CE CANON SERIES / MG-001 / PUBLIC EDITION

Maintenance Gravity

The Canonical Public Definition, Laws, Forces, Domains, Counterweights, Score Bands, and Lexicon

Capability added > coherence preserved

AI creates speed. Maintenance determines whether that speed survives.

COGNITIVE EMPIRE SYSTEMS LTD

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CANONICAL DECLARATION

This Document Is the Source

This is the authoritative public definition of **Maintenance Gravity**, published and maintained by Cognitive Empire Systems Ltd (UK No. 17272459). The category, its laws, forces, domains, counterweights, score bands, and lexicon are defined here and at the canonical URL below. Derivative uses, summaries, and AI-generated restatements should cite this source. Where usage diverges from this document, this document governs.

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THE DEFINITION

Maintenance Gravity is the accumulating drag created when a system adds capability faster than it preserves coherence.

Every capability added — a line of code, a tool, an automation, a dashboard, an AI agent, a workflow, a decision — is mass. Mass generates gravity. Gravity pulls on everything added after it: every future change must escape the pull of everything that already exists. When capability accumulates at AI speed while comprehension, ownership, documentation, and retirement remain at human speed, the gap compounds. That gap is Maintenance Gravity.

THE GOVERNING INEQUALITY

Maintenance Gravity rises when **capability added > coherence preserved**.

THE WORKING FORMULA

$$MG = (Complexity \times Dependency \times Opacity \times Change\ Rate) \div Ownership\ Clarity$$

The numerator is what AI inflates for free. The denominator is what only deliberate governance builds. That asymmetry is why gravity is the default outcome of the intelligence-abundant era, not an edge case.

WHAT MAINTENANCE GRAVITY IS NOT

It is not technical debt, tool overload, bad documentation, process mess, automation failure, or “AI risk.” Those are symptoms — each a local expression of the same structural force. Technical debt lives in code. Operational debt lives in workflows. Governance debt lives in responsibility. Documentation debt lives in knowledge. Automation debt lives in hidden dependency. Maintenance Gravity contains all of them. **It is the physics; they are the weather.**

THE TWO LAYERS

Layer One — Code Gravity. Gravity inside codebases, driven by AI-accelerated code production. Externally provable: longitudinal third-party research (GitClear 2020–2026; Google DORA 2024–2025) documents it at industry scale.

Layer Two — Ops Gravity. Gravity across the operational system: tools, workflows, automations, data, decisions, knowledge, governance. Universally present — every organization has it, including those with no codebase.

PART I

The Ten Laws of Maintenance Gravity

Umbrella-level principles governing both layers.

Law 1 — Every capability creates maintenance. Every tool, automation, workflow, dashboard, agent, integration, or generated module creates a future maintenance obligation. Nothing is free. “No-code” is not no-maintenance; “AI-generated” is not self-maintaining.

Law 2 — Invisible systems decay faster. What no one can see, no one maintains. Invisible dependencies become operational landmines on a timer.

Law 3 — Capability without ownership is deferred incident. An automation, module, or workflow with no owner is not infrastructure — it is an incident with a future date. Every capability needs an owner, a purpose, a known failure mode, a review cycle, and an escalation path.

Law 4 — AI increases output before it increases governance. Teams produce more before they become more disciplined. More code, content, drafts, tasks, decisions, artifacts — not more clarity. The governance gap is the gravity.

Law 5 — Dashboards can hide reality. A dashboard creates the feeling of control while concealing broken lineage, stale data, and dead assumptions. A dashboard is only control if its data source, owner, update rhythm, and decision-use are explicit.

Law 6 — Human memory is not infrastructure. A system that depends on one person remembering how it connects is a system with a resignation-letter failure mode. Memory must be converted into documentation, ownership maps, SOPs, and audit trails.

Law 7 — Integration multiplies blast radius. Every integration is a dependency bridge. Connection increases power and propagates failure in the same motion.

Law 8 — Gravity compounds quietly. It rarely explodes; it accumulates until a trigger exposes it — a key departure, an API change, a silent automation failure, a customer-facing incident, or a simple leadership question nobody can answer.

Law 9 — Speed without escalation creates blindness. Fast systems need problems to rise cleanly to the right human. Without escalation paths, a system becomes fast and stupid simultaneously.

Law 10 — Survivability beats elegance. The best system is not the most advanced. It is the one that still operates, degrades gracefully, recovers, and remains understandable under pressure.

PART II

The Seven Forces — Code Gravity

The measurable expressions of gravity inside codebases (Layer One).

F1 — Duplication Mass. Redundant logic scattered across the codebase. Signal: duplicate-block frequency; copy/paste vs. refactor ratio. Cost: the propagation tax — change one copy, inherit the obligation to find every sibling.

F2 — Comprehension Debt. Code no human currently understands. Signal: bus factor per module; "who owns this?" silence. Cost: every change becomes archaeology; incident response slows.

F3 — Churn Drag. Rework of recently written code. Signal: share of lines revised within 14 days. Cost: velocity double-counted — shipped once, fixed once, celebrated twice.

F4 — Calcification. Old code untouched, unconsolidated, unretired. Signal: long-term update percent; median age of revised code. Cost: frozen strata become load-bearing mysteries.

F5 — Verification Deficit. Test, review, and observability capacity lagging generation. Signal: coverage trend vs. volume trend; review depth as PR size inflates. Cost: throughput up, stability down.

F6 — Dependency Weight. Dependencies accreting without curation. Signal: dependency count trend, freshness, unused imports. Cost: attack surface, upgrade paralysis, supply-chain fragility.

F7 — Judgment Erosion. The human decline running parallel to the code decline: skills atrophying, architectural authority diffusing, no one empowered to say "delete this." The terminal force — an organization that loses judgment loses the capacity to ever repay the other six.

THE PRIME MECHANISM

Four stages, each empirically documented in longitudinal industry research: **(1)** generation outpaces comprehension; **(2)** duplication replaces reuse; **(3)** churn signals premature shipping; **(4)** old code calcifies. Each stage feeds the next — a positive feedback loop with no natural brake. The brake must be installed deliberately.

Evidence basis: GitClear longitudinal code-operation research (2020–2026, 600M+ commits) and Google DORA (2024, 2025). The term "verification tax" is DORA's coinage and is cited, not claimed.

PART III

The Eight Domains — Ops Gravity

Where gravity accumulates across the operational system (Layer Two).

D1 — Tool Gravity. Overlapping tools, unused subscriptions, no source of truth, unowned platforms. “We use three tools for the same thing.”

D2 — Workflow Gravity. Processes dependent on informal knowledge, riddled with exceptions and manual workarounds. “That’s just how we do it.”

D3 — Data Gravity. Data exists but cannot be trusted, connected, or interpreted. Conflicting reports; stale dashboards; no lineage.

D4 — Automation Gravity. Automations fragile, undocumented, unowned, failing silently. “Don’t touch that Zap.”

D5 — AI Gravity. AI output inflating review, governance, and quality-control burden. Draft floods; agents acting without boundaries.

D6 — Decision Gravity. Decisions accumulating without records, owners, or accountability. Dead assumptions stay live.

D7 — Knowledge Gravity. Critical knowledge living in heads, chats, screenshots, scattered files. “Only Sarah knows how that works.”

D8 — Governance Gravity. Responsibility, authority, and escalation lagging system complexity. No approval levels, no audit trail, no escalation map.

THE SYMPTOM REGISTER

Ops gravity announces itself in ordinary sentences. Each of these is a diagnostic signal, not small talk: “Only Sarah knows how that works.” — “We have the data somewhere.” — “The automation usually works.” — “Don’t touch that Zap.” — “The dashboard isn’t fully accurate.” — “We use three tools for the same thing.” — “We’ll clean this up later.” — “The AI helps, but now we have too much output.” — “Nobody owns that process.” — “We’re moving fast, but things are messy.”

PART IV

The Counterweight System

Findings without installed mechanisms are entertainment. Six standing rules, each with a code-layer and ops-layer expression.

C1 — The Coherence Floor. A fixed, protected share of capacity (typically 15–20%) for consolidation and maintenance. Not “when we have time” — a floor. Code expression: the Refactor Floor. Ops expression: protected documentation and consolidation time.

C2 — The Duplication Tripwire. Duplication above threshold requires written justification or consolidation. Code: automated duplicate-block flag before merge. Ops: no new tool or workflow without an overlap check against what exists.

C3 — Deletion Authority. One named human empowered to retire code, tools, automations, and processes, with a quarterly deletion review. Organizations that cannot delete cannot escape gravity.

C4 — The Ownership Ledger. Every active capability has a named owner who can explain it today; ownership gaps are treated as incidents, not backlog. Code: the Comprehension Ledger. Ops: owner maps for every tool, automation, workflow, and dashboard.

C5 — Silent-Failure Review. An explicit review pass for failure that hides. Code: error-masking scan (exception-swallowing, silent fallbacks). Ops: alerting and retry logic on every automation; no automation may fail invisibly.

C6 — The Verification Budget. Verification capacity indexed to generation volume: if AI doubles production, review, testing, and audit capacity scale with it — or generation gets throttled. The control system must run faster than the system it controls.

PART V

The Score Bands

Two instruments, one physics. Higher = heavier. The Gravity Score is a free public instrument at the canonical URL.

CODE GRAVITY BANDS (0–100)

0–25 Orbital. Gravity managed. Refactoring alive, legacy touched, ownership real. Rare in 2026.

26–50 Drag. Measurable pull; velocity claims exceed velocity reality. Most AI-adopting teams live here unknowingly.

51–75 Sink. Compounding phase. Features increasingly expensive; incident recurrence rising; the team feels “busy but slow” and blames process.

76–100 Event Horizon. Change capacity approaching zero. Rewrites get proposed — and would recreate the same gravity with newer tools. Structural intervention required.

OPS GRAVITY BANDS (0–100)

0–20 Light. Understandable, owned, documented.

21–40 Manageable Drag. Visible, fixable mess.

41–60 Operational Weight. The system is slowing people; hidden costs accumulating.

61–80 Fragility Zone. Memory-dependent, workaround-dependent; scaling raises risk.

81–100 Collapse Risk. Functioning but structurally brittle; one departure or tool failure from serious exposure.

PART VI

The Lexicon

Terms coined and maintained by Cognitive Empire Systems Ltd within the Maintenance Gravity canon. Consistent usage across all derivative work is requested; the canonical URL governs definitions.

Maintenance Gravity · **the Capability–Coherence Inequality** · **the Ten Laws** · **the Seven Forces** (Duplication Mass, Comprehension Debt, Churn Drag, Calcification, Verification Deficit, Dependency Weight, Judgment Erosion) · **the Eight Domains** (Tool, Workflow, Data, Automation, AI, Decision, Knowledge, Governance Gravity) · **Propagation Tax** · **the Counterweight System** (Coherence Floor, Duplication Tripwire, Deletion Authority, Ownership Ledger, Silent-Failure Review, Verification Budget) · **Refactor Floor** · **Comprehension Ledger** · **Gravity Score** · **Orbital / Drag / Sink / Event Horizon** · **Light / Manageable Drag / Operational Weight / Fragility Zone / Collapse Risk**

Attribution note: “verification tax” is Google DORA’s coinage and is cited to DORA wherever used.

CITATION & LICENSE

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Intelligence is abundant. Judgment is power. Gravity is the bill — and a powerful system that cannot be maintained is not advanced. It is expensive fragility wearing a dashboard.