CONTROLLED ENGINEERING RELEASE

8Sphere

Implementation Readiness & Reference System

PROFESSIONAL DESIGN EDITION

ADVISORY PROTOTYPE SIMULATION READY

A buildable, testable and auditable reference implementation spanning mathematics, digital-twin simulation, evidence governance, security and deployment.

VERSION 1.0.0
17 July 2026

RELEASE CLASSIFICATION
Advisory Prototype / Simulation Ready

PRODUCTION AUTHORIZATION
Not granted

SOPHIA - semantic and safety authority | CHARLOTTE - architecture and conformance | LANDON - execution and evidence

EXECUTIVE CONTROL

Executive release decision

02

RELEASE RECOMMENDATION

Approve for controlled engineering evaluation and synthetic simulation.
Do not authorize autonomous high-impact action or empirical performance claims.

Decision basis

The controlled build prompt and workflow were executed as a real advisory-mode reference implementation. The delivery includes working Python source, machine-readable contracts, a tamper-evident Evidence Ledger, 100 relationship test modules, eight deterministic scenarios, an Observatory prototype and deployment assets.

Mathematical implementation	ACCEPT
Relationships 1-100	CONDITIONAL
Digital Twin	ACCEPT
Observatory prototype	DEMONSTRATION
Security assurance	PARTIAL
External validation	PENDING
Human production approval	NOT SUPPLIED

CONTROLLED FILES
346
source, tests, evidence and documentation

RELATIONSHIPS
100
98 pass / 1 qualified / 1 fail

AUTOMATED TESTS
107 PASS
plus 1 preserved xfail

DIGITAL TWIN
8 / 8
deterministic scenario replays

EVIDENCE LEDGER
VALID
SHA-256 chain verified

EXTERNAL EXECUTION
DISABLED
human approval required

PERMITTED STATEMENT

A buildable, testable and auditable advisory reference implementation and synthetic simulation environment.

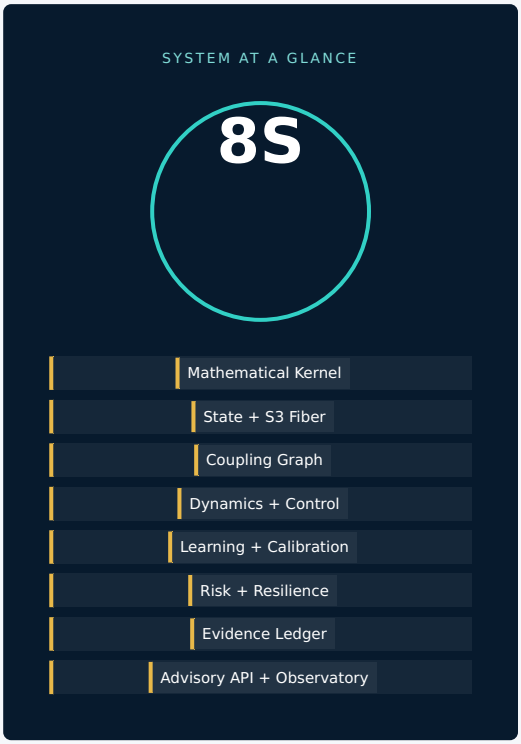
PROHIBITED STATEMENT

A proven financial predictor, proven systemic-failure prevention system or autonomous production-control platform.

DOCUMENT MAP

Contents and system overview

03



Evidence first

Every acceptance gate emits machine-readable evidence.

Advisory by design

External execution is disabled without human authorization.

Failure visibility

Relationship 91 remains failed; Relationship 12 remains qualified.

EXECUTIVE CONTROL

Workflow gate readiness

04

G0	Baseline	SAT
G1	Requirements	SAT
G2	Low-level design	SAT
G3	API contracts	SAT
G4	Data + evidence	SAT
G5	Math kernel	SAT
G6	Operational engines	SAT
G7	Relationships 1-100	COND
G8	Digital Twin	SAT
G9	Observatory	SAT
G10	Security	PART
G11	Build + deployment	SAT
G12	External validation	PEND
G13	Human authorization	PEND

10

of 14 gates
fully satisfied

Conditional readiness

The reference system is implementation-ready for controlled research and demonstration. Production claims remain blocked by external validation and accountable human authorization.

PRESERVED EVIDENCE CONDITION

Relationship 12 is QUALIFIED because original run-level evidence was absent.

PRESERVED FAILED GATE

Relationship 91 false-alarm rate is 5.9%, above the frozen 5% ceiling.

Satisfied Conditional Partial Pending

MATHEMATICAL FOUNDATION

Authoritative 8Sphere mathematics

05

SYSTEM STATE

$$X(t) = (b(t), q(t), G(t), theta(t), u(t), E(t))$$

Five-coordinate bounded base, normalized S3 fiber, coupling graph, parameters, advisory controls and evidence state.

HARD CAPACITY RADIUS

$$r(b) = product_{i=1..5} sqrt(1 - b_i^2)$$

Multiplicative capacity collapses as any coordinate approaches the boundary.

LOGARITHMIC DAMAGE

$$D(b) = -log r(b) = -1/2 sum log(1 - b_i^2)$$

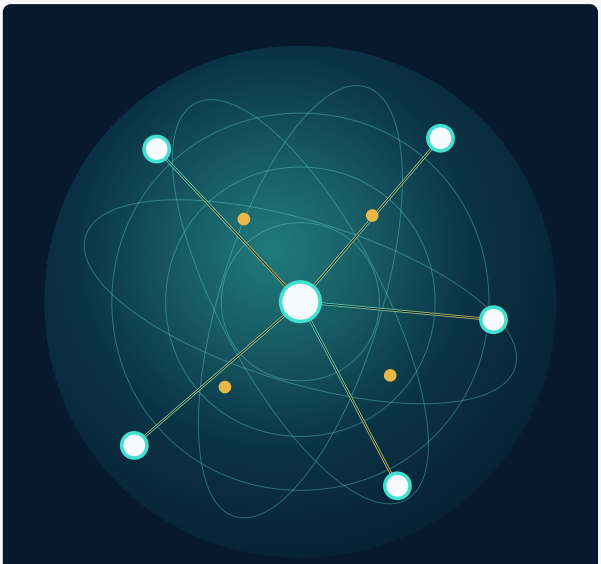
Additive damage decomposition supports exact coordinate attribution.

Domain
b in $[-1,1]^5$

Fiber
q in S3, finite non-zero norm

Precision
IEEE-754 double

Default tolerance
1e-12



8Sphere state geometry

Five bounded base axes coupled to a four-coordinate orientation fiber.

Capacity	Damage	Gradient	Elasticity	Hessian	Curvature	Projection	Spectrum

MATHEMATICAL FOUNDATION

Numerical and algorithmic controls

06

Implemented operations

CAPABILITY	OPERATION	CONTROL
Capacity + damage	Hard/soft radius; exact log decomposition	Reject coordinates outside [-1,1]
Sensitivity	Gradient, elasticity, Hessian, curvature	Finite values; reference tolerance 1e-12
Fiber geometry	Normalization and geodesic distance on S3	Reject zero or non-finite norm
Projection	Projection and pseudoinverse reconstruction	Shape and rank validation
Graph spectrum	Spectral radius, influence, communities	Square finite adjacency matrix
Risk	Expected shortfall, drawdown, capacity class	Advisory labels only

Reference call

```
from eight_sphere.kernel.core import CapacityKernel

result = CapacityKernel.evaluate(
    [0.32, -0.11, 0.67, 0.08, -0.42]
)

result.capacity
result.damage
result.contributions
result.gradient
result.elasticity
result.condition_index
```

FAILURE POSTURE

Invalid domains, malformed matrices, missing provenance and unauthorized control requests fail closed. No silent clipping, coercion or substitution is permitted.

Deterministic
Seeded stochastic work

Traceable
Formula to code to test

Versioned
Source hash and model identity

Auditable
Evidence emitted at each gate

SYSTEM ARCHITECTURE

System context and operating boundary

07

Inputs

Observed data, validated configuration, model versions, scenario definitions and human-entered approvals.

Core boundary

Mathematical evaluation, simulation, risk analytics and evidence preservation. No external action execution.

Outputs

Derived metrics, simulated trajectories, advisory recommendations, evidence records and release reports.

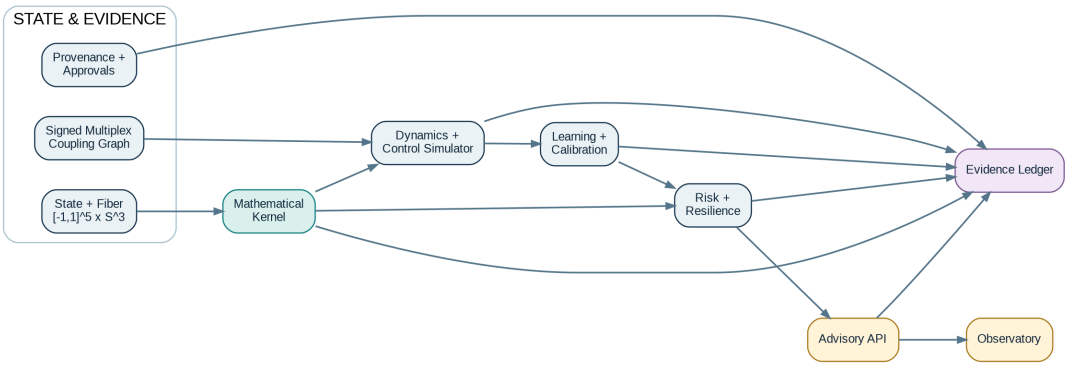
SYSTEM BOUNDARY

The reference package is a controlled engineering system. It does not include a signed commercial installer, production key infrastructure or autonomous execution adapters.

SYSTEM ARCHITECTURE

Reference implementation architecture

08



8S-CMP-001
Mathematical Kernel
capacity, damage, derivatives, fiber

8S-CMP-002
State + Fiber Engine
validated state records and history

8S-CMP-003
Coupling Graph
spectrum, influence, communities

8S-CMP-004
Dynamics + Control
shock, recovery and advisory control

8S-CMP-005
Learning + Calibration
ECE, Brier and uncertainty

8S-CMP-006
Risk + Resilience
ES, drawdown and risk class

8S-CMP-007
Evidence Ledger
append-only SHA-256 chain

8S-CMP-008
Advisory API
FastAPI interface

8S-CMP-009
Observatory
operator review prototype

SYSTEM ARCHITECTURE

Runtime processing and evidence flow

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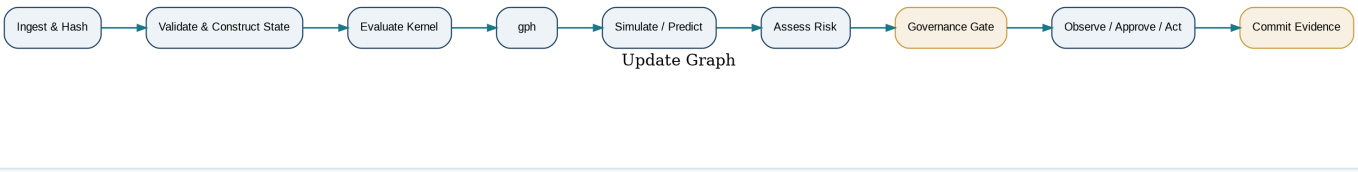

Ingest
01
Validate source, timestamp, confidence and evidence class.

Construct state
02
Build five-coordinate base, S3 fiber and graph context.

Evaluate
03
Compute capacity, damage, attribution, spectrum and risk.

Simulate
04
Run bounded deterministic scenarios and advisory controls.

Review
05
Surface limitations, confidence, alerts and approval needs.

Commit evidence
06
Hash inputs, code, configuration, results and approvals.

EVIDENCE CLASSES

Observed | Derived | Estimated | Simulated | Forecast | Human-entered

GOVERNANCE

Separation of authority and control

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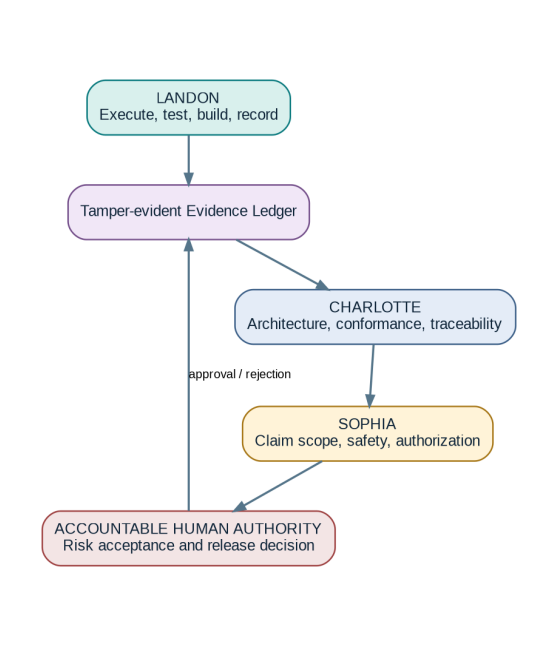

SOPHIA

Claim scope, safety, release blockers and authorization conditions.

CHARLOTTE

Architecture, interfaces, schemas, requirements and traceability.

LANDON

Execution, builds, tests, simulations and evidence generation.

HUMAN AUTHORITY

Residual-risk acceptance, production release and emergency override.

AUTHORITY	EXCLUSIVE RESPONSIBILITY	CANNOT INDEPENDENTLY AUTHORIZE
LANDON	Execution and evidence	Claims, exceptions or production release
CHARLOTTE	Architecture and conformance	Claim scope or residual-risk acceptance
SOPHIA	Safety and semantic authority	Human risk acceptance
Human authority	Release and high-impact approval	Evidence alteration or gate weakening

INTERFACE CONTROL

Advisory API and contract controls

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METHOD	ENDPOINT	RISK	AUTHORIZATION	OUTPUT CLASS
GET	/v1/health	Low	Public internal	Healthy
POST	/v1/states/evaluate	Low	Analyst	Derived
POST	/v1/fibers/compare	Low	Analyst	Derived
POST	/v1/networks/analyze	Medium	Analyst	Derived / estimated
POST	/v1/simulations/shock	Medium	Analyst	Simulated
POST	/v1/controls/recommend	High	Analyst + approval	Advisory only
GET	/v1/evidence/{id}	Sensitive	Validator / auditor	Evidence

CONTRACT DISCIPLINE

OpenAPI 3.1 and JSON Schema are authoritative. Mutations use idempotency keys; authorization and validation errors are never automatically retried.

```
POST /v1/states/evaluate
Content-Type: application/json

{
  "base": [0.32, -0.11, 0.67, 0.08, -0.42]
}

200 OK
{
  "capacity": 0.641,
  "damage": 0.445,
  "evidence_class": "derived"
}
```

Compatibility policy

- Major versions may break compatibility.
- Minor versions remain backward-compatible.
- Bounded workloads and explicit timeouts are mandatory.
- Control recommendations never execute external actions.

DATA + EVIDENCE

Authoritative data model and Evidence Ledger

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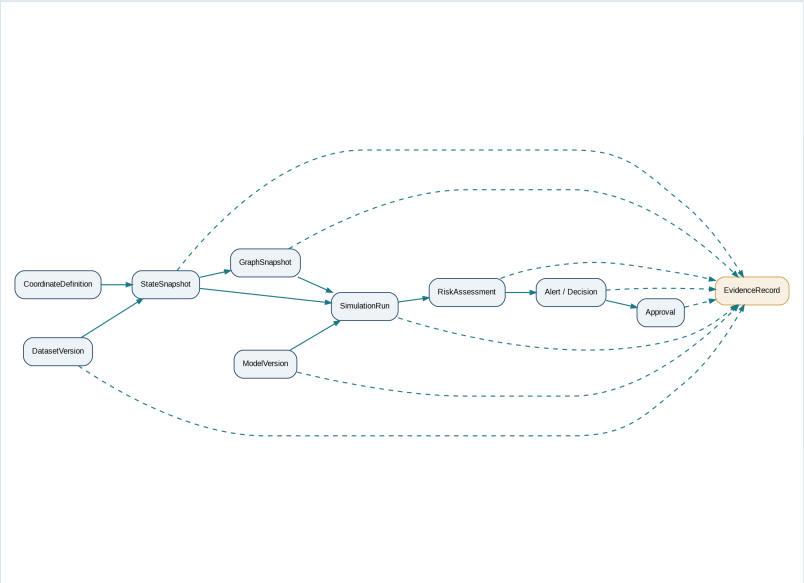

`system_state`
Base + fiber observation
bounds, confidence, provenance

`model_version`
Immutable model identity
semantic version + source hash

`simulation`
Digital Twin run
seed, config, result hash

`approval`
Human authorization
authority, scope, rationale, time

`evidence`
Claim-support record
hash chain + approval link

`audit_event`
Security / operations event
actor, action, object, event hash

INPUT HASH → CODE + CONFIG → RESULT → APPROVAL → EVIDENCE HASH

LEDGER BOUNDARY

The SHA-256 hash chain provides tamper evidence for the reference release. Production use still requires cryptographic signatures, key management and trusted timestamping.

LOW-LEVEL DESIGN

Component specification and failure posture

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ID	COMPONENT	PRINCIPAL CLASSES / SERVICES	FAILURE POSTURE
8S-CMP-001	**Mathematical Kernel**	CapacityKernel; fiber + spectral functions	Reject invalid domains
8S-CMP-002	**State + Fiber**	Pydantic state models	Bounds, norm, provenance
8S-CMP-003	**Coupling Graph**	GraphEngine	Reject non-square matrices
8S-CMP-004	**Dynamics + Control**	DynamicsEngine	Bounded iterations; advisory only
8S-CMP-005	**Learning + Calibration**	LearningEngine	Explicit uncertainty outputs
8S-CMP-006	**Risk + Resilience**	RiskEngine	Risk labels remain advisory
8S-CMP-007	**Evidence Ledger**	EvidenceLedger	Append-only hash verification
8S-CMP-008	**API**	FastAPI application	Validation + bounded workloads
8S-CMP-009	**Observatory**	Static web prototype	Evidence class + limitations

Numerical
Double precision, default equality tolerance 1e-12.

Storage
Append + fsync for evidence records.

Concurrency
Bounded workloads and deterministic replay.

Authorization
External action requires a valid human approval record.

VERIFICATION + VALIDATION

Automated Relationships 1-100 regression program

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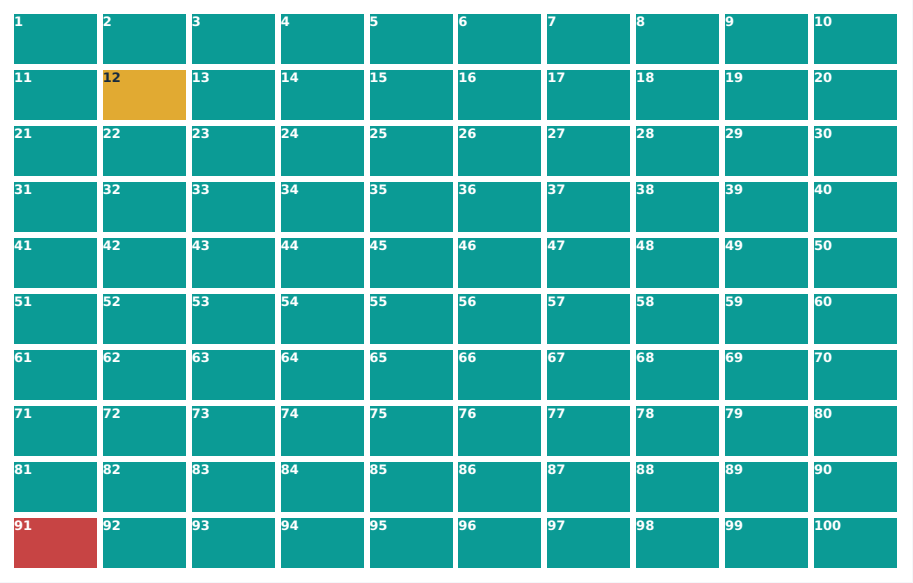

98 PASS 1 QUALIFIED 1 FAIL

PYTEST
107 passed
1 strict expected failure

COVERAGE
100 / 100
relationship modules represented

LEDGER
VALID
hash-chain verification

EXECUTION
2.05 sec
reference environment

Foundational mathematics
Direct identities, geometry, derivatives and control laws.

Synthetic systems
Network, dynamics, learning, risk and causal prototypes.

Operational governance
Leakage, change detection, evidence and release aggregation.

REGRESSION RULE

No test may be weakened solely to manufacture a pass. Relationship 91 remains a strict expected failure until independently remediated.

VERIFICATION + VALIDATION

Relationship register 001-025

Controlled relationship register

Requirement, component, claim class and gate state. Full evidence identifiers remain in the machine-readable traceability CSV.

REL.	RELATIONSHIP	COMPONENT	CLAIM CLASS	STATUS
001	**Five-coordinate base with S3 fiber**	Mathematical Kernel	synthetic numerical	PASS
002	**Multiplicative weakest-link capacity**	Mathematical Kernel	synthetic numerical	PASS
003	**Boundary sensitivity**	Mathematical Kernel	synthetic numerical	PASS
004	**Hard versus softened boundary**	Mathematical Kernel	synthetic numerical	PASS
005	**Base-dimension consistency**	Mathematical Kernel	synthetic numerical	PASS
006	**Stratified degenerating fiber space**	Mathematical Kernel	synthetic numerical	PASS
007	**Non-injective projection aliasing**	Mathematical Kernel	synthetic numerical	PASS
008	**Signed directed coupling**	Mathematical Kernel	synthetic numerical	PASS
009	**Phase synchronization**	Mathematical Kernel	synthetic numerical	PASS
010	**Logistic activation cascade**	Mathematical Kernel	synthetic numerical	PASS
011	**Shell-radius semantic direction**	Mathematical Kernel	synthetic numerical	PASS
012	**Integrated financial value test**	Mathematical Kernel	synthetic integrated test; run-level evide...	QUALIFIED
013	**Coordinate contribution decomposition**	Mathematical Kernel	direct mathematical identity	PASS
014	**Unequal-stress concentration**	Mathematical Kernel	direct consequence under fixed squared str...	PASS
015	**Coordinate elasticity**	Mathematical Kernel	direct differential identity	PASS
016	**Cross-coordinate derivatives**	Mathematical Kernel	direct differential identity	PASS
017	**Curvature toward collapse**	Mathematical Kernel	direct differential identity	PASS
018	**Weighted-coordinate capacity**	Mathematical Kernel	direct consequence of the supplied softene...	PASS
019	**S3 angular distance**	Mathematical Kernel	direct metric validation	PASS
020	**Prototype base-fiber coupling**	Dynamics + Control	synthetic prototype coupling law	PASS
021	**Path dependence and holonomy**	Dynamics + Control	synthetic noncommutative coupling conseque...	PASS
022	**Spectral cascade threshold**	Dynamics + Control	synthetic network scaling law	PASS
023	**Synchronization-activation association**	Dynamics + Control	synthetic shared-driver association; not c...	PASS
024	**Hysteresis and recovery**	Dynamics + Control	synthetic nonlinear network behavior	PASS
025	**Signed-network balance and antagonistic clusters**	Coupling Graph Engine	graph-theoretic identity with Monte Carlo ...	PASS

VERIFICATION + VALIDATION

Relationship register 026-050

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Controlled relationship register

Requirement, component, claim class and gate state. Full evidence identifiers remain in the machine-readable traceability CSV.

REL.	RELATIONSHIP	COMPONENT	CLAIM CLASS	STATUS
026	**Centrality versus systemic influence**	Coupling Graph Engine	controlled linear network dynamics	PASS
027	**Projection dimension from 1D through 7D**	Mathematical Kernel	geometric Monte Carlo audit of local eight...	PASS
028	**Projection reconstruction error**	Mathematical Kernel	linear algebra identity and optimality audit	PASS
029	**Noise sensitivity and missing-coordinate robustness**	Risk + Resilience	controlled measurement-error stress test	PASS
030	**Boundary recovery time**	Dynamics + Control	closed-form recovery law audit	PASS
031	**Shock propagation speed**	Dynamics + Control	graph-support propagation identity	PASS
032	**Regime switching**	Learning + Calibration	synthetic hidden-state prototype with know...	PASS
033	**Parameter identifiability**	Learning + Calibration	synthetic inverse-problem and excitation a...	PASS
034	**False-alert cost and warning utility**	Learning + Calibration	synthetic calibrated warning-decision expe...	PASS
035	**Calibration against realized probabilities**	Learning + Calibration	synthetic probability-calibration benchmark	PASS
036	**Walk-forward and out-of-sample stability**	Learning + Calibration	synthetic chronological expanding-window v...	PASS
037	**Effective dimensionality**	Mathematical Kernel	synthetic numerical	PASS
038	**Local Jacobian conditioning**	Mathematical Kernel	mathematical/numerical	PASS
039	**S^3 geodesic–chord equivalence**	Mathematical Kernel	mathematical identity	PASS
040	**Capacity level-set volume**	Mathematical Kernel	Monte Carlo geometry	PASS
041	**Coordinate-contribution entropy**	Mathematical Kernel	mathematical/synthetic	PASS
042	**Base-fiber mutual information**	Learning + Calibration	synthetic Gaussian coupling	PASS
043	**Capacity-surface curvature**	Mathematical Kernel	mathematical/numerical	PASS
044	**Stress-cluster persistence**	Coupling Graph Engine	synthetic topological proxy	PASS
045	**Lyapunov contraction**	Dynamics + Control	synthetic nonlinear dynamics	PASS
046	**Critical slowing down**	Dynamics + Control	mathematical/synthetic	PASS
047	**Basin-of-attraction boundary**	Dynamics + Control	synthetic nonlinear dynamics	PASS
048	**Delay-induced oscillation**	Dynamics + Control	synthetic delayed dynamics	PASS
049	**Damping ratio and overshoot**	Dynamics + Control	mathematical/numerical	PASS
050	**Minimum control-energy scaling**	Dynamics + Control	mathematical control law	PASS

VERIFICATION + VALIDATION

Relationship register 051-075

Controlled relationship register

Requirement, component, claim class and gate state. Full evidence identifiers remain in the machine-readable traceability CSV.

REL.	RELATIONSHIP	COMPONENT	CLAIM CLASS	STATUS
051	**Resonance under periodic forcing**	Dynamics + Control	mathematical frequency response	PASS
052	**Adaptive feedback stabilization**	Dynamics + Control	synthetic adaptive control	PASS
053	**k-core depth and cascade reach**	Coupling Graph Engine	synthetic network dynamics	PASS
054	**Community modularity and containment**	Coupling Graph Engine	synthetic network response	PASS
055	**Edge betweenness and contagion bridges**	Coupling Graph Engine	synthetic graph intervention	PASS
056	**Multiplex-layer coupling**	Coupling Graph Engine	mathematical/synthetic network	PASS
057	**Assortativity and shock amplification**	Coupling Graph Engine	degree-preserving graph experiment	PASS
058	**Path redundancy and resilience**	Coupling Graph Engine	mathematical/Monte Carlo	PASS
059	**Network percolation threshold**	Coupling Graph Engine	synthetic random graph	PASS
060	**Targeted versus random node removal**	Coupling Graph Engine	synthetic scale-free graph	PASS
061	**Fisher information and excitation**	Mathematical Kernel	mathematical/numerical	PASS
062	**Bias-variance tradeoff**	Learning + Calibration	synthetic regression	PASS
063	**Regularization path**	Mathematical Kernel	mathematical/synthetic regression	PASS
064	**Feature collinearity and coefficient instability**	Mathematical Kernel	synthetic regression	PASS
065	**Sample complexity**	Mathematical Kernel	synthetic logistic estimation	PASS
066	**Domain-shift sensitivity**	Learning + Calibration	synthetic regression	PASS
067	**Conformal prediction coverage**	Learning + Calibration	distribution-free synthetic validation	PASS
068	**Ensemble diversity benefit**	Learning + Calibration	synthetic ensemble	PASS
069	**Expected shortfall versus capacity radius**	Risk + Resilience	synthetic loss model	PASS
070	**Tail dependence beyond correlation**	Risk + Resilience	synthetic copula comparison	PASS
071	**Diversification under correlation**	Risk + Resilience	mathematical/Monte Carlo	PASS
072	**Kelly sizing under uncertainty**	Risk + Resilience	synthetic decision analysis	PASS
073	**Drawdown-duration dynamics**	Risk + Resilience	synthetic return process	PASS
074	**Risk-budget attribution**	Risk + Resilience	mathematical identity	PASS
075	**Transaction-cost break-even**	Risk + Resilience	mathematical decision rule	PASS

VERIFICATION + VALIDATION

Relationship register 076-100

Controlled relationship register

Requirement, component, claim class and gate state. Full evidence identifiers remain in the machine-readable traceability CSV.

REL.	RELATIONSHIP	COMPONENT	CLAIM CLASS	STATUS
076	**Liquidity and square-root slippage**	Risk + Resilience	synthetic market-impact law	PASS
077	**Outlier influence and robust estimation**	Risk + Resilience	synthetic regression	PASS
078	**Heavy-tail robustness**	Risk + Resilience	synthetic heavy-tail estimation	PASS
079	**Adversarial coordinate perturbation**	Risk + Resilience	mathematical/synthetic perturbation	PASS
080	**Label-noise attenuation and ranking resilience**	Learning + Calibration	synthetic classification	PASS
081	**Delayed-data degradation**	Learning + Calibration	synthetic time series	PASS
082	**Asynchronous-sampling attenuation**	Learning + Calibration	synthetic sampling process	PASS
083	**Coordinate quantization precision**	Mathematical Kernel	numerical encoding	PASS
084	**Model-version reproducibility**	Learning + Calibration	computational reproducibility	PASS
085	**Directional Granger predictability**	Learning + Calibration	synthetic VAR	PASS
086	**Intervention-response recovery**	Dynamics + Control	synthetic structural causal model	PASS
087	**Counterfactual structural consistency**	Learning + Calibration	synthetic structural causal model	PASS
088	**Confounding and adjustment**	Learning + Calibration	synthetic structural causal model	PASS
089	**Lead-lag estimation**	Learning + Calibration	synthetic time series	PASS
090	**Future-regime leakage in validation**	Learning + Calibration	synthetic regime-shift classification	PASS
091	**Change-point detection**	Learning + Calibration	synthetic sequential monitoring	FAIL
092	**Forecast-horizon decay**	Dynamics + Control	mathematical/synthetic AR process	PASS
093	**Decision-threshold stability**	Learning + Calibration	synthetic calibrated decisions	PASS
094	**Benchmark-superiority gate**	Learning + Calibration	synthetic nonlinear benchmark	PASS
095	**Cost-adjusted out-of-sample performance**	Risk + Resilience	controlled synthetic trading process	PASS
096	**Integrated stress-scenario composition**	Dynamics + Control	mathematical scenario audit	PASS
097	**Predictive-uncertainty decomposition**	Learning + Calibration	synthetic ensemble uncertainty	PASS
098	**Human–model decision fusion**	Learning + Calibration	synthetic independent-error fusion	PASS
099	**Cross-seed reproducibility**	Learning + Calibration	Monte Carlo reproducibility	PASS
100	**Integrated 8Sphere validation gate**	Learning + Calibration	governance aggregation	PASS

DIGITAL TWIN

Deterministic scenario library

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ID	SCENARIO	PRIMARY RESULT	REPLAY
SCN-001	**Single-coordinate boundary shock**	capacity 0.195 | damage 1.635	VERIFIED
SCN-002	**Distributed multi-coordinate stress**	capacity 0.253 | damage 1.373	VERIFIED
SCN-003	**Base-fiber divergence**	capacity 0.738 | damage 0.304	VERIFIED
SCN-004	**Network contagion**	spectral radius 0.482	VERIFIED
SCN-005	**Delayed feedback**	final norm 0.0065	VERIFIED
SCN-006	**Recovery and hysteresis**	Deterministic replay	VERIFIED
SCN-007	**Missing and corrupted data**	Deterministic replay	VERIFIED
SCN-008	**Governance approval failure**	Deterministic replay	VERIFIED

Fixed seed 01

20260717 recorded in every scenario.

Input hash 02

Configuration integrity recorded before execution.

Evidence class 03

Every output is explicitly labeled simulated.

Replayable 04

tools/run_scenarios.py reproduces the bundle.

SYNTHETIC BOUNDARY

Scenario success demonstrates reproducibility and implementation behavior, not external-world predictive validity.

DIGITAL TWIN

Scenario execution and reproducibility evidence

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SCN-001
Boundary shock
0.195
capacity / condition index 49.0

SCN-002
Distributed stress
0.253
capacity / condition index 1.0

SCN-003
Base-fiber divergence
1.571
fiber distance, radians

SCN-004
Network contagion
0.482
spectral radius

SCN-005
Delayed feedback
0.0065
final norm / stable trajectory

SCN-006-008
Recovery, corruption, governance
3 / 3
reproducible evidence bundles

CONFIGURATION — SEED — SOFTWARE VERSION — RESULT HASH — EVIDENCE RECORD

Replay command

```
python tools/run_scenarios.py
```

Output bundle

JSON result, input hash, evidence classification, deterministic seed and scenario identifier.

OBSERVATORY

Operator interface and review console

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ADVISORY PROTOTYPE

8Sphere Observatory

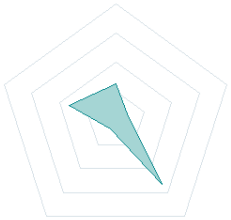
Integrated state, fiber, network, risk, evidence and human-review console

SIMULATION READY
Automation disabled

SYSTEM CAPACITY

0.641

GUARDED | damage 0.445



BASE STATE & DAMAGE ATTRIBUTION

B1		+0.32 | 0.054
B2		-0.11 | 0.006
B3		+0.67 | 0.299
B4		+0.08 | 0.003
B5		-0.42 | 0.097

GOVERNANCE & EVIDENCE

Relationship 12	QUALIFIED
Relationship 91	FAILED GATE
Human approval	REQUIRED
External execution	DISABLED

Human-entered · ived | Estimated | Simulated | Forecast

Executive state
Capacity, damage and risk classification.

Attribution
Five-coordinate state and exact damage contribution.

Governance
Qualified and failed gates, approval state and execution lock.

Evidence labeling
Observed, derived, estimated, simulated, forecast or human-entered.

PROTOTYPE STATUS

The delivered Observatory is a professional static demonstration. Production design still requires graph maps, scenario comparison, alert workflows, keyboard navigation and screen-reader validation.

SECURITY ENGINEERING

Security posture, access and assurance

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PARTIAL

Reference controls delivered; independent assurance pending.

Threat model	RBAC	SBOM	Air-gap procedure
Incident response	Tamper evidence	Bounded API inputs	Read-only container posture

Role-based access snapshot

ROLE	READ STATE	RUN SIMULATION	VIEW EVIDENCE	RECOMMEND CONTROL	APPROVE ACTION	RELEASE BUILD
Observer	yes	no	limited	no	no	no
Analyst	yes	yes	yes	yes	no	no
Validator	yes	yes	yes	no	no	no
Approver	yes	no	yes	no	yes	no
Release_Manager	yes	no	yes	no	no	yes
Administrator	yes	yes	yes	yes	no	no

OPEN 01
Independent penetration test

OPEN 02
Operational key management

OPEN 03
Signed release pipeline

BUILD + DEPLOYMENT

Deployment topology and recovery controls

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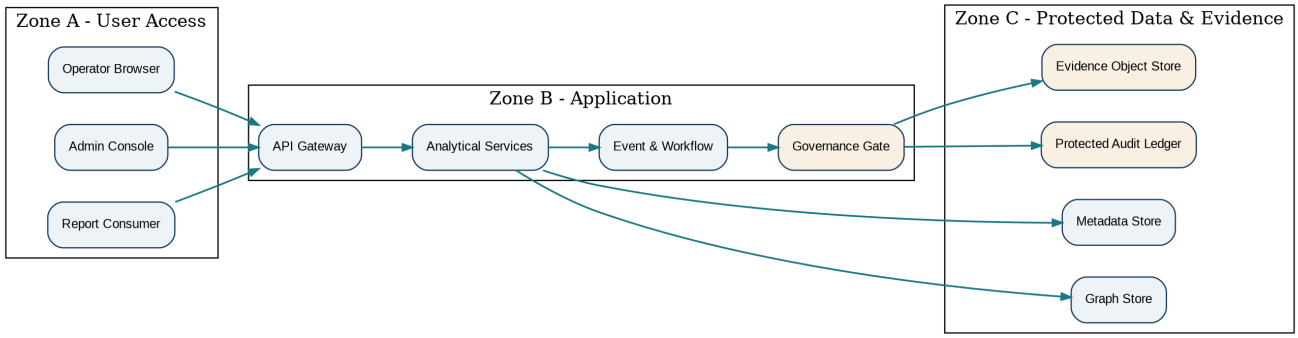

Linux
Source installation and controlled virtual environment.

Windows
Reference install command and local advisory runtime.

Containers
Dockerfile, Compose and read-only service posture.

Air gap
Transfer manifest, hash verification and quarantine workflow.

Recovery
Backup, restore, health checks and evidence validation.

Rollback
Return to last validated release and preserve audit history.

```
pip install -e .[test]
pytest
python tools/run_regression.py
uvicorn eight_sphere.api.app:app
```

```
docker compose build
docker compose up -d
python deployment/healthcheck.py
```

INDEPENDENT VALIDATION

External validation protocol and claim ladder

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Freeze definitions
01
Define five coordinates, fiber meaning and primary hypotheses.

Protect chronology
02
Preserve train/test order and prevent future-data leakage.

Benchmark
03
Compare with simple and domain-standard baselines.

Stress
04
Calibration, sensitivity, ablation, domain shift and negative controls.

Replicate
05
Independent execution without undisclosed dependencies.

Authorize claims
06
Publish negative results and require accountable review.

MATHEMATICAL	SYNTHETIC	EMPIRICAL	PREDICTIVE	CONTROLLED PILOT	PRODUCTION

CURRENT CLAIM CEILING

The release supports mathematical and synthetic claims only. Empirical, predictive and production claims remain blocked.

TRACEABILITY

Lab-to-system evidence architecture

25

100	100	100	100
relationship records	requirements	test mappings	evidence identifiers

Relationship — Requirement — Component — Interface — Data object — Test — Control — Evidence — Release gate

COVERAGE STATEMENT

Every Relationship 1-100 maps to a requirement, component, test and evidence identifier. Relationship 12 and Relationship 91 retain their non-pass states throughout the chain.

RELEASE CONTROL

Limitations and remediation plan

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OPEN ITEM	PRIORITY	OWNER	EXIT CRITERION
R91 false-alarm gate	High	Learning + Calibration	Rework detector; rerun frozen benchmark; independent review
R12 run-level evidence	Medium	Evidence / Baseline	Recover or regenerate 1,000-trial evidence with provenance
External validation	Critical	Validation Program	Freeze real-data protocol and execute chronological study
Penetration testing	High	Security	Independent assessment and remediation closure
Human authorization	Critical	Accountable Authority	Formal risk acceptance and signed release decision

R1
Evidence repair
Relationship 12 provenance

R2
Algorithm remediation
Relationship 91 gate

R3
Security assurance
Pen test + key management

R4
External validation
Independent empirical study

R5
Release decision
Human authorization

NO HIDDEN EXCEPTIONS

Open items remain release-visible. Conditional or failed evidence cannot be relabeled as passing through documentation changes.

FINAL READINESS

Release statement and authorization boundary

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RECOMMENDED RELEASE CATEGORY

ADVISORY PROTOTYPE / SIMULATION READY

Suitable for mathematical review, synthetic simulation, API and schema evaluation, engineering testing and controlled demonstrations.

AUTHORIZED USE

- Mathematical reference implementation
- Synthetic laboratory platform
- Digital Twin scenario replay
- Advisory decision-support demonstration
- Engineering and security review

NOT AUTHORIZED

- Autonomous high-impact action
- Unrestricted production deployment
- Empirical market-performance claims
- Claims of systemic-failure prevention
- Bypassing human approval

SOPHIA
Semantic and safety recommendation
Conditional approval

CHARLOTTE
Architecture and conformance
Reference scope conforms

LANDON
Execution and evidence
Build evidence complete

HUMAN AUTHORITY
Production release decision
Signature required

PACKAGE REGISTER

Delivery contents and integrity statement

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346	3.47	100%
controlled files	MiB implementation ZIP	relationship traceability

Source implementation
kernel, state, graph, dynamics, learning, risk, evidence and API

Machine-readable contracts
OpenAPI 3.1, JSON Schemas and SQL DDL

Verification assets
100 relationship modules, pytest suite and custom runner

Digital Twin
8 scenarios, result bundles and replay tooling

Observatory
HTML, CSS and JavaScript prototype

Security
Threat model, RBAC, SBOM, incident and air-gap procedures

Deployment
Windows, Linux, Docker, health, backup and rollback

Governance
Requirements registry, traceability map and claim controls

Integrity
SHA-256 manifest and cumulative artifact meter

Integrity control
MANIFEST_SHA256.csv records the controlled release hashes. ZIP integrity tests reported no errors.

Reference root
`8Sphere-Implementation-Readiness-and-Reference-System-Package-v1.0.0/`

This Professional Design Edition is a presentation layer over the controlled implementation package. Machine-readable source, tests and evidence remain the authoritative engineering artifacts.