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RADIANT Change Report - January 10, 2026

Report Period: Last 24 Hours (January 9-10, 2026) **Generated:** January 10, 2026 05:48 UTC-08:00 **Versions Covered:** v5.0.3 → v5.2.0 → v5.2.1 → v5.2.2

Executive Summary

Metric	Value
Releases	4 versions
Files Changed	66 files
Lines Added	~22,466
Lines Removed	~200
New Services	5
New Migrations	4
Documentation Updates	4 major guides

Version Releases

v5.2.2 - Orchestration Methods Scientific Implementation

New Features SE Probes (ICML 2024) | Attribute | Detail | | Service | SEProbesService in orchestration-methods.service.ts | | Algorithm | Logprob-based entropy estimation via OpenAI API | | Formula | Per-token Shannon entropy: $H = -\sum p * \log(p)$ | | Performance | 300x faster than sampling-based methods | | Parameters | probe_layers, threshold, fast_mode, sample_count |

Kernel Entropy (NeurIPS 2024) | Attribute | Detail | |———|———| | Service |
 KernelEntropyService in orchestration-methods.service.ts | | Algorithm | Embedding
 KDE using text-embedding-3-small | | Bandwidth | Silverman estimation: $h = \text{median_dist} / \sqrt{(2 * \ln(n+1))}$ | | Kernels | RBF, linear, polynomial | | Parameters | kernel, bandwidth, sample_count |

Pareto Routing - Multi-objective optimization across quality/latency/cost - Pareto frontier calculation with configurable weights - Budget constraint enforcement

C3PO Cascade (NeurIPS 2024) - Self-supervised difficulty prediction - Tiered model cascade (efficient → standard → powerful) - Confidence-based escalation

AutoMix POMDP (Nov 2025) - POMDP belief-state model selection - -greedy exploration (default =0.1) - Self-verification for quality assurance

System vs User Methods Protection

- Added `isSystemMethod` field to API responses
- System methods: Only parameters and enabled status editable
- Admin UI shows “System” badge for protected methods
- API validation prevents editing system method definitions

Documentation Created: ORCHESTRATION-REFERENCE.md Complete reference document (2,326 lines) documenting all system orchestration capabilities.

System Methods (70+) by Category:

Category	Count	Key Methods
Generation	3	GENERATE_RESPONSE, GENERATE_WITH_COT, REFINE_RESPONSE
Evaluation	8	CRITIQUE_RESPONSE, JUDGE_RESPONSES, POLL_JUDGE, G_EVAL, PAIRWISE_PREFER, SELF_REFLECT, COMPARE_ANALYSIS
Synthesis	6	SYNTHESIZE_RESPONSES, BUILD_CONSENSUS, MOA_LAYERS, MULTI_SOURCE_SYNTH, LLM_BLENDER, TOKEN_AUCTION
Verification	8	VERIFY_FACTS, PROCESS_REWARD, SELFCHECK_GPT, CITE_VERIFY, NATURAL_LOGIC, UNIFACT, EIGENSCORE, REQUERY_CHECK

Category	Count	Key Methods
Debate	6	GENERATE_CHALLENGE, DEFEND_POSITION, SPARSE_DEBATE, ARG_MAPPING, HAH_DELPHI, RECONCILE_WEIGHTED
Aggregation	4	MAJORITY_VOTE, WEIGHTED_AGGREGATE, SELF_CONSISTENCY, GEDI_VOTE
Reasoning	3	DECOMPOSE_PROBLEM, LOGIC_LM, LLM_MODULO
Routing	7	DETECT_TASK_TYPE, SELECT_BEST_MODEL, ROUTE_LLM, FRUGAL_CASCADE, PARETO_ROUTE, C3PO_CASCADE, AUTOMIX, AFLOW_MCTS
Uncertainty	6	SEMANTIC_ENTROPY, SE_PROBES, KERNEL_ENTROPY, CALIBRATED_CONF, CONSISTENCY_UQ, CONFORMAL_PRED
Hallucination	3	MULTI_HALLUC, METAQA, FACTUAL_GROUND
Human-in-Loop	3	HITL_REVIEW, TIERED_EVAL, ACTIVE_SAMPLE
Collaboration	1	ECON_NASH
Neural	1	CATO_NEURAL

System Workflows (49) by Category:

Category	Count	Workflows
Adversarial & Validation	2	ARE (Red Team Attack), LM_VS_LM (Cross-Examination)
Debate & Deliberation	3	SOD (AI Debate), MDA (Multi-Agent Debate), ReConcile (Round Table Consensus)
Judge & Critic	3	LAAJE (AI Judge), RLAIIF (Constitutional Critic), IREF (Critique-Revise Loop)
Ensemble & Aggregation	3	SCMR (Majority Vote), CWMA (Weighted Ensemble), SMOE (Mixture Router)
Reflection & Self-Improvement	3	ISFR (Self-Refine Loop), VRL (Reflexion Agent), LATS (Tree Search Reasoning)

Category	Count	Workflows
Verification & Fact-Checking	2	CoVe (Chain of Verification), SelfRAG (Retrieval-Augmented Verification)
Multi-Agent Collaboration	2	LLM_MAS (Agent Team), MAPR (Peer Review Pipeline)
Reasoning Enhancement	9	CoT, ZeroShotCoT, ToT, GoT, ReAct, L2M, PS, MCP, PoT
Model Routing Strategies	4	SINGLE, ENSEMBLE, CASCADE, SPECIALIST
Domain-Specific Orchestration	4	DOMAIN_INJECT, MULTI_EXPERT, CHALLENGER_CONSENSUS, CROSS_DOMAIN
Cognitive Frameworks	14	FIRST_PRINCIPLES, ANALOGICAL, SYSTEMS, SOCRATIC, TRIZ, DESIGN_THINKING, SCIENTIFIC, LATERAL, ABDUCTIVE, COUNTERFACTUAL, DIALECTICAL, MORPHOLOGICAL, PREMORTEM, FERMI

Documentation Structure for Each Method/Workflow: - UI Name (user-friendly display) - Scientific Name (academic/formal name) - Code identifier - Detailed description - All parameters with types, defaults, and descriptions - Inputs/Outputs specification - Research references (where applicable) - Accuracy improvements (where applicable) - Best use cases and problem indicators

Source Migration Files: - 066_orchestration_patterns_registry.sql - Base workflow definitions - 157_orchestration_methods_part1.sql - Generation, Evaluation, Synthesis methods - 157_orchestration_methods_part2.sql - Verification, Debate, Aggregation, Reasoning methods - 157_orchestration_methods_part3.sql - Routing, Uncertainty, Hallucination, HITL, Collaboration, Neural methods

Files Modified

- packages/infrastructure/lambda/shared/services/orchestration-methods.service.ts
- packages/infrastructure/lambda/admin/orchestration-methods.ts
- apps/admin-dashboard/app/(dashboard)/orchestration/methods/page.tsx
- docs/THINKTANK-ADMIN-GUIDE.md
- docs/STRATEGIC-VISION-MARKETING.md
- .windsurf/workflows/auto-build.md

v5.2.1 - Production Hardening: Resilience Integration

P0: Circuit Breaker Integration **ResilientProviderService** (`lambda/shared/services/resilient-provider.service.ts`)
| Feature | Description | |———|———| | Wrapper | Ready-to-use for all external AI provider calls | | Combines | CircuitBreaker + Retry + Timeout in single call | | Monitoring | Provider health via `getAllProviderHealth()` | | Logging | Auto-logging of state changes and failures |

Integration Points: | Service | Calls Protected | |———|———| | `model-router.service.ts` | Bedrock, LiteLLM, direct provider calls (Groq, Perplexity, xAI, Together) | | `embedding.service.ts` | OpenAI, Bedrock, Cohere embedding calls (single + batch) | | `translation-middleware.service.ts` | Qwen 2.5 7B SageMaker translation calls | | `inference-components.service.ts` | SageMaker inference component lifecycle | | `formal-reasoning.service.ts` | Lambda executor, SageMaker neural-symbolic (LTN, DeepProbLog) |

P0: Silent Failure Fixes

- Fixed 10+ empty catch blocks in `advanced-agi.service.ts`
- Affected areas: Strategy selection, transfer learning, prediction, action selection, rule extraction, hybrid reasoning, proposal generation
- All now log proper error context with `logger.warn()`

P1: React ErrorBoundary **ErrorBoundary** (`apps/admin-dashboard/components/error-boundary.tsx`)
| Component | Purpose | |———|———| | `PageErrorBoundary` | Full-page error handling | | `SectionErrorBoundary` | Graceful section-level fallbacks | | Error reporting | `/api/admin/errors/report` in production | | Dev mode | Shows stack traces | | Prod mode | User-friendly message |

P1: Billing Idempotency **IdempotencyService** (`lambda/shared/services/idempotency.service.ts`)
| Feature | Detail | |———|———| | Purpose | Prevents duplicate charges on retry | | TTL | 24 hours for idempotency keys | | Status tracking | pending → completed/failed | | Helpers | `extractIdempotencyKey()`, `generateIdempotencyKey()` |

Migration: `V2026_01_10_002__idempotency_keys.sql` - `idempotency_keys` table with RLS - Cleanup function for expired records

New Files

- `packages/infrastructure/lambda/shared/services/resilient-provider.service.ts`
- `packages/infrastructure/lambda/shared/services/idempotency.service.ts`
- `packages/infrastructure/migrations/V2026_01_10_002__idempotency_keys.sql`
- `apps/admin-dashboard/components/error-boundary.tsx`

v5.2.0 - Production Hardening (PROMPT-39)

Phase 1: Resilience Layer **CircuitBreaker** (`packages/shared/src/utils/resilience.ts`)
| Feature | Configuration | |———|———| | Purpose | Prevents cascading failures when AI providers are down | | States | CLOSED → OPEN → HALF_OPEN | | Threshold | 5 failures in 30 seconds | | Recovery | Opens circuit for 60 seconds | | Patterns | Retry with exponential backoff, timeout wrappers, bulkhead |

Python Resilience (`packages/flyte/utils/resilience.py`) | Feature | Detail | |
 - | Library | Tenacity-based retry decorators | | Decorator | `@with_retry(max_attempts=3)` | |
 Circuit Breaker | Implementation for Python Flyte tasks | | Timeouts | 5s connect, 60s read (never infinite) |

Phase 2: Observability & Error Handling **Silent Failure Fixes** (`consciousness-engine.service.ts`)
 - Empty catch blocks now log full error traces with correlation IDs - Memory retrieval and drive computation failures properly logged - Fallback logic clearly marked with `_fallback` module tags

Environment Validator (`packages/shared/src/config/validator.ts`) | Feature | Detail | |
 Timing | Validates on Lambda cold start | | Failure | Throws `CriticalConfigurationError` immediately | | Core Requirements | `LITELLM_PROXY_URL`, `DB_SECRET_ARN`, `DB_CLUSTER_ARN` |

Phase 3: Rate Limiting **RateLimiterService** (`lambda/shared/services/rate-limiter.service.ts`)
 | Feature | Configuration | | Algorithm | Token bucket with Redis storage |
 | Default | 100 requests/minute per tenant | | Fallback | In-memory when Redis unavailable | |
 Overrides | Per-tenant with expiration | | Middleware | `withRateLimit` for Lambda handlers | |
 Response | 429 with `Retry-After` headers |

Environment Variables: | Variable | Default | Description | |
`RATE_LIMIT_ENABLED` | true | Enable/disable rate limiting | | `RATE_LIMIT_REQUESTS_PER_MINUTE`
 | 100 | Default rate limit | | `RATE_LIMIT_WINDOW_SECONDS` | 60 | Rate limit window |

Phase 4: Testing Foundation **EconomicGovernor Tests** (`__tests__/economic-governor.service.test.ts`)
 - Full test coverage for model selection logic - Tests for all governor modes (off, performance, balanced, cost_saver) - Error handling and edge case coverage - Batch processing and singleton pattern tests

New Files

- `packages/shared/src/utils/resilience.ts` - TypeScript resilience utilities
- `packages/shared/src/config/validator.ts` - Environment validation
- `packages/flyte/utils/resilience.py` - Python resilience utilities
- `packages/infrastructure/lambda/shared/services/rate-limiter.service.ts`
- `packages/infrastructure/__tests__/economic-governor.service.test.ts`

v5.0.3 - Grimoire Schema Compliance

Index Row Size Crash Prevention

Change	Detail
Added	SHA-256 hash column (<code>heuristic_hash</code>)
Replaced	TEXT-based unique constraint with hash-based
Reason	Prevents PostgreSQL B-Tree index size limit errors
Compliance	SHA-256 for SOC2/Veracode scanner compatibility

Vector Index Performance Upgrade

From	To
IVFFlat	HNSW
Pre-training required	No pre-training
Parameters	<code>m=16, ef_construction=64</code>
Benefit	Better recall, superior for dynamic inserts

Maintenance Security Enhancement

- System tenant ID now configurable via `SYSTEM_MAINTENANCE_TENANT_ID`
- Production warning logged if using default system tenant
- Improves audit trail clarity

Migration: `V2026_01_10_001__fix_heuristics_schema.sql`

Database Migrations

Migration	Purpose
<code>V2026_01_08_001__hybrid_protocols.sql</code>	Hybrid protocol support
<code>V2026_01_09_001__v5_grimoire_governor.sql</code>	Grimoire & Economic Governor tables
<code>V2026_01_10_001__fix_heuristics_schema.sql</code>	Index fixes, HNSW migration
<code>V2026_01_10_002__idempotency_keys.sql</code>	Billing idempotency support

Documentation Updates

Document	Changes
THINKTANK-ADMIN-GUIDE.md	Section 34.3 (System vs User Methods), 34.5 (Method Parameters), 34.6 (User Templates)
RADIANT-ADMIN-GUIDE.md	Section 10.4 (Orchestration Methods), parameter inheritance model
STRATEGIC-VISION-MARKETING.md	Updated orchestration section, 20 scientific algorithms
ORCHESTRATION-REFERENCE.md	New 2,326-line complete reference

New Services Summary

Service	Purpose	Location
ResilientProviderService	Circuit breaker wrapper for all AI providers	lambda/shared/services/resilient-provider
IdempotencyService	Prevents duplicate billing charges	lambda/shared/services/idempotency.service.ts
RateLimiterService	Token bucket rate limiting	lambda/shared/services/rate-limiter.service.ts
SEProbesService	Fast uncertainty estimation	orchestration-methods.service.ts
KernelEntropyService	Embedding-based uncertainty	orchestration-methods.service.ts

Architecture Improvements

Resilience Pattern

EXTERNAL AI PROVIDER CALL

```

ResilientProviderService.callWithResilience()
  CircuitBreaker (5 failures → 60s open)
  Retry (exponential backoff, 3 attempts)
  Timeout (configurable per-provider)
  Health Monitoring (getAllProviderHealth())

```

Error Handling Improvement

```

BEFORE: try { ... } catch (e) { } // Silent failure
AFTER:  try { ... } catch (e) { logger.warn('Context', { error: e, correlationId }); }

```

Risk Mitigations

Risk	Mitigation
Cascading Provider Failures	CircuitBreaker with automatic recovery
Duplicate Billing	IdempotencyService with 24h TTL
Rate Abuse	Token bucket rate limiting with 429 responses
Silent Failures	All catch blocks now log with context
Config Errors	Environment validator on cold start
UI Crashes	React ErrorBoundary with graceful fallbacks
Index Crashes	SHA-256 hash for large text constraints
Vector Search Performance	HNSW indexing upgrade

Testing Coverage Added

Test Suite	Coverage
<code>economic-governor.service.test.ts</code>	Model selection, all governor modes, error handling, batch processing

Files Changed Summary

New Files (14): - `packages/shared/src/utils/resilience.ts` - `packages/shared/src/config/validator.t`
- `packages/flyte/utils/resilience.py` - `packages/infrastructure/lambda/shared/services/rate-limite`
- `packages/infrastructure/lambda/shared/services/resilient-provider.service.ts` -
`packages/infrastructure/lambda/shared/services/idempotency.service.ts` - `packages/infrastructure/`
- `packages/infrastructure/migrations/V2026_01_08_001__hybrid_protocols.sql` -
`packages/infrastructure/migrations/V2026_01_09_001__v5_grimoire_governor.sql` -
`packages/infrastructure/migrations/V2026_01_10_001__fix_heuristics_schema.sql`
- `packages/infrastructure/migrations/V2026_01_10_002__idempotency_keys.sql` -
`apps/admin-dashboard/components/error-boundary.tsx` - `docs/ORCHESTRATION-REFERENCE.md`
- `docs/CHANGE-REPORT-2026-01-10.md`

Modified Services (10): - `model-router.service.ts` - Resilience integration - `embedding.service.ts`
- Resilience integration - `translation-middleware.service.ts` - Resilience integration -
`inference-components.service.ts` - Resilience integration - `formal-reasoning.service.ts` -
Resilience integration - `advanced-agi.service.ts` - Silent failure fixes - `consciousness-engine.service.ts`
- Silent failure fixes - `orchestration-methods.service.ts` - New scientific implementations -
`orchestration-methods.ts` (admin) - System method protection - `methods/page.tsx` - System
badge UI

Report generated automatically from CHANGELOG.md and git history