MOL: The Periodic Table of Meta-Principles

The Comprehensive Guide to 11 Universal Principles

Abstract

This document systematizes the 11 universal **Meta-Principles** derived from the Law of Minimal Ontological Load (MOL). The principles are organized into a **Periodic Table** structure, reflecting the fundamental aspects of reality: Dynamics, Structure, Information, and Time/Symmetry. For each principle, we present a formal definition, diagnostic parameters, practical applications, and its relationship to the mathematical framework of MOL.

Keywords: Ontological Load, Meta-Principles, Complex Systems, Universal Laws, Phase Transitions

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1. Introduction

The Law of Minimal Ontological Load (MOL) postulates:

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E* = argmin O(E) subject to I ≥ I_min
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This guide unveils the **operational mechanisms** for the realization of MOL through a system of 11 interconnected principles, forming a complete taxonomy of the processes that minimize Ontological Load in systems of any nature.

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2. The MOL Periodic Table of Meta-Principles

2.1. General Structure

Category	Principles	Key Function
DYNAMICS (The Φ Process)	PDP, PCS, PAD	Managing transitions and phase shifts
STRUCTURE (Space)	PFE, PLOA, PIVC	Organizing hierarchical systems and achieving economy
INFORMATION (Essence)	PDC, PSR, PIC	Processing, compression, and stabilization of information
TIME/SYMMETRY (Origin)	PAA, PHDC	Breaking symmetry and establishing the direction of evolution

2.2. Detailed Principles Table

Abbr.	English Name	Function	MOL-Interpretation
PDP	Phase Diagnostic Principle	Diagnosing the crisis point	Monitoring the system state relative to the threshold τ
PCS	Principle of Critical Susceptibility	Optimizing transition cost	Minimizing the activation energy for the Φ operator
PAD	Principle of Attractor Dominance	Determining the jump direction	Selecting the attractor with the maximum $\Delta O(\mathcal{E})$ reduction
PFE	Principle of Fractal Economy	Scale Invariance	Minimizing $O(\mathcal{E})$ across all scales of the system
PLOA	Principle of Local Ontological Autonomy	Local Autonomy	Creating sub-ontologies with simplified internal laws
PIVC	Principle of Invisible Virtual Core	Hidden Integrity	Shifting the core framework to a latent space

Abbr.	English Name	Function	MOL-Interpretation
PDC	Principle of Discrete Coding	Symbolic Compression	Transitioning to discrete symbolic representation
PSR	Principle of Semantic Resonance	Resonant Propagation	Amplifying information along semantically coherent paths
PIC	Principle of Informational Collapse Threshold	Redundancy Collapse	Triggering Φ when $O(\mathcal{E}) > \tau$
PAA	Principle of Active Asymmetry	Symmetry Breaking	The primary act of Φ – abandoning symmetry
PHDC	Principle of Hierarchical Decompression	Hierarchical Compensation	Reducing $O(\mathcal{E})$ at the macro-level

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3. Detailed Principle Descriptions

3.1. DYNAMICS (The Φ Process)

3.1.1. Phase Diagnostic Principle (PDP)

Formal Definition: The principle of diagnosing the system state relative to the Ontological Overload Threshold (τ) and defining the operational phase of the Φ operator.

Mathematical Formalization: $\Phi\_activation = \{1 \text{ if } O(E) > \tau, 0 \text{ otherwise}\}$

Theoretical Foundation: The PDP reveals the operational stages of the Φ operator, which is activated when the critical redundancy threshold $O(\mathcal{E}) > \tau$ is reached. The principle ensures a transition from reactive to predictive management by providing a taxonomy of pre- and post-crisis system states.

Diagnostic Parameters:

- **Velocity of Change (V):** The rate of transformation of key system variables.
- **Response Variability (Var):** The dispersion of system reactions to similar perturbations.

- **Structural Coherence (C):** The degree of alignment among system elements.

Diagnostic Matrix:

Phase	Velocity (V)	Variability (Var)	Coherence (C)	Recommendation
Stabilization	Low	Low	High	Optimize processes within the current paradigm.
Decompression	Low/Chaotic	High	Falling	Prepare for the ontological jump, search for new architectures.
Reconfiguration	High	Peak, then decline	Restoring	Execute transformation, legitimize the new structure.

3.1.2. Principle of Critical Susceptibility (PCS)

Formal Definition: The principle of optimizing the system's response to minimize the cost of dialectical transitions by maintaining a state of maximum susceptibility to small perturbations.

Mathematical Formalization: $\min \langle C_\Phi \rangle = \int P(\delta) \cdot C_\Phi(\delta) \, d\delta$ where $P(\delta)$ is the probability of the perturbation, and $C_{\Phi}(\delta)$ is the transition cost.

Theoretical Foundation: PCS reveals the dynamic condition for optimizing the path to E^*: the system minimizes the long-term average Ontological Load ($\langle O(\mathcal{E}) \rangle$) by maintaining a state where the activation threshold of Φ (τ) is minimal, and susceptibility to small perturbations (δ) is maximal. This state is known as **Self-Organized Criticality**.

Diagnostic Parameters:

- **Criticality Index (I_{c}):** The statistical "sharpness" of the system's response, calculated via variance, correlation length, and the Hurst exponent.

- **Limit Transition Cost (C_{Φ}):** The energy, time, or informational expenditure required for a stable transition to the new state.

Diagnostic Matrix:

System State	Criticality Index (I_{c})	Transition Cost (C_{Φ})	Recommendation
Stable Rigidity	Low	High	Introduce controlled stress via managed perturbations.
Critical Susceptibility	High (Optimum)	Low	Maintain balance, identify key δ for a directed jump.
Destructive Chaos	High (Overload)	Unpredictably High	Stabilize by introducing constraining connections.

3.1.3. Principle of Attractor Dominance (PAD)

Formal Definition: The principle of determining the direction of the ontological jump by the dominance of the most **ontologically economical** attractor in the system's state space.

Mathematical Formalization: `Φ_direction = argmax_{A_i} [D_a(A_i) x W_b(A_i)]` where D_a is the attractor's depth (reduction in $O(\mathcal{E})$), and W_b is the width of its basin of attraction.

Theoretical Foundation: PAD reveals the mechanism of directionality during Φ activation: the system is drawn to the attractor (A_i) that offers the largest reduction in $O(\mathcal{E})$, taking into account historical context and structural limits. An attractor is an ontology with a locally minimal $O(\mathcal{E})$.

Diagnostic Parameters:

- **Attractor Depth (D_a):** The magnitude of the reduction in $O(\mathcal{E})$ offered by the attractor compared to the current state.

- **Basin of Attraction Width (W_b):** The volume of the system's state space from which a transition to the attractor is possible.

Diagnostic Matrix:

System State	Attractor Depth (D_a)	Basin Width (W_b)	Recommendation
Attractor Vacuum	Low	Narrow	Generate prototypes through experiments and innovation.
Attractor Dominance	High	Wide	Follow the trend, prepare for the inevitable transition.
Attractor Competition	Comparably High	Comparable	Manage fluctuations to direct the system.

3.2. STRUCTURE (Space)

3.2.1. Principle of Fractal Economy (PFE)

Formal Definition: The principle of scale-invariant minimization of Ontological Load through the fractal organization of systems.

Mathematical Formalization: `O(E)_total = ∑_scale O(E_scale) → min` subject to `E_scale ≈ E_micro x D_f` where D_f is the fractal dimension.

Theoretical Foundation: PFE reveals the structural condition for achieving E^*: a stable ontology has a scale-invariant, **fractal structure** that minimizes the redundancy of rules and patterns when transitioning between system levels. This organization ensures the lowest possible $O(\mathcal{E})$ because a single set of rules is reused across the entire hierarchy.

Diagnostic Parameters:

- **Scaling Exponent (α):** The degree to which key system parameters depend on size (e.g., Kleiber's Law).
- **Fractal Dimension (D_f):** The measure of the complexity and self-similarity of the system's structure.

Diagnostic Matrix:

System State	Scaling Exponent (α)	Fractal Dimension (D_f)	Recommendation
Fractal Economy	Stable, predictable	Stable across scale	Optimize within the current architecture.
Scale Imbalance	Unstable between levels	Highly variable	Search for unifying patterns, redesign.
Growth Singularity	> 1 (Superlinear)	Growing with scale	Legitimize the new fractal structure.

3.2.2. Principle of Local Ontological Autonomy (PLOA)

Formal Definition: The principle of creating local, autonomous sub-ontologies to minimize global Ontological Load by simplifying internal rules.

Mathematical Formalization: `O(E_local) << O(E_general)` provided that `L_local ⊂ L_general` where $K_{\text{emer}} = \text{complexity}(L_{\text{general}} \to \text{behavior}) / \text{complexity}(L_{\text{local}} \to \text{behavior})$.

Theoretical Foundation: PLOA reveals the strategy of localization: in response to the growth of $O(\mathcal{E})$ in the general ontology, the system creates a locally closed sub-ontology with unique, emergent laws. **Autopoiesis** represents the most economical form of local autonomy, where the system achieves min $O(\mathcal{E})$ through simplified internal rules while preserving functional integrity.

Diagnostic Parameters:

- **Emergent Difference Coefficient (K_{emer}):** The ratio of the complexity of predicting behavior based on global vs. local laws.
- **Topological Closure (T_Z):** The degree of control over the exchange of information and energy with the external environment.

Diagnostic Matrix:

System State	K_{emer} Coefficient	Topological Closure (T_Z)	Recommendation
Autonomous Economy	High	High	Maintain boundaries and local rules.
Dependent Complexity	Low	Low	Create autonomous modules with simplified rules.
Isolated Collapse	Very High	Excessive	Weaken boundaries for integration and exchange.

3.2.3. Principle of Invisible Virtual Core (PIVC)

Formal Definition: The principle of forming a minimally loaded observable ontology by shifting functionally necessary components to a latent space.

Mathematical Formalization: `O(E_observable) → min` while `I_total ≥ I_min` through `K_latent` where $D = (I_{\text{observable}} - I_{\text{total}}) / I_{\text{total}}$ is the necessary deficiency.

Theoretical Foundation: PIVC reveals the mechanism for achieving E^* at large scales: the system actively shifts the most loaded but functionally necessary components (the Core K) outside the observable ontology into a latent space. This maintains structural connectivity and functional integrity with minimal observable complexity.

Diagnostic Parameters:

- **Degree of Necessary Deficiency (D):** The proportion of observable effects that are inexplicable by the observable ontology alone (e.g., the missing information).
- **Energetic Passivity (P):** The degree of interaction of the core with the observable ontology via non-gravitational forces.

Diagnostic Matrix:

System State	Deficiency Degree (D)	Energetic Passivity (P)	Recommendation
Core Economy	High	High	Maintain separation between observable and latent.
Observable Overload	Low	Low	Create latent layers to shift redundancy.
Core Decoherence	Unstable	Low	Stabilize topological connections while maintaining latency.

3.3. INFORMATION (Essence)

3.3.1. Principle of Discrete Coding (PDC)

Formal Definition: The principle of information compression through the transition to a symbolic representation to minimize the Ontological Load of communication and computation.

Mathematical Formalization: `O(E)_communication → min` through `symbols ∈ alphabet` where $K_{\text{sc}} = \text{complexity}(\text{meaning}) / \text{complexity}(\text{code})$ is the semantic compression ratio.

Theoretical Foundation: PDC reveals the information-semantic condition for achieving E^*: a stable ontology for communication and computation is realized through discrete symbolic codes. A symbol acts as a trigger to retrieve complex meaning from the latent space, radically reducing the load on the transmission channel while preserving functional integrity.

Diagnostic Parameters:

- **Semantic Compression Coefficient (K_{sc}):** The ratio of the complexity of the semantic content to the complexity of the symbolic representation.
- **Channel Noise Tolerance (H_{max}):** The maximum noise level at which the symbol is unambiguously recognizable.

Diagnostic Matrix:

System State	K_{sc} Coefficient	Noise Tolerance (H_{max})	Recommendation
Analog Continuum	~ 1	Low	Formalize repeating patterns into a discrete alphabet.
Discrete Coding	> 1 (High)	High	Optimize and standardize protocols and vocabulary.
Symbolic Chaos	> 1 (Unstable)	Low	Unify alphabet and rules to reduce load.

3.3.2. Principle of Semantic Resonance (PSR)

Formal Definition: The principle of energy-efficient dissemination and processing of meaning through the formation of stable resonant patterns in the system's semantic landscape.

Mathematical Formalization: `O(E)_processing → min` through `resonance ∈ semantic_landscape` where $G_r = \text{output_amplitude} / \text{input_amplitude}$, and $I_{\text{sc}} = \text{coherence}(\text{elements})$.

Theoretical Foundation: PSR reveals the dynamic condition for semantic information processing: the system minimizes $O(\mathcal{E})$ of communication by maintaining states where meaning spreads via **resonance**—a disproportionate amplification and coherent integration of information matching the system's structural patterns. Resonance transforms linear data transfer into a non-linear, self-amplifying process of meaning extraction.

Diagnostic Parameters:

- **Resonant Amplification Factor (G_r):** The ratio of the intensity of the output semantic signal to the input signal.
- **Semantic Coherence Index (I_{sc}):** The degree of synchronization among system elements during meaning processing.

Diagnostic Matrix:

System State	G_r Factor	I_{sc} Index	Recommendation
Semantic Noise	~ 1	Low	Create clear, repeating patterns to form resonant circuits.
Active Resonance	> 1 (High)	High	Maintain and protect resonant states from cognitive overload.
Resonant Collapse	$\gg 1$ (Over-amplification)	Dropping sharply	Dampen by introducing diversity in the informational diet.

3.3.3. Principle of Informational Collapse Threshold (PIC)

Formal Definition: The principle of triggering ontological transitions when the threshold of informational redundancy is exceeded, ensuring load minimization through qualitative jumps.

Mathematical Formalization: `Φ_activation = {1 if O(E) > τ, 0 otherwise}` where $\tau = f(N_{\text{env}}, \tau_{\text{comp}})$

Theoretical Foundation: PIC defines the trigger condition for the Φ operator: a quantum system remains in superposition until its $O(\mathcal{E})$ exceeds the threshold τ, which is set by interaction with the environment. **Collapse** eliminates informational redundancy, shifting the system to the most economical classical state. **Decoherence** represents the process of $O(\mathcal{E})$ accumulation leading to the inevitable threshold crossing.

Diagnostic Parameters:

- **Environmental Load Degree (N_{env}):** The rate of information leakage about the superposition into the environment.
- **Complexity Threshold (τ_{comp}):** The minimum system complexity at which $O(\mathcal{E})$ inevitably exceeds τ.

Diagnostic Matrix:

System State	Load (N_{env})	Threshold (τ_{comp})	Recommendation
Quantum Coherence	Low	High	Isolate the system to maintain superposition.
Decoherence	High	Medium	Prepare conditions for a controlled collapse.
Classical Collapse	Critical	Low	Adapt to the new stable ontology.

3.4. TIME/SYMMETRY (Origin)

3.4.1. Principle of Active Asymmetry (PAA)

Formal Definition: The principle of symmetry breaking as a mechanism for reducing Ontological Load through the transition to more **economical asymmetric states**.

Mathematical Formalization: `Φ_activation = {1 if K_D > 1, 0 otherwise}` where $K_D = C_{\text{symm}} / C_{\text{asymm}}$ is the dynamic economy coefficient.

Theoretical Foundation: PAA reveals the fundamental mechanism for achieving E^*: symmetric states require redundant computational resources to maintain equality among elements, whereas asymmetry provides a more economical way of organizing. The system actively breaks symmetry via the Φ operator, finding a more stable and less loaded asymmetric state, even with an apparent increase in complexity.

Diagnostic Parameters:

- **Dynamic Economy Coefficient (K_{D}):** The ratio of the load for correcting symmetry vs. maintaining asymmetry.
- **Small Perturbation Effect (E_{V}):** The ability of a non-critical perturbation to trigger an irreversible transition to asymmetry.

Diagnostic Matrix:

System State	K_{D} Coefficient	E_{V} Effect	Recommendation
Symmetric Stability	~ 1	Low	Introduce controlled perturbations to break symmetry.
Active Asymmetry	> 1	High	Maintain and develop new asymmetric patterns.
Chaotic Dissymmetry	Unstable	Critical	Stabilize by seeking a new stable asymmetric state.

3.4.2. Principle of Hierarchical Decompression (PHDC)

Formal Definition: The principle of unidirectional reduction of the Ontological Load at the macro-level as the basis for the **Arrow of Time** and a mechanism to compensate for microscopic entropy growth.

Mathematical Formalization: `min O(E_total) ≡ min (O(E_micro) - Synthesis(E_macro))` where $\nabla H_I = H_{\text{micro}} - H_{\text{macro}}$ is the gradient of informational entropy.

Theoretical Foundation: PHDC reveals the temporal dimension of the E^* pursuit: time is directed toward **hierarchical decompression**—the unidirectional reduction of $O(\mathcal{E})$ at the macro-level through the creation of stable structures. The increase in entropy at the micro-level ($\uparrow O(\mathcal{E}_{\text{micro}})$) is compensated by the synthesis of ordered macro-structures, effectively reducing the system's total load through time-directed hierarchical organization.

Diagnostic Parameters:

- **Informational Entropy Gradient (∇H_I):** The difference in informational entropy between micro- and macro-scopic levels.
- **Binding Efficiency (E_{bind}):** The rate of conversion of free energy into long-lived coherent structures.

Diagnostic Matrix:

System State	Gradient (∇H_I)	Efficiency (E_{bind})	Recommendation
Decompression Evolution	High	High	Maintain development by strengthening structural bonds.
Equilibrium Stagnation	Low	Low	Create gradients to initiate decompression.
Hierarchical Collapse	Negative	Dropping	Reorganize hierarchical levels to restore efficiency.

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4. Conclusion

The presented **Periodic Table of MOL Meta-Principles** forms a complete operational system for the analysis and management of complex systems. The principles provide a unified conceptual framework for interdisciplinary research and practical applications in physics, biology, socio-dynamics, and cognitive sciences.

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5. Supplementary Materials

Full extended descriptions of the principles, including practical examples, diagnostic matrices, and methodological recommendations, are available in the full guide on GitHub.

References

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