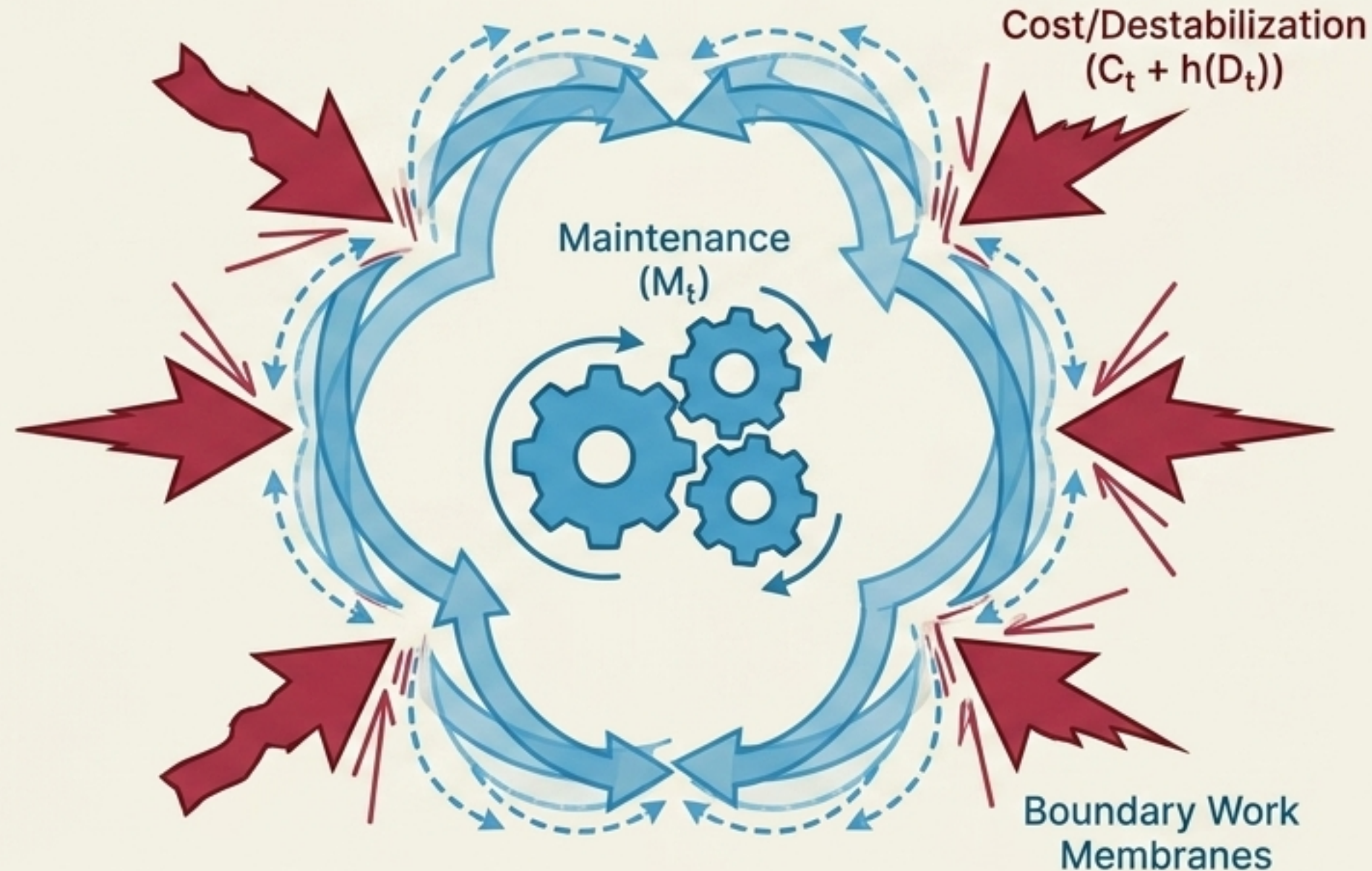
$$\frac{\partial W_t}{\partial M_t} \approx 0$$



Failure Mode 2: Sufficiency Failure (The Overwhelmed State)

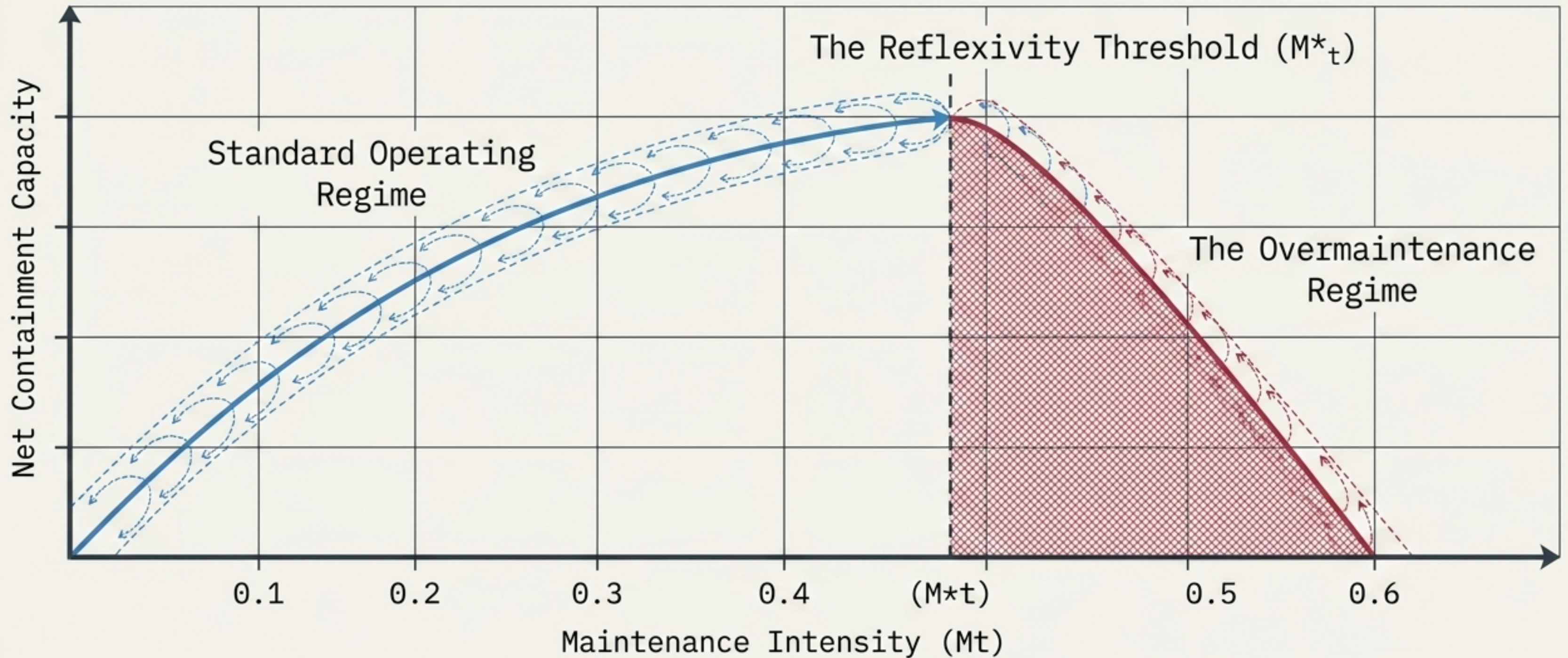
Maintenance is real and effective, but mathematically outmatched by cost. The system simply loses the race.

$$C_t > g(M_t)$$



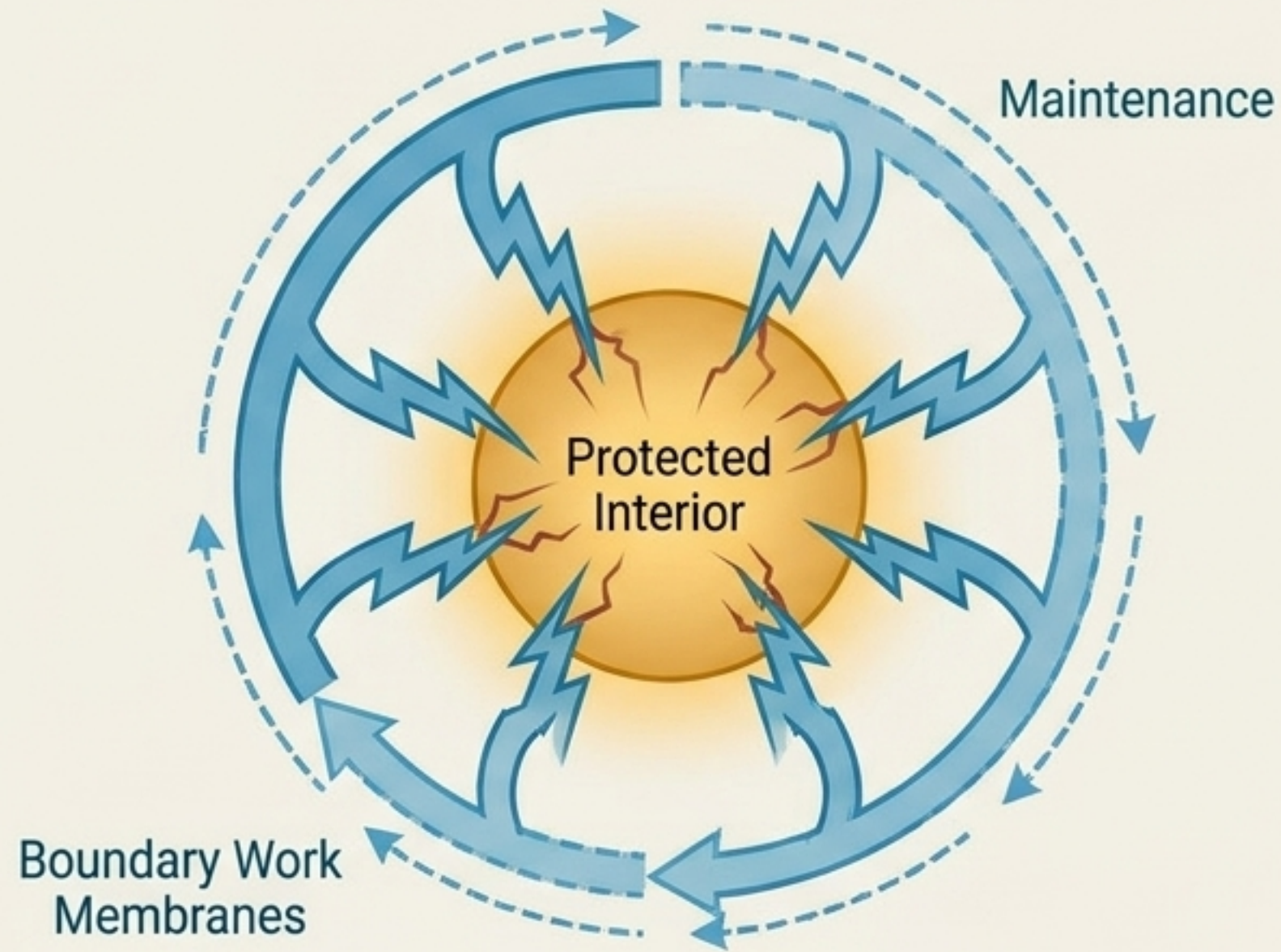
The Reflexivity Threshold

Beyond a specific threshold, increasing maintenance **activity** generates destabilization faster than boundary work. The system actively dismantles its own containment.



Pathologies of Protection: Two Channels of Reflexivity

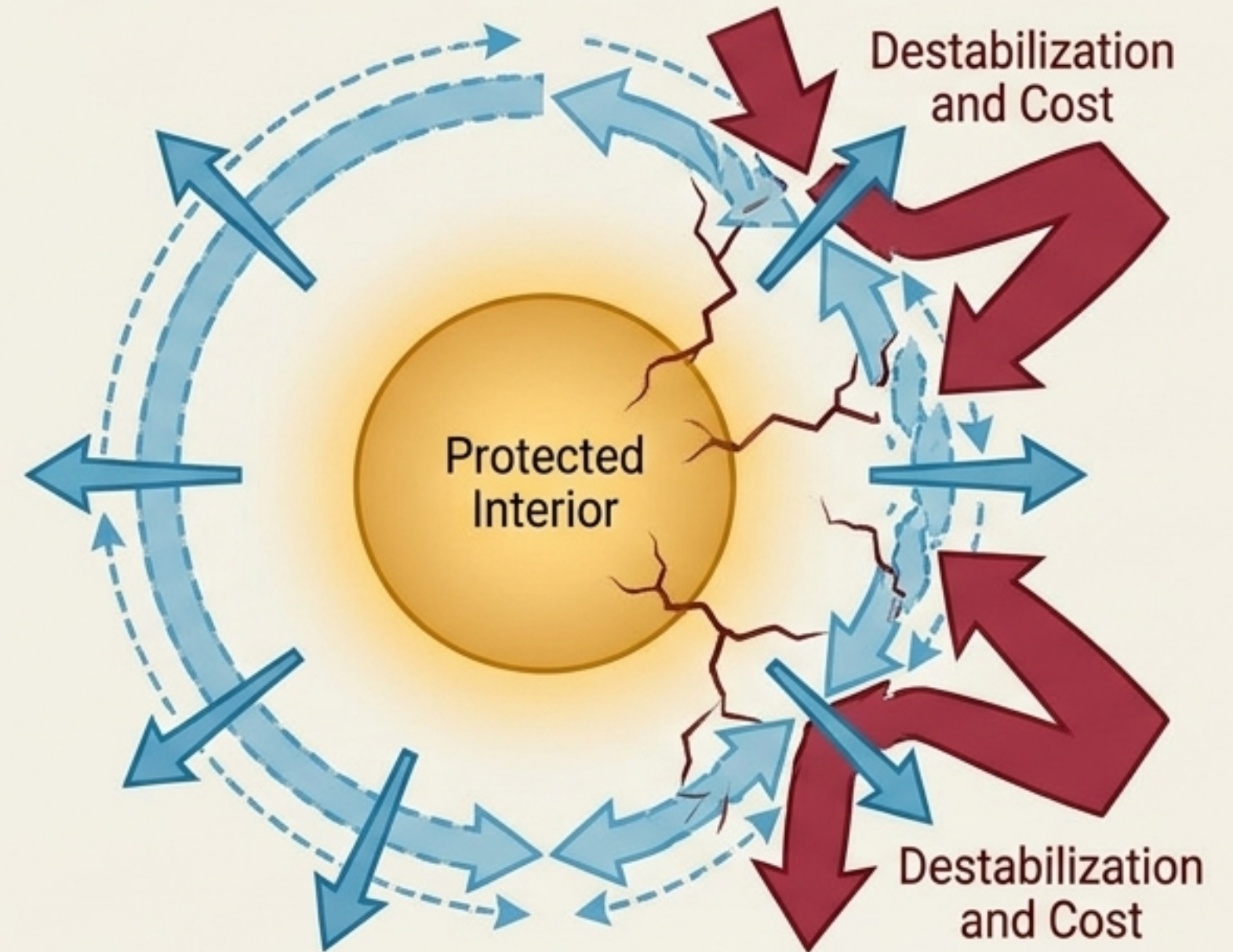
Type I: Interior Misidentification



The maintenance system loses the capacity to distinguish boundary from interior, attacking the core directly.

Example: Autoimmune pathology or over-aggressive corporate quality control.

Type II: Environmental Provocation

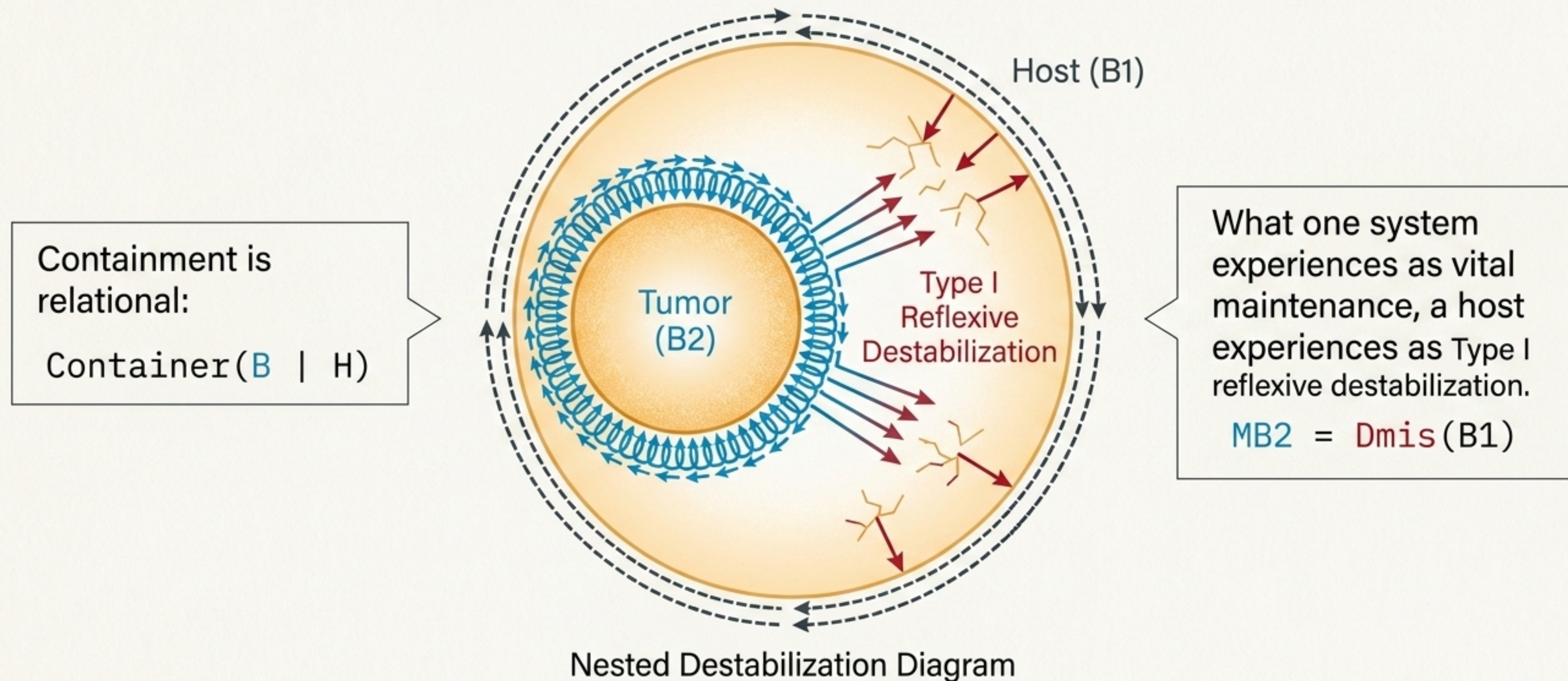


Maintenance hits the environment and amplifies external destabilization, bouncing back to crush the boundary.

Example: Policing that generates the unrest it was meant to suppress.

The Tumor Problem and the Relational Turn

If viewed in isolation, a tumor satisfies every criterion for a perfect container.
The paradox resolves only when we abandon the isolated system.

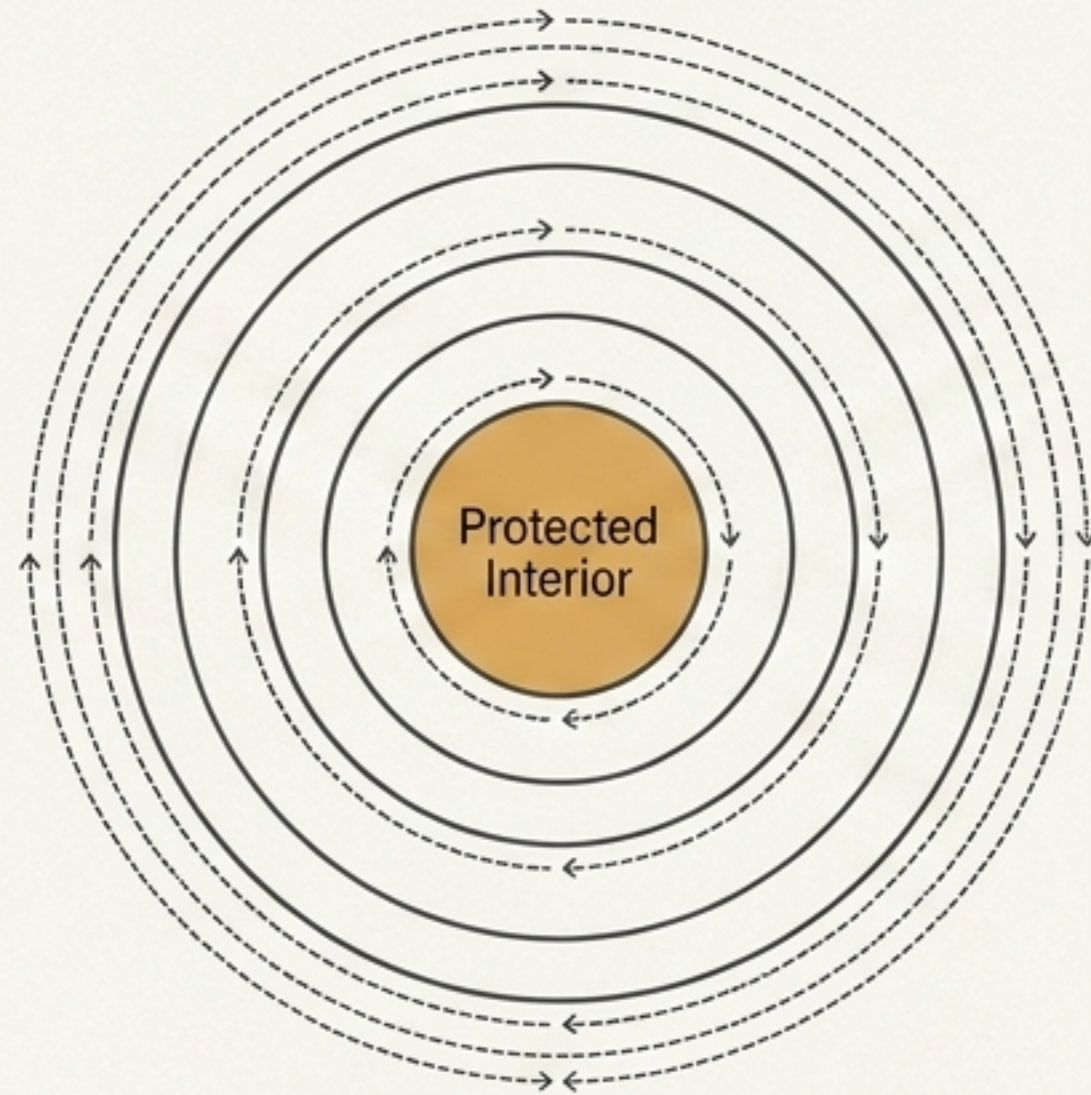


Containment Ecologies

To understand survival, we must separate two relations ordinarily treated as one

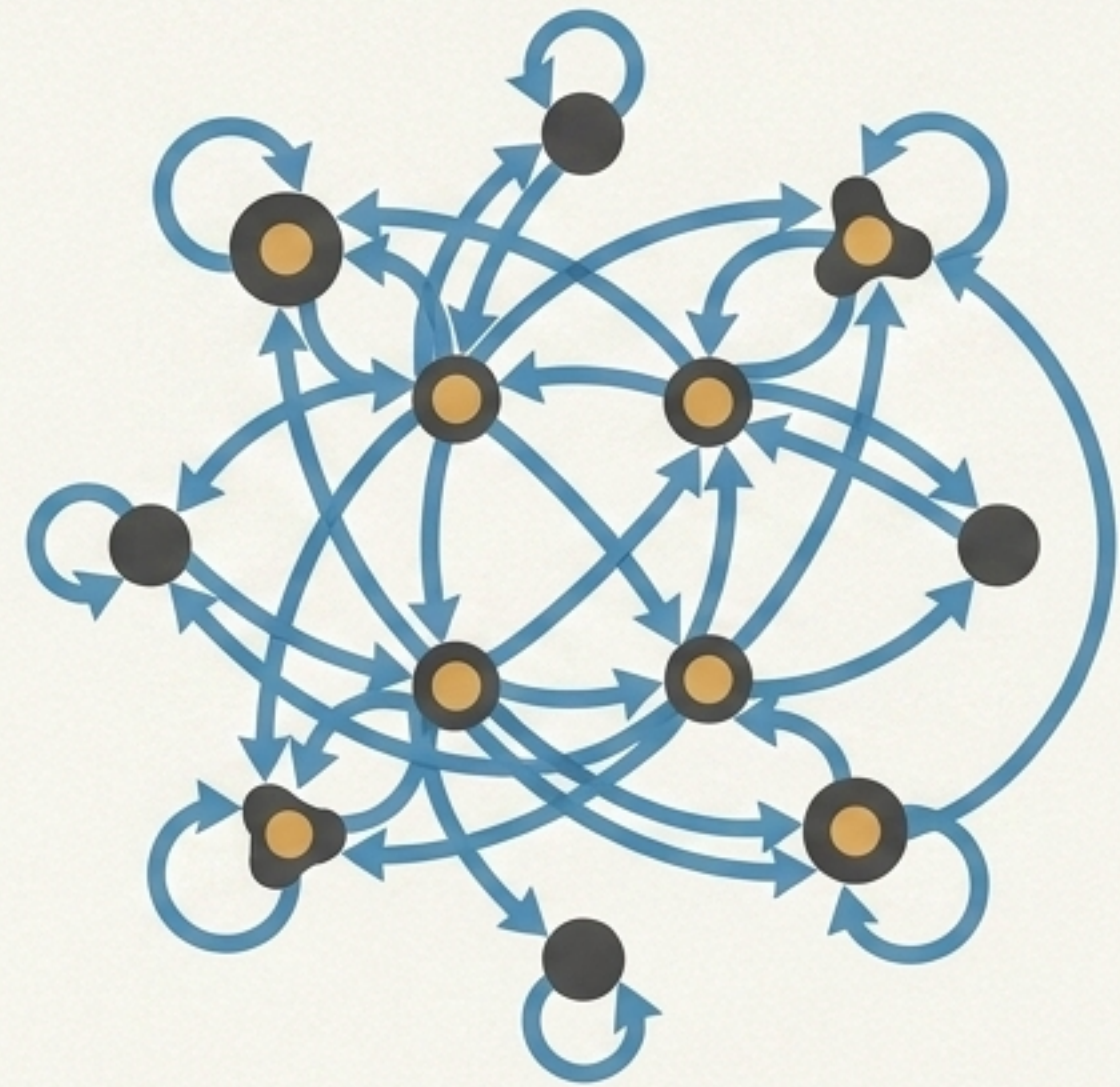
What a system is

Constitutive Graph: Structural Hierarchy



How a system survives

Interaction Graph: Survival Dependency

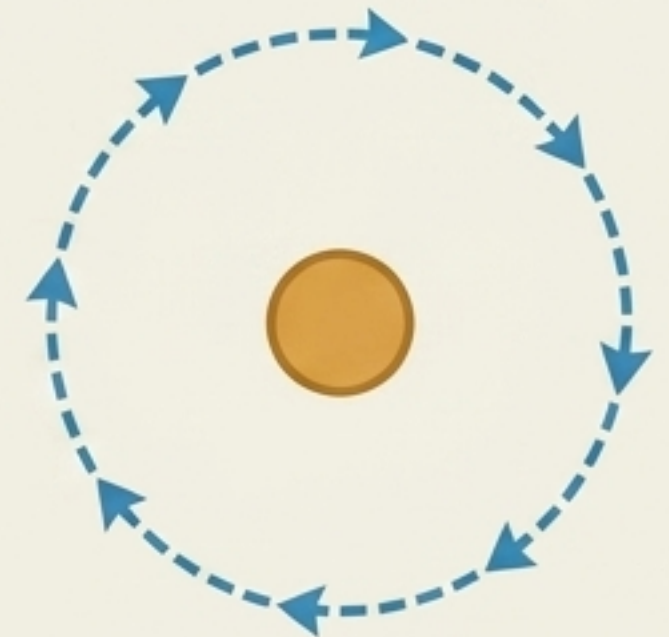
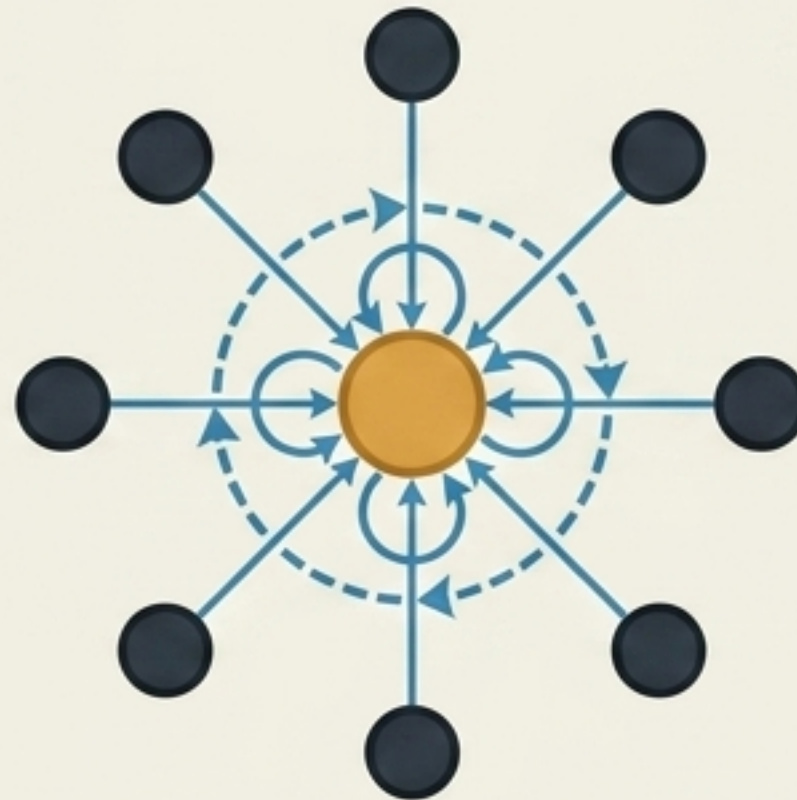


The constitutive relation dictates structural hierarchy (an organ inside a body). The interaction relation dictates survival dependency, which is rarely hierarchical and often cyclic.

Autonomy is a Limiting Regime, Not a Category

Autonomy is approached asymptotically as external boundary work becomes negligible relative to total maintenance.

$$\Delta(B) = \frac{W_{cross}}{W_{total}}$$

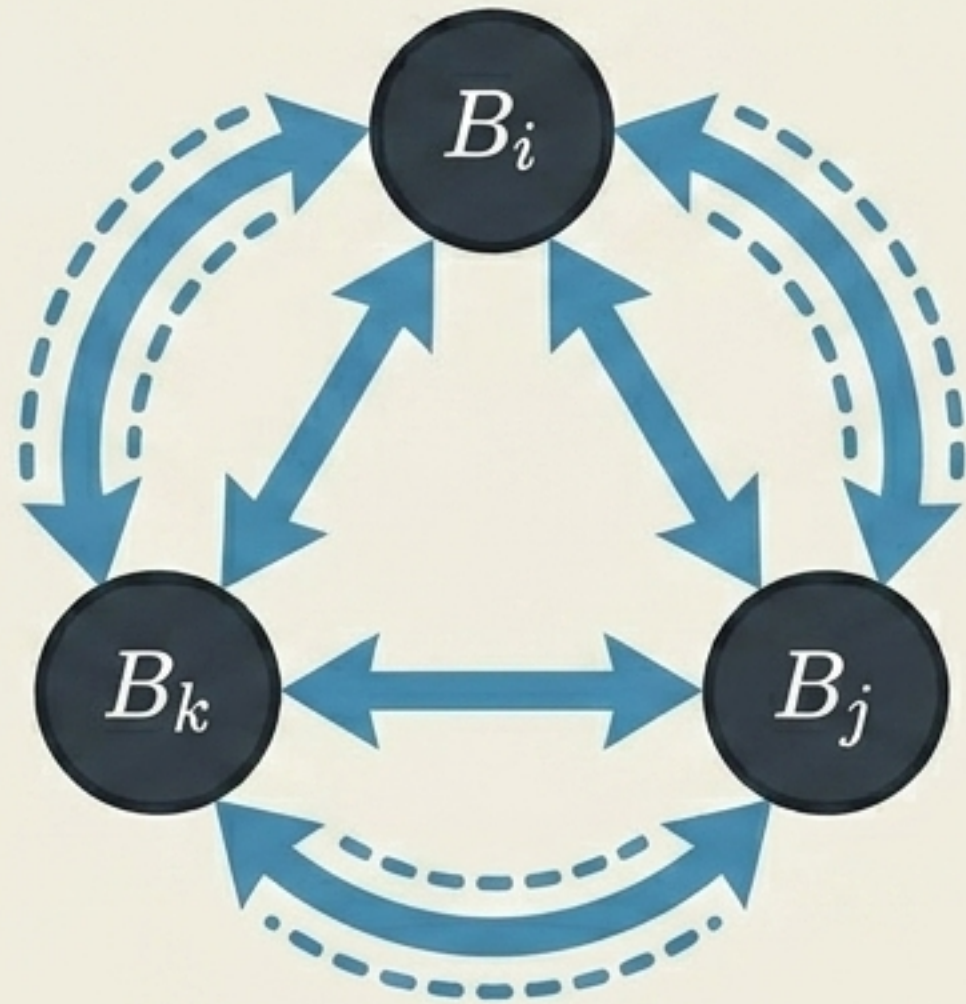


Fusing the Cycle: The Birth of Higher-Order Containers

When reciprocal interaction cycles become sufficiently dense, the principled move is to redraw the constitutive boundary. The cycle fuses into a single higher-order container.

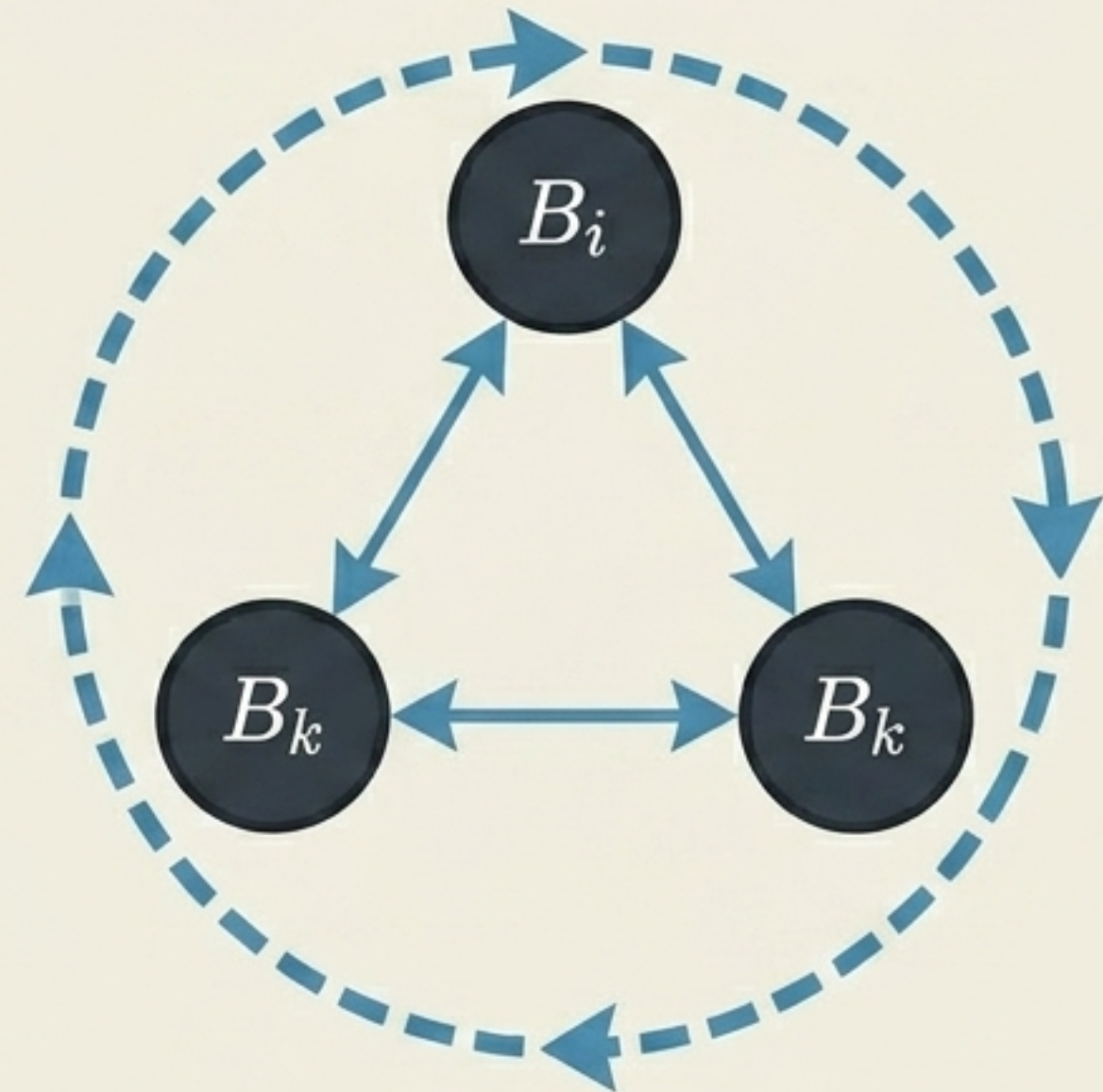
Step 1: Reciprocal Interaction

Nodes in a tight cycle with high individual dependency.



Step 2: Boundary Redrawn

The cycle becomes autonomous as a unit, approaching $\Delta \rightarrow 0$ relative to the outside.



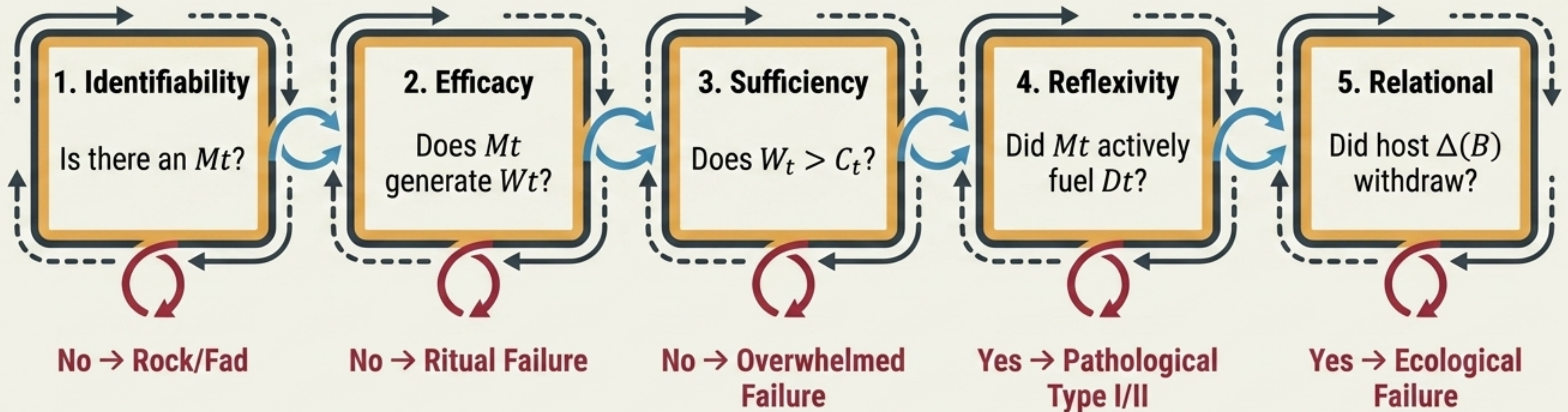
Four Domains, One Diagnostic

Run side by side, the domains do not converge on a single failure mode, but on a single shared vocabulary. The theory separates substrate from the structural math of survival.

| Domain | Cell | Language | State | Corporation |
|------------------------|---------------------------------|---|--------------------------------------|-----------------------------------|
| Mt Identity | Ion pumps, trafficking | Schools, households | Courts, taxation | Governance, payroll |
| Efficacy Failure | Mutated inert channel | Ceremonial instruction | Ritual sovereignty | On-paper compliance |
| Sufficiency Failure | Toxin overload | Demographic outmatched | Overwhelmed by invasion | Liquidity / market crisis |
| Reflexivity Failure | Autoimmune lysis (Type I) | Prescriptivist alienation (Type II) | Provocative policing (Type II) | Over-aggressive QA (Type I) |

The Diagnostic Sequence: Locating Collapse by Elimination

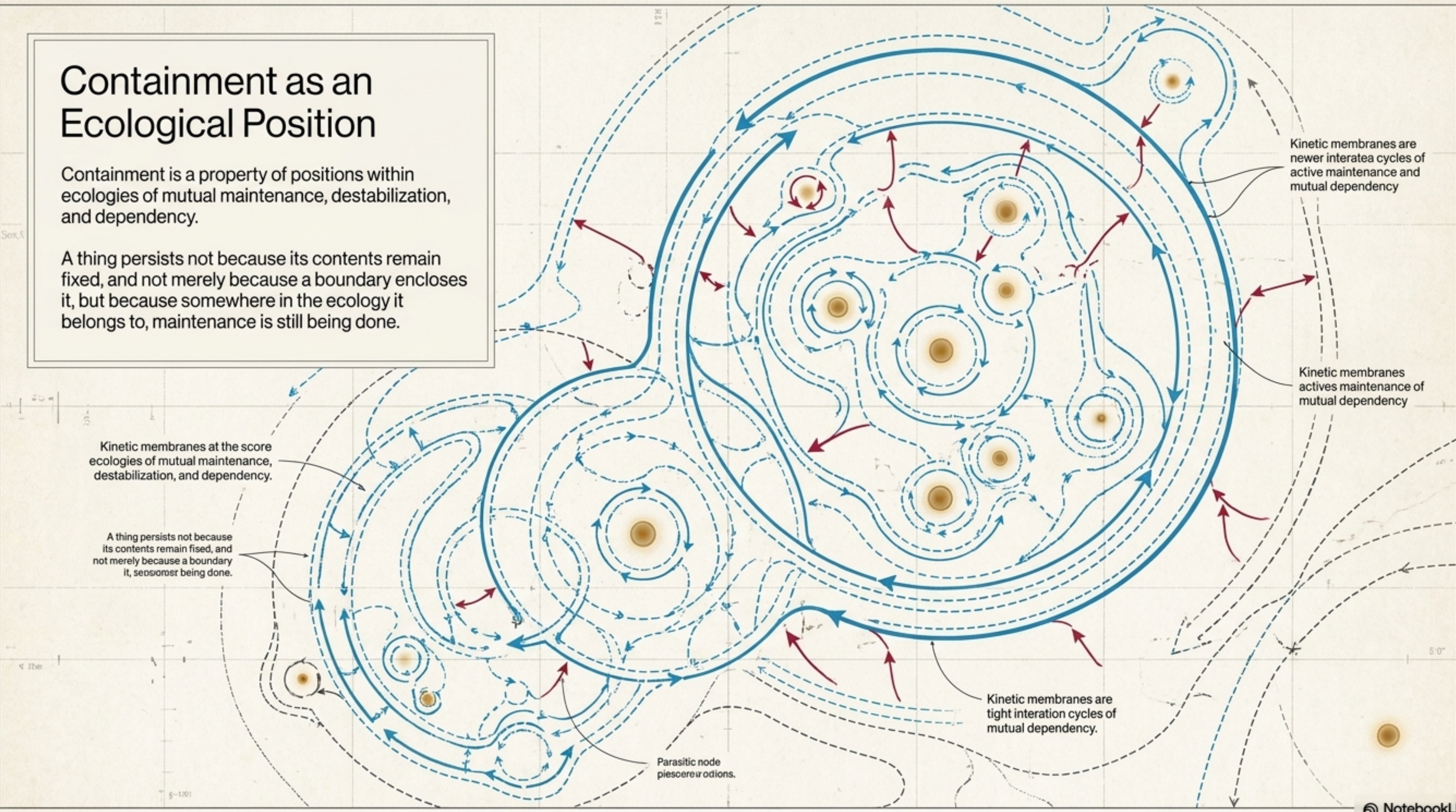
The most catastrophic collapses happen when effective maintenance turns self-destructive or has its ecological foundation withdrawn.



Containment as an Ecological Position

Containment is a property of positions within ecologies of mutual maintenance, destabilization, and dependency.

A thing persists not because its contents remain fixed, and not merely because a boundary encloses it, but because somewhere in the ecology it belongs to, maintenance is still being done.



Kinetic membranes are newer interatea cycles of active maintenance and mutual dependency

Kinetic membranes activates maintenance of mutual dependency

Kinetic membranes at the score ecologies of mutual maintenance, destabilization, and dependency.

A thing persists not because its contents remain fised, and not merely because a boundary it, seosomsr being done.

Kinetic membranes are tight interaction cycles of mutual dependency.

Parasitic node piesoere v odions.

Appendix A: Relation to Autopoietic Theory

The two accounts are siblings with different parents. The present account explains structural persistence across all domains, requiring entirely new machinery for failure taxonomies and relational system nesting.

| Dimension | Autopoietic Theory | The Present Account |
|------------|--|--|
| Primitive | Organizational Closure (Biological) | <u>Maintenance</u> (<u>Cross-domain admissibility</u>) |
| Boundary | Topological / Spatial | Sorting of continuations (Geometry optional) |
| Part-Whole | Whole regulates parts | Constitutive vs. Interaction graph (System-to-system nesting) |
| Failure | Binary (Maintained or lost) | <u>4-mode taxonomy</u> with Reflexivity thresholds |