VANTHERIS

ENGINEERING ASSURANCE, WITH VISIBLE BOUNDARIES

Architecture & Tool Qualification Brief

Make the basis of each claim reviewable.

Vantheris connects engineering claims with versioned evidence and explains what changes when that evidence changes. This brief separates the working MVP from scoped research and outlines a practical enterprise evaluation.

01

Workflow

Inspect evidence and model changes.

02

Architecture

Separate proposals from acceptance.

03

Qualification

Plan around a specific intended use.

01 / PRODUCT WORKFLOW

From evidence to an explainable change.

The near-term user is an automotive functional safety team reviewing the support behind a safety argument.

1 Establish the source baseline

Record source references, external identities and versions. The current MVP accepts structured JSON; broad document extraction and ALM rollout remain integration work.

2 Navigate the argument

Explore typed GSN nodes and links. The graph preserves shared evidence even when a tree view is used for navigation.

3 Inspect the gaps

Report missing support, stale version or time bindings, and support cycles together. Unknown freshness stays visible.

4 Model an evidence change

Recompute a separate scenario against a named snapshot. Preserve all affected Goal ancestors and the dependency paths behind the result.

5 Prepare the review package

Export the selected support subgraph as core GSN v3 SVG with lossless CAPA extensions, a manifest and the structural report.

ILLUSTRATIVE SCENARIO

A test report is withdrawn.

Baseline

A shared Solution supports multiple claims in one graph.

Intervention

The scenario marks its numeric value as missing. The original evidence and history stay intact.

Review result

Affected ancestors and paths remain visible. Missing values remain null.

Interpretation boundary. Numeric propagation applies a scoped prototype rule; it is not a safety probability or general AND/OR evaluation. Modeled support changes trigger review. Dependency reachability does not establish that a claim is physically false.

Sources: S1, S2, S3, S4, S5. Current MVP plus an explicitly labeled example.

02 / ARCHITECTURE & TRUST

Keep every acceptance decision scoped.

Separate source statements, producer proposals, human review and verifier results throughout the workflow.

01 Source & candidate boundary

Offline JSON Producer emits a candidate with trusted=false. Future extraction adapters belong behind the same interface.

02 Small structural verifier

Deterministic rules check typed relationships, identities, exact version references and support acyclicity. No external API calls.

03 Versioned graph & analysis

Identity-bearing nodes and edges preserve shared evidence. Separate gap, numeric propagation and scenario functions report their own limits.

04 Review & export surfaces

The synthetic AEB demo and audit bundle expose sources, changes and results. Display badges are separate from verifier acceptance.

Current acceptance scope
trusted=true: graph_structure_only

Runtime boundary
MVP records and history live in RAM.

Research is separate. Selected Lean and Z3 checks, cryptographic protocols, distributed storage and qualification planning are scoped prototypes. They do not form a certified kernel or a completed production platform.

Schemas 0.5 / graph-structure/0.3.0. Single-worker MVP; durable enterprise operations remain to be validated. On-premises or VPC is the intended deployment boundary.

Sources: S1, S2, S3, S6. Structural validity does not establish evidence sufficiency.

03 / TOOL QUALIFICATION PLANNING

Qualification follows the intended use.

A proof of an algorithm leaves translation, configuration, presentation and operational use as distinct assurance obligations.

112	10	0
planning matrix rows	modeled use records	qualification decisions

The step 63 baseline records **111 open rows** and **one scoped evidence declaration** for a local negative experiment. This is planning metadata, not independent acceptance or a completed qualification dossier.

Automotive profile

ISO 26262-8:2018 planning keeps ASIL, TI, TD and TCL separate. Project owners and qualified reviewers must supply justified applicability and classification decisions.

Aviation profile

DO-178C / DO-330 / DO-333 planning keeps DAL, tool criterion and TQL separate. Requested credit, formal-method assumptions and remaining activities must be explicit.

No automatic ASIL, DAL, TCL or TQL assignment or cross-sector conversion. The research profile leaves qualification_decision and credit_decision null, even if every row receives positive metadata.

THE CONTROL CHAIN TO REVIEW

Source / parser / translation / proof checker / build and runtime / audit package / report / consuming decision

A correct checker can verify the wrong formalization. A valid signature can accompany a misleading report. Each transition needs evidence tied to the intended use and exact release.

Evidence already recorded: step 63 run3 reports 280 passed tests and 15 local challenge experiments. Those development checks do not establish normatively complete obligations, an independent audit or production qualification.

Sources: S6, S7, S8. Profile qualification-chain/0.1.0; baseline run3, 12 Sep 2026.

04 / PROPOSED ENTERPRISE PILOT

Start with one argument. Agree what success means.

A bounded evaluation can test review value while making integration and assurance work visible. The proposal below is not an operating customer deployment.

01 Scope and baseline

Choose one bounded safety argument and a controlled set of requirements, FMEA items and test records. Name the source owner, safety reviewer and integration owner.

Deliverable: intended-use note, source inventory and agreed mapping.

02 Traceability and changes

Build an agreed graph, confirm shared evidence, and prepare known missing, stale and changed-evidence cases. Review dependency paths and scenario explanations against an expert baseline.

Deliverable: versioned graph, finding log and adjudicated change cases.

03 Review and handover

Inspect the selected audit package and register unresolved cases. Document access, retention, persistence and deployment requirements before any operational expansion.

Deliverable: evaluation report, release inventory and next-stage backlog.

AGREE THE ACCEPTANCE MEASURES BEFORE INGESTION

Track source/version coverage, expert-adjudicated false findings and missed findings, unknown results, explanation usefulness and reviewer effort. Preserve denominators, exclusions and unresolved labels; set thresholds with the pilot team.

Human responsibility remains explicit: source adequacy, argument meaning, applicability, safety decisions and any request for tool credit stay with the authorized project reviewers.

Proposed evaluation design, informed by S2 and S8. Pilot scope and acceptance are to be agreed.

05 / READING THE EVIDENCE

A brief with a traceable baseline.

Prepared from local project records as of 12 September 2026. The source snapshot was STATUS.md, step 67; the current product phase was MVP.

S1 **STATUS.md**

Single current maturity record; step 67, 12 Sep 2026.

S2 **docs/architecture.md**

Program intent, MVP boundary and open research directions.

S3 **docs/producer-verifier.md**

Producer interface and graph-structure/0.3.0 acceptance scope.

S4 **docs/simulate-change.md; docs/gaps.md**

Scenario isolation, affected ancestors, missing data and freshness.

S5 **docs/audit-export.md; README.md**

Selected GSN v3 SVG plus CAPA extension bundle; current runtime.

S6 **docs/qualification-chain.md**

qualification-chain/0.1.0; intended-use and release-bound planning.

S7 **docs/qualification-chain-verification.md**

Step 63 / run3: recorded tests, challenge cases and matrix evidence.

S8 **docs/qualification-chain-independent-plan.md**

Outstanding independent review, standards mapping and operational work.

How to interpret the references
The paths above identify records in the UEPCUE repository; historical CAPA and Certify Engine naming is retained there. Test totals are attributed to their dated records and were not rerun for this publication. A companion source manifest records SHA-256 hashes of the local source snapshot.

This brief is an architectural and evaluation aid. It makes no certification, qualified-tool, full-standard-compliance or independent field-calibration claim. Release-specific evidence and authorized project decisions remain necessary.

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