

THE DYNAMIC ARCHITECTURE OF VIABILITY

From Distinction, Energy, Constraint, and Absence
to Sentience, Relation, and Life-Coherent Worlds



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A TRANSDISCIPLINARY SYNTHESIS AND RESEARCH PROGRAMME

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One relational process · Three windows · Seven functions
Grammar · Algebra · Geometry · Dynamics · Life-value

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Abstract

This monograph integrates a sequence of papers on distinction, autopoiesis, viability, emotional sentience, qualia, relationality, exceptional mathematics, love and life-value into one dynamic architecture. Its central proposal is that living reality is best approached neither as a hierarchy of substances nor as a list of disconnected explanatory levels, but as a historically recursive circulation. Energy gradients make work possible; constraints channel work; self-producing closure establishes a beneficiary for whom outcomes matter; perception detects viability-relevant differences; affect compresses their significance into valence; regulation selects and enacts responses; action alters the organism–world field; memory and learning sediment the history of coupling; and generative margin protects variation from which new options can arise. The loop is simultaneously material, experiential and relational, although these descriptions are not interchangeable.

The synthesis is organized by a triune-aspect process monism. A single relational process is accessible through a first-person window of feeling, a second-person window of participation and mutual address, and a third-person window of publicly describable organization. This is advanced as a metaphysical orientation, not an empirical result. It avoids multiplying substances while refusing to reduce lived presence or interpersonal recognition to third-person descriptions. It remains neutral between the claim that all reality is experiential and the more conservative claim that phenomenal experience occurs only when living regulation reaches a particular organization.

At the functional level, the framework proposes seven recurrent viability roles: constraint (C), margin (M), state (X), disturbance (D), perception (P), regulation (R) and options (O). Their seven balanced triads — CMX, XDR, XPO, MOR, CDO, CPR and MDP — form a Fano-plane incidence pattern. That incidence structure is exact once the mapping is stipulated, but the claim that these seven roles form a minimal cross-scale grammar is a bridge hypothesis. The Fano plane, octonions, Spin(8) triality, the exceptional Jordan algebra, Freudenthal systems and exceptional Lie groups are therefore treated with a double discipline: their mathematical relations are exact; their proposed relevance to biological, experiential and social organization is conjectural and must earn empirical standing.

Deacon's account of constraint, absence and teleodynamics clarifies how a process can be organized around what is not yet the case. Friston's free-energy formulations clarify how adaptive systems can maintain themselves through inference and action under uncertainty. Maturana and Varela clarify operational closure, structural coupling, cognition and the observer-dependent constitution of explanatory domains. Peil Kauffman, Panksepp, Damasio and Solms clarify the biological and neural organization of valence and feeling. Wilber's AQAL and Wilber–Combs frameworks help prevent category errors by locating interior and exterior, individual and collective, state and developmental stage. McMurtry's life-value ontology supplies the normative test: an organization is life-coherent insofar as it protects, restores or enlarges life-capacity without transferring disabling costs to other lives or the future conditions of life.

The resulting framework is intentionally stronger than a survey and more cautious than a total theory. It offers a coherent model, explicit formal bridges, cross-scale case analyses and a falsifiable research programme. It does not claim to have solved the hard problem of consciousness, derived ethics from physics, or proven that living systems instantiate exceptional algebras. Its achievement is to relocate these uncertainties inside a common architecture in which their exact status, mutual constraints and empirical openings become visible.

Keywords: viability; autopoiesis; teleodynamics; free-energy principle; emotional sentience; affect; qualia; participatory sense-making; triune-aspect process monism; Fano plane; octonions; triality; exceptional mathematics; life-coherence; biology of love

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Executive synthesis

The papers gathered behind this monograph already contained most of the required parts. What they lacked was not another concept but a stable account of how the concepts move together. The primary distinction explained how a domain can begin. Autopoiesis explained how a living unity constitutes and conserves itself. Teleodynamics explained how constraints can be organized around absent ends. Active inference explained anticipatory regulation under uncertainty. Emotional sentience and affective neuroscience explained why viability must be weighted rather than merely represented. The I–You–It windows explained why reality is never exhausted by detached observation. The viability grammar specified recurring functional relations. The exceptional programme asked whether those relations possess deeper formal closure. Life-value and the biology of love supplied an answer to the question that pure systems theory cannot settle: coherence for whom, at whose cost and in service of what manner of living?

The integration can be stated in one sentence:

Energy becomes living work when recursively regenerated constraints preserve a bounded organization; that organization senses and feels the significance of its changing relation to the world, acts through historically learned options, and — in human coexistence — can reflectively conserve relations that enlarge rather than disable life.

This sentence contains five transitions that must not be collapsed.

1. **Energy to organization.** Energy is necessary for every material transformation, but energy alone does not specify form, function, beneficiary or value. Constraint selects pathways and prevents most physically possible changes from occurring.
2. **Organization to immanent norm.** In a self-producing system, some outcomes preserve the organization and others destroy it. This establishes an organism-relative good/bad polarity without yet proving phenomenal feeling.
3. **Immanent norm to felt valence.** In animals, distributed homeostatic, interoceptive, brainstem, hypothalamic, limbic and cortical processes integrate bodily significance into felt states. The proposal that feeling is the intrinsic aspect of this integrated regulation is a metaphysical identity hypothesis supported by structural fit, not deduced from nonexperiential premises.
4. **Feeling to relation and world.** A subject does not merely register an environment. Through action and structural coupling it enacts a lived world. With other subjects, mutual responsiveness creates a second-person domain that cannot be reconstructed from two isolated first-person reports plus an external description.
5. **System coherence to life-coherence.** A tumour, bureaucracy, market, military apparatus or propaganda network can be internally coherent while destroying its host conditions. Persistence, efficiency and integration are therefore insufficient norms. Life-capacity across affected scales supplies the evaluative test.

The proposed ontology is **triune-aspect process monism**: one reality of relational becoming, disclosed intrinsically as felt presence, participatorily as mutual address and extrinsically as organization. “Aspect” does not mean three detachable substances. “Window” does not imply that the three accounts are optional perspectives on an otherwise featureless object. Each discloses relations that the others cannot replace. The first-person window supplies lived significance; the second-person window supplies recognition, trust, obligation and co-regulation; the third-person window supplies public measurement, causal modelling and reproducibility.

The proposed functional grammar is **V = (C, M, X, D, P, R, O)**. These terms are roles in a recurrent cycle, not chronological stages and not seven substances. Constraint shapes the viable region; margin indicates reserve before a critical boundary; state names the present configuration and trajectory; disturbance perturbs it;

perception detects relevant difference; regulation changes action or internal organization; options are the viable paths still available. Because each function receives meaning through the others, additive scorekeeping is inadequate. Relational coherence is the object of study.

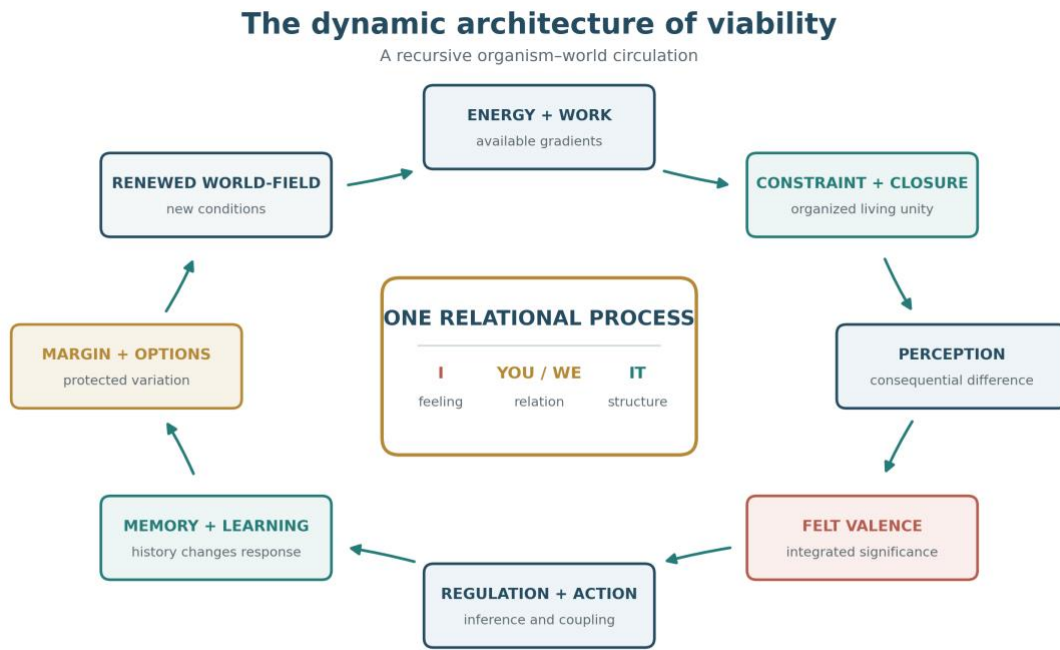
The proposed formal programme proceeds through four levels:

- **Grammar:** which distinctions and triads must be represented?
- **Algebra:** how do the operations compose, and how does order matter?
- **Geometry:** what is the shape of the viable region, its boundaries, distances, directions and curvature?
- **Dynamics:** how do energy, disturbance, inference, regulation, learning and history move the system through that geometry?

The proposed research discipline uses five claim classes throughout this monograph.

Status	Meaning	Typical examples here
Established result	Empirically well supported or mathematically proved within its domain	thermodynamic conservation; neural dependence of wakeful affect; Fano incidence; octonionic nonassociativity; Spin(8) triality
Scientific framework	A serious, productive but revisable explanatory programme	autopoiesis; teleodynamics; free-energy principle; active inference; affective neuroscience
Bridge hypothesis	A proposed mapping that can guide formalization and tests	seven functions as a minimal grammar; global viability compression as a correlate of affect; exceptional structures as models of relational closure
Metaphysical hypothesis	A claim about what reality or experience ultimately is	triune-aspect process monism; analytic idealism; panexperientialism; phenomenal identity of integrated valence
Normative or theological judgment	A claim about what ought to be conserved or how life should be lived	life-coherence; legitimate otherhood; the Greatest Commandment as a grammar of relation

The synthesis therefore closes a conceptual circuit without pretending to close every explanatory gap. Its strongest conclusion is methodological: no adequate science of viability can be purely energetic, computational, phenomenological, interpersonal, mathematical or ethical. It must coordinate these domains while preserving their differences.



Work becomes life-relevant through constraint and closure; action then changes the field that must be sensed again.

Figure 1. The dynamic architecture of viability.

Energy and constraint enter a recursive organism–world circulation whose intrinsic, participatory and extrinsic disclosures must be coordinated without reduction.

Preface — The synthesis that was already implicit

This manuscript does not replace the earlier papers. It changes their relation. Each paper isolated a necessary window because the whole could not initially be seen at once. The first-cut papers began with distinction; the viability papers identified recurrent functions; the qualia and self papers tracked the interiority of regulation; the relational papers restored the second-person domain; the exceptional papers investigated formal closure; the field and life-course papers followed embodiment across scales; the biology-of-love and life-value papers restored the normative ground; and the natural-drift and Inverse Darwinism papers introduced history, redundancy and protected novelty. Read separately, each work appears to advance a different centre. Read dynamically, they are phases of a single circulation.

The decisive reorganization is from ladder to loop. A ladder invites a misleading picture: matter at the bottom, experience above it, society higher still, mathematics somehow overarching all of them, and spirituality at the summit. The living process is not arranged that way. Planetary conditions enter the organism through exposure, nutrition, climate, institutions, language and relationship. Organismic feeling and action alter relationships. Repeated relations become norms and institutions. Institutions reorganize material flows and planetary conditions. Every “higher” level depends on and returns to the “lower”; every “lower” level is selectively reorganized by histories at the “higher.” The exceptional ladder may still illuminate increasing formal integration, but it belongs inside this circulation rather than defining the ontology of the whole.

The manuscript is written in a bold structural-hypothesis register with explicit limits. It asks whether a real relational architecture links energy, constraint, life, feeling, language, social order and mathematical form. It does not infer truth from resonance. It treats resonance as an invitation to derive, operationalize and test. Whenever a mathematical structure “answers back,” the question is not whether it feels profound, but whether it constrains a mapping fixed in advance, forbids an expected transition, predicts an invariant, identifies a failure mode, or outperforms simpler alternatives.

The same discipline applies to spiritual resonance. The Greatest Commandment, Maturana’s biology of love and life-value theory converge on a relational insight: self, other and encompassing source cannot be made coherent through domination or exclusion. Yet theological illumination is not laboratory confirmation. The resonance matters because it may disclose a durable human orientation; it does not exempt the framework from empirical or ethical scrutiny.

The result is best read as three things at once: a synthesis of an existing corpus, a candidate architecture of viability across scales, and a research charter for finding where the architecture holds, where it must be modified and where it fails.

PART I — FROM THE FIRST DISTINCTION TO A LIVING DOMAIN

1. Distinction is necessary but not yet alive

George Spencer-Brown's instruction to draw a distinction identifies the minimal act by which form becomes articulable. A mark creates a boundary and, with it, marked and unmarked sides. This is not yet an organism, observer, subject or world. It is the formal beginning of a domain in which such relations can later be specified (Spencer-Brown, 1994).

The importance of this restraint cannot be overstated. Many theories smuggle life into the first distinction by calling one side a self, the other an environment and the boundary a membrane. Those terms already contain organization, history, metabolism and point of view. A logical cut does not produce them. The cut supplies the possibility of inside/outside; living closure must actively produce and conserve an inside whose continuation depends on exchanges across the boundary.

Maturana's biology of cognition relocates distinction in the praxis of an observer. An object is not encountered as a ready-made package of observer-independent properties and then labelled. It is brought forth through an operation of distinction within a domain of operations. This does not mean that anything can be said without consequence. It means that claims of objectivity depend on specified operations, criteria and communities of validation. "Objectivity in parentheses" accepts responsibility for the path by which a world is distinguished while remaining answerable to the constraints of experience and consensual coordination (Maturana, 1988).

This immediately clarifies a question that otherwise becomes ill posed: what domains of distinctions existed before human language? Before human observers there were no humanly articulated domains of distinctions. There were, however, living systems whose structures made recurrent differences consequential. A bacterium's chemotactic apparatus does not linguistically distinguish nutrient from toxin, yet different molecular encounters trigger different state transitions and actions within its operational organization. It is legitimate for an observer to describe these as biological discriminations, provided the description is not projected back as a tiny human representation in the cell (Maturana, 1970; Maturana & Varela, 1980).

Three levels should therefore be separated:

- A **physical difference** is any distinguishable variation in an observer's description of a process.
- An **operational discrimination** occurs when a system's organization responds differently to different perturbations.
- A **linguistic distinction** occurs in recursive consensual coordination when a community can distinguish its own distinctions and coordinate around them.

Human languaging adds a decisive recursion. We do not merely respond differently; we coordinate coordinations of action, distinguish those coordinations, contest them and conserve them as names, norms, roles, models and institutions (Di Paolo et al., 2018; Maturana & Varela, 1992). Mathematical domains are an especially disciplined form of this recursion. Their apparent "life of their own" arises because initial stipulations generate consequences no individual intention controls, proof makes those consequences shareable, and later operations reveal structures that were implicit but unforeseen. This relative autonomy warrants realism about formal constraint; it does not by itself prove that every formal structure is physically instantiated (Maturana, 2000).

The first cut therefore becomes living only through a further sequence: boundary production, recursive closure, selective coupling, memory, regulation and historical conservation. The fundamental transition is not from no

distinction to distinction alone, but from a distinction made by an observer to a system that continually regenerates the conditions under which some differences matter to its own continuation (Maturana & Varela, 1980; Varela, 1979).

1.1 The first methodological rule

At every scale, distinguish the observer's domain from the operational domain of the system. "Perception" in a coral reef, "memory" in an immune network, "choice" in a cell and "intention" in an institution may be useful functional terms, but they do not automatically imply phenomenal consciousness or a unitary social subject. Domain discipline prevents both reductive denial and anthropomorphic inflation.

2. Energy, exergy and the insufficiency of power alone

Energy is indispensable to the architecture, but "energy is the unifying matrix" is true only after an important qualification. In physics, energy is a quantitatively conserved property associated with the capacity of a system to produce change. The familiar phrase "capacity to do work" is most accurate for available energy or exergy: the portion that can perform useful work relative to an environment. Living systems persist far from thermodynamic equilibrium by exploiting gradients — chemical, electrochemical, thermal, photonic and mechanical — and dissipating them while maintaining organized constraints.

Energy alone does not explain why one process repairs a membrane, another contracts a muscle, another consolidates a memory and another destroys tissue. The same energetic quantity can be channelled into radically different work. Organization resides not in energy as such but in constraints that restrict degrees of freedom, couple processes and preserve some pathways while excluding others. A river and a turbine may involve comparable flows; the turbine's constraints make rotational work available. A cell goes further: its constraints are produced by the very processes they constrain. Membranes, enzymes, gradients and genetic–epigenetic regulation form a reciprocally dependent network that continually rebuilds the organization using the matter and energy passing through it (Deacon, 2012; Maturana & Varela, 1980).

Deacon's language of absence is helpful here. A constraint is physically manifest in what does not occur: degrees of freedom are prevented, transitions suppressed, possibilities narrowed. Yet this "absence" is not a ghostly force added to physics. It is a relational fact about a system's accessible state space. In living systems, networks of constraints regenerate one another, so that absent or future conditions — an unmet metabolic need, an anticipated danger, an unoccupied niche, a target state — can organize present activity through the structures that embody sensitivity to them (Deacon, 2012).

Teleodynamics names this higher-order closure of constraint-producing processes. It offers a naturalized account of end-directedness: the system behaves as if oriented to its continued organization because processes that would undermine that organization are countered by processes whose own persistence depends on it. The "end" is not an external blueprint. It is the absent condition around which the self-maintaining dynamics are recursively organized (Deacon, 2012).

This is also where the language of value first becomes legitimate in a minimal biological sense. A perturbation is beneficial, harmful or irrelevant relative to the continuation and development of an organized living unity. This is immanent normativity: not yet morality, not necessarily conscious pleasure or pain, but an objective organism-relative difference between what supports and what erodes viability.

The architecture therefore assigns distinct roles:

Term	What it contributes	What it does not by itself explain
Energy	Material possibility of change	organization, beneficiary, meaning or value
Exergy / available work	Capacity to drive directed transformation in context	which direction ought to be taken
Constraint	Selection and coordination of pathways	why the constraint is regenerated
Autopoietic closure	Production of the living unity and its boundary	phenomenal feeling
Teleodynamic closure	End-directedness around self-maintenance	the precise neural basis of experience
Information	Reduction of uncertainty or system-relative difference	semantic significance without an interpreter or beneficiary
Affect	Felt or affectively weighted viability significance	ethical rightness across persons and scales
Life-value	Normative evaluation of consequences for life-capacity	a substitute for domain-specific causal science

2.1 Three meanings of free energy

The synthesis must also prevent a recurrent equivocation. Thermodynamic free energy, variational free energy and expected free energy are related through formal and conceptual bridges, but they are not the same quantity.

- **Thermodynamic free energy** concerns energy available for work under specified physical conditions.
- **Variational free energy** is an information-theoretic functional used to bound surprisal under a probabilistic model:

$$F[q] = E_q[\ln q(s) - \ln p(o,s)] \geq -\ln p(o).$$
- **Expected free energy** evaluates policies in active inference by combining predicted preference fulfilment and information gain under a generative model.

Friston's free-energy principle proposes that systems maintaining characteristic states can be described as minimizing a variational bound on surprise, while active inference models perception and action as coupled means of doing so (Friston, 2010, 2013). This clarifies anticipatory regulation, embodied inference and action under uncertainty. It does not identify a beneficiary merely by writing down a density, and it does not make thermodynamic energy identical with prediction error. Deacon supplies the missing organizational question — what recursively regenerated constraints constitute the system whose persistence is at issue? Friston supplies a formal language for how such a system may infer and act under uncertainty. Their combination is strongest when their differences are conserved (Deacon, 2012; Friston, 2010, 2013).

3. Autopoiesis, cognition and worlds brought forth

Autopoiesis identifies a living system by the organization through which a network of processes produces the components that recursively realize that same network and constitute a bounded unity. Matter changes; organization is conserved through changing structure. The cell is not a thing that happens to metabolize. It is an ongoing production whose cessation dissolves the unity (Maturana & Varela, 1980; Varela, 1979).

Maturana's extension — "living systems are cognitive systems, and living as a process is a process of cognition" — does not claim that every cell thinks propositions. Cognition is effective action in a domain of structural coupling. The medium perturbs but does not instruct; the system's present structure determines the changes it can undergo. Through recurrent interactions, organism and medium become historically congruent. The organism enacts a world of relevance because only some environmental variations can trigger changes within its organization and only some changes are conserved (Maturana, 1970; Maturana & Varela, 1992).

This framework dissolves a false choice between a fully pre-given world and arbitrary construction. The medium has structures and regularities that resist some actions and permit others. The organism does not manufacture these constraints at will. Yet its lived world — the domain of affordances, threats, nutrients, mates, tools, symbols and obligations — arises through the coupling of those regularities with its own organization and history. Object and world are relational achievements (Thompson, 2007; Varela et al., 1991).

In humans, languaging transforms this coupling. Language is not primarily the transfer of representations from one head to another. It is recursive coordination of coordinations of conduct. Conversations braid languaging with emotioning: what actions are possible in fear differs from what is possible in curiosity, trust, resentment or love. Cultures are networks of such conversations that conserve ways of distinguishing, feeling and acting. Institutions stabilize these recurrent coordinations in rules, infrastructures, categories, budgets, technologies and sanctioned identities (Deacon, 1997; Di Paolo et al., 2018; Maturana & Varela, 1992).

This makes cognition biologically continuous with life while keeping human symbolic recursion distinctive. It also reveals a major source of confusion. An observer may describe an institution as “seeking survival,” a market as “perceiving risk” or a state as “remembering trauma.” These can be legitimate functional abstractions, but institutions are not thereby proven to be autopoietic organisms or phenomenal subjects. Their agency is enacted through human bodies, artifacts, legal rules, communication networks and material infrastructures. Whether a collective possesses an irreducible subjectivity remains a metaphysical and empirical question, not a grammatical implication.

3.1 Objectivity and mathematics

Maturana’s advice on mathematical formalism is neither anti-realist nor naïvely Platonist. Formalisms specify relational matrices. They are effective when the operational coherences generated within the formal domain map adequately onto coherences in the domain being studied. Mathematics should therefore be used as a disciplined “third look”: a public, repeatable examination of relations that may escape unaided intuition. Its power lies in the constraints it imposes after definitions are fixed (Maturana, 2000).

The criterion is not elegance alone. A formalism begins to disclose a real organization when it successfully maps operations, predicts relations not used to construct the mapping, distinguishes possible from impossible transitions, and survives perturbation across cases. Until then, mathematical fertility is evidence of an interesting formal domain, not evidence that nature or society literally possesses that ontology.

This domain discipline will govern the exceptional programme later in the manuscript.

PART II — THE VIABILITY GRAMMAR IN MOTION

4. Seven recurrent functions, not seven things

The viability grammar proposes seven functions that recur whenever a bounded adaptive process persists under disturbance: constraint, margin, state, disturbance, perception, regulation and options. The set is written $V = (C, M, X, D, P, R, O)$. These symbols do not name elementary particles, anatomical modules or metaphysical substances. They identify questions that a sufficient account of viability must answer (Sahely, 2026a).

Constraint (C) asks what limits and organizes possible change. Constraints include physical boundaries, metabolic dependencies, constitutive rules, developmental commitments, ecological limits, institutional laws and learned habits. Some constraints enable by excluding: a membrane prevents indiscriminate diffusion and thereby makes regulated exchange possible. Others become pathological when they persist after their enabling function has been lost.

Margin (M) asks how much reserve separates the current process from loss of viability. It may be metabolic reserve, perfusion reserve, time, trust, liquidity, ecological diversity, redundancy, spare capacity or tolerance for error. Margin is not inefficiency by definition. It is the room within which correction, learning and protected variation remain possible (Holling, 1973; Sahely, 2026a, 2026e).

State (X) asks what configuration and trajectory the process presently occupies. A state is never only a static snapshot. Two patients with the same blood pressure may have different trajectories, compensatory loads and reserves. State should therefore include rates of change, hidden burden and relevant history.

Disturbance (D) asks what perturbations act on the process and how their intensity, duration, timing and coupling relate to current vulnerability. A disturbance is not inherently external. Mutation, inflammation, rumination, misinformation and endogenous market feedback can all function as disturbances. What counts as disturbance depends on the organization under study.

Perception (P) asks how relevant differences become available to regulation. At cellular scales this means receptor-mediated discrimination and intracellular signalling, not necessarily experience. At organismic scales it includes interoception, exteroception, affective salience and learned prediction. At social scales it includes measurement, testimony, journalism, science and public deliberation. Perception fails through blindness, noise, delay, suppression and proxy substitution (Craig, 2002; Sahely, 2026a; Seth, 2013).

Regulation (R) asks how the process acts to maintain, restore or transform viable organization. Regulation may be biochemical, autonomic, behavioural, interpersonal or institutional. It includes feedback and feedforward control, but in living systems also changes the controller through learning and development.

Options (O) asks which viable paths remain open. Options are not abstract choices detached from capacity. A path counts only if the system can enact it without leaving the relevant viability domain or transferring intolerable cost elsewhere. Optionality therefore links freedom to embodiment, resources, time, knowledge and relationship.

The grammar is deliberately relational. Each function is partly constituted by the others. Margin is distance from a constraint boundary relative to the current state and likely disturbances. Perception matters only insofar as regulation can use it. Options depend on constraint, margin, state, perception and regulatory capacity. A list or additive score cannot capture these dependencies (Sahely, 2026a, 2026e).

4.1 The seven triads

The balanced triadic closure used in this programme is:

Triad	Functional reading	Characteristic failure
C–M–X	Geometry of viability: state relative to constraint and reserve	hidden margin depletion; apparently normal state near a cliff
X–D–R	Response channel: regulation fitted to state and disturbance	overreaction, underreaction, delay or mistargeted response
X–P–O	Perception–possibility: state recognition opens actionable paths	tunnel vision, learned helplessness, counterfeit options
M–O–R	Adaptive capacity: reserve enables alternative regulation	rigid control, exhausted reserve, no safe experiment
C–D–O	Pressure versus possibility: constraints and disturbance reshape paths	entrapment, forced choice, catastrophic narrowing
C–P–R	Governance: constraints orient perception and response	metric capture, censorship, Goodhart effects, regulatory capture
M–D–P	Early warning: disturbance is detected before reserve is lost	late recognition, normalization of deviance, silent brittleness

This configuration is the unique projective plane of order two once seven positions and pairwise-complete triples are required: each function occurs in three triads and every pair occurs exactly once. That combinatorial statement is exact. The semantic assignment of functions to points is constrained by the intended meanings but is not mathematically forced by the Fano plane itself (Baez, 2002; Sahely, 2026a).

An important distinction follows. **Incidence is symmetric; causality need not be.** The Fano pattern says which triples co-belong. It does not say that all directions of influence are equivalent. Within the viability interpretation, constraint, perception and regulation (C–P–R) can be treated as a generative triad: constraints shape what can be sensed and done; perception makes relevant differences available; regulation changes the system and its constraints. Disturbance acts as a forcing field. State, margin and options emerge as relational consequences of this organized encounter. This functional asymmetry must not be mistaken for an asymmetry proven by Fano incidence.

The seven-function viability grammar

Fano incidence: seven points · seven lines · one line through every pair

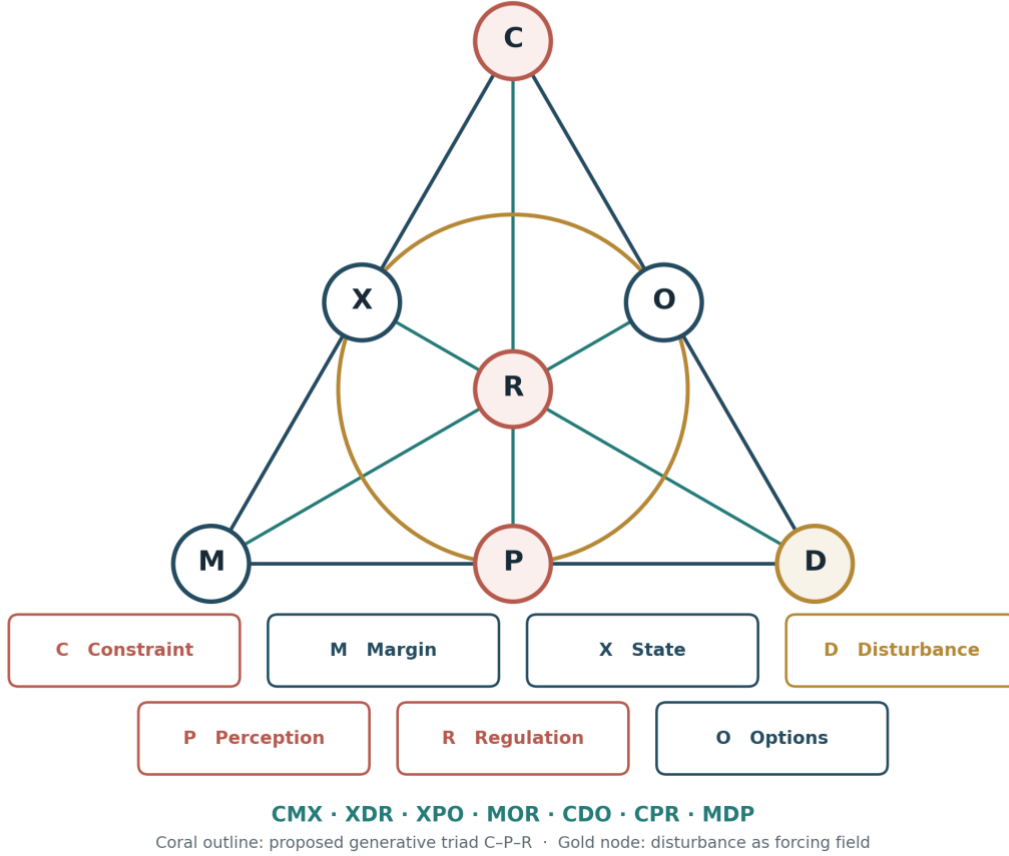


Figure 2. The Fano-plane closure of the seven functions.

The geometry establishes balanced incidence; the generative interpretation of C-P-R and D is an additional hypothesis.

4.2 A binary construction

One transparent encoding uses the nonzero vectors of the three-dimensional binary vector space F_2^3 :

$$C = 100; M = 010; D = 001; X = 110; P = 011; O = 101; R = 111.$$

Each Fano line is a triple whose vector sum is zero. The seven lines are CMX, MDP, CDO, XDR, XPO, MOR and CPR. This demonstrates how three independent binary distinctions plus the rule of pair-completion generate seven nonzero positions. It does **not** prove that the semantic functions arose historically from binary variables or that natural systems implement binary arithmetic. It establishes a disciplined combinatorial model (Baez, 2002).

5. From grammar to dynamics

A grammar becomes explanatory only when embedded in a dynamical system. Let $x(t)$ denote the state trajectory, $K(t)$ a time-dependent viability domain, $d(t)$ a disturbance, $C(t)$ constitutive constraints, $e(t)$ available energetic resources, $p(t)$ a perceptual or inferential state, $m(t)$ memory state, $v(t)$ organism-relative value or preference parameters, $u(t)$ regulatory action, $\theta(t)$ learned parameters, $\varepsilon(t)$ residual error or noise, and H_t the system's relevant history up to time t . A minimal controlled dynamics can be written:

$$\dot{x} = f(x, u, d; C, e), \quad p = h(x, d; \vartheta) + \varepsilon, \quad u = \pi(p, m, v), \quad \dot{\vartheta} = \ell(H_t).$$

Here the policy π selects action using perception, memory and organism-relative value parameters; the learning rule ℓ changes the mapping through history. For $x \in K(t)$, margin can be represented as distance to the boundary of K under an appropriate metric g :

$$M(x, t) = \text{dist}_g(x, \partial K(t)).$$

Optionality over horizon T is the set of admissible regulatory paths $u(\cdot)$ that, from state x at time t , generate trajectories $x_u(\tau)$ remaining inside the time-dependent viability domain:

$$\mathcal{O}_T(x, t) = \{u(\cdot) \mid x_u(\tau) \in K(\tau), \forall \tau \in [t, t+T]\}.$$

These expressions are conceptual scaffolds. They make hidden assumptions visible: the choice of state variables, metric, boundary, horizon, admissible action and affected population. Different systems require different operationalizations. The framework does not supply a universal scalar by notation alone.

5.1 Multiple timescales

Living dynamics are nested across timescales. Rapid regulation stabilizes variables over seconds or minutes. Learning changes response mappings over hours or years. Development changes the architecture of the organism. Evolution changes lineages and ecological relations. Culture and institutions conserve recurrent coordinations across generations. Planetary feedback can unfold over decades to millennia while still penetrating daily physiology through heat, food, pathogens, displacement and fear (McEwen, 1998; Sahely, 2026d, 2026e).

The same disturbance can therefore have opposite effects depending on duration and recovery. A transient stressor may expand adaptive capacity through successful regulation and learning. Recurrent stress without restoration consumes margin, sensitizes threat systems and narrows options. The relevant unit is not disturbance magnitude alone but the ratio among load, reserve, response, recovery and historical reorganization (Holling, 1973; McEwen, 1998).

This supports a dynamic definition:

Viability is the historically sustained capacity of a relationally bounded process to remain within, restore, or responsibly transform its life-supporting domain under disturbance while preserving sufficient margin and optionality for future adaptation.

“Responsibly transform” matters. A system can maintain itself by exporting damage. A corporation can preserve profit by degrading workers and ecosystems; a state can preserve internal order by external violence; a tumour can preserve its lineage by exhausting the organism. Such processes may be viable in a narrow local sense while life-incoherent across the containing field.

5.2 The recursive loop

The dynamic architecture can be read as the following circulation:

1. Energy gradients provide available work.
2. Constraints channel work into organized pathways.
3. Reciprocally regenerated constraints constitute autopoietic or teleodynamic closure.
4. A boundary and history establish an organism–world interface.
5. Perception detects differences relevant to viability.
6. Valence compresses multidimensional significance into attraction, aversion, urgency and arousal.

7. Regulation and active inference select internal change or action.
8. Action modifies both organism and medium through structural coupling.
9. Memory, learning and development alter future sensitivity and action.
10. Margin and redundancy protect variation, enabling new complementarities and options.
11. The transformed organism–world field supplies the next conditions of energy, constraint and disturbance.

No single step is sovereign. Removing energy makes the loop physically impossible; removing constraint makes it unorganized; removing closure removes the beneficiary; removing perception makes regulation blind; removing affect from sentient animals removes felt urgency; removing relation erases co-regulation and social world-building; removing history turns life into a timeless control diagram; removing margin makes adaptation brittle; removing life-value leaves us unable to distinguish a flourishing whole from a successful parasite.

6. Deacon, Friston and Inverse Darwinism as complementary windows

Deacon's teleodynamics and Friston's free-energy formulations often appear to compete because both address goal-directed organization. They answer different questions.

Deacon asks how constraints become recursively dependent such that a process is organized around maintaining its own conditions of existence. The key concepts are absence, constraint, work and nested dynamical dependence. This provides an account of emergent normativity and beneficiary: an end is immanent to the process because the process regenerates the constraints that make the end causally effective (Deacon, 2012).

Friston asks how a system separated by a statistical boundary can maintain a limited repertoire of characteristic states through perception and action. Variational free energy makes inference tractable; expected free energy formalizes policy selection with pragmatic and epistemic components. This provides a powerful account of anticipatory regulation and uncertainty reduction (Friston, 2010, 2013).

Their integration can be expressed as a division of labour:

Question	Deaconian emphasis	Fristonian emphasis
What constitutes the system?	recursively regenerated constraints and teleodynamic closure	states separated by a Markov-blanket factorization
Why do outcomes matter?	persistence of the constraint-producing organization	prior preferences and characteristic states in the generative model
How does the system cope with uncertainty?	historically structured constraints and work	inference, prediction and action minimizing variational/expected free energy
How does novelty arise?	constraint reorganization and emergent higher-order dynamics	model learning, exploration and epistemic action
What remains underexplained?	exact inferential algorithms	origin and normative legitimacy of preferences/beneficiary

The Markov blanket is a conditional-independence structure in a model, not automatically a cell membrane, an ontological wall or a conscious boundary. Teleodynamic closure is not automatically phenomenal feeling. A productive synthesis keeps these caveats visible.

Inverse Darwinism adds a missing temporal mechanism. Duplication, degeneracy, redundancy and excess capacity can protect an existing function while variants drift. Because immediate viability is buffered, changes that would

otherwise be eliminated can persist long enough to discover complementarities or new functions. Natural selection may later stabilize these relations, but selection is not the sole generator of the protected possibility space (Edelman & Gally, 2001; Kalkman & Deacon, 2026; Maturana & Mpodozis, 2000; Sahely, 2026d).

In the viability grammar, Inverse Darwinism links M, O and R. Margin protects exploration; exploration enlarges or reorganizes options; regulation preserves enough continuity for novelty to become integrated. Yet redundancy can also harden into dependency, bureaucracy or parasitic complexity. Generative reserve must therefore be judged by whether it increases life-serving capacity rather than self-reproduction alone.

PART III — FROM IMMANENT CONCERN TO FELT CONCERN

7. Affect as the intrinsic significance of regulation

Living systems display immanent concern before we can confidently attribute phenomenal concern. A bacterium moves up a nutrient gradient and away from a toxin; a plant regulates water loss; immune networks discriminate and adapt. These processes are goal-directed and value-laden relative to organismic viability. It does not follow that they feel good or bad (Maturana & Varela, 1980; Sahely, 2026g; Vaz & Varela, 1978).

The conservative biological hypothesis adopted here distinguishes at least four layers:

Layer	Organization	Minimal claim
Cellular proto-self	metabolic closure, membrane discrimination, homeostatic regulation	organism-relative normativity; no phenomenal claim required
Multicellular integrative self	endocrine, immune, autonomic and neural coordination	system-wide regulatory weighting and embodied state integration
Core affective self	brainstem–hypothalamic–midbrain and distributed interoceptive networks	felt valence, arousal, motivation and primary affect
Narrative–social self	cortical memory, language, imagination and interpersonal recognition	temporally extended identity, emotion concepts, moral and cultural meaning

Peil Kauffman’s emotional-sentience programme is valuable because it treats emotion as a self-regulatory sense rather than a disruptive by-product of cognition. It identifies valence as information about the relation between self-preservation, self-development and current conditions (Kauffman, 2014, 2015). Panksepp’s affective neuroscience contributes evidence for evolutionarily conserved subcortical systems supporting primary-process affect and action tendencies (Panksepp, 1998, 2011). Damasio connects homeostatic regulation, body mapping, emotion and feeling, emphasizing how organismic condition becomes consciously present (Damasio, 1999; Damasio & Carvalho, 2013). Solms (2021) argues that affective consciousness depends primarily on upper brainstem and related arousal–homeostatic systems rather than being generated by cortex alone; cortex enriches content, learning and report.

These programmes differ in detail, but they converge on a deeper proposition: affect is not a decorative label placed on cognition after the important work is done. It is the organism-wide weighting of what matters for continued living. It reduces a high-dimensional field — metabolic deficit, tissue damage, social threat, uncertainty, opportunity, memory and predicted consequence — into action-guiding felt significance (Craig, 2002; Damasio & Carvalho, 2013; Sahely, 2026c, 2026f; Seth, 2013).

Calling this **affective compression** does not mean feelings are simple or merely informational. It means that a feeling makes a complex relational condition globally available as an integrated “how things are going for me, now.” Pain is not equivalent to a nociceptive message. It integrates bodily threat, location, urgency, attention, action readiness, expectation, memory and self-concern. Fear is not only a prediction of danger; it changes the field of possible action. Joy does not merely label success; it opens exploration, play and social approach.

7.1 The metaphysical identity hypothesis

The strongest parsimonious proposal is that felt valence and integrated organismic regulation are not two causally linked events but two aspects of one process. Neurophysiology describes the process extrinsically: firing patterns,

neuromodulators, network integration, autonomic change and action. Feeling is what that same organized process is intrinsically for the living subject (Sahely, 2026c, 2026f, 2026g).

This is a **metaphysical identity hypothesis** because the identity cannot be derived from a vocabulary that has excluded experience at the outset. No equation composed only of mass, charge, firing rate or information entails “and therefore it hurts.” The identity is proposed because it removes an unnecessary causal gap, respects the dependence of experience on biological organization and generates a coherent research programme: changes in the organization of global valence should covary systematically with changes in felt quality, unity, intensity and action relevance.

The hypothesis earns explanatory power if it supports structural correspondences:

- qualitative intensity should track the magnitude and global availability of viability-relevant deviation, not stimulus energy alone;
- valence should depend on predicted consequences and regulatory controllability, not only present tissue state;
- affective unity should degrade when organism-wide integration is disrupted even if local processing persists;
- similar local signals should feel different when embedded in different bodily, relational and autobiographical contexts;
- conscious affect should be absent or profoundly altered when the neural systems required for integrated arousal and homeostatic significance are destroyed.

These predictions do not prove identity. They make the proposal empirically disciplined. The residual hard problem remains: why should any organization possess an intrinsic felt aspect at all? The framework narrows the question from “How does a brain manufacture feeling?” to “Which organization of living, valenced, history-bearing activity is identical with unified phenomenal concern — and was minimal concern phenomenal from life’s beginning?”

7.2 The hippocampus is not an emotion-and-memory location

The intuition that emotion and memory point to a deeper unity is sound; localization to the hippocampus is not. The hippocampal formation is crucial for episodic and relational memory, contextual mapping and aspects of imagination. Emotional salience and learning involve the amygdala; homeostatic and endocrine control involves hypothalamic and brainstem systems; interoceptive feeling involves insular, cingulate and subcortical networks; motivation and reinforcement involve distributed neuromodulatory and basal-ganglia circuits. Memory itself includes multiple systems (Damasio, 1999; Panksepp, 2011; Phelps, 2004; Solms, 2021; Squire & Zola-Morgan, 1991).

The deeper clue is therefore **distributed integration**, not a hidden seat. Emotion changes what is encoded, consolidated and retrieved; memory changes what a present event means; bodily regulation sets the background against which both occur. The “unknown known” is that the organism does not first perceive, then remember, then add emotion. It brings forth a present through the inseparable interaction of bodily condition, prior history, predicted future, significance and possible action (Phelps, 2004; Sahely, 2026g; Seth, 2013).

8. Qualia: differentiation explained, existence not dissolved

The framework can explain much about why experiences differ without claiming to explain why experience exists. Qualitative distinctions arise from structured differences across several layers (Craig, 2002; Sahely, 2026f; Seth, 2013):

1. **Transduction:** different receptor systems are selectively sensitive to different physical relations.

2. **Topography and connectivity:** signals enter different pathways and preserve different spatial or functional organization.
3. **Opponent and population coding:** qualities are specified by relational patterns, not single labelled cells.
4. **Predictive context:** the same signal is interpreted against different priors, expectations and inferred causes.
5. **Affective and action relevance:** qualities are weighted by what they afford or threaten for the organism.
6. **Cross-modal and bodily integration:** colour, sound, pain and emotion are situated in a unified embodied scene.
7. **Learning and biography:** language, culture, expertise and memory refine discriminatory spaces.

This explains why red and green, bitter and sweet, ache and burn, shame and grief occupy distinct relational positions in experience. It can explain similarity structure, discriminability, context effects, action tendency and report. It does not derive the intrinsic “redness” of red from wavelength or neural code. A complete third-person map could still leave open why that map has any first-person presence.

The phrase “patterns of excitation” invites the correct question: excitation of what? In physical accounts, neural or field excitation presupposes a material substrate with state variables. In analytic idealism, excitation is a metaphor for modulation of universal consciousness (Kastrup, 2019). The latter can take experience as ontologically primitive and therefore avoids deriving it from nonexperience, but it still owes an account of why the universal medium has these differentiated modes, why dissociation yields private subjects and why particular physical organizations correspond so tightly to particular qualitative changes. Naming a universal experiential medium relocates rather than automatically resolves the differentiation problem.

The present framework remains metaphysically open. It is compatible with three graded positions:

- **Emergent identity:** experience is what sufficiently integrated living regulation is at the organismic level.
- **Dual- or triune-aspect process monism:** intrinsic feeling, participatory relation and extrinsic organization are irreducible disclosures of one process.
- **Panexperiential potential:** some primitive interiority is fundamental, while living systems integrate it into unified subjects.

It is less naturally compatible with strict illusionism if illusionism means that there is literally no felt presence to explain. It can incorporate deflationary lessons about introspective misrepresentation without treating the existence of experience as a cognitive mistake.

9. The second-person window

First-person phenomenology and third-person neuroscience do not exhaust experience. A person becomes visible as a subject through address, responsiveness and mutual vulnerability. The second-person window is not simply information about another organism. It is the domain in which “you” appears as someone whose perspective and welfare can make a legitimate claim on “me.”

Participatory sense-making shows how interaction can acquire dynamics not reducible to either participant in isolation. Timing, gesture, turn-taking, gaze, tone, trust and repair form a coupled process that shapes what each can perceive and do. Infants develop regulation through co-regulation before reflective self-description. Clinical care depends not only on diagnostic accuracy but on whether the patient is encountered as a legitimate participant. Social institutions depend on trust that testimony can matter and that rules remain answerable to those affected (De Jaegher & Di Paolo, 2007; Di Paolo et al., 2018).

The second-person window contributes at least five forms of knowledge:

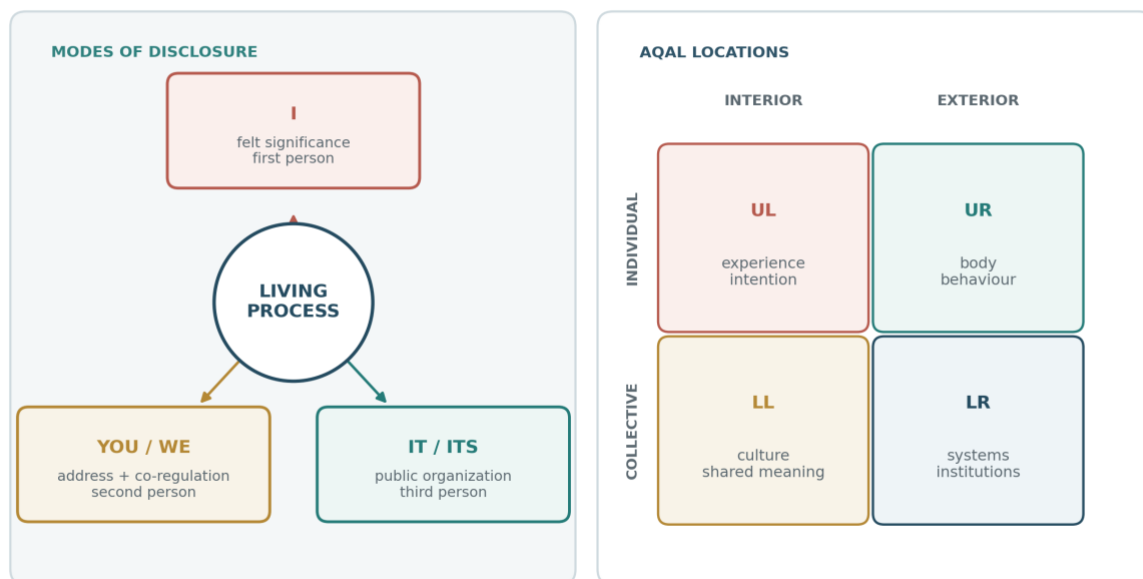
- **recognitional knowledge:** apprehending another as a subject rather than an object;
- **participatory knowledge:** knowing how a relation changes through one's own response;
- **ethical salience:** experiencing obligation, injury, promise, forgiveness and responsibility;
- **co-regulatory knowledge:** sensing and adjusting mutual arousal, safety and attention;
- **dialogical correction:** discovering the limits of one's first-person certainty through another's irreducible report.

This is where Maturana's definition of love becomes structurally central. Love is the emotioning in which the other arises as a legitimate other in coexistence. It does not require agreement with every action or removal of protective boundaries. It changes the domain of possible actions: listening, repair, cooperation, restraint and mutual transformation become available, while dehumanization and instrumental use are constrained (Maturana & Dávila, 2006; Maturana & Verden-Zöller, 2008; Sahely, 2026b).

Love therefore functions as **relational generative margin**. Biological redundancy protects structural variation long enough for new complementarity to emerge. Love protects legitimate participation through difference long enough for learning, repentance, reconciliation and shared novelty to become possible. This is an analogy across domains, not an identical mechanism. Its value is that it specifies what both achieve: the prevention of premature elimination of difference.

Three windows, four locations

Modes of disclosure and the AQAL map answer different questions



AQAL asks where a phenomenon is located; the three windows ask how one process becomes knowable and answerable.

Figure 3. The three windows and AQAL.

The windows specify modes of disclosure; AQAL locates interior and exterior, individual and collective aspects.

10. AQAL, Wilber–Combs and category discipline

Wilber's AQAL framework supplies a useful methodological grid. The upper-left quadrant concerns individual interiority; upper-right, individual behaviour and organism; lower-left, culture and shared meaning; lower-right, systems and institutions. Its value here is not as a substitute for mechanism but as a reminder that every mature inquiry can ask about all four locations (Wilber, 2000, 2006).

The three windows cut across the four quadrants. The first-person window is most explicit in individual interiority but can be shaped by culture. The second-person window lives in interaction and shared meaning yet is embodied in behaviour and institutional conditions. The third-person window can study bodies, behaviour, communication systems and cultural artifacts. The grids therefore answer different questions: AQAL asks **where** a phenomenon is located in an individual–collective/interior–exterior matrix; the triune windows ask **how** a process becomes knowable and answerable.

The Wilber–Combs matrix separates temporary states of consciousness from durable developmental stages of meaning-making. A person may undergo a powerful unitive, mystical or nondual state without possessing the cognitive, moral or interpersonal development needed to interpret and embody it responsibly. Conversely, a highly developed conceptual system can remain affectively defended or spiritually arid. This distinction protects the viability programme from treating intensity, complexity or transcendence as self-validating (Wilber, 2006).

Five developmental verbs are useful: waking up to states and presence; growing up through perspective-taking and moral development; cleaning up defensive shadow and trauma; showing up in institutions and material responsibility; opening up to relational participation and correction. No single axis guarantees life-coherence.

The integral framework also exposes a recurrent confusion around energy. Spiritual language often uses “energy” for felt vitality, arousal, attention, interpersonal atmosphere or symbolic potency. These phenomena are real as experiences and relations, but they should not be equated without measurement with physical energy. A disciplined synthesis can study correlations among metabolic expenditure, autonomic state, neural activity, subjective vitality and relational resonance while preserving the domain of each measure.

PART IV — A TRIUNE-ASPECT PROCESS MONISM

11. Can reality be both experience and structure?

Yes — but “both” must be specified. If experience and structure are treated as independent substances, their interaction becomes mysterious. If one is reduced to the other by definition, important evidence is discarded. Process monism offers a third path: reality is relational becoming; “experience” and “structure” name irreducible aspects or modes of disclosure of that becoming.

The proposal becomes triune when the second-person is included. The three aspects are:

1. **Intrinsic or first-person:** how the process is present to itself as felt significance.
2. **Participatory or second-person:** how subjects become mutually present and co-determine a relational field.
3. **Extrinsic or third-person:** how the process is publicly describable as organization, behaviour and causal relation.

This is monism because there is one process, not three ontological stuffs. It is aspectual because no window can be translated without remainder into another. It is processual because identity is historical conservation through change, not a static substrate. It is relational because the units themselves arise through bounded dependence and coupling.

The view does not require that every physical event be a conscious subject. It distinguishes **intrinsic nature** from **unified subjectivity**. Reality may possess an intrinsic aspect without every local interaction constituting a point of view. A unified subject may require closure, integration, temporal depth, valence and self–world differentiation. This leaves open whether minimal life is already phenomenal or whether phenomenal unity emerges only with particular neural organization.

11.1 Comparison with analytic idealism

Bernard Kastrup’s analytic idealism begins with universal phenomenal consciousness as the sole ontological primitive. Individual minds are understood as dissociated alters of a universal field; the physical world is the extrinsic appearance of mentation. Its parsimony lies in refusing to derive experience from nonexperience and in avoiding a subject-combination problem by starting with one consciousness and explaining apparent multiplicity through dissociation (Kastrup, 2019).

The viability framework shares two intuitions with analytic idealism: experience cannot be explained by merely redescribing extrinsic relations, and physical description may disclose only an outer aspect of a process. It differs in starting point and explanatory burden.

Question	Analytic idealism	Triune viability process monism
Ontological primitive	universal consciousness	relational process; intrinsic nature left open
Individual subjects	dissociated alters	historically bounded, valenced and integrated living processes
Physical world	extrinsic appearance of universal mentation	publicly modelled organization of relational processes
Second-person relation	relation among alters within one field	irreducible participatory window and co-regulatory domain
Why experience exists	primitive fact of reality	not derived; intrinsic aspect proposed as identity hypothesis

Question	Analytic idealism	Triune viability process monism
Why qualia differ	different modes/excitations of consciousness	structured transduction, integration, valuation and history explain relations; intrinsic texture remains primitive
Main risk	dissociation and qualitative differentiation remain undermechanized	biological threshold may appear arbitrary; metaphysical closure remains incomplete

Analytic idealism can answer “Why is experience universal?” only by making universality axiomatic or arguing that experience is the one indubitable datum from which ontology should begin. It does not derive universality from a more basic premise; that would contradict its monism. The viability framework makes a weaker claim: experience is undeniable where present, its organization is biologically tractable, and its intrinsic existence is not derivable from purely extrinsic terms. Universal experience remains possible but is not required for the scientific programme.

11.2 Why triality comes to mind

Spin(8) triality is an exact mathematical symmetry relating the eight-dimensional vector representation and two inequivalent chiral spinor representations. Octonionic constructions make this threefold equivalence especially vivid (Baez, 2002). It resonates with I–You–It because three apparently different representational roles can be permuted while preserving a deeper relational structure.

The resonance should be stated carefully. Spin(8) does not mathematically entail subject, other and world. No canonical isomorphism maps the three representations onto first-, second- and third-person domains. The proposed mapping is a bridge hypothesis: perhaps a formalism in which three irreducible roles are symmetrically related can discipline models that otherwise privilege the detached third person.

The empirical content would have to come from a mapping fixed before observation. For example, one might specify three families of relational variables — intrinsic regulatory state, interpersonal coupling state and public sensorimotor state — and ask whether transformations among them preserve a nontrivial invariant better captured by a triality-inspired model than by ordinary multivariate statistics. Until such work succeeds, triality is a conceptual guide, not an explanation of consciousness or love.

11.3 The remaining uncertainty

The framework’s metaphysical uncertainty can now be stated precisely:

At what organization of living, valenced, history-bearing activity does intrinsic concern become unified phenomenal concern — or was minimal concern already phenomenal from life’s beginning?

Evidence can constrain the organization required for reportable, wakeful and affective consciousness. It can reveal dependencies, dissociations, gradients and evolutionary continuities. It cannot, without an additional identity principle, derive first-person presence from premises defined entirely in third-person terms. The proposed identity of integrated valence and felt concern is therefore the most parsimonious bridge currently available within this architecture, but it remains open to revision by better metaphysics or deeper science.

PART V — THE FORMAL ARCHITECTURE: GRAMMAR, ALGEBRA, GEOMETRY AND DYNAMICS

12. Mathematics has a life of implication

Mathematical distinctions are enacted in human languaging, written in symbols and validated through communal operations. Once axioms and definitions are fixed, however, their consequences are not freely negotiable. A proof can surprise its author; two independent paths can converge on the same invariant; a proposed construction can fail for reasons no preference can remove. This is the qualified sense in which mathematical distinctions have “a life of their own” (Maturana, 2000).

Three forms of autonomy should be separated:

- **Logical autonomy:** consequences follow from stipulations independently of what the stipulator hoped to obtain.
- **Historical autonomy:** a mathematical tradition accumulates problems, techniques and standards across generations and outlives individual minds.
- **applicative autonomy:** a formal structure can fit an empirical domain in ways not used to construct it, thereby constraining prediction and intervention.

The first two are features of mathematics as a recursive social practice. The third is the point at which mathematics begins to reveal an organization in nature. The viability programme is secure at the first two levels and exploratory at the third.

Maturana’s formulation is especially useful: a formalism specifies a relational matrix or geometry; its effectiveness depends on an isomorphism, or at least a disciplined homomorphism, between formal operations and the operational coherences of the studied domain. “Isomorphism” should not be used loosely. A genuine structural mapping identifies objects, operations and preserved relations. Resemblance of diagrams is not enough (Maturana, 2000).

12.1 Four formal levels

The programme should therefore be developed sequentially.

Grammar specifies the roles and permissible relations. The seven functions and their triads belong here. The central tests concern completeness, redundancy and semantic necessity.

Algebra specifies composition. If regulation after perception differs from perception after regulation, order matters. If grouping three operations differently changes their result, associators matter. Algebra asks which operations close, which commute, which associate and what transformations preserve the structure.

Geometry specifies viable regions, boundaries, distances, directions and curvature. Margin becomes distance to a boundary; optionality becomes the volume or diversity of viable directions; a geodesic becomes a least-cost path under the system’s constraints; curvature records how locally reasonable actions diverge at larger scale.

Dynamics specifies motion through the geometry under energy flow, disturbance, sensing, regulation, learning and historical change. It asks whether the geometry itself changes, whether boundaries move, how fast perception and response occur, and which transformations preserve or destroy viability.

The ordering matters. A quartic scalar introduced before the state space, mapping and dynamics are defined is a symbol, not a measurement. The formal ascent must not outrun the empirical constitution of the domain.

13. From Fano incidence to octonionic composition

The Fano plane is the smallest projective plane. It organizes seven points and seven lines so that every line contains three points, every point lies on three lines, and every pair of points lies on exactly one line. This is why it is an attractive grammar of balanced triadic closure (Baez, 2002).

Fano incidence alone does not force the octonions. To obtain octonionic multiplication one must orient the lines, assign signs, include a scalar unit and impose the appropriate multiplication and norm relations. The octonions form an eight-dimensional normed division algebra. Their imaginary units anticommute and multiplication is nonassociative but alternative (Baez, 2002).

The associator is

$$[a, b, c] = (ab)c - a(bc).$$

In the viability programme, the associator is interpreted as a possible measure of lawful context or path dependence: the result of composing three operations may depend on how they are grouped. This interpretation must avoid a previous temptation. A nonzero associator is not automatically “breakdown.” In the octonions, nonassociativity is lawful. A failure signal would be deviation from the expected associator structure, instability under the specified operations or an empirically harmful path dependence — not nonassociativity itself.

This yields three competing formal foundations that should continue to be pressure-tested:

Candidate	Strength	Limitation
Fano incidence	minimal static skeleton of balanced triadic closure	no intrinsic composition, direction or dynamics
General triple systems	triadicity is primitive; flexible across domains	may be too unconstrained to generate distinctive predictions
Octonions	unifies Fano organization, oriented composition, noncommutativity and nonassociativity	requires additional axioms; biological mapping remains unproven

The programme should not decide among them by aesthetic preference. It should ask which level is sufficient for each empirical problem. Many applications may require only hypergraph or triple-system models. Octonions become warranted only if orientation, sign, noncommutativity, alternativity or characteristic associator relations improve explanation or prediction.

14. The exceptional ascent and its exact limits

Once octonionic structure is admitted, a remarkable sequence of exact mathematical relations becomes available (Baez, 2002).

- G_2 is the automorphism group preserving octonionic multiplication.
- The exceptional Jordan algebra $J_3(\mathbb{O})$ consists of 3×3 Hermitian octonionic matrices with a commutative Jordan product and cubic norm; its automorphism group is the compact form of F_4 , while an E_6 form is associated with norm-preserving structure transformations.

- A Freudenthal triple system built from the Jordan algebra carries a quartic form; an appropriate E_7 acts by transformations preserving that quartic structure.
- E_8 appears in further Lie-theoretic and quasiconformal constructions related to the Freudenthal system.

These are established mathematical facts in their proper formulations. The viability readings — grammar invariance for G_2 , integrated viable architecture for $J_3(\mathbb{O})$, global coherence for the cubic norm, dynamic persistence for the Freudenthal quartic and recursive multiscale closure for E_8 — are interpretive hypotheses.

Two corrections are essential.

First, if an E_7 transformation preserves a quartic invariant Δ , Δ cannot “degrade under E_7 dynamics.” A viability model that uses changing Δ must either employ dynamics outside the preserving group, compare states belonging to differently parameterized domains, or treat Δ as an empirical statistic merely inspired by the invariant rather than as the exact invariant itself.

Second, E_8 is not “maximal mathematics.” It is the largest of the five exceptional simple Lie groups by dimension and a natural endpoint of a particular exceptional ladder. Mathematics contains indefinitely richer structures. E_8 should therefore be interpreted, if at all, as a candidate closure within this programme, not the summit of reality.

The relational-exceptional programme		
Keep mathematical entailment separate from empirical interpretation		
FORMAL STAGE	MATHEMATICAL RELATION	STATUS IN THIS PROGRAMME
Distinction → triads	Recursive relational closure	BRIDGE
Fano plane	Pairwise-complete incidence	EXACT
Octonions $\mathcal{O}$	Oriented, nonassociative composition	EXACT
G_2	Automorphisms preserving $\mathcal{O}$	EXACT
$J_3(\mathcal{O}) \cdot F_4 \cdot E_6$	Cubic Jordan structure	EXACT
FTS · E_7	Quartic structure and symmetry	EXACT
E_8 extension	Further exceptional closure	EXACT LINK / BRIDGE USE
MATHEMATICS Internal relations are rigorous once premises are fixed.		EMPIRICAL BRIDGE Instantiation in living or social systems must be tested.

Figure 4. The relational–exceptional programme.

The left-to-right status distinction prevents exact mathematical entailment from being confused with empirical instantiation.

14.1 Hopf fibrations and projection

The normed division algebras exist only in dimensions 1, 2, 4 and 8 over the reals. They underlie the classical Hopf fibrations, including the octonionic fibration $S^7 \rightarrow S^{15} \rightarrow S^8$ (Baez, 2002). These structures are relevant because they

formalize how a higher-dimensional total space can project onto a base while preserving a structured family of hidden directions — the fibre.

This resonates with the organism–world interface and with conscious presentation: a high-dimensional process may be available to a subject only through a lower-dimensional integrated appearance while hidden degrees of freedom remain organized in the background. Again, resonance is not identity. A useful bridge would require a specified state space, projection map, fibre interpretation and empirical invariant. Without those, the Hopf fibration remains a mathematically illuminating analogy.

14.2 The Altimeter and the Wu-Wei vector

The **Altimeter** is the project’s name for a possible invariant-like estimate of global relational condition. It should not be introduced as a universal quartic formula. It is a research target: can multiple measures of constraint fit, margin, sensing, response and option-space be compressed into a robust indicator that detects relational deterioration before local variables cross conventional thresholds?

The **Wu-Wei vector** names a complementary decision principle: the smallest well-oriented intervention that releases blocked self-regulation and enlarges viable option-space without imposing unnecessary control. In geometry, this would be a direction with favourable expected change in margin and life-capacity under cost and uncertainty constraints. In practice, it shifts governance from domination to navigation.

The Altimeter asks, “How is the whole relational field changing?” The Wu-Wei vector asks, “What is the least forcing move that improves its capacity to regulate and learn?” Both remain symbolic until domain-specific variables and validation procedures are defined.

PART VI — ONE CIRCULATION ACROSS ORGANISM, RELATION, INSTITUTION AND PLANET

15. The field of viability

The field of viability is the structured set of conditions through which a living process can continue, develop and participate. It includes the organism's internal regulation and the medium's affordances, hazards and supports. For persons it also includes family, care, income, housing, culture, law, public infrastructure, ecology and historical inequality. These are not “external factors” appended to biology. Through recurrent exposure and coupling they become physiology, expectation, habit, disease risk and available action (Engel, 1977; Sahely, 2026e).

The closed circulation across scales operates in two directions. Global and institutional arrangements condition situations, relationships and bodies. Bodies and persons act, speak, cooperate, resist, invent and institutionalize, thereby changing larger arrangements. Neither downward determination nor upward emergence alone is sufficient (Bateson, 1979; Sahely, 2026a, 2026e).

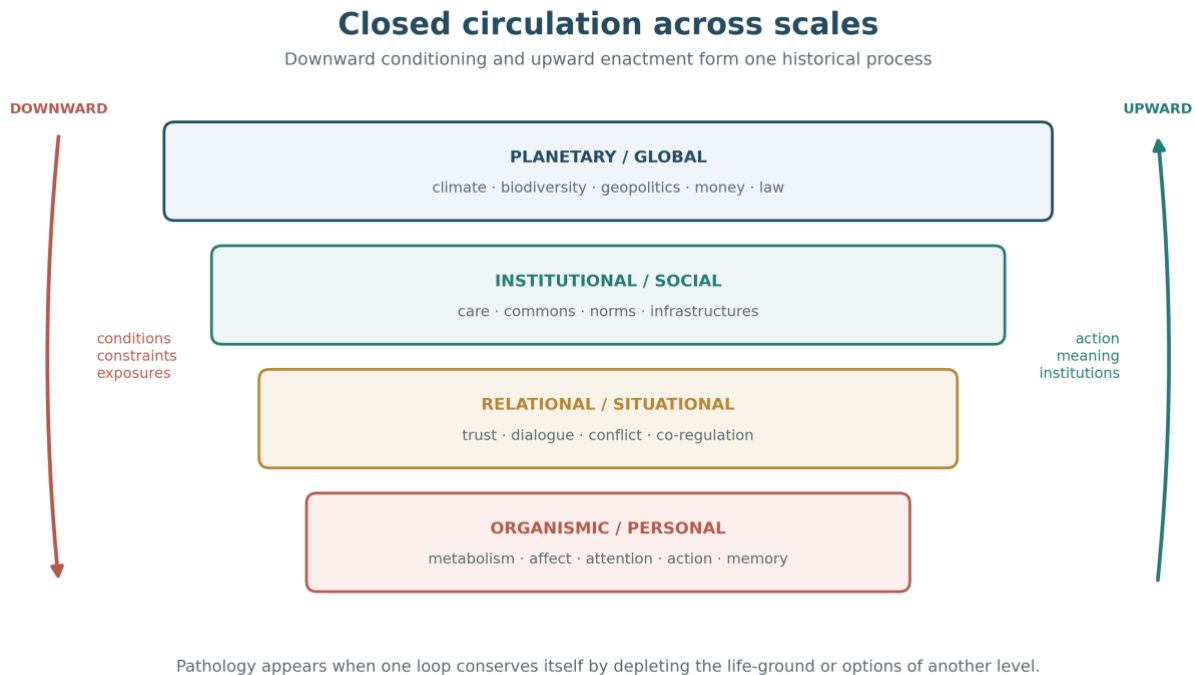


Figure 5. Closed circulation across scales.

Conditions flow downward as constraints and exposures; embodied action flows upward through meaning and institution.

This model improves on a simple hierarchy in four ways.

- 1. It is historical.** Present physiology carries accumulated exposures; institutions carry sedimented decisions; ecosystems carry delayed consequences.
- 2. It is reciprocal.** Organisms change niches; patients change care relationships; citizens change norms; technologies change attention.
- 3. It is asymmetrical.** Power, wealth and law give some actors greater capacity to set constraints and export costs.

4. It is normatively open. A stable loop may conserve domination or depletion; stability alone is not the goal.

The key failure pattern is **loop entrapment**: a subsystem becomes increasingly effective at conserving itself by narrowing perception, consuming margin and removing alternatives in the containing field. Addiction, chronic inflammation, authoritarian information control, extractive finance and escalating war share this abstract pattern without sharing a single mechanism.

16. Four cross-scale tests

The same grammar should not be trusted merely because it can redescribe many cases. The following cases show what a disciplined mapping requires and where analogies stop.

16.1 Septic shock

Septic shock is not adequately understood as “infection plus low blood pressure.” It is a multi-system disturbance involving pathogen–host interaction, dysregulated immune response, endothelial and microcirculatory dysfunction, altered metabolism, coagulation, autonomic and endocrine responses, organ cross-talk and treatment effects (Singer et al., 2016).

Function	Septic-shock mapping
C	vascular and organ architecture; immune rules; metabolic dependencies; treatment constraints
M	cardiovascular reserve, oxygen-delivery reserve, renal/hepatic reserve, time before irreversible injury
X	trajectory of perfusion, organ function, lactate, mentation and compensatory load
D	infection, toxins, inflammatory cascades, fluid shifts, iatrogenic perturbations
P	immune recognition, chemosensation, interoception, bedside monitoring, laboratory and imaging signals
R	autonomic/endocrine/immune responses; fluids, antimicrobials, vasopressors, ventilation and source control
O	remaining physiological responses and safe therapeutic paths under time pressure

The triads expose relational failure. Normal blood pressure can conceal exhausted margin under high vasopressor support (C–M–X). Delayed source control leaves regulation mismatched to disturbance (X–D–R). Fragmented monitoring produces data without an actionable path (X–P–O). Aggressive correction of one variable can narrow options elsewhere.

The three windows are also indispensable. Third-person measures guide causal intervention. First-person pain, dyspnoea, fear and delirium disclose suffering and may provide early warning. Second-person trust, explanation, consent and family presence shape co-regulation, adherence and dignity. None can substitute for the others.

The case supports the viability grammar as a diagnostic organization. It does not imply that the patient’s physiology is octonionic. A mathematical bridge would require prospectively defined variables and evidence that triadic or nonassociative models outperform ordinary clinical models.

16.2 Coral-reef bleaching

A coral reef is a multi-species ecological organization, not a single conscious organism. Thermal stress can disrupt coral–algal symbiosis, impair metabolism, produce bleaching and increase mortality risk. Local pollution,

overfishing, disease and habitat damage reduce margin; diversity and connectivity can support recovery (Holling, 1973; Hughes et al., 2017).

Constraint includes symbiotic dependence, carbonate chemistry, habitat structure and ecological interactions. Margin includes thermal tolerance, genetic and species diversity, water quality, reproductive capacity and connected refugia. State includes bleaching extent, recruitment, structural complexity and trophic relations. Disturbance includes heat anomalies and local stressors. Perception is used functionally for molecular sensing, organismic response and human monitoring; it should not be read as evidence of reef-wide phenomenality. Regulation includes physiological acclimatization, ecological succession and human governance. Options include migration, assisted recovery, emissions reduction, local protection and restoration.

The case reveals cross-scale life-coherence. A local tourism or fishing system can remain economically “coherent” while depleting the reef that supports it. Conversely, a restriction imposed without viable livelihood alternatives can transfer disabling costs to communities and lose legitimacy. Life-coherent governance must restore ecological margin while protecting participation and opening feasible transitions.

16.3 Financial crisis

A financial system can appear efficient while leverage, concentration and correlated strategies silently erode margin. Constraint includes contracts, capital rules, settlement infrastructure and legal obligations. Margin includes liquidity, capital buffers, diversity and trust. State includes balance-sheet exposures, network concentration and asset-price trajectory. Disturbance includes defaults, repricing and rumours. Perception includes audits, ratings, market signals and regulatory data. Regulation includes margin calls, central-bank facilities, fiscal response and institutional resolution. Options include refinancing, restructuring, orderly failure and public alternatives (Haldane & May, 2011; McMurtry, 2013).

The grammar highlights proxy capture. Rising prices may be treated as evidence of health while leverage and option-space deteriorate. Institutions may suppress inconvenient perception to preserve short-term confidence. Emergency rescue may stabilize the financial subsystem by transferring costs to households, public services or future generations. Such a response can be system-coherent and life-incoherent.

An Altimeter in this domain would need to detect coupled deterioration among margin, information fidelity, concentration, response flexibility and cost externalization. Its performance must be compared with simpler network and stress-test models; symbolic quartics add no value unless they improve warning or decision.

16.4 The US–Israel–Iran conflict system

This case is used structurally, not as an adjudication of disputed facts or a chronology of current events. The relevant unit is an escalatory conflict system involving states, allied groups, civilian populations, regional infrastructures, media, memories of violence, strategic doctrines and external powers. The abstract concern is with direct, structural and culturally legitimated violence, not with assigning equivalence among actors (Galtung, 1969).

Each actor can interpret increased armament, secrecy, pre-emption or retaliation as regulation in service of security. Yet reciprocal threat perception can transform each regulation into the other’s disturbance. Trust margin collapses; communication becomes strategically filtered; domestic identity narrows perceived options; civilian vulnerability and ecological risk rise; every move appears forced by the prior move. The system becomes trapped in a self-confirming X–D–R loop.

The life-coherent question is not which apparatus achieves superior internal coherence. It is whether actions protect or destroy the shared life-ground: civilians, water, health systems, food, climate stability, cultural continuity and the future possibility of coexistence. A viable exit requires restored perception, credible restraint, channels for mutual recognition, protected diplomatic margin and options that do not require humiliation or annihilation. Love in Maturana's technical sense does not mean acquiescence to violence. It means preserving the legitimacy of persons while firmly opposing actions and structures that destroy coexistence.

The case also marks the limit of abstraction. A grammar can reveal escalation patterns; it cannot replace international law, history, local testimony, power analysis or fact-specific moral responsibility.

17. Signal fidelity, trust and optionality

Across all four cases, three variables repeatedly mediate the movement from stress to collapse.

Signal fidelity concerns whether consequential differences can enter shared perception without distortion or suppression. In organisms, this includes receptor function and interoception; in institutions, reporting, audit, science, whistleblowing and testimony. A system that punishes its sensors becomes surprised by conditions it helped conceal.

Trust is a relational margin. It reduces the cost of coordination, allows uncertainty to be acknowledged and permits corrective information to travel. Trust is not credulity. It depends on demonstrated truthfulness, competence, reciprocity and repair. When trust collapses, energy is diverted into surveillance, defence and signalling; options narrow.

Optionality is the geometry of future viability. Systems often maintain a preferred metric by consuming unmeasured options: soils are depleted to sustain yield, clinicians are exhausted to sustain throughput, households are indebted to sustain consumption, civil liberties are curtailed to sustain order. Option-space loss is therefore an early warning of false coherence.

These three form a practical diagnostic: can the system sense truth, remain in relation and still choose among viable paths? When the answer to all three is no, collapse may already be relationally advanced even if headline indicators look stable.

PART VII — LIFE-COHERENCE, LOVE AND THE GREATEST COMMANDMENT

18. Why viability needs a value test

Viability is initially descriptive: can a process persist within its constraints? At social and planetary scales that question is insufficient because systems persist by affecting other lives. A norm is required to evaluate the distribution and transfer of capacity.

McMurtry's life-value approach identifies life-capacity as the common ground of value: the capacity to feel, think, move, relate, create and participate within life-supporting conditions (McMurtry, 2011, 2013). The present synthesis formulates the test as follows (Sahely, 2026b):

A relation, practice, technology or institution is life-coherent insofar as it protects, restores or enlarges life-capacity across the affected field without transferring disabling costs to other persons, species, communities, ecosystems or future generations.

This is not a single algorithm. Conflicts among capacities, scales and time horizons require judgment, evidence and participation. The test nevertheless rules out important evasions. Profit, growth, security, efficiency, institutional survival and mathematical elegance cannot function as final invariants when their conservation disables the life-ground on which they depend.

The life-value test asks seven questions:

1. What living capacities are enabled?
2. Whose capacities are disabled or made invisible?
3. What margins are consumed to produce the apparent gain?
4. Are costs transferred across geography, class, species or generation?
5. Does the process preserve truthful feedback and legitimate participation?
6. Does it enlarge or narrow future option-space?
7. Can the organization be corrected without violence when its effects become known?

This makes love a criterion of systems design rather than a sentiment appended after analysis. Love enlarges the domain in which another's life can count as a constraint on one's own action. It disciplines power by preserving legitimate otherhood.

19. The Greatest Commandment as relational grammar

The Greatest Commandment joins love of God, neighbour and self (Matthew 22:34–40; Mark 12:28–34). In theological terms these are not three rival objects but a single orientation of the whole person: toward the encompassing source and good of life, toward the other as neighbour, and toward one's own embodied life without self-erasure. The triune viability architecture resonates strongly with this grammar (Sahely, 2026b).

- **Love of God** orients the system beyond its own self-conservation toward the life-ground and ultimate good that no local subsystem may monopolize.
- **Love of neighbour** opens the second-person window and recognizes another as a legitimate subject whose suffering and capacity matter.

- **As yourself** preserves embodied self-regard and prevents love from becoming sacrificial enablement of exploitation.

Jesus' teachings repeatedly enact viability principles without being reducible to them. "By their fruits" tests claims by lived consequences rather than prestige (Matthew 7:16–20). The Good Samaritan widens the second-person domain beyond group identity (Luke 10:25–37). Sabbath protects margin against total extraction (Mark 2:27). Mercy and forgiveness interrupt retaliatory loops and restore options without denying harm. The warning against serving God and Mammon identifies proxy capture: a means of exchange becomes a false invariant (Matthew 6:24). Healing restores persons to bodily and social participation. The Kingdom is described through relations that reconfigure the field from domination toward mutual provision and legitimate belonging.

This resonance does not turn theology into neuroscience or Fano geometry. It suggests that ancient wisdom may preserve phenomenologically tested orientations to relational viability. The scientific programme can study the effects of forgiveness, trust, care, ritual, cooperation and material sufficiency. Theology asks a larger question about ultimate meaning and fidelity. Their responsible dialogue requires neither collapse nor separation.

20. Love judges the conservation

Every self-organizing system conserves something. The decisive question is what manner of living that conservation brings forth (Maturana & Dávila, 2006; Sahely, 2026b).

Autopoiesis explains organizational conservation, not moral worth. Teleodynamics explains immanent ends, not whether those ends deserve support. Active inference explains preference-guided regulation, not whether preferences are just. Exceptional invariants formalize preservation under transformation, not whether the preserved quantity serves life. Integral maps include many perspectives, not whether their coordination is compassionate. Energy powers work, not whether the work heals or destroys.

Love therefore "judges the conservation." The phrase does not mean that love replaces evidence or permits sentimentality. It means that a system's boundaries, metrics and transformations must remain answerable to the lives they affect. The question accompanying every formalism is:

What manner of living does this organization conserve, whose participation does it recognize, and what life-ground does it consume?

This is where the programme becomes more than a general systems theory. It becomes a discipline of life-coherent world-bringing.

PART VIII — A DISCIPLINED RESEARCH PROGRAMME

21. Bridge hypotheses that can fail

A bridge hypothesis becomes scientifically useful only when its failure conditions are stated. The present programme proposes the following testable bridges.

21.1 Minimal-grammar hypothesis

Claim. The seven functions C, M, X, D, P, R and O form a near-minimal sufficient vocabulary for comparing viability across bounded adaptive systems.

Test. Pre-register operational definitions across several domains. Compare seven-function relational models with smaller and larger alternatives using predictive performance, transferability, interpretability and intervention success.

Failure. The seven roles prove redundant, omit recurrent necessary functions, or add no value beyond established state-space, control, resilience or network models.

21.2 Triadic-closure hypothesis

Claim. Viability-relevant failure is often better detected through triadic interactions than through isolated variables or pairwise associations.

Test. Fit pairwise and higher-order models to prospective clinical, ecological and institutional datasets. Ask whether the seven nominated triads predict transition, recovery or fragility out of sample.

Failure. The triads do not replicate, alternative triples perform equally well, or added complexity produces no prospective gain.

21.3 Margin–optionality hypothesis

Claim. Declining reserve and shrinking viable option-space provide earlier warning of collapse than conventional state metrics alone.

Test. Estimate distance-to-boundary and reachable safe sets in systems with known transitions. Compare warning time and false-alarm rate with standard indicators.

Failure. Margin and optionality cannot be measured reliably or do not improve prediction and intervention.

21.4 Affective-compression hypothesis

Claim. Core affect compresses a high-dimensional estimate of organism-wide viability, controllability and predicted consequence into felt valence, arousal and action readiness.

Test. Simultaneously measure interoception, autonomic state, metabolic variables, subcortical/cortical dynamics, reported feeling, controllability and action. Test whether latent global-viability models explain affective changes better than stimulus-centred models.

Failure. Affect is better explained without organism-wide viability variables, or the proposed latent structure does not generalize across contexts and subjects.

21.5 Intrinsic-identity hypothesis

Claim. Unified felt valence is the intrinsic aspect of a particular organization of integrated living regulation.

Test. The identity itself is not directly falsifiable as a metaphysical statement, but structural implications are: disruption of the required integration should disrupt the unity and quality of affect in predictable ways; restored organization should restore them.

Failure or revision. A different organization predicts conscious affect more precisely; robust feeling occurs without the proposed integrative architecture; or the identity hypothesis ceases to constrain research.

21.6 Participatory-field hypothesis

Claim. Second-person coupling has causal and epistemic properties not captured by summing individual states.

Test. Compare individual-only with interaction-dynamic models in co-regulation, psychotherapy, joint action and conflict repair. Look for predictive effects of synchrony, turn-taking, mutual adaptation and repair.

Failure. Dyadic variables add no explanatory or intervention value beyond individual measures and common external causes.

21.7 Exceptional-structure hypothesis

Claim. Some viability systems instantiate oriented triadic composition and lawful context dependence better modelled by octonionic, triple-system or exceptional structures than by ordinary linear or associative models.

Test. Fix the mapping from empirical variables to formal roles in advance. Derive forbidden relations, associator signatures or invariant constraints. Test out of sample against simpler baselines.

Failure. The mapping remains post hoc, no distinctive prediction follows, simpler models perform as well, or the expected invariants are absent.

22. Measurement architecture

The research programme needs convergent measures across the three windows and four AQAL locations. No single metric can validate the whole.

Domain	First-person	Second-person	Third-person	Life-coherent consequence
Organismic	valence, pain, vitality, agency, uncertainty	care, co-regulation, therapeutic alliance	physiology, behaviour, neural dynamics, biomarkers	restored function without unacceptable burden
Relational	felt safety, recognition, shame, trust	turn-taking, repair, mutual responsiveness	interaction timing, network exchange, observed conduct	enlarged participation and reduced domination
Institutional	experienced legitimacy, voice, moral injury	deliberation, representation, accountability	rules, flows, budgets, delays, concentration, outcomes	life-capacity distributed without cost externalization
Ecological	human and, where warranted, animal experience	stewardship relations and community knowledge	biodiversity, fluxes, thresholds, resilience indicators	restored life-support and intergenerational option-space

The design should combine perturbation and recovery rather than relying only on correlation. A viability model should predict what happens when margin is experimentally or naturally reduced, when perception is delayed, when response is constrained and when options are restored. Recovery trajectories may be more informative than static classification because they reveal the organization's capacity to reconstitute itself.

22.1 A domain-constitution protocol

Before formal modelling, investigators should answer:

1. What operational process is being bounded, and by whom?
2. What organization is presumed to be conserved?
3. What matter, energy and information cross the boundary?
4. What timescale and containing field are relevant?
5. Who or what is the beneficiary of regulation?
6. Which variables instantiate C, M, X, D, P, R and O?
7. Which measures belong to observer description, and which participate causally in the system?
8. What costs are exported beyond the chosen boundary?
9. Which first- and second-person evidence would be lost by an exclusively objective model?
10. What observation would count against the proposed mapping?

Only after these questions are answered should the Fano, octonionic or exceptional formalism be introduced.

23. Unresolved tensions and their proper placement

The synthesis does not eliminate uncertainty; it localizes it.

Tension	Current resolution	What remains open
Cellular normativity vs cellular experience	all living cells possess immanent viability norms; phenomenal attribution is withheld	whether minimal life has any experiential aspect
Neural dependence vs universal experience	unified animal affect depends on neural organization; metaphysical universality is optional	exact threshold and ontology of intrinsic nature
Physical energy vs generalized capacity	use energy technically; use margin, agency or vitality for broader capacities	rigorous cross-domain relations among these measures
I–You–It as windows vs aspects	epistemically secure as windows; ontologically proposed as aspects	whether second-person relation is fundamentally irreducible
Organism vs institution	institutions possess functional agency through people, artifacts and rules	whether any collective is a unified phenomenal subject
System coherence vs life-coherence	life-capacity and cost transfer provide the normative test	conflict among lives, scales and time horizons
Fano closure vs octonionic necessity	Fano incidence follows from stipulated closure; octonions require orientation and further axioms	whether empirical systems warrant the lift
Quartic invariant vs changing viability	exact E_7 invariants are preserved; empirical viability change requires non- E_7 dynamics or a looser statistic	construction and validation of a real Altimeter
Mathematical realism vs Maturana's constructivism	mathematics has constraint-relative autonomy in languaging and can map operational coherences	metaphysical status of mathematical objects

Tension	Current resolution	What remains open
Love as biology vs love as norm/theology	Maturana identifies a relational emotion; life-value and theology extend its meaning	universality, conflict and institutional embodiment

This table is a map of future work, not a list of embarrassments. A mature framework makes its seams inspectable.

24. Practice: from control to navigation

The practical shift is from maximizing a preferred output to navigating a living field. Control asks how to make a variable conform. Navigation asks where the system is, which constraints are constitutive, how much margin remains, what disturbance is unfolding, what can be reliably perceived, what regulation is available, and which future paths remain life-coherent.

A concise viability inquiry is:

- **Clarify the boundary.** What system and containing field are being distinguished?
- **Name the invariant.** What organization or life-capacity must be conserved?
- **Map the seven functions.** Where are constraint, margin, state, disturbance, perception, regulation and options?
- **Listen through three windows.** What is felt, what occurs between persons, and what is publicly measurable?
- **Examine history and timescale.** What has been learned, depleted, silenced or locked in?
- **Find the bottleneck triad.** Which relational channel is failing first?
- **Protect generative margin.** What reserve, redundancy, time or safety would permit learning?
- **Choose the Wu-Wei vector.** What minimally forcing intervention restores feedback and opens options?
- **Apply the life-value test.** Who gains capacity, who bears cost, and what future becomes unavailable?
- **Keep the model corrigible.** What evidence would require a different distinction?

This protocol can guide clinical consultation, organizational review, policy design and conflict transformation without pretending that all domains share one mechanism.

Conclusion — The world is the circulation we conserve

The initial question was whether a scattered body of work could be linked into a coherent whole. The answer is yes, provided the whole is understood dynamically.

The first distinction opens a domain. Energy makes transformation possible. Constraint gives transformation form. Autopoietic and teleodynamic closure establish a living unity for whom continuation can succeed or fail. Perception makes consequential differences available. Affect makes integrated significance felt. Regulation and active inference turn significance into anticipatory action. Action changes the medium and the self. Memory and learning conserve a history. Margin protects variation. Relationship makes subjects mutually answerable. Languaging stabilizes shared worlds. Institutions materialize recurrent conversations. Mathematics gives those relations a disciplined third look. Life-value asks whether the conservation serves the life-ground. Love keeps the other present within the field of legitimate concern.

The unifying matrix is therefore not energy alone, consciousness alone, information alone, love alone or exceptional mathematics alone. It is **relational viability in motion**: energy channelled by constraints, organized into self-maintaining closure, weighted by value, disclosed through experience and relation, extended through history and judged by the life it makes possible.

The triune-aspect proposal gives this whole a parsimonious metaphysical footing. There are not three worlds — private experience, interpersonal meaning and objective matter — but one process that cannot be fully known through only one window. The first person prevents mechanism from erasing presence. The third person prevents presence from escaping causal and public discipline. The second person prevents both from erasing obligation and mutual transformation.

The seven-function grammar gives the whole a reusable analytic form. The exceptional programme asks whether that grammar possesses deeper algebraic and geometric closure. It now has a stronger footing because the bridges are explicit and the limits are enforceable. Its next advance will not come from another resonance. It will come from pre-registered mappings, derived constraints, prospective data and honest comparison with simpler models.

No final explanatory closure has been achieved. The hard problem remains; the phenomenal threshold remains; the universal status of experience remains; the exact empirical status of the exceptional ladder remains. Yet the uncertainty is no longer amorphous. We know which questions are scientific, which are mathematical, which are metaphysical and which are ethical. More importantly, we know how they constrain one another.

The programme's deepest proposition is also its practical criterion:

We bring forth worlds through what we recurrently conserve. Wisdom is the disciplined capacity to conserve relations in which truth can be sensed, life can remain viable, difference can participate, and new possibility can emerge without sacrificing the life-ground.

Appendix A — Corpus concordance

The present synthesis reorganizes rather than supersedes the earlier corpus.

Work	Principal contribution to the synthesis
<i>A Single Grammar Across Scale</i> (9 February 2026)	sequence from invariant and energy through affect, cognition, culture and ethics
<i>Qualia at the Interface</i> (10 February 2026)	experience as intrinsic control significance under self-referential viability, uncertainty and compression
<i>The Self as a Viability Stack</i> (10 February 2026)	cellular proto-self, integrative body, core affective self and narrative identity
<i>The Viability Grammar</i> (2026)	seven functions, seven triads and a cross-domain diagnostic language
<i>The Geometry of Viability</i> (2026)	margin, option-space, curvature and quartic-inspired formalization
<i>From Entanglement to Governance</i> (2 April 2026)	relational coherence across scales and movement from formal relation to public organization
<i>From Distinction to Coherence</i> (April 2026)	missing middle of recursive closure, triads and incidence between the primary cut and exceptional ascent
<i>Emotional Sentience as Relational Architecture</i> (22 April 2026)	affective ascent and bridge from Kauffman’s emotional sentience to relational–exceptional structure
<i>The Field of Viability Framework</i> (27 April 2026)	person-in-field, life-course embodiment and collective action
<i>The Architecture of Viability</i> (27/28 April 2026)	comprehensive grammar of coherence across life, mind, society and planet
<i>The Biology of Love as the Grammar of Life-Coherence</i> (30 April 2026)	legitimate otherhood, domain discipline and normative life-coherence
<i>Life-Coherent Attention and the Worlds We Bring Forth</i> (2 June 2026)	Maturana–Wilber integration, attention, three windows and AI-mediated world-bringing
<i>The Evolution of Worlds</i> (24 June 2026)	natural drift, Inverse Darwinism, protected variation and life-coherent generative margin

Appendix B — Canonical glossary

Affect: felt or affectively weighted significance of organism–world condition, including valence, arousal and action readiness.

Altimeter: a proposed invariant-like estimate of global relational condition; a research target, not a validated universal scalar.

Autopoiesis: organization through which a network of production recursively realizes itself and constitutes a bounded living unity.

Constraint (C): a restriction or coupling that shapes accessible transformations and thereby enables organized form.

Disturbance (D): a perturbation considered relative to the organization and timescale of the system.

Domain of distinctions: an operational or linguistic space in which specified distinctions can be enacted and validated.

Generative margin: protected reserve that permits variation, error, exploration and new complementarity without immediate loss of core function.

Immanent normativity: organism-relative better/worse arising from the requirements of maintaining living organization.

Life-capacity: capacity of living beings to feel, think, move, relate, create and participate within sustaining conditions.

Life-coherence: organization that protects, restores or enlarges life-capacity without transferring disabling costs across lives, scales or generations.

Margin (M): reserve or distance separating present state from a critical viability boundary.

Options (O): actionable trajectories that remain viable over a relevant horizon.

Perception (P): acquisition or enactment of differences relevant to regulation; the term does not imply phenomenal awareness at every scale.

Regulation (R): action or internal change that maintains, restores or transforms viable organization.

Second-person window: participatory domain of address, recognition, co-regulation and mutual answerability.

State (X): present configuration and trajectory, including hidden load and relevant history.

Structural coupling: recurrent interaction through which system and medium become historically congruent while changes remain structure-determined.

Teleodynamics: higher-order organization in which mutually dependent constraint-generating processes produce immanent end-directedness.

Triune-aspect process monism: metaphysical proposal that one relational process is irreducibly disclosed intrinsically, participatorily and extrinsically.

Viability domain: set of states and trajectories compatible with continued organization under specified constraints and horizon.

Wu-Wei vector: least-forcing intervention direction expected to restore feedback, margin and life-coherent options.

Appendix C — Formal skeleton and mathematical audit

C.1 Viability state space

Let $K(t)$ be a viability set in a state space S with boundary $\partial K(t)$. Let $x(t)$ be system state, $d(t)$ disturbance, $C(t)$ constitutive constraints, $e(t)$ available energetic resources, $p(t)$ perceptual state, $m(t)$ memory state, $v(t)$ value or preference parameters, $u(t)$ regulation, $\theta(t)$ learned parameters, $\varepsilon(t)$ residual error or noise, and H_t the system's relevant history up to time t :

$$\dot{x} = f(x, u, d; C, e), \quad p = h(x, d; \vartheta) + \varepsilon, \quad u = \pi(p, m, v), \quad \dot{\vartheta} = \ell(H_i).$$

For $x \in K(t)$, margin under metric g is:

$$M(x, t) = \text{dist}_g(x, \partial K(t)).$$

Reachable viable options over horizon T , where $x_u(\tau)$ is the trajectory generated by an admissible regulation path $u(\cdot)$ from state x at time t , are:

$$\mathcal{O}_T(x, t) = \{u(\cdot) \mid x_u(\tau) \in K(\tau), \forall \tau \in [t, t+T]\}.$$

These expressions connect the grammar to viability theory and control without asserting a universal functional form.

C.2 Fano construction

Assign the seven nonzero elements of F_2^3 as C=100, M=010, D=001, X=110, P=011, O=101 and R=111. Each line is a triple summing to zero:

$$CMX; MDP; CDO; XDR; XPO; MOR; CPR.$$

Exact: pairwise-complete incidence. Interpretive: the semantic labels and the claim of biological minimality.

C.3 Octonionic lift

An oriented Fano diagram can encode multiplication of seven imaginary octonion units. Incidence is insufficient without orientation, signs, scalar unit and norm relations. The associator $[a, b, c] = (ab)c - a(bc)$ expresses lawful nonassociativity. Empirical use requires a mapping in which composition order and grouping have observable meaning.

C.4 Exceptional lift

The sequence $\mathbb{O} \rightarrow G_2 \rightarrow J_3(\mathbb{O}) \rightarrow \text{FTS} \rightarrow E_7$, with associated F_4/E_6 structures, is mathematically standard in appropriate real forms and constructions. The project's viability interpretations are not standard theorems. E_7 preserves the relevant quartic form; variable “viability” therefore cannot be an exact E_7 orbit invariant unless the domain, representation or dynamics changes.

C.5 Claim audit

Statement	Status
Three independent binary distinctions produce seven nonzero F_2^3 elements	exact mathematics
The lines of the Fano plane give seven pairwise-complete triples	exact mathematics
The seven viability functions map meaningfully onto those points	bridge hypothesis
The Fano mapping uniquely fixes octonion multiplication	false without orientation and further axioms
Octonionic associators can model context dependence	bridge hypothesis
Spin(8) triality is an exact symmetry	exact mathematics

Statement	Status
I–You–It instantiate triality	speculative bridge hypothesis
$J_3(\mathbb{O})$, FTS and E_7 provide cubic/quartic invariants	exact mathematics
Those invariants measure biological or social viability	unvalidated bridge hypothesis
E_8 is the endpoint of a particular exceptional ascent	defensible mathematical description
E_8 is the maximal structure of reality	unsupported metaphysical claim

Appendix D — Claim-status ledger

Established or strongly supported scientific claims: living systems require energy gradients and organized material processes; cell viability depends on boundary and metabolic regulation; animal affect depends on distributed neural and bodily systems; hippocampal, amygdalar, hypothalamic, brainstem, insular, cingulate and cortical contributions are differentiated and interactive; chronic social and ecological exposures become embodied; redundancy and degeneracy can support robustness and evolutionary innovation.

Productive scientific frameworks: autopoiesis and structural coupling; teleodynamics; free-energy principle and active inference; affective neuroscience; interoceptive inference; participatory sense-making; allostasis; natural drift and Inverse Darwinism. These are not equal in empirical scope or consensus and should not be collapsed.

Bridge hypotheses developed here: seven-function minimality; Fano triadic closure; affective compression of global viability; intrinsic identity of integrated valence; three-window coordination; triality-inspired I–You–It relations; exceptional invariants as viability diagnostics; love as relational generative margin.

Metaphysical commitments: one relational process rather than independent mental and physical substances; irreducibility of first-, second- and third-person disclosure; openness about universal experience and the phenomenal threshold.

Normative commitments: life-capacity is the final evaluative ground; cost transfer must be included; legitimate otherhood constrains action; mathematics and institutions remain answerable to the manner of living they conserve.

Appendix E — AI use and transparency note

This manuscript was developed through a dialogical process between Dr Bichara Sahely and OpenAI’s ChatGPT. Artificial intelligence supported corpus retrieval, conceptual integration, claim-status auditing, drafting, figure construction, reference organization, document production and visual quality review. The governing questions, conceptual programme, prior corpus, interpretive direction, evaluative judgments and final responsibility remain with Dr Sahely. The document is a transdisciplinary theoretical synthesis, not a systematic review, clinical guideline or empirical proof of a universal cross-scale mechanism. Readers should independently assess contested scientific, philosophical, mathematical and theological interpretations.

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