RENAR

Requirements Engineering & Normative Adaptive Regulation — normative core

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RENAR Core

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> ***What this is.*** *A conceptual overview of RENAR for the human reader: what the standard is about, why it is needed, and how it works at the top level. Without technical detail, frontmatter, the lifecycle, or normative rules — that is the domain of the full RENAR Standard.*
>
> ***Reading time:*** *≤ 10 minutes.* ***Who it is for:*** *PMs, lawyers, regulators, and engineers encountering RENAR for the first time. If you are an AI agent, read the Standard directly — you do not need Core.*

What RENAR Is

RENAR (*Requirements Engineering & Normative Adaptive Regulation*) is a normative requirements-engineering standard for development with AI agents. The standard governs:

- **The data model** of requirements artifacts: BR (business requirement), SR (system requirement), TR (task), ADAPT (two-way adaptation of the TZ), 9 SPEC types (architecture, API, data, integration, process, UI, AI, security, operations), TC (test cases).
- **The lifecycle and Quality Gates** (QG-0..QG-4) — artifact states and the conditions for transitions.
- **Substrate capabilities** V1–V6, which the artifact storage system MUST satisfy: immutable history, atomic changes, comparison/review, branching, end-to-end version pinning, author + timestamp.
- **Conformance** — the RENAR-1..RENAR-5 levels, mandatory clauses, the manifest, and assessment procedures.

RENAR is a **specialization of SENAR** (the methodological foundation for development with AI agents) in the area of requirements engineering. A RENAR-conformant implementation is always compatible with SENAR; the reverse does not hold.

Why RENAR Exists

In development with AI agents, requirements live simultaneously across several artifacts: the client's contractual TZ, the engineering BR/SR/SPEC, test cases, the task description, the implementation in code. All of this is written and edited by a mix of humans and AI agents. Without formal contracts between artifacts, **requirements drift** arises — a divergence between what has been recorded, what is verified, and what is actually implemented.

RENAR closes eight normalized classes of drift:

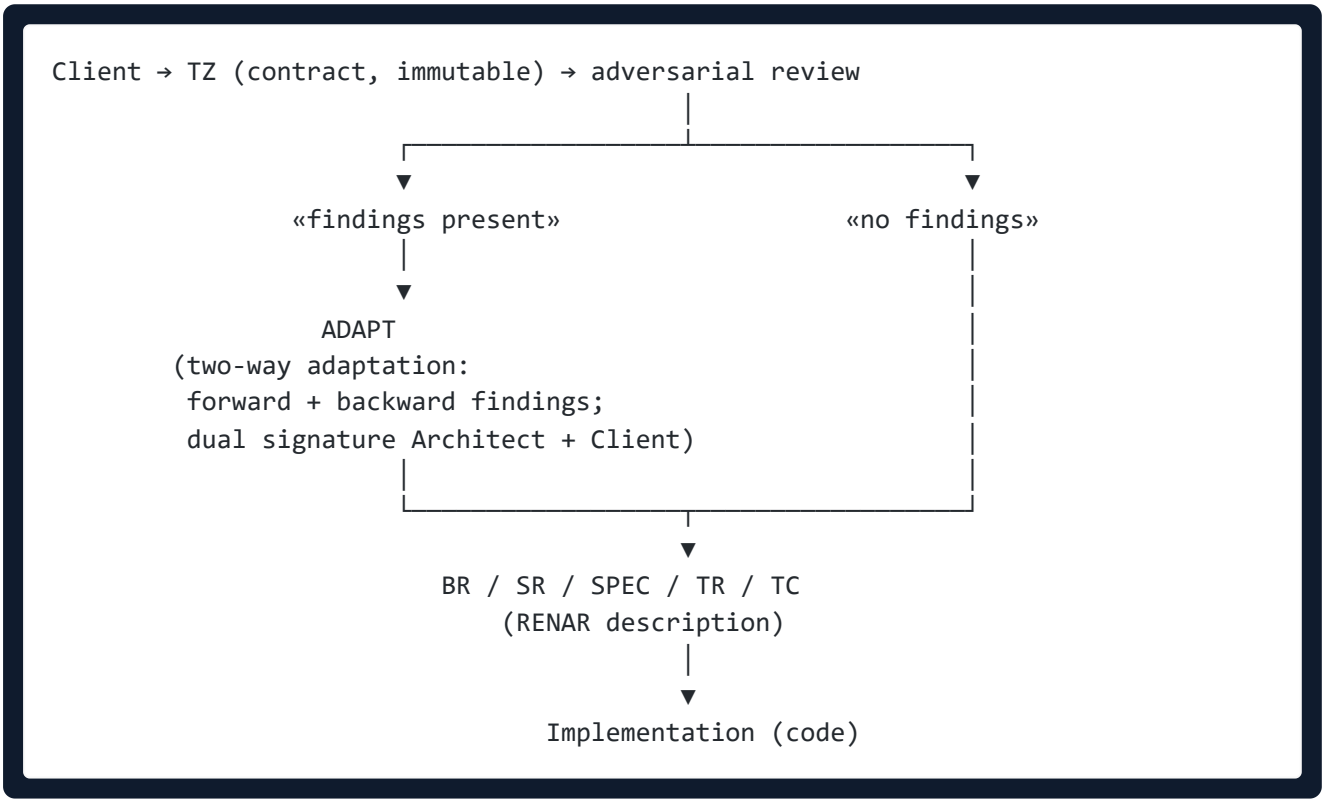
1. **Schema drift** — artifact fields diverge between projects.
2. **Lifecycle drift** — statuses (`draft` / `approved` / `verified`) mean different things to different authors.
3. **Source-of-Truth drift** — one entity is edited in several places at once.
4. **Implementation drift** — code implements a requirement that has already been deleted or renamed.
5. **Terminological drift** — terms mean different things to different people.

6. **Order / provenance drift** — a delta-TZ is applied out of order, or references a non-existent requirement.
7. **TC ↔ requirement provenance drift** — a test verifies obsolete behavior.
8. **Test-fitting drift** — an AI agent weakens a test's criteria instead of fixing the code.

All eight classes are **structural**: they arise from the very fact that an artifact is co-owned by several authors, not from lapses in discipline. They can be closed only normatively — by recording a contract for how artifacts are linked, who writes which field, and which preconditions MUST hold at state transitions.

How RENAR Works (Conceptually)

The full lifecycle of a single requirement:



Key properties:

- **The TZ is a contractual, immutable artifact.** Once signed by the client, it is not edited. Scope changes are formalized through a delta-TZ.
- **ADAPT is a reactive bridge between the client's language and the language of requirements.** It is created only when converting the TZ → RENAR requires agreement with the client (backward findings identified, term mapping, scope clarification). The adversarial reviewer (a separate AI agent on a different model) records a verdict of "findings present" or "no findings" for each TZ.
- **The RENAR description is the Source of Truth about the system's behavior.** Code is a derived implementation artifact, not the authoritative definition of behavior. If the code does X but the SR says Y, that is a defect in the code, not "the actual requirement has changed."
- **TC pos/neg pairing.** Every verifiable assertion of a requirement has at least one positive and one negative test case. AI agents readily cover the happy path and skip negative scenarios — RENAR makes pairing normative.
- **Adversarial review.** A separate AI agent on a different model deliberately looks for what the primary agent missed: missing backward findings, weakened TC criteria, hidden assumptions. This is

a compensating mechanism against self-consistent but semantically incorrect AI outputs.
- **Dual signature of ADAPT.** When an ADAPT is created, it moves to approved only after two signatures: the client (or their representative) confirms that the interpretation matches their intent; the architect confirms technical feasibility and the closure of all findings.

The full lifecycle is governed through **Quality Gates** (QG-0 Approval, QG-1 Implementation, QG-2 Verification mandatory; QG-3 Architecture, QG-4 Acceptance optional). Each transition to a higher artifact status passes through the corresponding gate with a recorded participant and preconditions.

The Default Executor — the AI Agent

RENAR artifacts are **by default** created and maintained by an AI agent on assignment from an engineer. The human acts as verifier and approver: reviewing the result, clarifying the task when needed, and approving lifecycle transitions.

Two things follow from this positioning that are unfamiliar when reading the standard for the first time:

- **Artifacts look dense** (dozens of frontmatter fields, lifecycle transitions, graph links) — because the primary reader is machine. The density is not bureaucracy but a requirement for "code in natural language" that the AI agent executes in subsequent steps.
- **The process overhead of maintenance is machine, not human.** An AI agent does not tire of filling in frontmatter; the volume of work is linear. To a human this overhead seems unbearable — but it is precisely this overhead that need not be borne by hand.

At the same time, **the human remains the source of decisions** on contractual outcomes: the ADAPT signature, QG-0 approval, the spot-check of tests, acceptance of the result. The AI agent is responsible (executes); the human is accountable (answers for the result).

Who Will Find RENAR Useful

RENAR is built for **contract-oriented development**: projects with an explicit contractual TZ and an identifiable client party answerable for that TZ. Typical contexts:

- **Custom development** — an independent vendor + a client with a signed TZ and acceptance criteria.
- **Regulated industries** (healthcare, finance, the public sector) — where a compliance audit is mandatory by regulation.
- **Enterprise consulting** — a third party implements against a corporate client's TZ with approval from several stakeholders.
- **Public-sector / government IT** — tender TZs, formal acceptance, multi-year contracts.
- **Long-lived products** — where the Product Owner plays the role of the Client's representative for internal feature TZs.

RENAR is **not applicable** to lean startup discovery, pure R&D without a defined scope, hackathon proofs-of-concept, and other contexts without an immutable TZ and an identifiable Stakeholder.

Routes by Role

Role	Where to start

PM / RTE	guide/05 — RENAR vs SAFe; then guide/09 §E3 — a practical example
Legal / Compliance	guide/09 §E3 → guide/06 → reference/07 — ISO 29148 mapping
Regulator / Auditor	reference/07 → reference/08 → standard/13 — conformance manifest
RE engineer / Architect	guide/00 Quickstart → standard/06 → standard/10

Where to Read Next

Document	Purpose
standard/ — 15 normative chapters	The complete normative description; required reading for the AI agent and the assessor
guide/00-quickstart	A 30-minute practical end-to-end example: TZ → ADAPT → SR → SPEC → TC
guide/01-walkthrough	An extended example on a full-scale scenario
guide/06-compliance	GDPR, FZ-152, AI Act mapping
reference/01-glossary	The canonical glossary + mapping to ISO 29148, BABOK, SAFe, NIST AI RMF
reference/02-schemas	Machine-readable artifact schemas (JSON Schema), validation rules
reference/03-ai-risk-register	14 AI risks per ISO/IEC 23894 + NIST AI RMF

00. Introduction

> ***Part of the RENAR Standard v1.0-draft*** · ← *Table of contents*

> ***For newcomers.*** *This chapter is normative and dense (RFC-2119, closed lists, mandatory clauses). If you are a human meeting RENAR for the first time — start with the conceptual overview* `core/renar-core.md` *(≤ 10 min), then* `guide/00-quickstart` *(≈ 30 min), then come back here. If you are an AI agent — go straight to the normative chapters.*

0.1 Why this chapter

The client wrote in the TZ: "the user exports a report." The engineer read it as a PDF export, the specification named CSV, and the test ends up checking Excel. There is no ill intent — the requirement simply lives in five places at once (the client's contractual TZ, the engineering decomposition, the specifications, the test cases, the code), and at each seam the meaning shifts a little. When artifacts are written by a mix of humans and AI agents, there are more seams and the shift is faster. So the bottleneck of development is no longer code speed but **requirements correctness**. RENAR exists so that meaning does not leak at these seams: it sets explicit contracts between artifacts.

This chapter answers four questions: **what** RENAR is (§0.2), **why** it is needed (§0.3), **how** it relates to SENAR (§0.4), and **what the minimum** is below which conformance cannot be claimed — the Minimum Viable RENAR (MVR; §0.5). Closed lists and the language of the corpus — §0.6, §0.7.

This chapter introduces **no** new normative requirements. Each of the seven MVR statements is a reference to a §1–§13 chapter where it becomes a precise norm; here it is given as a coherent whole.

> ***Modal-verb convention.*** *Normative force is expressed with UPPERCASE RFC-2119 keywords:* `MUST` / `SHALL` / `REQUIRED` *— the mandatory level;* `SHOULD` / `RECOMMENDED` *— the recommended level;* `MAY` / `OPTIONAL` *— the permitted level;* `MUST NOT` / `SHALL NOT` *— prohibition. Conformance follows RFC 2119 + ISO/IEC/IEEE 29148:2018 §5.2.1. This convention applies in all normative chapters. (The RU corpus uses lowercase modals as its canonical form under the RFC 8174 carve-out; the EN corpus uses UPPERCASE — see the EN Style Guide §2.)*

0.2 What RENAR is

RENAR (*Requirements Engineering & Normative Adaptive Regulation*) is a normative requirements-management standard for development with AI agents. The standard governs:

- The **data model** of requirement artifacts (BR / SR / TR), ADAPT, the nine SPEC types, and TC.
- The **lifecycle** of artifacts through a closed list of Quality Gates (QG-0 / QG-1 / QG-2 mandatory; QG-3 / QG-4 optional).
- The **substrate capabilities** V1–V6.
- **Conformance** — the RENAR-1..RENAR-5 levels, mandatory clauses, the manifest, and assessment procedures.

RENAR is a **specialization of SENAR** (§1.6) in the requirements-engineering domain. A RENAR-conformant implementation is **always** SENAR-compatible; the converse does not hold (§1.6.2).

RENAR is not tied to a specific substrate (VCS, document store, wiki): the normative chapters use substrate-independent language and govern the **capabilities** V1–V6 (§3.1). RENAR is a standard, **not** an implementation.

0.2.1 The AI agent as a regular implementer

RENAR artifacts are **routinely** created and maintained by an AI agent under an engineer's assignment. The human acts as reviewer and approver. This is a normative positioning, not a methodological recommendation.

Consequences:

1. **Completeness** — the completeness requirements for artifacts: the AI agent executes "code in natural language," and without completeness, provenance breaks down (§0.3).
2. **frontmatter density** — the dozens of fields are a consequence of the machine nature of the primary reader. In a multilingual UI, fields MAY be displayed human-readably (§4.13.3).
3. **Compensating mechanisms** — the ADAPT dual signature (§7.5), the engineer's spot-check (§9.14), adversarial review (§9.4), and the Quality Gates (§10.3) ensure that the human remains the source of decisions on contractual outcomes.

What §0.2.1 does **not** assert: RENAR does not require an AI agent for conformance — the standard is implementable by hand, but the process overhead makes that impractical (§1.4.1, indicator 5). The AI agent does not replace human approval — all normative signatures are performed by a human. The AI agent acts as responsible (R in RACI §5.6), not accountable (A).

0.3 Why RENAR exists

In development with AI agents, requirements live simultaneously in several artifacts created and maintained by a mix of human and AI-agent authors. Without normative contracts between them, **requirements drift** arises — a divergence between what is recorded, what is verified, and what is implemented.

RENAR closes **eight normative drift classes** (the full list with enforcement points — §4.11; the conceptual description — core/renar-core.md). All eight are **structural**: they arise from the very fact that an artifact is jointly owned by several authors, not from lapses in discipline. They can be closed only normatively — by fixing the contract of links, field authorship, and transition preconditions (§13.3, mandatory clauses).

The contract is machine-enforceable only on the condition that artifacts are complete (§0.2.1). An artifact with defaults is a contract with holes through which drift passes regardless of any hooks: a hook sees only what is recorded. The same applies to canonical names and closed lists (§4.2): a hook compares strings, it does not interpret synonyms.

0.4 Relationship to SENAR

RENAR governs **only** those aspects of requirements engineering that SENAR leaves to the domain standard's discretion: the artifact data model, the lifecycle of requirement artifacts, and the conformance manifest for requirements engineering. RENAR does **not** duplicate and does **not** override SENAR constructs (the 5 values, 14 rules, common Quality Gates, 5 base roles).

The project conformance manifest (§13.4) MUST declare both `senar-version` and `renar-version`. A claim of RENAR conformance without a compatible SENAR version is non-conformant

(§13.8).

If a RENAR normative statement turns out to be incompatible with a SENAR norm, that is a bug in the RENAR Standard. The resolution is through the formal change procedure of the SENAR Standard, with a corresponding alignment in RENAR (§13.9), not through a project-local override.

Aspect	SENAR (base)	RENAR (requirements-engineering specialization)
5 values + 14 rules + 5 roles	governs	inherits
Common Quality Gates	general framework	closed list of canonical QG-0..QG-4 (§10.3)
Artifact data model	— (out of scope)	BR / SR / TR / ADAPT / 9 SPEC types / TC (§6–§9)
Requirement-artifact lifecycle	—	canonical state machines (§10)
Substrate capabilities	—	V1–V6 (§3)
Conformance manifest	generic SENAR	RENAR-CONFORMANCE.yaml + mandatory clauses (§13)

RENAR's original contribution (not inherited from SENAR): the requirements data model; ADAPT with two-way adaptation and dual signature; substrate-independent V1–V6; the canonical lifecycle and QG for the requirements axis; pos/neg pairing and judge ≠ production as blocking clauses; the RENAR-1..RENAR-5 conformance levels.

0.5 Minimum Viable RENAR (MVR)

Minimum Viable RENAR is a closed list of seven normative statements, mandatory for any RENAR-conformant implementation regardless of the declared level (including `RENAR-1`). The MVR is equivalent to the mandatory clauses of §13.3.

#	Statement[1]	Normative source
MVR-1	**Source-of-Truth inversion**: the requirement-artifact hierarchy MUST be the source of truth about system behavior; code is a derived artifact. Reverse-engineering behavior from code into an SR without a bug-fix justification is prohibited.	§2.3, §13.3.1
MVR-2	**V1–V6 capabilities**: the project substrate MUST satisfy all six capabilities — immutable history (V1), atomic change unit (V2), diff & review (V3), branching / change-set (V4), cross-substrate version pin (V5), author + timestamp (V6).	§3.3, §13.3.2
MVR-3	**Reactive, stage-agnostic ADAPT (0..N per TZ)**: ADAPT is a reactive artifact, created if and only if converting a TZ → RENAR description **at any derivation stage** produces a gap between the client's language and the requirements language. A single TZ has **zero or more** ADAPTs; each is bound to its trigger (TZ import or a specific decomposition stage) through `trigger-stage`, and multiplicity is the regular case. When a gap is present, the ADAPT is REQUIRED to be in status `approved` with a dual signature. When no gap is present (the adversarial reviewer returned a "no findings" verdict), no ADAPT is created; BR/SR/SPEC reference the TZ directly through the	§7, §13.3.3

	mandatory `source.tz-section` + `source.adversarial-review-ref`. A delta-TZ follows the same rule.	
MVR-4	**Closed list of 9 SPEC types**: a SPEC type MUST belong to the closed list `SPEC-ARCH` / `API` / `DATA` / `INT` / `PROC` / `UI` / `AI` / `SEC` / `OPS`. A project MUST NOT create new types locally.	§8.3, §13.3.4
MVR-5	**TC pos/neg pairing**: every normative statement of a verifiable artifact that is covered by at least one TC MUST have a paired negative TC. The exception is when the statement itself describes a negative invariant.	§9.7, §13.3.5
MVR-6	**Closed list of Quality Gates**: an implementation MUST support QG-0 (Approval), QG-1 (Implementation), QG-2 (Verification) as `required`. QG-3 / QG-4 are `declared` or `absent`. Creating new gate types locally is prohibited.	§10.3, §13.3.6
MVR-7	**Conformance manifest**: a project MUST contain a manifest with both `renar-version` + `senar-version` + `level` (RENAR-1..RENAR-5) + confirmation of the §13.3 mandatory clauses. The manifest is immutable (V1).	§13.4

[1] Each row states a mandatory-level requirement (RFC-2119 `MUST` / `SHALL`) as interpreted by ISO/IEC/IEEE 29148:2018 §5.2.1.

An implementation satisfying all seven MVR conforms to at least the `RENAR-1` level (§13.2.1). An implementation that violates even one MVR **has no** RENAR conformance regardless of the declared level (§13.8).

0.6 Closed-list policy

The list of seven MVR is closed at v1.0. A project MUST NOT extend the MVR locally or shorten the list.

An implementation MAY **tighten** requirements beyond the MVR through the `declared-stricter` marker (§10.10.2, §13.4): require QG-3/QG-4 as `required`, require adversarial review of TC on all SPEC types, declare `RENAR-3+` as the minimum.

An implementation MUST NOT declare-weaker: issue a RENAR conformance claim without supporting one of MVR-1..MVR-7; declare ADAPT optional; allow single-TC coverage for a normative statement without the negative-invariant exception; omit `senar-version` or `level` in the manifest.

A change to the MVR is made only through the formal change procedure of the RENAR Standard (§13.9): research draft → public review → minor-version bump → migration guidance.

0.7 Corpus language

The RENAR normative corpus is bilingual: an RU edition (`standard/`, primary) and an EN edition (`standard/en/`, this file). Both are hybrids: **canonical identifiers** (latin and closed-list abbreviations) + connective prose in the edition's language. The policy is fixed by the EN Style Guide for the EN corpus and by reference/06 for the RU corpus, alongside §4.2. Artifacts and IDs, lifecycle statuses, VCS domain terms, and accepted technical terms stay latin in both editions; the editions differ only in the connective prose and in RFC-2119 polarity (EN UPPERCASE vs RU lowercase).

Substrate. The storage concept is, in the EN corpus, simply `substrate` — the canonical term used in prose, field names (`substrate-capabilities`), code/YAML, and file names alike. (The RU corpus renders the prose form as «носитель» and keeps `substrate` only in identifiers; see §4.2.)

Table of contents · **Next: 01. Scope →**

01. Scope

> ***Part of the RENAR Standard v1.0-draft*** · *← Table of contents*

1.1 Where RENAR works and where it does not

Two teams write code with AI agents. The first builds a banking module against a signed TZ: there is a client, an acceptance, an audit — every requirement must be demonstrable. The second tests hypotheses at startup speed: a "requirement" exists today and is gone tomorrow after a pivot. RENAR is for the first. It is built where there is a contractual TZ and a party held accountable for it: contract development, regulated industries, consulting against someone else's TZ. In pure product discovery — "first build, then understand what was built" — RENAR is not merely redundant, it is structurally inapplicable: there is no immutable TZ, nothing from which to build an ADAPT. This chapter draws both boundaries — the **subject-matter** one (what the standard governs) and the **contextual** one (when it should be used at all) — through the closed lists of §1.2–§1.5.

The substantive norms of artifacts and the lifecycle are **not** set by this chapter — that is the domain of chapters 06–14; substrate-native implementation mechanisms are the domain of chapter 3 and `guide/03-tool-guide-*.md`.

1.2 What RENAR governs (closed list)

The closed list of RENAR's normative areas at version v1.0. Each area is covered in the indicated chapter:

#	Area	Chapter
1	Requirements hierarchy (BR / SR / TR)	06
2	ADAPT (two-way adaptation of the TZ): Forward interpretation + Backward findings + dual signature	07
3	Closed list of 9 specification types (SPEC-ARCH / API / DATA / INT / PROC / UI / AI / SEC / OPS)	08
4	Test Cases as a full-fledged artifact (TC); pos/neg pairing; spec-specific TC obligations	09
5	Lifecycle states + Quality Gates (QG-0 / QG-1 / QG-2 mandatory; QG-3 / QG-4 optional)	10
6	substrate-independent versioning capabilities V1–V6	03
7	Maturity model (RENAR-1..RENAR-5)	11
8	Requirements-engineering metrics (RDLT, Hallucination Rate, DRA, ACR, etc.)	12
9	Conformance (mandatory clauses, manifest, self-assessment, third-party assessment)	13
10	Roles and responsibility for artifacts (specializations over SENAR §4)	05

All of the listed areas have normative content: mandatory requirements and a prohibition on project-local extensions of the corresponding closed lists.

1.2.1 What falls within the normative area

The RENAR normative area covers:

- **The artifact data model** — mandatory frontmatter fields, types, enum values, consistency invariants.
- **Lifecycle states + transitions** — state machines per artifact type; pre/post-conditions; the gate-id for each transition.
- **Identity and provenance** — immutable identifiers; substrate-native recording of authorship and time (V6); version pin between artifacts (V5).
- **Cross-artifact constraints** — `verifies[]`, `constrained-by[]`, `parent`, `delta-of`, `verified-by`, `implements-spec` — the normative semantics of links and the consistency rules.
- **AI provenance** — mandatory recording of the generator model, prompt-template, and token volume; the human-edits rules for approval.
- **Conformance procedures** — mandatory clauses, the manifest schema, the assessment cadence, the handling of conformance loss.

1.3 What RENAR explicitly does NOT govern (closed list)

The closed list of areas left **deliberately** outside the standard. Implementation in these areas is a free choice and does not affect conformance.

#	Area	What is out of scope
1	**The SENAR methodology as a whole**	The 5 values, 14 rules, common Quality Gates, agent instrumentation — governed by SENAR; RENAR neither duplicates nor overrides them.
2	**A specific substrate / VCS**	The choice of a specific version-control / document-database / wiki-platform is at the implementation's discretion; RENAR governs only the capabilities V1–V6 (§3).
3	**The implementation tech stack**	Programming languages, frameworks, databases, infrastructure components — out of scope; RENAR governs requirements, not the implementation.
4	**A specific UI / IDE / artifact editor**	Web interfaces, IDE extensions, CLI tools — out of scope; only the storage format of artifacts in the substrate is governed.
5	**Specific test runners**	pytest, jest, playwright, ragas, etc. — substrate-specific; RENAR governs only the mandatory recording of `automation.location` and `last-run` (V5+V6).
6	**Sales / contract business processes**	Pre-sale, formulation of the contractual price, the legal structure of contracts — out of scope; RENAR treats the TZ as an **input** and does not govern the process of its creation on the client side.
7	**Project management practices**	Agile ceremonies, sprint planning, kanban boards, story-point estimation — out of scope; RENAR governs the workflow of requirement artifacts, not management overhead.

8	**AI model selection and prompt engineering**	The choice of LLM provider, prompt-templates, fine-tuning strategies — out of scope; RENAR governs only the mandatory recording of `ai-provenance.generated-by` and adversarial review (§9.4).
9	**Specific substrate-native commands and hooks**	substrate-specific CLI commands (for example, specific VCS command names), the implementation of hooks (§10.11) — substrate-specific and belong in `guide/03-tool-guide-*.md`.
10	**Legal interpretation of artifact signatures**	Electronic signature, legal force, GDPR processing of personal data in the TZ — outside the standard's scope; governed by applicable law.

1.3.1 The substrate-independence principle

The RENAR Standard's normative chapters use substrate-independent terminology (§3.1). Substrate-dependent names (specific products, protocols, commands) do not appear in the normative text; they are present only in `guide/` (substrate-specific tools) and `reference/` (examples).

1.4 Scope of applicability (primary scope)

1.4.1 Contract-oriented development

RENAR's normative primary context is **contract-oriented development**: a project in which:

1. **A TZ exists** (an explicitly formulated requirement from the client side) which, once signed, becomes **immutable** (§7.4.1 ADAPT source).
2. **An identifiable client party exists** (a stakeholder with signing authority, §5.3.6) — able to confirm acceptance (§10.4.2) and to sign an ADAPT (§5.5).
3. **Reactive two-way client-side validation** — adversarial review of the TZ is mandatory; if findings are discovered or clarification is needed, the Forward interpretation of the TZ is discussed with the client through ADAPT (§7.3, §7.4.1). If the conversion is unambiguous, validation reduces to a recorded "no findings" verdict (with no client interaction).
4. **A delta-TZ workflow** is possible — scope changes are formalized through a delta-ADAPT (§7.6), not through a hidden reinterpretation.
5. **An AI agent is available as the primary author** of RENAR artifacts (§0.2.1). Without an AI agent the standard remains applicable, but the process overhead of maintaining artifacts by hand — with full frontmatter, lifecycle transitions, and graph links — makes RENAR conformance impractical; the team either accepts that overhead or applies a `declared-stricter` limited scope (§1.7.2) to a critical subset of requirements.

1.4.2 Typical representatives of contract-oriented development

Context	Characteristics
Contract development against a TZ	Independent vendor + identifiable client; formal contract; acceptance criteria.
Regulated industries	A compliance audit is mandatory (healthcare, finance, public sector); traceability requirements → tests → code is required by regulation.

Enterprise consulting	A third party implements against the corporate client's TZ; approval by several stakeholders; an audit log.
Long-lived product with an explicit product owner	The Product Owner plays the role of the client's representative for internal feature TZs; an internal SLA + audit are mandatory.
Public-sector / government IT	Tender TZs; formal acceptance; multi-year contracts.

1.4.3 Spec-Driven Development (SDD) — the modern name

Contract-oriented development with AI acceleration is a form of **Spec-Driven Development** (§2.3.4). RENAR is the normative standard for AI-native SDD; it is not an alternative to SDD but its specialization in the requirements-management domain.

1.5 Where RENAR is inapplicable (negative scope)

RENAR is normatively inapplicable in contexts where the preconditions of §1.4.1 are structurally absent. A claim of RENAR conformance (§13.4) for projects in these contexts is non-conformant (§13.8).

1.5.1 Lean startup / pure discovery

A product team builds an MVP under market uncertainty; "requirements" are hypotheses validated against users, not immutable agreements. Out of scope: there is no immutable TZ (hypotheses are re-checked after a pivot); a client representative is structurally absent (the internal product manager = author + sole assessor — a violation of §5.5.3); the delta-TZ workflow does not apply (a pivot = a change of scope **as a whole**, not a delta). Lean startup teams MAY borrow **individual practices** of RENAR (AI provenance, adversarial review of TC) without claiming conformance — permitted as a source of ideas.

1.5.2 Pure R&D / research projects

A research project with no defined resulting scope (exploratory ML research, novel-algorithm prototyping without a client). Out of scope: there is no TZ as an immutable artifact; acceptance criteria (QG-4 §10.4.2) cannot be formalized — the "success" criterion of scientific research is not signed in advance; the ADAPT dual signature does not apply.

1.5.3 Exploratory hackathon / proof-of-concept

Time-boxed exploratory work with no mandatory client acceptance. The same reasons as §1.5.1 + an explicit waiver of formal acceptance.

1.5.4 Internal product without an external client

An internal team tool; the "client" coincides with the author; there is no independent stakeholder for the ADAPT dual signature. In the absence of an independent client representative, the ADAPT dual signature (§5.5) is structurally impossible — `client-signature.signed-by == architect-signature.signed-by` violates §5.5.3. This is **the same underlying defect** as in §1.5.1: a structural absence of two-sidedness.

An implementation MAY apply a subset of RENAR practices **locally** (immutable identifiers, lifecycle states, V1–V6 for its own discipline), but it MUST NOT claim RENAR-N conformance. The manifest either does not

exist or explicitly declares "non-conformance."

Negative scenario: an attempt to declare RENAR-N for an internal product without an independent client representative is non-conformant (§13.8). If the internal product acquires an identifiable stakeholder (an internal Product Owner with acceptance authority), the scenario moves out of §1.5 into §1.4.2 "Long-lived product with an explicit product owner," and full conformance applies.

1.5.5 Negative scenarios — specifics

Scenario	Why it is non-conformant
A project with no written TZ; requirements are verbal discussions	Violation of §1.4.1 (1): there is no TZ as an immutable artifact; ADAPT has no source (§7.4.1).
A project where author == client (one person signs both sides)	Violation of §5.5.3 on two independent persons in the ADAPT signatures.
A project where scope is revised without a formal delta-TZ record	Violation of the §7.6 delta-ADAPT workflow; violation of the §13.3 mandatory clause "an ADAPT for every TZ."
A manifest that declares tech-stack-specific requirements (for example, "Python is mandatory")	Violation of §1.3 (3): the tech stack is outside the standard's scope; the manifest is non-conformant.

1.6 Relationship to SENAR

1.6.1 RENAR as a specialization of SENAR

SENAR is the **methodological base**: the 5 values of AI-native development, the 14 rules, agent instructions, common Quality Gates (§10.2.3), 5 base roles (§5.2).

RENAR is **a specialization of SENAR in the requirements-engineering domain**: it governs only those aspects that SENAR leaves to the domain standard's discretion (the artifact data model, the lifecycle, the conformance manifest). RENAR does not duplicate SENAR and does not override SENAR constructs.

1.6.2 Compatibility

A RENAR-conformant implementation is **always** SENAR-compatible. The converse does not necessarily hold: a SENAR-compatible project MAY **not** claim RENAR conformance if it operates outside the primary scope of §1.4.

An incompatibility of RENAR with SENAR at any normative point is a bug in the RENAR Standard; it is resolved through the formal change procedure of the SENAR Standard, with a corresponding alignment in RENAR.

1.6.3 RENAR is not an alternative to SENAR

An implementation MUST NOT claim "we follow RENAR instead of SENAR" — this is a violation of §1.6.1. RENAR is used on top of SENAR; the project's conformance manifest declares both the SENAR version and the RENAR version simultaneously (§13.4).

1.7 Closed-list policy (closed list)

1.7.1 What is closed at v1

The lists §1.2 (normative areas), §1.3 (exclusions), §1.4 (primary scope), §1.5 (negative scope) are closed. Project-local extensions and attempts to govern excluded areas through the manifest (§1.3 (3) tech stack, §1.3 (7) PM practices) are non-conformant. Adding new primary contexts or moving a scenario from §1.5 into §1.4 is done only through the formal change procedure of the standard.

1.7.2 Declared-stricter is permitted

An implementation MAY **tighten** scope relative to the normative minimum, declaring it explicitly in the conformance manifest (§13.4) with the `declared-stricter` marker (§10.10.2): apply RENAR only to a subset of requirements (security-critical SR); require additional artifact types (threat-models); prohibit RENAR without a Client representative. Declared-stricter is a permitted local policy; conformance to the normative level is preserved.

1.7.3 Declared-weaker is prohibited

An implementation MUST NOT declare-weaker relative to §1.2 / §1.3 / §1.4: claim RENAR conformance for a project in the §1.5 negative scope; apply RENAR without ADAPT (a violation of §13.3.3); govern excluded §1.3 areas through a project-local manifest.

1.7.4 The extension path

A change to §1.2 / §1.3 / §1.4 / §1.5 is done only through the formal change procedure of the standard (§13.9): a research draft with justification → public review → a minor- or major-version bump → migration guidance for existing conformant projects.

1.7.5 Master list of closed lists in RENAR

This paragraph is the single index of all closed lists in the RENAR Standard. Each listed list is non-extensible locally at the project level; changes are possible only through the formal change procedure of the standard (§13.9). The canonical source for each list is in the indicated section; the other mentions are cross-references.

#	Closed list	Canonical source	Cross-refs
1	Normative areas of the standard (10 items)	§1.2	§1.7.1
2	Exclusions from the normative area (10 items)	§1.3	§1.7.1
3	Primary scope: applicability contexts (4 indicators + 5 typical representatives)	§1.4	§1.7.1
4	Negative scope: inapplicability contexts (5 contexts + 4 negative scenarios)	§1.5	§1.7.1
5	RENAR roles (specializations over SENAR §4)	§5	§1.2 (10)

6	ADAPT Backward findings categories (7 categories)	§7.4.4	§13.3.7
7	SPEC-* specification types (9 types: ARCH/API/DATA/INT/PROC/UI/AI/SEC/OPS)	§8.3	§4.4.1, §13.3.4
8	Normative TC principles (closed list)	§9.2	§13.3
9	TC types (`tc-type` : 6 values)	§9.5	§4.5.2
10	Lifecycle states by artifact type (BR / SR / SPEC / TC / ADAPT / TZ)	§10.5–§10.8	§4.7–§4.10
11	Quality Gates: mandatory {QG-0, QG-1, QG-2}, optional {QG-3, QG-4}	§10.3, §10.4	§10.10, §13.3.6
12	substrate-independent versioning capabilities V1–V6	§3.x	§1.2 (6)
13	Maturity levels RENAR-1..RENAR-5 (5 levels)	§11.3	§13.2, §13.9
14	REQ-specific metrics (10 metrics)	§12.3	§12.5
15	Drift classes (violations of the requirements infrastructure)	§4.11	§4.2
16	Prohibited / deprecated terms (non-canonical)	§4.14	§4.2

The extension of any closed list goes through the same formal procedure as a change to §1.2–§1.5 (§1.7.4, §13.9).

Chapter-level closed-list policies (§10.10, §12.3, §13.9) are specializations of this §1.7 for the corresponding lists and do **not** introduce independent procedures.

1.8 Cross-references

Source	Use
SENAR (full methodology)	RENAR's methodological base (§1.6.1); RENAR does not duplicate SENAR norms.
§5 Roles	Artifact ownership and roles — specializations over SENAR §4 (§1.2 (10), §1.6.1).
§2 Methodology positioning	Three foundational assertions (Source-of-Truth inversion, waterfall-form ≠ classical waterfall, substrate-independent versioning) — the justification of scope §1.4.
§7 ADAPT	ADAPT as the normative requirement §1.4.1 (3) for two-way client-side validation.
§10 Lifecycle and QG	Lifecycle + Quality Gates — the normative area §1.2 (5).
§3 Substrate versioning	The capabilities V1–V6 — the normative area §1.2 (6); the substrate-independence principle §1.3.1.
§13 Conformance	Mandatory clauses, the manifest, conformance loss — the normative area §1.2 (9); negative scenarios §1.5.5.
`core/renar-core.md`	A Core-mode boundary case for §1.5.4 (internal product without an external client).
`guide/02-transition-guide.md`	Practical guidance for projects transitioning from a lean style to contract-oriented development (substrate-specific).

02. Positioning in the Typology of Methodologies

2.1 The three claims everything rests on

Before describing artifacts and processes, RENAR states the three ideas everything else stands on: **the Source of Truth is the requirements, not the code**; **the process has a layered form, but this is not classical waterfall**; **versioning is a mandatory substrate property, not a tie to a tool**. It sounds like generalities — but remove any one of them, and the remaining chapters fall apart. The requirements hierarchy (chapter 6) loses its Source-of-Truth meaning, ADAPT loses its role as the bridge between the contractual and engineering loops, the specifications lose their parallel axis, the test cases lose their binding to a requirement version, the lifecycle loses transition atomicity, and substrate versioning loses its normative footing.

This chapter is therefore the foundation; §2.3–§2.5 SHOULD be read in sequence. All three claims are **mandatory clauses**: each is a mandatory clause for any RENAR conformance claim (chapter 13).

2.2 The three fundamental claims

1. **Source-of-Truth inversion.** The Source of Truth about system behavior is the hierarchy of requirement artifacts. Code is a derived implementation artifact. This is Spec-Driven Development (SDD).
2. **Waterfall-shaped ≠ classical waterfall.** The RENAR process has a sequential, layered shape with gates. The standard explicitly distances itself from the four deadly sins of classical waterfall.
3. **Substrate-independent versioning.** Versioning is a mandatory property of the substrate implementing RENAR. The particular versioning tool is interchangeable. Six capabilities (V1–V6) set the normative requirements on the substrate; the details are in chapter 3.

The three claims are logically connected (see §2.6).

2.3 Claim 1 — Source of Truth about behavior: requirements, not code (Source of Truth)

2.3.1 Normative formulation

The Source of Truth about system behavior is the hierarchy of requirement artifacts: TZ → ADAPT → BR / SR / SPEC → TR → TC. Code is a derived artifact implementing this hierarchy. On a divergence between the code and a higher-level requirement, the requirement normatively wins.

2.3.2 Distribution of roles

Level	Who is the Source of Truth	Who is derived
TZ	Contract with the client	—
ADAPT	Two-way interpretation of the TZ	derived from the TZ
BR / SR / SPEC	The system's engineering standard	derived from ADAPT
TC	Contract of verifiable behavior	derived from SR / SPEC
TR (task)	The act of handing work to an implementer	derived from SR + SPEC
Code	Implementation	derived from everything above

2.3.3 Contract (mandatory consequences)

The standard requires the following behavior from any implementation claiming RENAR conformance:

1. **Prohibition of reverse-engineering behavior from code into an SR.** An AI agent or human creating a new SR or amending an existing SR uses ADAPT and the existing SRs as the source — but not the observable behavior of the implementation. Reverse-engineering is permissible only when creating a bug-fix task (see §2.3.4).
2. **Separation of code review and specification review.** Code review checks that a change conforms to the code. Specification review checks that the tests and the implementation conform to the requirements. These are two distinct gates, with distinct artifacts and distinct default reviewers.
3. **Drift detection as a substrate hook.** When a reference to an SR/SPEC absent from the requirements substrate is found in code, the atomic change unit in the implementation substrate is blocked (see chapter 10 §10.5, chapter 3 §3.5).
4. **Prohibition of silently adapting an SR to the code.** If the implementation does X while the SR requires Y, exactly one of two things is true: (a) the implementation is wrong — a bug-fix task is created to bring the code to the SR; (b) the SR is wrong — a delta-ADAPT is created with justification and signatures to change the SR. A third option ("we'll just update the SR to match the code") is prohibited.

2.3.4 Positioning in the industry typology

Claim 1 is a concrete realization of the **Spec-Driven Development (SDD)** paradigm — an industry term that emerged in 2024–2025 in response to the acceleration of development with AI agents. SDD recognizes that when AI agents can decompose formal specifications into code in minutes, **specification correctness** becomes the critical constraint, rather than code correctness.

Standard / methodology or framework	Corresponding provision	Relation to RENAR §2.3
ISO/IEC/IEEE 29148:2018 §6.4.5	Requirements management mandates traceability from requirements to implementation	RENAR §2.3 is a concrete realization of this mandate
BABOK Guide v3 §6.5	Verify requirements before they drive solution work	RENAR §2.3 normatively specifies verification as two distinct gates (code/spec)

ISO/IEC 5338:2023	AI-system lifecycle — requirements govern the generation of AI artifacts	RENAR §2.3, together with the reference/04 AI Style Guide and adversarial review (guide/07 §4.5), supports this mandate
Spec-Driven Development (industry, 2024-2025)	GitHub Spec Kit, Anthropic spec-first agents, Amazon Kiro, Tessl, BMAD-Method	RENAR is the formal standard within this paradigm

What is new here for RENAR. The Source-of-Truth inversion itself is the definition of the SDD paradigm, not a RENAR invention. RENAR's contribution is its **enforcement**: the four contractual consequences of §2.3.3 (prohibition of reverse-engineering into an SR, separation of code review and specification review, the drift hook, prohibition of silently adapting an SR to the code), which turn the paradigm from a principle into verifiable normative requirements.

2.3.5 Differentiation from SDD tools

Industry SDD tools and RENAR are in one paradigm, but in different layers:

Axis	Industry SDD tools (Spec Kit, Kiro, Tessl, BMAD)	RENAR
Nature	Reference implementation plus ready-made tooling with a prescribed process	Formal normative standard (capabilities, lifecycle, invariants)
Substrate	tied to a specific tool / platform	substrate-independent (V1–V6); VCS / document-oriented store / other — interchangeable
Contractual loop	Usually absent	ADAPT: two-way adaptation of the TZ + dual signature (§7)
Conformance	Undefined	Conformance claim via a manifest + mandatory clauses (§13)
Verification	Tests as a practice	pos/neg pairing + judge ≠ production as blocking gates (§9)

RENAR does not compete with these tools: an industry SDD tool MAY be a **substrate-native RENAR implementation** without losing the portability of the conformance claim (§14.5.2).

2.4 Claim 2 — Waterfall-shaped, not classical waterfall

2.4.1 Normative formulation

The RENAR process has a sequential, layered shape: TZ → ADAPT → BR/SR/SPEC → TR → implementation → TC run → accepted. This is a waterfall-like shape. The standard explicitly distances itself from the four deadly sins of classical waterfall and MUST NOT be interpreted as classical waterfall in the sense of Royce 1970.

This claim is a **positioning clarification** (removing a false analogy with classical waterfall), not a claim of novelty: after the four distancings of §2.4.2 the shape coincides with the V-model and ATDD. RENAR's

novelty lies in ADAPT, V1–V6, and the translation of practices into mandatory clauses. The claim remains a mandatory clause (§2.7) — without it, a reviewer forces an unsuitable template onto RENAR.

2.4.2 The four distancings from classical waterfall

Classical waterfall (Royce 1970, industry practice 1970–1990)	RENAR
One big "requirements → design → code → tests" pass per quarter or year	**delta-TZ workflow**: each change is a mini-cycle taking days or hours. The same shape repeats hundreds of times with AI acceleration. See chapter 7 §7.6 (delta-ADAPT)
Tests at the end of the cycle, after implementation	**TC is a full-fledged verification artifact** (chapter 9). Paired pos/neg TCs are created together with the SR/SPEC, not after the code. This is closer to the V-model and ATDD than to waterfall
One-way "throw the spec over the wall"	**ADAPT is a two-way document** by construction. Forward (engineering interpretation) + Backward (questions to the client). Prohibition of one-way handoff
The spec is written once, then untouchable; reality drifts	**Continuous reconciliation** through substrate hooks. code ↔ spec drift is detected automatically and lands in a delta-ADAPT. The spec is alive

2.4.3 Applicability

RENAR is applicable in the following contexts:

- Contract-oriented development (the presence of a contract with the client, a signed TZ).
- Regulated industries: regulatory conformance, medicine, fintech, the public sector, PII processing.
- Enterprise consulting (a third party builds the product against someone else's TZ).
- Projects with a high cost of requirement changes late in the cycle.
- Projects requiring an audit trail for conformance reviews (chapter 13).

RENAR is **not applicable** in the following contexts:

- Pure product discovery without a contractual context (lean startup, product-MVP "build first, understand what we are building later").
- Pure R&D without defined requirements.
- Prototyping with a lifecycle shorter than the time to write an ADAPT.

Applicability is documented as part of the conformance procedure (chapter 13).

2.4.4 Positioning in the industry typology

Methodology	Relation to RENAR
Classical Waterfall (Royce 1970)	RENAR distances itself on the 4 points of §2.4.2
V-model	RENAR is closer to the V-model: paired TCs, tests at the start of each layer
Scrum / Kanban	Not in conflict, but RENAR is a different axis (artifact-based, not process-based). A Scrum sprint MAY contain a RENAR delta-ADAPT cycle

SAFe Solution Intent	ADAPT is a concrete realization of Solution Intent for contract-oriented development. See guide/05-safe-comparison.md
BABOK Requirements Analysis	RENAR §2.3+§2.4 is a formal realization of BABOK §3+§6 for the context of development with AI agents

2.5 Claim 3 — Substrate-independent versioning

2.5.1 Normative formulation

Versioning is a mandatory property of the substrate implementing RENAR. The standard sets six capabilities (V1–V6) that the substrate MUST provide. The particular versioning tool is interchangeable: a substrate satisfying V1–V6 implements RENAR regardless of whether it is a distributed VCS, a centralized VCS, a document-oriented DBMS with conflict resolution, or another mechanism.

2.5.2 The six mandatory capabilities (overview)

The full normative formulation of V1–V6 is in chapter 3. At the level of typological positioning:

#	Capability	What it provides
V1	Immutable history	Any past state of an artifact is recoverable
V2	Atomic change unit	A "change" is one transaction; all or nothing
V3	Diff & review	A human sees a change and approves or rejects it before integration
V4	Branching / change-set	Drafts are separable from the approved truth
V5	Cross-substrate version pin	The implementation substrate pins the version of the requirements substrate
V6	Author + timestamp	Every change has an author and a time

2.5.3 A substrate that does not satisfy V1–V6 does not implement RENAR

The impossibility of implementing RENAR on a substrate without V1–V6 is structural, not operational: claim 1 (Source-of-Truth inversion) physically does not work without versioning, because:

- It is impossible to say "the implementation was built against the requirements as of date X" — provenance is lost (violation of V1, V6).
- It is impossible to build a delta-ADAPT — there is no base version against which to measure the delta (violation of V1).
- It is impossible to verify a TC — the `verifies[].requirement-version` field loses meaning without a stable version identifier (violation of V5).
- The requirement transition `verified → accepted` is impossible — the gate has nothing to rely on (violation of V1, V5).
- An audit trail of "what we delivered to the client under contract 2025-Q3" is impossible (violation of V1, V6).

Therefore a substrate without V1–V6 (a flat file server with file renaming as the versioning mechanism; a document store without conflict resolution; other systems without immutable history) **does not implement RENAR** regardless of its other properties.

2.5.4 Substrate-independent normative language

RENAR's normative paragraphs use substrate-independent language: "atomic change unit," "version pin," "author and timestamp," "diff & review" — not the names of specific tool primitives. This ensures the standard applies to any future substrate satisfying V1–V6. Substrate-specific details are in Chapter 3 §3.4 (the normative mapping table of V1–V6 × substrates), guide/03-tool-guide-git.md (distributed VCS), guide/04-document-store-substrate.md (document-oriented store).

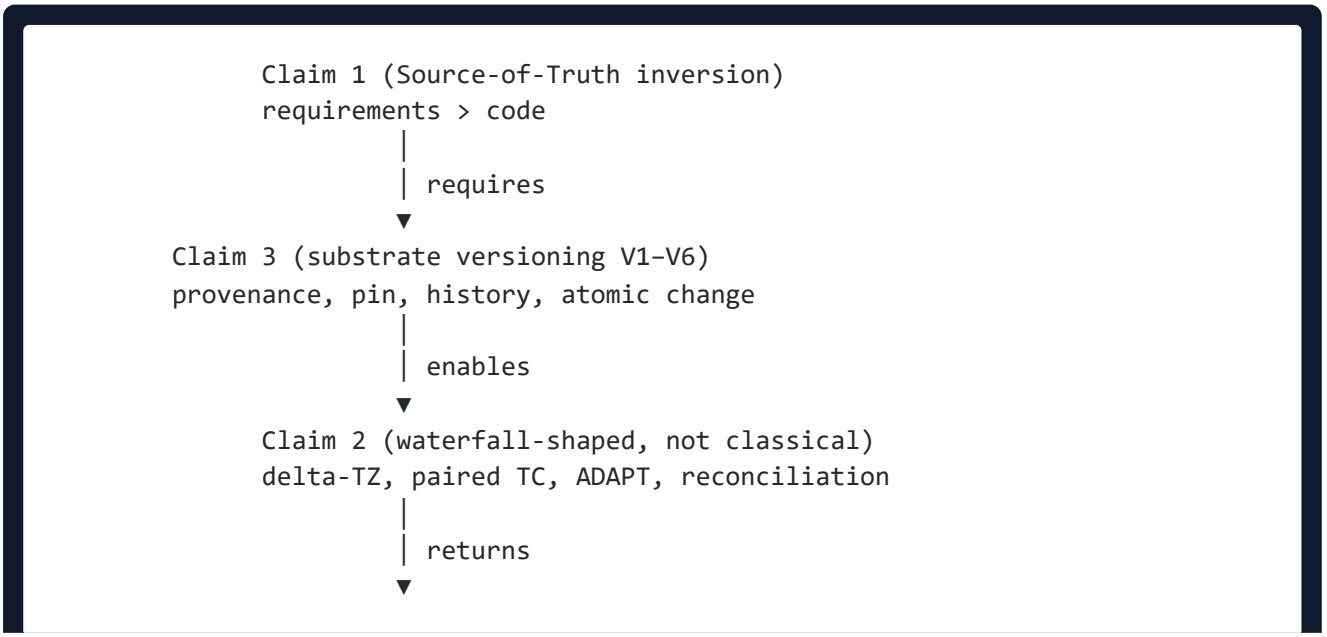
2.5.5 Positioning in the industry typology

Standard	Corresponding provision	Substrate neutrality
ISO/IEC/IEEE 29148:2018 §6.4.5	Configuration management of requirements	substrate-neutral; governs capabilities, not tools
BABOK Guide v3 §5.3	Maintain requirements (for traceability)	substrate-neutral
CMMI-DEV CM SG2	Track and Control Changes	substrate-neutral
SAFe Solution Intent	Versioned artifact	Does not govern the substrate
ISO/IEC 5338:2023	AI artifact provenance	substrate-neutral; provenance is a capability

RENAR follows the same neutrality and explicitly fixes V1–V6 as a contract, which these standards left implicit.

2.6 The logical connection of the three claims

The three claims are connected directionally:



```
Contract-oriented development
is viable with AI acceleration
```

Without claim 1: the Source of Truth is diffuse, the spec drifts, audit is impossible. **Without claim 3**: claim 1 is declarative and physically does not work. **Without an explicit claim 2**: a reviewer forces unsuitable templates onto RENAR (agile sprint without a waterfall shape, or classical waterfall without the 4 distancings) and rejects the standard on a false analogy.

All three claims are mandatory clauses (chapter 13). At the v1 level, a RENAR conformance claim requires accepting all three claims; without any one of them it is untenable.

2.7 Consequences for the conformance procedure

The claims of §2.3, §2.4, §2.5 are **mandatory clauses** for any conformance claim at the RENAR levels (RENAR-1..RENAR-5; see ch. 11, ch. 13). A team cannot claim "we implement RENAR-1 without Source-of-Truth inversion" (a contradiction in terms) or "we implement RENAR on a substrate without V1–V6" (the substrate is non-conformant); it MAY choose **not to claim** RENAR conformance in a context of non-applicability (§2.4.3) — this is normatively permissible. The concrete self-assessment checklist is in ch. 13.

2.8 Relationship to other chapters of the standard

Chapter	Relation
06 Requirements	The BR/SR/TR hierarchy is a concretization of the Source-of-Truth chain from §2.3.2
07 ADAPT	Two-way adaptation is a concretization of claim 2 (distancing from "throwing the spec over the wall")
08 Specifications	SPEC-* as a parallel axis is a consequence of the Source-of-Truth inversion for structural description
09 Test cases	TC as a full-fledged verification artifact is a concretization of claim 2 (distancing from "tests at the end")
10 Lifecycle and QG	The gates enforce claim 1 (drift hooks) and claim 2 (continuous reconciliation)
03 Substrate versioning	The detailed norms of V1–V6 (§2.5 is an overview)
11 Maturity	The RENAR-1..RENAR-5 levels extend the claims with additional requirements
13 Conformance	Self-assessment against the three mandatory clauses

03. Substrate versioning — V1–V6

3.1 The six substrate capabilities

The Source-of-Truth inversion from chapter 2 — the requirement wins, not the code — rests on a single physical condition: the substrate MUST faithfully remember what changed and when. If a past state can be rewritten after the fact, the phrase "the implementation was accepted against the requirements of version X" loses its meaning, and with it the whole acceptance contract collapses. So the six capabilities V1–V6 are not an infrastructure detail but the foundation on which the RENAR idea stands at all; that is why we put them up front, before the chapters on artifacts.

This chapter gives a **detailed normative formulation** of each capability: preconditions, postconditions, the relation to the trace chain of the Source of Truth, and examples of mapping onto common substrates. The conceptual rationale is §2.5 (statement 3, "Positioning in the methodology typology").

The concrete versioning mechanism — distributed or centralized VCS, a document store with conflict resolution — is **interchangeable**. RENAR governs capabilities, not tools.

3.2 Rationale for mandatoriness

Let us examine, one by one, exactly what breaks without each capability. The relation here is structural, not operational: it is not about team discipline, but about the fact that without the capability the corresponding property of truth simply cannot be expressed.

No capability	What becomes impossible	Relation in RENAR
V1 (immutable history)	"The implementation was built against the requirements as of date X"	provenance, audit log, acceptance gate
V2 (atomic change unit)	Guaranteed consistency of changes	delta-ADAPT as an atomic change unit (see §7.6)
V3 (diff & review)	Approval of requirements and specifications	QG QG-ADAPT-approve, QG-spec-approved
V4 (branching / change-set)	A draft is separable from approved truth	transitions `draft` → `review` → `approved`
V5 (cross-substrate version pin)	Pinning a requirement version from the implementation	the `verifies[].requirement-version` field in TC (§9)
V6 (author + timestamp)	provenance of every change	signatures in ADAPT, `ai-provenance` in SR/SPEC

Therefore a substrate without V1–V6 — a flat file server with no history, a document store without conflict resolution, any mechanism without immutable change tracking — **does not implement RENAR** regardless of its other merits. This is a structural constraint, not a question of team discipline.

3.3 Normative definitions of V1–V6

Paragraphs §3.3.1–§3.3.6 are formulated **independently of any concrete substrate**. The names of specific products appear only in §3.4 (example) and §3.6 (language illustrations).

3.3.1 V1 — immutable history

Capability (immutable history): the substrate MUST ensure that, for any artifact, any past state is addressable and recoverable without loss.

Preconditions: the artifact is registered in the substrate as a versioned object.

Postconditions: for any point in time T in the artifact's history there exists a stable version identifier through which the state at moment T is fully recoverable.

Without V1 it is impossible to:

- Recover the artifact's state as of the contract-signing date.
- Compare the current state with a baseline.
- Build an audit log for conformance (chapter 13 §13.4).
- Set a baseline point for delta-ADAPT.

Concrete realizations on different substrates — §3.4.

3.3.2 V2 — atomic change unit

Capability (atomic change unit): the substrate MUST ensure that any change to an artifact (or to a consistent group of artifacts) is recorded as a single transaction: all or nothing. Intermediate inconsistent states are not observable from the outside.

Preconditions: the substrate has a notion of a transaction (atomic change).

Postconditions: after an atomic change, either all edits are visible to an observer or none are. An intermediate "inconsistent" state MUST NOT exist.

Without V2 it is impossible to:

- Update a BR and its related SR consistently in one transaction.
- Guarantee consistency between a requirement and its `linked-tasks[]` metadata.
- Carry out ADAPT approval as a single atomic action (dual signature + the `client-ready → approved` transition in one transaction).
- Roll back a change without a "half-applied" state.

3.3.3 V3 — diff & review

Capability (diff & review): the substrate MUST ensure that a proposed (but not yet integrated) change is representable as a diff against a baseline state, and that a human or AI agent with review authority can approve or reject it **before** it is included in approved truth.

Preconditions: the proposed change exists separately from approved truth (see V4).

Postconditions: before approval the change exists but is not considered part of the Source of Truth. After approval it becomes part of the Source of Truth as an atomic change unit (V2).

Without V3 it is impossible to:

- Run the quality gates QG-ADAPT-approve, QG-spec-approved, QG-sr-approved (see chapter 10).

- Apply the ADAPT dual signature (see §7.5).
- Review code and specification independently (see §2.3.3 (2)).
- Use adversarial review as a gate.

3.3.4 V4 — branching / change-set

Capability (branching / change-set): the substrate MUST separate **work in progress** (WIP) from **approved truth** (the Source of Truth) so that several independent changes can be developed in parallel without affecting the Source of Truth.

Preconditions: the artifact is registered in the substrate.

Postconditions: for any artifact at a given moment there MAY exist (a) exactly one approved version (the Source of Truth) and (b) zero or more drafts — each of which is either integrated through V3 or rejected.

Without V4 it is impossible to:

- Separate the `draft` lifecycle status from `approved` (chapter 10).
- Run several delta-ADAPTs in parallel.
- Hold backward findings in `asked-to-client` without blocking approved truth.
- Evolve SPEC-* experimentally without affecting requirements derived from the implementation.

3.3.5 V5 — cross-substrate version pin

Capability (cross-substrate version pin): substrate A that uses an artifact of substrate B MUST be able to pin a specific version of substrate B's artifact as a stable cross-substrate identifier. This identifier MUST unambiguously recover the state of the artifact in substrate B.

Preconditions: substrate A and substrate B satisfy V1 (each has a stable version identifier).

Postconditions: for every pinned reference in substrate A to an artifact of substrate B there exists a pair `(artifact-id, version-id)`, and through it the full state of substrate B's artifact at the moment of pinning is recovered.

Without V5 it is impossible to:

- Use the `verifies[].requirement-version` field in TC (chapter 9 §9.4).
- Tie the implementation substrate (code) to a specific version of the requirements substrate (SR/SPEC).
- Guarantee: "this implementation was accepted against the requirements of version X."
- Compute the TC freshness metric (a pinned version older than the current one — the TC is stale).

3.3.6 V6 — author + timestamp

Capability (author + timestamp): for every atomic change unit (V2) the substrate MUST register an identifiable author (a human or an AI agent with a unique id) and a timestamp with a precision no coarser than one second.

Preconditions: the substrate has an author identification system.

Postconditions: for any atomic change unit the query "who? when?" yields an unambiguous answer.

Without V6 it is impossible to:

- Apply the ADAPT dual signature (a signature = author + timestamp in the substrate's native form).
- Record `ai-provenance` in artifact frontmatter.

- Build an audit log for conformance.
- Compute the adversarially-found metric (the distribution of backward findings across authors).

3.4 Mapping V1–V6 onto concrete substrates (example)

> ***Informative.*** *The table shows how V1–V6 are usually realized on common substrates. It is* ***not*** *part of the normative contract. Any substrate that satisfies V1–V6 implements chapter 3 — whether or not it appears in the table.*

Capability	Git	Mercurial	SVN	Perforce	Document store (example)
V1 — immutable history	commits, hash-chain	changesets, hash-chain	revisions, sequential numbering	changelists	revision tree per doc (`_rev`)
V2 — atomic change unit	commit	commit	atomic revision	changelist submit	document update (single _rev advance)
V3 — diff & review	merge request / pull request	hg phabricator, mq	svn diff + commit gate	swarm review	API workflow + Hub UI approval
V4 — branching / change-set	branches	named branches, bookmarks	branches (copy semantic)	branches / streams	conflict branches / WIP docs / draft status
V5 — cross-substrate version pin	submodule SHA	subrepo changeset	externals (peg rev)	branches / streams reference	`_rev` reference + `created_by_order`
V6 — author + timestamp	commit metadata	commit metadata	revision properties	changelist metadata	doc fields (`author` , `updated_at`)

Practical workflows for each substrate:

- guide/03 — git
- guide/04 — document store

3.5 A substrate that does not satisfy V1–V6

The following configurations **do not implement RENAR**, because they violate one or more capabilities:

Configuration	Violation
Flat file server; "version" = renaming the file	V1 (no stable history; renaming = loss of provenance)
Document store without conflict resolution	V2 (an inconsistent state is possible)
Wiki without revision history	V1, V6
Wiki with revision history but no approval procedure	V3

VCS using `mtime` instead of an immutable identifier	V1, V5
Substrate that edits historical revisions in place	V1 (history is mutable — an audit log is impossible)

A team **adopting** RENAR on a substrate from this list **MUST** either migrate to a suitable substrate or build a **compensating layer** that provides V1–V6 on top of the underlying storage. In both cases the conformance manifest MUST explicitly document how V1–V6 are realized.

3.6 Substrate-independent language

RENAR normative paragraphs use **substrate-independent** wording: "atomic change unit" (V2), "version pin" (V5), the `approved` state (after V3), "draft" (V4). Terms **specific to a substrate** (tool names and their primitives) are permitted only:

- in illustrative tables with an explicit marker (as in §3.4);
- in cross-references to a substrate-specific guide/;
- in appendices to normative chapters.

3.6.1 Examples: normative form and a git illustration

Normative (substrate-independent) wording	Git illustration (not the norm)
"A requirement change is recorded as an atomic change unit with author and time (V2, V6)"	"The change is recorded as a commit"
"A change passes diff & review before integration (V3)"	"The change passes merge-request review before merge into main"
"The implementation substrate pins a specific version of the requirements substrate (V5)"	"`.src` pins the `.req` submodule SHA"
"The ADAPT dual signature — two independent author+timestamp events (V6)"	"The dual signature — two approvals in the merge-request UI"
"Editing an already-approved requirement outside an atomic change unit with review is a violation"	"A force-push to an approved branch is blocked by hooks"

3.6.2 The substrate as a conformance parameter

Each team fixes its **substrate choice** in the conformance manifest with an explicit mapping V1–V6 → substrate-native primitives. When the substrate changes (for example, from git to a document store) the manifest is updated and a regression check of V1–V6 is run (§3.8).

3.7 Conformance manifest

The canonical schema is §13.4, the file `RENAR-CONFORMANCE.yaml` (YAML 1.2) at the root of the requirements substrate. Chapter 3 governs the substrate-related part: the declaration of the chosen substrate and the V1–V6 mapping (the `substrate-capabilities` field, §13.4.2).

```yaml
# Fragment of RENAR-CONFORMANCE.yaml — the substrate-specific part
# (full schema — §13.4.2)
substrate:
  requirements:   { tool: "<name>", version: "<version>" }
  implementation: { tool: "<name>", version: "<version>" }
v1-v6-mapping:
  v1-immutable-history:   { primitive: "<substrate-specific>", validation: "<CI
check / manual>" }
  v2-atomic-change-unit:  { primitive: "<substrate-specific>", validation: "<CI
check / manual>" }
  v3-diff-review:         { primitive: "<substrate-specific>", validation: "<CI
check / manual>" }
  v4-branching:           { primitive: "<substrate-specific>", validation: "<CI
check / manual>" }
  v5-cross-substrate-pin: { primitive: "<substrate-specific>", validation: "<CI
check / manual>" }
  v6-author-timestamp:    { primitive: "<substrate-specific>", validation: "<CI
check / manual>" }
```

Confirmation of the mandatory clauses (§2.3 Source-of-Truth inversion, §7 ADAPT, §8 closed list of 9 SPEC types, §9 pos/neg, and others) goes in the `mandatory-clauses-confirmed` field (§13.3–§13.4).

The manifest is **REQUIRED** for any conformance claim at level RENAR-1 and above (chapter 13).

3.8 Substrate migration

When changing the substrate, the team **MUST** perform the steps in order:

1. **Pre-migration audit:** the target substrate satisfies V1–V6; otherwise migration is prohibited until a compensating layer exists.
2. **Manifest draft:** an updated `RENAR-CONFORMANCE.yaml` with the new mapping.
3. **Isomorphism check:** all artifacts (BR, SR, SPEC, ADAPT, TC) are transferable without loss of fields, ids, or provenance. All ids are **immutable** — renaming during migration is prohibited.
4. **Atomic switchover:** the migration is an atomic change unit at the process level; a single-moment transfer of all artifacts. **Using two substrates as the Source of Truth in parallel is prohibited** (see §2.3.3 (1)).
5. **Post-migration check:** a regression check of V1–V6 on real artifacts.
6. **Manifest registration:** the updated `RENAR-CONFORMANCE.yaml` is registered in the new substrate as an atomic change unit (V2).

After switchover the old substrate is an archive (a read-only snapshot) or is decommissioned. Working on two substrates as the Source of Truth in parallel is prohibited.

3.9 Relation to other chapters

Chapter	Relation
02 Positioning in the typology §2.5	Conceptual rationale for V1–V6

06 Requirements hierarchy	frontmatter relies on V1 (immutable id), V5 (version pin)
07 ADAPT	Approval by dual signature — V3 + V6; delta-ADAPT — V1 + V2 + V4
08 Specifications	`constrained-by[]`, `depends-on[]`, `referenced-by[]` — through V5
09 Test cases	`verifies[].requirement-version` — a direct application of V5
10 Lifecycle and QG	Status transitions — V2 + V3 + V4
11 Maturity model	RENAR-3+: V5 required; RENAR-4+: V6 + ai-provenance
13 Conformance	`RENAR-CONFORMANCE.yaml` — a mandatory artifact
guide/03	Practice on git
guide/04	Practice on a document store

04. Terms and Definitions

> ***Part of the RENAR Standard v1.0-draft*** · ← *Table of contents*

4.1 Why a single vocabulary of terms

The same word often means different things to two teams: for one a "spec" is an SR, for another a screen mock-up, for a third a whole API contract. As long as terms float, traceability collapses and any conversation about conformance stalls. This chapter removes the ambiguity: a reference of phrasings read when aligning artifacts, checking the substrate, and preparing a conformance assessment. It fixes one name per concept and so quenches terminological drift between teams and tools. After the table of contents, go to §4.3–§4.5 for artifact types, §4.6–§4.7 for statuses and gates, §4.8–§4.10 for substrate and provenance, §4.11/§4.14 for drift classes and forbidden terms; the index of closed lists — §1.7.5.

The chapter normalizes the **canonical terminology of RENAR**: one definition per concept; a single source of truth for the other chapters, implementation substrates, and conformance-checking tools. Terminological drift (§4.11) is a distinct class of conformance violations (§13.3.1 indirectly).

The chapter does **not** duplicate reference/01-glossary.md: this chapter contains the **canonical normative** short-form definitions; `reference/01` provides expanded explanations with anti-patterns, history, and industry context (informational material).

4.2 The "canonical only" principle

RENAR picks **one canonical term** per concept. Inside the substrate (frontmatter, IDs, normative body paragraphs, scripts, CI hooks) **only the canonical term** is used. The mapping to related standards (§4.13) is for documentation, migration, and integration with external systems; inside the substrate, replacing the canonical term with an equivalent from the mapping table **does not happen**.

When a non-canonical term (per §4.14) is detected in a normative artifact, the substrate-native hook (§10.11.1) MUST raise a warning on the change-set; for RENAR-4+ (§11.7) — a blocking error.

Multilingual projects MAY display the canonical terminology in the UI in the client's language (§4.13.3); this is a **UI translation**, not a canonical replacement.

4.3 Requirement artifacts

4.3.1 TZ — source requirements artifact

TZ (`TZ-YYYY-NNN`) is an **immutable** (§7.4.2) contractual artifact recording the obligations between the client and the engineering team. Once registered in the substrate it is not edited. Changes go through a delta-TZ as a new immutable artifact (§7.6).

4.3.2 ADAPT — bridge artifact

ADAPT (`ADAPT-NNN`) is a mandatory bridge artifact (§7.4.1) between the TZ and the requirements hierarchy. It contains Forward (the engineering interpretation) + Backward (questions to the client) sections. Each TZ MUST have exactly one root ADAPT in status `approved` (§13.3.3). Lifecycle: §4.6.4.

4.3.3 BR — Business Requirement

BR (`BR-NN`) is a business-level artifact. It describes an observable business effect (`business-outcome`), not the way of achieving it. It decomposes into SR. Frontmatter — §6.5.2. Lifecycle: §4.6.1.

4.3.4 SR — System Requirement

SR (`SR-NN`) is a system-level artifact. It describes the mandatory behavior of the system within a single business effect. It has a parent BR (`parent: BR-N`) or a parent SR (when `level: subsystem` or `level: module` — §6.7). Frontmatter — §6.6.2. Lifecycle: §4.6.1.

4.3.5 TR — Task Requirement

TR (`TR-NN`) is an implementer task-level artifact. It describes a practically executable piece of work with goal + AC. It has an implementation chain `implements: SR-N` (or BR for trivial tasks). Frontmatter — §6.7.2. Lifecycle: §4.6.2.

4.3.6 Hierarchy

The requirements hierarchy:

```
TZ → ADAPT → BR → SR → TR → implementation
                   │
                   └── SPEC-* (parallel axis, §4.4)
```

An SR MAY implement a SPEC through `implements-spec[]` (§8.6.2) — this is a **link**, not a parent edge.

4.4 SPEC artifacts

SPEC is an artifact of the structural description of the system as a parallel axis to the requirements (§8.2). It is not a parent edge with SR; it is linked through `constrained-by[]` / `implements-spec[]` (§8.6). Lifecycle: §4.6.3.

4.4.1 Closed list of the 9 SPEC types

Closed list (§8.3):

Type	Purpose
`SPEC-ARCH`	System architecture (contexts, containers, components, deployment view, quality attributes)

`SPEC-API`	API contracts (REST / GraphQL / gRPC / async events)
`SPEC-DATA`	Data model (schema, ERD, migrations, retention, PII classification)
`SPEC-INT`	Integration (interaction between subsystems and external systems)
`SPEC-PROC`	Process / workflow (business processes, state machines, saga)
`SPEC-UI`	UI / UX (screens, navigation, accessibility, baselines)
`SPEC-AI`	AI / ML (model cards, RAG, prompt engineering, eval strategy)
`SPEC-SEC`	Security (authn / authz, threat model, secrets management)
`SPEC-OPS`	Operations (deployment, observability, SLO/SLA, runbook)

A project MUST NOT create new SPEC types locally (§13.3.4).

4.5 Testing artifacts

4.5.1 TC — Test Case

TC (`TC-NN`) is an artifact of a verifiable criterion. It covers the normative assertions of BR / SR / SPEC (through `verifies[]` with a version pin, §9.4). Lifecycle: §4.6.5.

4.5.2 Closed list of TC types (`tc-type`)

Closed list (§9.5):

`tc-type`	Purpose
`acceptance`	E2E tests of the business goal for BR (§9.5); runner-family: E2E + AI validator
`ux`	UX tests with a VLM judge (§9.6.1) for SPEC-UI
`system`	General-purpose system tests for SR / SPEC-PROC / SPEC-ARCH (§9.5)
`contract`	Contract tests (§9.6.3) for SPEC-API / SPEC-INT / SPEC-DATA
`eval`	Eval tests for SPEC-AI with an LLM judge (§9.6.2); the judge model MUST differ from the implementation model
`security`	Security tests (§9.6.4) for SPEC-SEC by STRIDE categories

4.5.3 Pos / neg pairing

Normative requirement (§9.7): every normative assertion is covered by a **pair** of TC (positive scenario + negative scenario). Single-TC coverage is permitted only for invariant assertions (security STRIDE).

4.6 Lifecycle statuses

4.6.1 BR / SR

Closed list (§10.5): `draft → approved → verified → accepted → deprecated`. `accepted` is a terminal non-degradable status (§10.4.2, optional); `deprecated` is terminal.

4.6.2 TR

Closed list (§10.6): `draft → approved → done`; `obsolete` is the alternative terminal status.

4.6.3 SPEC

Closed list (§10.7): `draft → review → approved → verified`; `obsolete` is terminal.

4.6.4 ADAPT

Closed list (§10.8): `draft → review → client-ready → answered → approved → frozen`. `frozen` is a terminal immutable status; changes are made only through a delta-ADAPT or errata.

4.6.5 TC

Closed list (§10.9): `draft → ready → passing / failing → obsolete`. `passing ↔ failing` are runner-managed transitions (§10.9.3), not gate-passages.

4.6.6 Backward findings (sub-state in ADAPT)

Closed list (§7.4.5): `open → asked-to-client → answered → resolved → frozen`; `revised` is a return to `asked-to-client`.

4.6.7 Lifecycle closed lists are not locally extensible at the project level

Any status outside the closed list for the corresponding artifact type is a conformance violation (§10.10.2).

4.7 Quality Gates

The canonical list from §10.3 + §10.4. A project MUST NOT create new gate types locally (§10.10.2, §13.3.6).

Gate	Purpose	Conformance status
`QG-0` — Approval (§10.3.1)	Approval of an artifact for development / implementation	**Required**
`QG-1` — Implementation (§10.3.2)	Implementation valid (TC `draft → ready` only)	**Required**
`QG-2` — Verification (§10.3.3)	Promote an artifact to `verified`	**Required**

`QG-3` — Architecture (§10.4.1)	Approval of ADAPT (dual signature) / SPEC-ARCH	Optional (`declared` or `absent`)
`QG-4` — Acceptance (§10.4.2)	Acceptance of a BR into `accepted`	Optional

Runner-managed transitions (`ready → passing` , `passing → failing` , and others) are **not** Quality Gates (§10.9.3).

4.8 Substrate terms

4.8.1 Substrate

Substrate (in fields and code — `substrate`) is the system for storing and versioning RENAR artifacts. RENAR is substrate-independent: it normalizes capabilities (§4.8.2), not tools.

4.8.2 Capabilities V1–V6

The closed list from §3.3. All six are absolutely mandatory for conformance (§13.3.2):

Capability	Semantics
`V1` — Immutable history	Any past state of an artifact is recoverable
`V2` — Atomic change unit	Changes are committed as "all or nothing"
`V3` — Diff & review	A proposed change is representable as a diff against a baseline state and passes approval before integration into the source of truth
`V4` — Branching / change-set	Drafts are separable from approved truth; parallel changes are independent
`V5` — Cross-substrate version pin	A link between substrates pins a specific version of an artifact
`V6` — Author and timestamp	Every atomic change unit has an identifiable author and a timestamp of ≥ second-level precision

4.8.3 Atomic change unit

A substrate change (V2) satisfying the "all or nothing" property — a substrate-native transaction; intermediate inconsistent states are not observable from the outside. The concrete implementation (an atomic write in a distributed VCS, a transaction in a document store, another mechanism) is substrate-specific; the description of the forms is deferred to `guide/` .

4.8.4 Version pin

A substrate-native mechanism (V5) that pins a specific version of an artifact in one substrate from another through the pair `(artifact-id, version-id)`.

4.8.5 Audit trail

A substrate-native append-only collection of gate-passage and transition events (§10.13). Each event contains a timestamp, artifact-id, artifact-version, from-status, to-status, gate-id, actor, evidence-refs. Deletion is not permitted (V1 retention, §10.13.3).

4.9 System hierarchy

Closed list of levels (§6.7, §6.8):

Level	Purpose
`system`	The entire product as a whole; the top level; rarely used (cross-subsystem tasks)
`subsystem`	A subsystem (for example, a separate service, a frontend application)
`module`	A module within a subsystem

The `level` field is recorded in the artifact frontmatter (BR / SR / TR). The hierarchy MAY be extended downward through subsystem → module evolution (§6.9.1) or back upward (§6.9.3).

4.10 Provenance terms

4.10.1 ai-provenance — canonical schema

A frontmatter block (§11.7.1, mandatory at RENAR-4) recording the provenance of an AI-generated artifact. This section is the **single canonical source** of the schema; the chapter-level YAML examples in §6.5.2, §6.6.2, §8.5, §9.3 refer here and do **not** define independent fields.

Field	Mandatory?	Semantics
`ai-provenance.generated-by`	mandatory	Model identifier (`<vendor>-<model>-<version>@<date>`)
`ai-provenance.generated-at`	mandatory	UTC timestamp of generation (ISO-8601)
`ai-provenance.prompt-template`	mandatory	Substrate-native pointer to a prompt template (`<path>@<version>`)
`ai-provenance.context-tokens`	mandatory	Input context size (integer)
`ai-provenance.output-tokens`	mandatory	Output size (integer); source for the metrics in §12.3

`ai-provenance.human-edits`	mandatory	Boolean — whether manual edits were made after generation (informational field; see §4.10.1.1)
`ai-provenance.generation-time-ms`	optional	Generation latency in milliseconds; RECOMMENDED at RENAR-5 for cost/latency budget monitoring (§11.8.1)
`ai-provenance.cost-budget`	optional at RENAR-4, mandatory at RENAR-5	Planned generation cost budget
`ai-provenance.cost-actual`	optional at RENAR-4, mandatory at RENAR-5	Actual cost; source for §12.3.9 Cost per Approved Requirement

Adding new fields to the schema is done only through the formal change procedure of the standard (§13.9). Locally defined ai-provenance.* fields by an implementing project are a `declared-stricter` extension (§10.10.2) and do not violate conformance, but are not considered canonical.

4.10.1.1 Semantics of `human-edits`

`human-edits` is an **informational** field for traceability and observability, not a gating flag. The value `human-edits: true` means the artifact was edited manually after the initial AI generation; it does **not** trigger auto-rejection. The normative rule P3 (§9.2) — "the engineer does not write TC by hand" — normalizes **provenance**, not subsequent edits. A substrate implementation MAY (`declared-stricter`) additionally require a review for artifacts with `human-edits: true` ; this is a local tightening, not part of the base RENAR-N conformance.

4.10.2 Source citation

An inline pointer in the artifact body (mandatory at RENAR-4, §11.7.1) to the source of a specific normative assertion. The format is substrate-specific; typical patterns: `[TZ-XXX §Y line Z]` , `[ADAPT-NNN §A.B]` , a `derived` marker with a pointer to the parent artifact.

4.10.3 Traceability chain

The chain of artifacts from the TZ to a TC run, recording the provenance of each assertion:

```
TZ → ADAPT → BR → SR → TR / SPEC → TC.last-run
```

Each link is connected through canonical frontmatter fields (§4.12). The trace chain is the source of truth for the conformance review (§12.5.3).

4.11 Drift classes (closed list)

A closed list of eight classes of violations of the requirements infrastructure. Changing the list is a formal change procedure of the standard (§13.9.3). The substrate-native hook (§10.11.1) MUST detect each class

at the corresponding enforcement point.

#	Class	What is violated	Enforcement point
4.11.1	Schema drift	An artifact's frontmatter does not conform to the mandatory schema ch. 06/08/09	Substrate hook on the change-set; RENAR-3+ — blocking (§11.6.1)
4.11.2	Lifecycle drift	An artifact is outside the closed list of statuses (§4.6) or has gone through a forbidden transition (§10.12)	Substrate hook on the promote-transition
4.11.3	Source-of-truth drift	Implementation code / a derived artifact diverges from the SR / SPEC it references through `verifies[].version` (V5)	Reconciliation hook RENAR-4+; registered as a backward finding in a delta-ADAPT
4.11.4	Implementation drift	The implementation substrate has stopped referencing the current `version` of the requirements substrate (the V5 pin is stale)	Auto-invalidate `verified` (§10.5.4)
4.11.5	Terminological drift	Use of a non-canonical term (§4.14) in a normative artifact	Substrate hook on the change-set; RENAR-4+ — blocking
4.11.6	Order / provenance drift	An artifact references a source in a lower status than the §10.3.1 reference-validation requires	Substrate hook (§10.11.1) blocks the change-set
4.11.7	TC ↔ requirement provenance drift	A TC has lost its `verifies[]` reference or `last-run.requirement-version` does not match the current `version`	Runner-managed: the TC is moved to `failing` (§10.9.3) until a re-run
4.11.8	Test-fitting drift	A TC's Pass / Fail criteria are changed simultaneously with the implementation code so that a failing TC becomes passing without addressing the root cause (§9.13)	Substrate hook via the `[test-spec-change]` marker; a single person cannot approve both change-sets (§10.11.3)

4.12 Connection field terms (frontmatter)

Canonical names of the fields recording links between artifacts:

Field	Source artifact	Semantics
`parent`	BR / SR	A single parent in the hierarchy (BR-NN or SR-NN)
`children[]`	BR / SR	Auto-derived reverse edge (§6.x)
`implements`	TR	Implementation chain (`SR-N` or `BR-N`)
`implements-spec[]`	TR	Implementation of SPEC-* specifications (§8.6.2)
`constrained-by[]`	SR	Constraints from SPEC-* (§8.6.1)
`depends-on[]`	SPEC	Dependency graph between SPECs (§8.6.3)

`verifies[]`	TC	Closed list of verifiable artifacts with `version` (§9.4)
`verified-by[]`	BR / SR / SPEC	Auto-derived reverse edge from `verifies[]`
`source.adapt`	BR / SR / SPEC	The ADAPT from which the artifact was derived
`replaces` / `replaced-by`	Any	Replacement on deprecation (§10.5.3)
`supersedes`	A new version of an artifact	Which artifact is being replaced (in lieu of "reviving" an obsolete one)
`last-run`	TC	Result of the last runner run (§9.12); bot-managed only

The full schema of each artifact — in reference/02-schemas.md.

4.13 Mapping to related standards

4.13.1 Requirement artifacts

RENAR canonical	SENAR (RU)	ISO/IEC 29148	BABOK v3	SAFe
`BR` (Business Requirement)	БТ (Бизнес-требование)	Business Requirement	Business Need	Portfolio Epic / Strategic Theme
`SR` (System Requirement)	СТ (Системное требование)	System Requirement / Software Requirement	Solution Requirement (Functional)	Feature
`TR` (Task Requirement)	ТЗ (Требование к задаче)	(no direct class; detailing of a system / system-element requirement)	Solution Requirement (detailed)	Story
`ADAPT`	(RENAR-extension)	(n/a — formalised bridge artefact)	Stakeholder Requirement workshop output	(n/a)
`TC` (Test Case)	ТК	Test Case (verifiable item)	Verification artefact	Story acceptance test
`SPEC-*` (9 types)	(RENAR-extension)	Design Description (subset)	Solution Component (subset)	Enabler tech spec (subset)

4.13.2 Lifecycle statuses

RENAR canonical	ISO/IEC 29148	CMMI
`draft`	proposed	identified

`approved`	agreed-to / baselined	committed
`verified`	verified	validated
`accepted`	accepted	accepted
`deprecated` / `obsolete`	retired / superseded	obsolete / superseded

4.13.3 Multilingual UI

Multilingual projects MAY display the canonical terminology in the UI in the client's language (RU example):

English (canonical)	Russian (UI translation)
Business Requirement	Бизнес-требование
System Requirement	Системное требование
Test Case	Тест-кейс
Quality Gate	Контрольная точка качества
Acceptance	Приёмка
Verified	Проверено
Approved	Утверждено
Deprecated	Устарело

This is **a UI translation only**. Frontmatter, IDs, file names, and normative body paragraphs are always canonical latin / the canonical RU from this chapter.

4.14 Forbidden / deprecated terms

A closed list of non-canonical terms; the RENAR-4+ substrate hook is blocking on detection in a normative artifact (§4.2).

Forbidden term	Canonical replacement	Why
"User Story" as a requirement	`SR`	A story is a unit of planning, not a requirement; a story MAY implement an SR through `implements`
"Use Case" (formally, as an artifact)	`SPEC-UI + SR`	A use case mixes UX and behavior; RENAR separates SPEC-UI (UX) and SR (behavior)
"Spec" (as a generic term)	A concrete `SPEC-*` or `requirement` / `SR`	"Spec" is ambiguous; we use precise terms
"Business logic"	`SR`	A code term, not a requirements term
"Functionality"	`SR` / `TR`	Too broad

"Feature" (as a requirement)	`BR` (business level) or `Feature` in a SAFe context (not RENAR canonical)	Ambiguous; RENAR uses BR
"Wish-list item"	(never)	A contractual document is not written this way
"Epic" (as a requirement)	`BR` (business level)	An epic is a unit of planning, not a requirement

4.14.1 Deprecated RENAR-specific labels

When migrating from pre-v1.0 draft material, deprecated labels are encountered:

Deprecated label	Canonical v1.0 replacement
`UIC` (UI Concept)	`SPEC-UI` (§8.5.6)
`AIC` (AI Concept)	`SPEC-AI` (§8.5.7)
`TS` (Technical Specification)	`SPEC-ARCH` or `SPEC-OPS` depending on the content
`INT-SR` (Integration SR)	`SR` with `constrained-by: [SPEC-INT-N]`
`INT-TC` (Integration TC)	`TC` with `tc-type: contract`
`TM` (Module/Submodule SR)	`SR` with `level: module` (§6.7)
`QG-0 Context Gate` (old)	`QG-0 Approval Gate` (canonical v1.0, §10.3.1)
`QG-1 Requirements Gate` (old)	`QG-1 Implementation Gate` (canonical v1.0, §10.3.2) — semantic shift: previously approval of BR/SR, now only TC `draft → ready`
`QG-2 Implementation Gate` (old)	`QG-1 Implementation Gate` (canonical v1.0, §10.3.2)
`QG-3 Verification Gate` (old)	`QG-2 Verification Gate` (canonical v1.0, §10.3.3)

Migrating an existing requirements substrate with old labels is a separate one-off process; the substrate-native hook on the change-set MUST auto-detect deprecated labels and propose canonical replacements.

4.15 Order of dispute resolution (Authority)

When there is a disagreement over a term, the order of recourse is:

1. **This chapter (§4)** — canonical for the RENAR Standard.
2. **The corresponding chapter of the standard** (06–14) — for artifact-specific semantics (for example, ADAPT specifics — in §7).
3. **SENAR §3** (terminology of the parent standard).
4. **ISO/IEC 29148:2018** — for general-engineering requirements terminology.
5. **BABOK v3** — for business-analysis terms.

6. **Fixing it through the formal change procedure** of the standard (§13.9.3) — if all of the above are silent.

Do not use as a source of terminology:

- Tickets in ticket systems (often contradictory).
- Team chats (slang ≠ canonical).
- Presentations and old draft material.
- Marketing material.

4.16 Relationship to other chapters

Chapter	Relationship
02 Methodology positioning	§2.3 Source-of-Truth inversion + §2.5 substrate-independent versioning — the foundation for §4.8 substrate terms
06 Requirements hierarchy	BR / SR / TR artifact frontmatter — §4.3, §4.9, §4.12 links
07 ADAPT	ADAPT specifics — §4.3.2, §4.6.4, §4.6.6 backward sub-states
08 Specifications	SPEC-* types — §4.4, §4.6.3 SPEC lifecycle
09 Test cases	TC — §4.5, §4.6.5; pos/neg pairing — §4.5.3
10 Lifecycle and QG	Canonical Quality Gates — §4.7; state machines by type — §4.6; closed-list policy — §10.10 in parallel with §4.11 / §4.14
03 Substrate versioning	V1–V6 definitions — §4.8.2
11 Maturity model	ai-provenance mandatory at RENAR-4+ — §4.10 (criterion source — §11.7.1)
12 Metrics	Drift classes §4.11 — source for metrics such as Reconciliation Findings (§12.3.10)
13 Conformance	§13.3 mandatory clauses reference the canonical terminology of this chapter
reference/01-glossary.md	Expanded explanations, anti-patterns, history — non-normative

05. Roles

> ***Part of the RENAR Standard v1.0-draft*** · ← *Table of contents*

5.1 Who is responsible for what

RENAR does not set up its own role hierarchy — it inherits the five base roles from SENAR §4 and adds specializations for working with requirements on top of them: who owns each artifact (ADAPT, BR, SR, SPEC, TR, TC) and who is responsible for each Quality Gate. This is also where the rule for which the chapter largely exists lives: the **ADAPT dual signature** (client + Architect), without which ADAPT does not transition to `approved`.

The chapter does **not** govern the substrate-native mechanisms for implementing role checks (substrate-native ACL, V6 author identifiers, substrate-native signing events) — that is the domain of chapter 3 (substrate capabilities) and `guide/03-tool-guide-*.md` (substrate-specific tooling).

5.2 Base roles (SENAR §4)

5.2.1 Closed list

RENAR references the five base roles of SENAR §4 as the Source of Truth. The list is closed on the SENAR side; RENAR neither adds nor removes roles.

Role	Brief semantics (for the RENAR context)
Supervisor	The person who initiates and oversees the work of the AI agent; in RENAR, the typical customer for requirements-elicitation, draft-generation, and ADAPT-review tasks.
AI agent	A software participant that performs the generation and maintenance of requirement artifacts (Forward interpretation of ADAPT, BR/SR/TR/SPEC/TC, updating graph links on changes). In RENAR — the **regular primary author** of artifacts (§0.2.1); includes the primary generator and the adversarial critic. The AI agent is **not** an owner (§5.3) and does **not** place signatures (§5.5).
Architect / Tech Lead	The person normatively accountable for technical decisions and the approval of requirement artifacts (QG-0 §10.3.1); a signing party of the ADAPT dual signature (§5.5). The Source of Truth is the SENAR §4 role "Architect / Tech Lead"; this EN edition uses the short name **Architect** (the RU corpus renders it «Архитектор»).
Reviewer	A person or AI agent performing the adversarial review of artifacts; in RENAR — a mandatory role for QG-0 (§10.3.1).
Stakeholder	An external interested party — the client, an authorized client representative, a product owner, an end-user representative; the source of the TZ and the client-side signing party (§7.5) and QG-4 (§10.4.2).

The full definition of each role's semantics — duties, constraints, interactions — is set out in SENAR §4 and applies to RENAR unchanged.

> ***Naming of the Architect role.*** *Everywhere below in the standard, guide, and appendices, the SENAR role "Architect / Tech Lead" is denoted by the short name* ***Architect*** *(for example, "the Architect confirmed" in §8.3, the dual signature in §5.5). This is a short form, not a separate role: a conformance manifest MUST use the normative SENAR name (§5.2.2).*

> ***Naming of the Stakeholder role.*** *Everywhere below in the standard, guide, and appendices, the SENAR role "Stakeholder" is used directly as the role name (for example, "an authorized stakeholder" in §5.3.6, the client-side signing party in §5.5). It is the normative SENAR name; a conformance manifest MUST use it verbatim (§5.2.2).*

5.2.2 No override

An implementation MUST NOT:

- Rename the SENAR base roles in the normative part of the conformance manifest (§13.4).
- Merge two base roles into one in a way that removes the possibility of independent signing (for example, merging the Architect and the Stakeholder makes the §5.5 dual signature impossible and is **not permitted**).
- Add new base roles outside SENAR §4 without the formal SENAR Standard change procedure.

Project-local **aliases** (for example, a local name "Lead Engineer" as a synonym for the SENAR Architect / Tech Lead) are permitted in communication, but the conformance manifest (§13.4) MUST use the normative role names of SENAR §4.

5.3 RENAR specializations: responsibility for artifacts

Each artifact type has a normatively fixed owner — the role responsible for initiating the artifact, its substantive integrity, and its one-click promote through QG-0 (§10.3.1).

§	Artifact	Owner	Responsibility type	QG participants
5.3.1	**ADAPT**	Architect (implementer) + Client representative	Joint — both roles REQUIRED for approval	QG-0: Architect; QG-3 (opt.): dual signature (§5.5)
5.3.2	**BR / SR**	Architect	Single (Accountable); AI agent = Responsible primary generator	QG-0: Architect or authorized role-holder (§5.4); QG-2: automated runner; QG-4 (opt.): Stakeholder
5.3.3	**SPEC-***	Architect + domain technical lead	Joint by SPEC type: Architect — overall; domain TL — expertise	QG-0: Architect or authorized role-holder
5.3.4	**TR**	Architect (approval) + Engineer (execution)	Split	QG-0: Architect; QG-2: Engineer + runner
5.3.5	**TC**	Engineer + QA	Joint — Engineer authorship, QA pos/neg pairing (§9.7)	QG-1: Engineer/QA + runner; QG-2: runner with V5 pin

5.3.6	**QG-4 accepted**	Stakeholder (Client + Product Owner)	Single — Architect not sufficient	Only if QG-4 is in the manifest (§10.4.2)

5.3.1 Owner of ADAPT

ADAPT is the only RENAR artifact with **mandatory** joint responsibility: one party cannot drive an ADAPT to `approved` without the participation of the other (§7.5) — a normative safeguard against a unilateral interpretation of the TZ.

5.3.2 Owner of BR / SR

The Architect is normatively accountable for the ADAPT → BR → SR decomposition and for the consistency of the requirements tree. The AI agent is the regular primary generator of draft BR/SR (§0.2.1, §5.2.1), but **not** the owner: the owner is always a human or an authorized role-holder (§5.4). In RACI: the AI agent is **Responsible** (executes), the Architect is **Accountable** (answers for the result). A manifest's attempt to declare the AI agent as Accountable is non-conformant (§13.3).

5.3.3 Owner of SPEC-*

The domain technical lead is the normative term for expertise on a specific SPEC type (§8.3): ARCH (system architect), API (API designer), DATA (data architect), INT (integration lead), PROC (process owner), UI (UX lead), AI (ML lead), SEC (security lead), OPS (operations lead). In small projects one person MAY combine domain TL roles; merging the Architect + all domain TLs into one person is permitted when declared in the manifest (§13.4).

5.3.4 Owner of TR

TR has split responsibility: task approval rests with the Architect/authorized role-holder, execution with the Engineer. The Engineer cannot approve their own TR (a violation of §10.2.2).

5.3.5 Owner of TC

The AI agent is permitted as the primary generator of TC, but MUST pass a QA check before `ready` (§10.3.2). In projects without an explicit QA role, the QA participant becomes an engineer other than the author of the TC.

5.3.6 Owner of the accepted gate (QG-4)

QG-4 is the only gate for which the Architect is **not** a sufficient participant. Confirming a post-release business outcome requires an authorized stakeholder (Client + Product Owner). When QG-4 is absent from the manifest, the gate does not apply, and the Client/Product Owner role is not governed at this lifecycle stage.

5.3.7 Closed-list policy for owner assignments

The list §5.3.1–§5.3.6 is closed at v1. Project-local extensions (a new owner for a new type; reassigning owner authority between SENAR §4 roles) are **not permitted** without the formal standard change procedure (§13.9).

Negative scenario: an attempt to declare that the ADAPT owner is the Architect alone (without the Client representative) is a violation of §5.3.1 and §13.3; the manifest is non-conformant.

5.4 Authorized role-holder

5.4.1 Normative definition

An **authorized role-holder** is a person with explicitly delegated Architect authority for a specific scope (one artifact, one artifact type, or the whole project). The delegation is recorded substrate-natively (V6 author identifier + ACL §3.3.6); the concrete mechanism is substrate-specific. "Authorized role-holder" is a normative term, identical in application across §10.2.2, §10.3.1, §13.5.

5.4.2 Permitted scenarios

A participant for the **QG-0 Approval Gate** (§10.2.2) — BR/SR/SPEC/TR/ADAPT (on the Architect side)/TC; **self-assessment** (§13.5) — an assessor with the role `authorized-role-holder` in the manifest.

5.4.3 Prohibited scenarios

An authorized role-holder does **not** replace the `client-signature` in ADAPT (the dual signature requires a client-side stakeholder, not an implementer-side authorized role-holder); does **not** replace the Stakeholder in QG-4 (§10.4.2); does **not** replace the external assessor in a third-party independent assessment (§13.6).

5.4.4 Substrate-side authorization

The delegation MUST be recorded natively via V6 (§3.3.6): a substrate with ACL — through a role-based access list; a substrate with capability tokens — through issuing a delegating token; a substrate without explicit authorization — through a declaration of delegation in a native project artifact (a separate file with the Architect's signature). Substrate-specific details — `guide/03-tool-guide-*.md`.

5.5 ADAPT dual signature

5.5.1 Normative rule

ADAPT transitions to `approved` (QG-3 §10.4.1, §10.8.2) **only** when both signatures are present:

1. **`client-signature`** — from the Client representative (a stakeholder authorized to sign on behalf of the client).
2. **`architect-signature`** — from the implementer's Architect.

The structure of the signature fields is fixed in §7.5; each signature contains `signed-by`, `role`, `signed-at`, `signature-ref` (a substrate-native pointer to the signing event).

5.5.2 Semantics of each signature

Signature	Confirms
`client-signature`	The Forward interpretation matches the client's intent; all backward findings are answered and the answers are final; the ADAPT represents an understanding of the TZ agreed with the client.
`architect-signature`	The Forward interpretation is technically feasible; all backward findings are in the `resolved` state (§7.4.5); the decomposition into BR / SR / SPEC is safe to launch.

The signatures are **not** interchangeable. The Architect does not confirm client semantics; the Client does not confirm technical feasibility. Both confirmations are normatively mandatory.

5.5.3 Negative scenarios

- **One signature missing**: an ADAPT with only `client-signature` or only `architect-signature` filled in does **not** normatively transition to `approved`. QG-3 is prohibited (§10.8.2); an attempt at a forced transition is a violation of §13.3.
- **One person in both signatures**: an implementation where `client-signature.signed-by == architect-signature.signed-by` violates §5.5.1 (two roles require two independent persons). The internal-product scenario without an independent client representative is outside the primary scope (§1.5.4); a manifest for such a project does not claim RENAR-N conformance.
- **Authorized role-holder instead of the Architect**: permitted (§5.4.2); the signature is recorded with `role: authorized-role-holder` and `signature-ref` points to substrate-native evidence of the delegation.
- **Authorized role-holder instead of the Client**: **not permitted** (§5.4.3); the `client-signature` MUST be from a client-side stakeholder.

5.5.4 Relationship to other gates

The ADAPT dual signature is the only normative case of a dual signature in RENAR. The other gates (§10.3) are performed by a single participant (Architect, runner, stakeholder). This is a deliberate architectural decision: ADAPT is the point of agreement with the client, the other gates are internal implementation checks.

5.6 RACI matrix

The matrix fixes Responsible / Accountable / Consulted / Informed across RENAR artifact types and canonical gates. Abbreviations: **R** = Responsible (executes), **A** = Accountable (approves / answers for the result), **C** = Consulted (MUST be informed before the decision), **I** = Informed (notified after the decision).

5.6.1 Artifact matrix

Activity	AI agent	Architect	Domain technical lead	Engineer	QA	Reviewer	Client
TZ import	R	A	—	—	—	C (adversarial)	C

ADAPT creation (forward + backward)	R	A	C	—	—	C (adversarial)	C
ADAPT approval (dual signature)	—	**A (`architect-signature`)**	—	—	—	C (adversarial)	**A (`client-signature`)**
ADAPT → BR decomposition	R	A	C	—	—	C	I
BR → SR decomposition	R	A	C	—	—	C	I
SPEC-* creation	R	A	**R/A (per type)**	—	—	C	I
TR creation	R	A	C	C	—	—	I
TR implementation (execution)	—	C	C	R	—	—	I
TC creation	R	C	C	R/A	A	—	I
Adversarial review of an artifact	R (AI critic)	A	—	—	—	R	—

5.6.2 Quality Gates matrix

Conformant to the normatively fixed participant table §10.2.2.

Gate	Artifacts	Responsible	Accountable	Consulted	Informed
QG-0 Approval Gate	BR, SR, TR, SPEC, TC, ADAPT (on the Architect side)	Architect or authorized role-holder	Architect	AI critic (Reviewer)	Team
QG-1 Implementation Gate	TC (`draft → ready`)	Engineer / QA	Engineer	Automated runner	Team
QG-2 Verification Gate	BR, SR, TR, SPEC, TC	Automated runner (V5 + V6)	Architect	—	Team
QG-3 Architecture Gate (optional, ADAPT)	ADAPT (`answered → approved`)	Dual signature (Client + Architect)	Architect	AI critic	Team
QG-4 Acceptance Gate (optional, BR)	BR (`verified → accepted`)	Stakeholder (Client + PO)	PO	Architect	Team

5.6.3 Closed list of roles in RACI

The list of role columns of the matrix §5.6.1 / §5.6.2 is closed at RENAR v1:

AI agent, **Architect**, **Domain technical lead** (per SPEC type), **Engineer**, **QA**, **Reviewer** (adversarial), **Client** (authorized Stakeholder), **Product Owner**.

Project-local roles (for example, "Release Manager", "Compliance Officer") are permitted as **Informed** or **Consulted** in a local practical-RACI implementation, but do **not** appear as **Responsible** or **Accountable** in the normative conformance matrix — otherwise the manifest is non-conformant (§13.3).

5.7 Closed-list policy (closed list)

5.7.1 What is fixed at v1

The SENAR §4 base roles (§5.2.1) are closed on the SENAR side; the owner assignment §5.3.1–§5.3.6 is closed; the authorized role-holder (§5.4) is closed; the ADAPT dual-signature rule (§5.5.1) is closed; the RACI role columns (§5.6.3) are closed.

5.7.2 Declared-stricter is permitted

An implementation MAY **tighten** requirements, declaring this explicitly in the manifest (§13.4) with the `declared-stricter` marker (§10.10.2): require a dual signature for BR/SR (not only ADAPT); require an external adversarial reviewer at QG-0 for SPEC-SEC and SPEC-AI; prohibit combining the Architect and a domain technical lead.

5.7.3 Declared-weaker is prohibited

An implementation MUST NOT declare an ADAPT approved with a single signature; the TC author engineer approving without a QA participant; the implementer in the QG-4 participant role instead of the Stakeholder. A manifest that is declared-weaker relative to §5 is non-conformant (§13.8 loss of conformance).

5.7.4 Path for extensions

Adding a new role (§5.2, §5.3, §5.6.3) or owner combination (§5.3.7) — only through the formal standard change procedure (§13.9): research draft → public review → minor-version bump.

5.8 Cross-references

Source	Application
SENAR §4	Closed list of the 5 base roles; semantics and duties (normative source)
§7.5 ADAPT approval schema	Structure of the `client-signature` and `architect-signature` fields
§10.2.2 QG actor table	Normative gate → participant correspondence; aligned with §5.6.2

§10.3.1 QG-0 Approval Gate	Architect or authorized role-holder as the §5.4 participant
§10.4.1 QG-3 Architecture Gate	The dual-signature requirement (§5.5) for ADAPT
§10.4.2 QG-4 Acceptance Gate	Stakeholder (Client + PO) — §5.3.6
§3.3.6 V6 Author + timestamp	Substrate-native authorship recording for role-holder delegation §5.4.4
§13.4 Conformance manifest	Use of the normative role names §5.2.2
§13.5 Self-assessment	Assessor role enum (architect / authorized-role-holder / external-assessor) — §5.4 anchor
`core/renar-core.md`	Conceptual overview of the standard for the human reader (non-normative); roles and signatures are fully governed here, §5
`guide/03-tool-guide-*.md`	Substrate-specific delegation mechanisms (§5.4.4) and signature implementations

← Previous: 04. Terms and definitions · **Table of contents** · **Next: 06. Requirements hierarchy →**

06. Requirements hierarchy

> ***Part of the RENAR Standard v1.0-draft*** · *← Table of contents*

> ***Dense chapter:*** *before the frontmatter — guide/00 quickstart; chapter density — reference/09.*

6.1 Three requirement types and three levels

A requirement has three altitudes, and they must not be conflated. **The business** wants an outcome: "the customer resets their own password to take load off support." **The system** MUST behave so that this outcome becomes possible: "on a request from a confirmed address, the system sends a reset link with a 30-minute lifetime." **The engineer** takes this on as a single task: "implement password reset with a limit of three attempts per hour." Three different questions — why, what, and exactly how — and to each RENAR assigns its own artifact type: **BR**, **SR**, **TR**.

There are exactly three types, the list is closed, and they are linked into a tree: one SR elaborates one BR, one TR elaborates one SR. Layered on top are three scale levels — system, subsystem, module; they determine which of the three types are even appropriate (a module has no business owner of its own — hence no BR). The entire Source-of-Truth hierarchy from chapter 2 §2.3 rests on this axis: TZ → ADAPT → BR / SR / SPEC → TR → TC. The structure of the system is described in parallel — by SPEC-* specifications (chapter 8), which BR / SR / TR reference through typed graph edges.

The clauses of this chapter are normative. The closed lists of types and levels are mandatory clauses (chapter 13); they can be extended only through the formal change procedure of the standard.

The chapter draws on ISO/IEC/IEEE 29148:2018 "Requirements engineering" for the concepts of business / system / task requirements and the principles of traceability, but it fixes a closed list of exactly three types on the v1.0 requirements axis and deliberately distances itself from the freely extensible set of types characteristic of classical approaches.

6.2 The closed list of three requirements-axis types

6.2.1 Normative formulation

The RENAR v1.0 requirements axis contains exactly three types: BR, SR, TR. The list is closed. New types are added only through the formal change procedure of the standard (chapter 13).

Type	Expansion	Question	Contains	Does not contain
BR	Business Requirement	Who, what, and why?	Business goal, role, value	Technologies, screens, contracts, data fields
SR	System Requirement	What does the system do?	System behavior, constraints	Table names, frameworks, concrete structures
TR	Task Requirement	What exactly to implement?	Implementation specifics: fields, conditions, errors	Architectural decisions

6.2.2 The tree of parents

```
BR
 └── SR              # parent = BR (single)
      └── TR         # parent = SR (single)
                ↓
          Goal + Acceptance Criteria
          in the task-management system
```

`SR.parent` is a single BR. `TR.parent` is a single SR. This is a **tree**, not a graph; multiple parents on the requirements axis are prohibited. The link graph runs between requirements and specifications (§6.10).

6.2.3 What is not a requirements-axis type

Artifacts historically seen in projects under the names UIC (UI Concept), AIC (AI Concept), INT-SR (integration requirement), TS (technical specification) **are not requirements-axis types in v1.0**. They have been moved to the parallel specifications axis as the corresponding SPEC types (see §8.3 for the closed list of 9 SPEC types and §8.7 for migration):

Legacy artifact	RENAR v1.0 type
UIC	SPEC-UI
AIC	SPEC-AI
INT-SR	SPEC-INT
TS (architecture / data / API / process / security / ops)	SPEC-ARCH / SPEC-DATA / SPEC-API / SPEC-PROC / SPEC-SEC / SPEC-OPS

SPEC-* relates to the requirements axis not as "one more requirement type" but as a parallel axis with typed edges `SR.constrained-by[]` and `TR.implements-spec[]` (§6.10).

Test cases (TC) are a separate class of verification artifacts, governed by chapter 9. TC are not requirements: they verify the behavior described in BR / SR / SPEC.

6.3 Systems, subsystems, modules

The levels of organizational decomposition are a closed list of three elements: **system**, **subsystem**, **module**. Each element corresponds to an allowed set of requirement types (see §6.4).

6.3.1 System

A system is the top level of the hierarchy. A whole product or platform that is delivered and operated as a single unit and for which an organization is accountable.

Indicators of a system:

- a single owner on the business side (Product Owner, director, client);
- delivered and operated as a single unit;

- the client sees and assesses the system as a whole, not its parts separately;
- a single top-level TZ document and one root ADAPT.

Allowed requirement types: **BR, SR, TR**.

6.3.2 Subsystem

A subsystem is a large, self-contained component of the system that carries its own business value or has a separate business owner.

A subsystem is distinguished if **at least one** of the conditions holds:

Condition	Example
Its own team or technical owner	Frontend team vs AI-pipeline team
A separate database or an independently deployable service	An isolated microservice with its own deployment
The ability to be replaced independently of the others	The analytics module is replaced without changing the operational loop
A different business domain or a separate stakeholder	CFO vs COO
Added later as a separate initiative with a separate budget	A partner program

The key normative criterion: is there a separate person on the business side accountable for the value of this part of the system?

- yes → subsystem, BR are justified;
- no → module, SR only.

Allowed requirement types: **BR (if it has its own stakeholder) + SR + TR**.

6.3.3 Module

A module is a technical division within a subsystem. It implements part of the subsystem's behavior but has no business value of its own.

Indicators of a module:

- no separate business stakeholder;
- it does not exist and is not used apart from its subsystem;
- it is distinguished on a technical basis: functional area, layer, domain;
- it is not mentioned separately in the top-level TZ.

Allowed requirement types: **SR + TR**. No BR is created.

6.3.4 Summary table

	System	Subsystem	Module
Business stakeholder	yes	yes (its own)	no

Independent deployment	possible	yes	no
Mentioned separately in the TZ	yes	yes	rarely
Exists separately	yes	possible	no
BR	yes	yes (if its own stakeholder)	no
SR	yes	yes	yes
TR	yes	yes	yes

6.3.5 The "module → subsystem" evolution

The boundary between a module and a subsystem is not fixed forever. If a module has grown, gained its own team or business owner, it becomes a subsystem and gains a BR. Normatively: **a BR is written at the moment a business owner appears, not in advance**.

The reverse evolution (subsystem → module) is also permitted if the business owner has departed and the business value has become derivative; in that case the subsystem's BR is given status `deprecated` (§6.5.4), and its SR are re-parented to the parent system's BR.

6.4 Allowed requirement types by decomposition level

Level	BR	SR	TR	Explanation
System	mandatory	mandatory	mandatory	The top BR is mandatory (no business goal, no project)
Subsystem	optional	mandatory	mandatory	BR only when there is a stakeholder of its own
Module	not allowed	mandatory	mandatory	BR is normatively prohibited

The normative rationale for prohibiting BR at the module level: a business requirement without a business stakeholder and without independent business value leads to false decomposition and breeds "technical BR" indistinguishable from SR. This blurs the Source-of-Truth hierarchy (chapter 2 §2.3).

6.5 BR — Business Requirement

6.5.1 Normative definition

A BR records **what the business needs and why**. It describes the role, the action, and the business value without references to technologies, screens, contracts, or data structures.

6.5.2 BR frontmatter (mandatory fields)

```
---
id: BR-NN                          # immutable; NN sequential within scope
```

```yaml
title: "<short, descriptive>"
type: BR
slug: "<kebab-case>"                # auto-derived

# === Scope (mandatory) ===
level: system | subsystem           # BR at the module level is prohibited
(§6.4)
scope:
  system: "<system-id>"
  subsystem: "<subsystem-id>"       # null if level=system

# === Lifecycle (mandatory) ===
status: draft | approved | verified | deprecated
owner: "<role / responsible person>"

# === Source: provenance (conditional, see §7.4.1) ===
# source.adapt — mandatory if an ADAPT exists (a gap was found during TZ → RENAR
conversion);
# source.tz-section — always mandatory. At least one source is always present.
source:
  adapt: ADAPT-NNN                  # conditional: present if an ADAPT was
created for this TZ
  adapt-section: "Forward §N"       # mandatory if adapt is present
  tz-section: "§N.N"                # always mandatory — primary provenance
  adversarial-review-ref: "<substrate-native reference>"   # conditional: present
if source.adapt is absent — evidence of the "no findings" verdict (§7.4.1.2)

# === Cross-level link from subsystem BR → system BR (see §6.8.2) ===
# Recommended on v1.0; mandatory on v1.1+ when level=subsystem AND the parent
system has an approved BR.
# Not a parent edge — a separate link-graph edge type (see §6.8.3).
implements:                         # array; substrate-agnostic
  - id: BR-NN                       # ID of the parent system's BR
    scope:
      system: "<system-id>"         # mandatory for a cross-system reference
    rationale: "<short>"            # optional; reference to ADAPT§ if available

# === Link graph (auto-managed) ===
children: []                        # auto-derived; SR referencing parent.id=
<this BR>
implemented-by: []                  # auto-derived; subsystem BR referencing
implements[].id=<this BR>
verified-by: []                     # auto-derived; TC verifying through SR

# === AI provenance (mandatory on RENAR-4+; canonical schema — §4.10.1) ===
ai-provenance:
  generated-by: "<vendor>-<model>@<date>"
  generated-at: "<ISO-8601>"
  prompt-template: "<template-path>@<version>"
  context-tokens: integer
  output-tokens: integer
  human-edits: boolean
  # optional on RENAR-4, mandatory on RENAR-5 (see §4.10.1):
  # cost-budget, cost-actual, generation-time-ms
```

```
# === Replacement (mandatory if applicable) ===
replaces: "<old-id>"
replaced-by: "<new-id>"
deprecated-date: "<ISO date>"
---
```

The field `source.tz-section` is always mandatory. The field `source.adapt` is conditional: it is present when the TZ → RENAR conversion required an ADAPT (§7.4.1.1), and is omitted when the adversarial reviewer returned a "no findings, no clarifications" verdict (§7.4.1.2). If `source.adapt` is omitted, the field `source.adversarial-review-ref` is mandatory: it holds the evidence of that verdict for audit. The lifecycle hooks (§7.4.1, §10.11.1) check both cases: (1) if `source.adapt` is present — that the ADAPT is in status `approved` or higher; (2) if `source.adapt` is omitted — that `source.adversarial-review-ref` is present and the evidence is available to an auditor on request.

The field `parent` is absent in a BR: a BR is the root node of the requirements tree. For the cross-level link between a subsystem tree and a system tree, the separate field `implements[]` is used (see §6.8.2): this is **not** a parent edge but a typed cross-level declaration "this subsystem BR elaborates the listed system BR." The prohibition on multiple parents (§6.8.3) does not apply to `implements[]`.

6.5.3 BR body (mandatory sections)

Section	Obligation	Content
Need	mandatory	Who (role), what (action), why (business goal). Stated in one sentence.
Success criteria	mandatory	Measurable outcomes (3–7 items); each independently verifiable.
Context	mandatory	Where the requirement came from (with a reference to an ADAPT section), what alternatives were considered.
Constraints	optional	Business constraints (budget, deadlines, regulation), not technical ones.

Technical detail (UI, API, data model) is prohibited in a BR — the SPEC types (chapter 8) and SR exist for that.

6.5.4 BR statuses

Status	Meaning	Transition trigger
`draft`	In progress	Created by the author
`approved`	Approved, may be decomposed into SR	After QG-0 (chapter 10)
`verified`	All derived SR / TR / TC are complete, the business outcome is confirmed	After QG-2; all `verified-by` TC have `last-run.result = pass` on the current version

`deprecated`	Obsolete; superseded by another BR or no longer relevant	By the Architect / Product Owner, mandatorily with `replaced-by` (if there is a replacement)

A BR in status `deprecated` is **not deleted** — it remains as a historical trace for audit.

6.6 SR — System Requirement

6.6.1 Normative definition

An SR records **what the system does** (at the system, subsystem, or module level). It describes observable behavior and constraints. It does not describe table names, frameworks, or concrete data structures — that is the responsibility of SPEC (chapter 8).

6.6.2 SR frontmatter (mandatory fields)

```yaml
---
id: SR-NN                              # immutable
title: "<short, descriptive>"
type: SR
slug: "<kebab-case>"

# === Scope (mandatory) ===
level: system | subsystem | module
scope:
  system: "<system-id>"
  subsystem: "<subsystem-id>"          # null if level=system
  module: "<module-id>"                # null if level ≠ module

# === Lifecycle (mandatory) ===
status: draft | approved | verified | deprecated
owner: "<role / responsible person>"

# === Parent (mandatory) ===
parent:
  id: BR-NN                            # single parent

# === Source: provenance (conditional, see §7.4.1) ===
# Same rules as for BR: source.adapt conditional; source.tz-section always
mandatory;
# source.adversarial-review-ref mandatory if source.adapt is omitted.
source:
  adapt: ADAPT-NNN                     # conditional
  adapt-section: "Forward §N"          # mandatory if adapt is present
  tz-section: "§N.N"                   # always mandatory
  adversarial-review-ref: "<substrate-native reference>"   # mandatory if adapt
is omitted

# === Link graph (mandatory ones + auto-managed) ===
constrained-by:                        # typed edges to SPEC (chapter 8)
```

```yaml
  - SPEC-UI-NN
  - SPEC-API-NN
  - SPEC-DATA-NN
children: []                          # auto-derived; TR referencing parent.id=
<this SR>
verified-by: []                       # auto-derived; TC verifying the SR

# === AI provenance (mandatory on RENAR-4+) ===
ai-provenance:
  generated-by: "<vendor>-<model>@<date>"
  prompt-template: "<template-path>@<version>"
  context-tokens: integer
  output-tokens: integer
  human-edits: boolean

# === Replacement (mandatory if applicable) ===
replaces: "<old-id>"
replaced-by: "<new-id>"
deprecated-date: "<ISO date>"
---
```

Key fields. `parent.id` is a single BR; this is a tree of parents. `constrained-by[]` are typed references to SPEC-*; this is a **graph**, not a tree. An SR may reference any number of SPEC of any types; a SPEC, in turn, may be `referenced-by` many SR (chapter 8 §8.2).

6.6.3 SR body (mandatory sections)

Section	Obligation	Content
Requirement	mandatory	One sentence in normative form: "The system MUST ..." (modality per the convention of §0.5: "MUST" / "SHALL" = mandatory).
Behavior	mandatory	A detailed description of observable behavior; functional scenarios.
Constraints	mandatory if applicable	Non-functional constraints (performance, security); full constraints live in the `constrained-by[]` SPEC.
Link to SPEC	mandatory if `constrained-by[]` is present	A short explanation of which aspects of behavior are governed by which SPEC.

6.6.4 SR statuses

Identical to BR statuses (§6.5.4) — `draft → approved → verified → deprecated`. The `approved → verified` transition is after QG-2 (chapter 10); it requires all `verified-by` TC to have `last-run.result = pass` on the current SR version.

6.7 TR — Task Requirement

6.7.1 Normative definition

A TR is the atomic unit of an implementer's work. It records **what exactly to implement** within a single SR. A TR decomposes an SR down to a level fit for direct implementation (one task — one TR).

6.7.2 TR frontmatter (mandatory fields)

```yaml
---
id: TR-NN                              # immutable
title: "<short, descriptive>"
type: TR
slug: "<kebab-case>"

# === Scope (mandatory) ===
level: system | subsystem | module   # system — rare, cross-subsystem tasks
scope:
  system: "<system-id>"
  subsystem: "<subsystem-id>"        # null if level=system
  module: "<module-id>"              # null if level ≠ module

# === Lifecycle (mandatory) ===
status: draft | approved | done | obsolete
owner: "<assignee role / agent>"

# === Parent (mandatory) ===
parent:
  id: SR-NN                          # single parent

# === Source: trace chain (auto-derived from parent SR) ===
# A TR has no source of its own — it inherits from the parent SR (§6.7.5).
# If parent SR.source.adapt is omitted (§7.4.1), that fact is inherited too.
source:
  adapt: ADAPT-NNN                   # auto-derived from parent SR; may be
omitted
  sr-version: "<version-ref>"        # pinning to the SR version (substrate
capability V5; chapter 3)

# === Link graph ===
implements-spec:                     # typed edges to SPEC
  - SPEC-API-NN
  - SPEC-UI-NN
verified-by: []                      # auto-derived; TC verifying through SR

# === Goal + Acceptance Criteria ===
goal: "<one-sentence outcome>"
acceptance-criteria:
  - "<numbered, falsifiable, unambiguous>"
  - "..."
```

```
# === AI provenance (mandatory on RENAR-4+) ===
ai-provenance:
  generated-by: "<vendor>-<model>@<date>"
  human-edits: boolean
---
```

Key fields. `parent.id` is a single SR. `implements-spec[]` are typed edges to SPEC; they specify which SPEC must be taken into account when implementing this particular TR (a subset of the parent SR's `constrained-by[]` or its extension with SPEC types not listed directly on the SR). `acceptance-criteria` is a closed, numbered list of falsifiable statements.

6.7.3 TR body (mandatory sections)

Section	Obligation	Content
Goal	mandatory	One paragraph; the outcome that the TR makes observable.
Acceptance Criteria	mandatory	A numbered list; each item falsifiable; covers positive and negative scenarios.
Scope	mandatory	What is in / out of the TR (matches SENAR Rule 2).
References	mandatory if applicable	To SPEC from `implements-spec[]` and to sections of the parent SR.

6.7.4 TR statuses

Status	Meaning	Trigger
`draft`	TR created, AC not yet finalized	Authoring
`approved`	AC approved, work may start	QG-0 (chapter 10): goal + AC present
`done`	AC verified, TC passing	QG-2; `verified-by` TC `pass`
`obsolete`	TR no longer relevant before completion (e.g. the SR changed)	By the Architect, mandatorily with a note

6.7.5 A TR does not reference ADAPT directly

The implementer of a TR works within the SR / SPEC and **does not turn to ADAPT directly** — all the needed interpretations of the TZ are already recorded in the approved ADAPT and threaded into SR / SPEC through `source.adapt` (chapter 7 §7.7.3). If the implementer finds an ambiguity in the SR, this is a signal either for a new Backward finding in ADAPT (if the root of the ambiguity is in the TZ) or for a clarification of the SR (if the root is in the decomposition).

6.8 Extended hierarchy for composite systems

The base scheme `BR → SR → TR` holds for most projects. For composite systems the standard governs two variants of the extended hierarchy.

6.8.1 Subsystem as a technical division, not a standalone product

BR pertain to the system as a whole; subsystems are a technical division by teams, components, or other architectural boundaries:

```
BR (system)
 └── SR (system)          # optional, if there are cross-subsystem SR
      └── SR (subsystem)
           └── TR

SPEC-INT (between subsystems)    # parallel axis; see chapter 8
```

`SPEC-INT` belongs to none of the subsystems — it is a system-level integration specification.

6.8.2 Subsystem as a standalone product with its own stakeholder

The subsystem has its own BR with its own business owner:

```
BR (system)
 └┄┄ BR (subsystem)       # ┄┄ implements-edge (see below), NOT a parent edge
      └── SR (subsystem)
           └── TR
```

`└┄┄` between BR (system) and BR (subsystem) denotes a **typed cross-level `implements` edge** (§6.5.2): the subsystem BR declares which BR of the parent system it elaborates and implements. This is **not a parent edge** of the requirements tree: `BR (subsystem).parent` remains absent, and each such subsystem is the root node of its own tree. `implements` is a separate link-graph edge type, symmetric to the `constrained-by[] ⇔ referenced-by[]` pair for SPEC (§6.10.2).

The normative rule for `implements[]`:

Level	Scenario	Rule
Recommended on v1.0 / mandatory on v1.1+	`BR.level = subsystem` AND `scope.system` has ≥1 approved BR	`implements[]` MUST contain ≥1 reference to an applicable BR of the parent system
Permitted	`BR.level = subsystem` AND the parent system is a container with no BR of its own (organizational-level scope)	`implements[]` is omitted; the rationale is recorded in the `Context` section with a reference to ADAPT§
Prohibited	`BR.level = system`	`implements[]` does not apply (a system BR is the root of the whole scope hierarchy)

The lifecycle hooks (chapter 10 §10.11) MUST:

- Check that the target BR exists (by `id + scope.system`) when approving a subsystem BR.
- Check that the target BR is in status `approved` or higher; an erroneous draft target is fatal.
- Detect cycles in `implements` chains; a cycle is fatal.
- On deprecating a target BR (§6.5.4) — generate a cascade-warning for all `implemented-by[]` (not a cascade-deprecate; the decision on the evolution of the dependent BR rests with the Architect).

The machine-readable trace chain in §6.8.2 is reconstructed through the `implements` edge (§6.10.3) — the asymmetry with §6.8.1 is removed.

The subsystem's link to the system's shared ADAPT is preserved through `source.adapt` (if applicable); `implements[]` and `source.adapt` are independent fields and may point to different nodes of the graph.

6.8.3 The prohibition on multiple parents

The standard does not allow multiple `parent` for an SR or TR. Cross-functional requirements that might look like "children of two SR at once" are governed in one of two ways:

- they are split into several SR, each with a single parent BR;
- they are decomposed into a higher-level SR (the parent subsystem or system) on which these cross-functional scenarios depend.

The field `BR.implements[]` (§6.5.2, §6.8.2) is **not a parent edge** and is not subject to §6.8.3: a single subsystem BR may elaborate several system BR (cardinality 0..N). This is a deliberate difference in the typing of link-graph edges: parent is single, cross-level declarations are multiple.

6.9 Evolution of the hierarchy

6.9.1 Module → subsystem

The scenario from §6.3.5: a module gains a business owner. The normative sequence:

1. The appearance of a business owner is recorded through a Backward finding in ADAPT (category `scope` — a change of work boundaries; chapter 7 §7.4.4).
2. After the delta-ADAPT is approved — the module is promoted to subsystem status; a subsystem BR is created with `source.adapt: <delta-ADAPT>`.
3. The module's existing SR are preserved (immutable IDs); the SR `parent` field is updated to the new subsystem BR in an atomic change.
4. TR / TC referencing these SR require no changes (the parent SR is unchanged).

6.9.2 The prohibition on anticipatory hierarchy

Creating a subsystem BR "for growth," without an existing business owner, is a violation of the standard. A BR without a stakeholder turns into a "technical BR" that blurs the Source-of-Truth inversion and substitutes for an SR. The lifecycle hooks (chapter 10) MUST block the transition of a BR to `approved` if no identified business owner is recorded in ADAPT.

6.9.3 Subsystem → module

The symmetric scenario of §6.3.5: the subsystem has lost its business owner or the business value has become derivative of the parent system. The normative sequence:

1. The loss of the business owner / the reassessment of business value is recorded through a Backward finding in ADAPT (category `scope`; chapter 7 §7.4.4).
2. After the delta-ADAPT is approved — the subsystem BR is moved to status `deprecated` with the reason given in `Context` (business owner withdrawn / business value absorbed by the system). The BR is not deleted (immutable IDs, V1).
3. The subsystem's SR are preserved (immutable IDs); the SR `parent` field is updated in an atomic change to the parent system's BR (or to another subsystem's BR, if the SR's area belongs to it).
4. The subsystem is renamed to a module at the level of the area and the storage scheme (§6.11.2); the existing SR / TR IDs remain unchanged.
5. TR / TC referencing these SR require no changes.

If no BR of the parent system covers the behavior of an SR, this is a signal that the subsystem has not in fact lost its independent business value; reverse evolution is impossible in that case, and the subsystem BR remains `approved`.

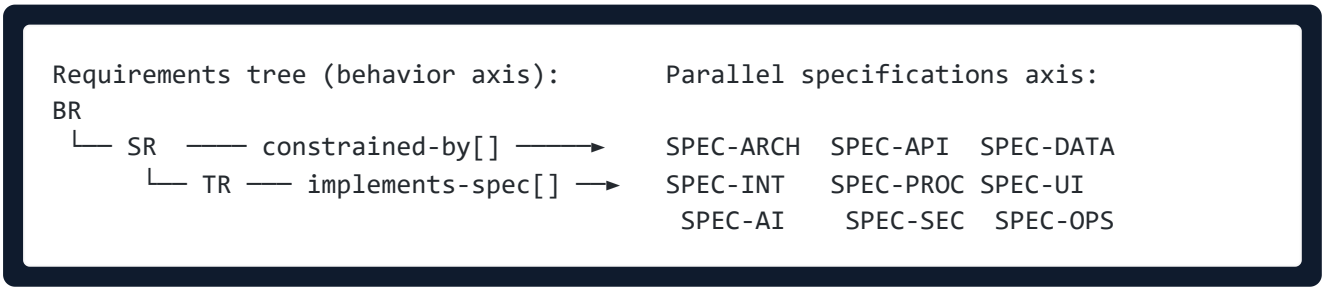
6.10 Linking the hierarchy to ADAPT and SPEC

The standard fixes the links between the requirements axis, ADAPT, and the parallel SPEC axis through normative frontmatter fields and typed link-graph edges.

6.10.1 Link to ADAPT

`BR.source.adapt`, `SR.source.adapt`, `SPEC-*.source.adapt` are conditional references to the ADAPT from which the artifact was derived (chapter 7 §7.7.1): present when an ADAPT was created; on a "no findings" verdict no ADAPT exists, and instead of the reference the field `source.adversarial-review-ref` is mandatory (§7.4.1). A TR has no direct `source.adapt` — it inherits it through the `parent SR` (§6.7.5).

6.10.2 The link graph with SPEC



Edge	Type	Obligation
`SR.constrained-by[] → SPEC-*`	Graph (multiple)	Optional; present when governing SPEC exist

`TR.implements-spec[] → SPEC-*`	Graph (multiple)	Optional; specifies SPEC for the implementer
`SPEC-*.referenced-by[] → SR / TR`	Auto-derived inverse	Auto-computed by substrate-native indexing
`SPEC-*.depends-on[] → SPEC-*`	Graph between SPEC	See chapter 8 §8.2

The link between the requirements axis and the SPEC axis is normative: an SR with non-trivial UI / API / data behavior MUST NOT remain without `constrained-by[]` (its absence is a signal either to write a SPEC or to justify the absence in the SR's Context).

6.10.3 The full trace chain (read-side)

ADAPT is a reactive artifact (§7.4.1): it is created only when the TZ → RENAR conversion produces a gap between the languages. The trace chain accordingly has **two valid variants**, chosen depending on whether an ADAPT exists for the specific TZ.

Variant A — when an ADAPT was created (`source.adapt` present):

```
TC-NN  →  verifies SR-12 v1.4
              │
              ├─ parent:        BR-03 v2.0     (BR-03 — level: subsystem)
              │                      │
              │                      └─ implements: BR-01 (system), BR-05 (system)
              │                                     (typed cross-level edge
§6.8.2)
              ├─ source.adapt:  ADAPT-001 §Forward §3.2
              │     └─ source-tz: TZ-2026-001 §3.4
              ├─ constrained-by: SPEC-UI-04, SPEC-API-02
              └─ children:      TR-101, TR-102, TR-103
                                     └─ implements-spec: SPEC-API-02
                                     └─ verified-by: TC-NN
```

Variant B — when no ADAPT was created (`source.adapt` omitted; the adversarial reviewer returned a "no findings" verdict, §7.4.1.2):

```
TC-NN  →  verifies SR-12 v1.4
              │
              ├─ parent:        BR-03 v2.0     (BR-03 — level: subsystem)
              │                      │
              │                      ├─ implements: BR-01 (system), BR-05 (system)
              │                      └─ source.tz-section: TZ-2026-001 §3.4
              │                         source.adversarial-review-ref: <verdict
evidence ref>
              ├─ source.tz-section: TZ-2026-001 §3.4   (no ADAPT for this TZ)
              │  source.adversarial-review-ref: <verdict evidence ref>
              ├─ constrained-by: SPEC-UI-04, SPEC-API-02
              └─ children:      TR-101, TR-102, TR-103
```

```
                                    └─ implements-spec: SPEC-API-02
                                    └─ verified-by: TC-NN
```

Both variants are **machine-readable**. In variant B the path is reconstructed through `source.tz-section` directly; the `adversarial-review-ref` evidence records who declared "no findings" and when (V6 author + timestamp), and is available on an auditor's request (§13.5).

For the "subsystem as a standalone product" scenario (§6.8.2) the chain in both variants contains the `implements` edge between the subsystem BR and the parent system BR — this reconstructs machine-readable traceability symmetric to the §6.8.1 scenario.

A superseded ADAPT in the trace chain. When an ADAPT moves to `superseded` (§7.6.4, §10.8.5), all derived BR / SR / SPEC with `source.adapt` pointing to it MUST be either redirected to the superseding ADAPT or re-derived. A dangling `source.adapt` reference to an ADAPT in status `superseded` makes the trace chain **invalid** (read-side): an audit must not lead to a superseded source of interpretation as if it were in force. The `superseded` ADAPT itself is preserved for audit (V1) and is reachable through the `superseded-by` edge from the superseding ADAPT — but not as the `source.adapt` of an in-force requirement. Enforcement is the `adapt-supersession` validation (§10.11.1).

6.11 Storage scheme

Requirements are stored in subfolders of the requirements substrate. The substrate-native storage implementation is substrate-specific (see guide/03 for distributed VCS; guide/04 for a document-oriented store).

6.11.1 At the system level

```
[requirements-substrate]/        # root of the requirements substrate (layout —
guide/03 or guide/04)
  br/                            # BR-NN-*.md
  sr/                            # SR-NN-*.md, level=system
  tr/                            # TR-NN-*.md, level=system (rare)
  specs/                         # SPEC-* (chapter 8)
  adapt/                         # ADAPT (chapter 7)
  tz/                            # immutable TZ sources
  REQUIREMENTS.md                # auto-generated index
```

6.11.2 At the subsystem / module level

```
[subsystem-substrate]/           # subsystem scope within the requirements
substrate
  br/                            # if the subsystem has its own stakeholder
  sr/
```

```
tr/
modules/
  [module-substrate]/
    sr/                          # a module has only SR + TR
    tr/
specs/                           # chapter 8
adapt/
REQUIREMENTS.md
```

6.11.3 REQUIREMENTS.md — auto-generated index

`REQUIREMENTS.md` is an auto-generated registry of all BR / SR / TR in the area: ID, type, level, title, status, parent, link to file. It is marked with a substrate-native auto-generated flag. Regeneration triggers are every frontmatter change or every approve / verify gate (chapter 10).

6.12 Quality Gates for the requirements axis

Detailed gate definitions are in chapter 10. A brief summary for BR / SR / TR:

Gate	Applies to	Precondition	Postcondition
QG-0 (Approval)	BR / SR / TR (`draft → approved`)	frontmatter valid, mandatory fields filled, identifier unique (V1); `source.adapt`, if present, points to an approved ADAPT, otherwise `source.adversarial-review-ref` is present (BR / SR); `parent` points to an approved BR / SR (SR); body sections conform to §6.5.3 / §6.6.3; adversarial review performed	The artifact is moved to `approved`; immutable until the next change's version; decomposition into child artifacts is allowed
QG-2 (Verification)	BR / SR / TR (`approved → verified` / `done`)	All `verified-by` TC `pass` on the current artifact version	The artifact is `verified` (BR/SR) or `done` (TR); the chain up to the parent BR is updated to verified if all children are verified

QG-1 (Implementation) **does not apply** to the requirements axis: it is a separate gate for TC only (§10.3.2) — there is no intermediate "QG-1 implementation" for BR / SR / TR; the `approved → verified` / `done` transition is governed by the single QG-2. A TR transitions `draft → approved` through the same QG-0 in a single step (frontmatter + goal + AC). `ready` and similar terms are not requirements-axis statuses and do not appear in the state machine `draft → approved → verified | done | obsolete | deprecated` (see §6.5.4 / §6.6.4 / §6.7.4).

The substrate hooks (chapter 3 §3.3) MUST block transitions that violate the precondition of the corresponding gate.

6.13 Links to other chapters

Chapter	Link
02 Positioning in the methodology typology	The BR / SR / TR hierarchy is the load-bearing structure of the Source-of-Truth inversion (Claim 1); the waterfall form (Claim 2) sets the BR → SR → TR layers
07 ADAPT	`BR.source.adapt`, `SR.source.adapt` are conditional (when there is no ADAPT — `source.adversarial-review-ref`); the requirements axis is derived from an approved ADAPT or directly from the TZ on a "no findings" verdict
08 Specifications	The parallel SPEC axis; `SR.constrained-by[]`, `TR.implements-spec[]` are typed graph edges
09 Test cases	TC verify BR / SR / TR; `verified-by[]` is an auto-derived inverse
10 Lifecycle and QG	The BR / SR / TR state machines; QG-0 / QG-2 for the requirements axis (QG-1 — for TC only)
03 Substrate versioning	Immutable IDs (V1); atomic change unit on re-parenting (V2); diff & review for approve (V3); versioning without loss of history (V4); pinning SR-version in TR (V5); substrate-native approve signature with author + timestamp (V6)
11 Maturity model	RENAR-1: the BR / SR / TR axis is mandatory; RENAR-3+: `constrained-by[]` for all SR where applicable
13 Conformance	The closed list of types (BR / SR / TR) is a v1.0 mandatory clause; the closed list of levels (system / subsystem / module) is a v1.0 mandatory clause
reference/02 — schemas	The full machine-readable schema of BR / SR / TR frontmatter

07. ADAPT — two-way TZ adaptation

7.1 What ADAPT is and why it exists

The client sends a TZ in their own language — the language of business and of the contract. It is signed and no longer changes: it is a contract. But turning it directly into precise requirements almost never works. Somewhere the TZ is silent about something important ("data export" — in what format? for what retention period?), somewhere it contradicts itself, somewhere the same term means one thing to the client and another to the engineer. Editing the TZ is not allowed — it is a contract. Silently filling in the gaps on the client's behalf is also not allowed: that way someone else's guesses seep into the requirements, and at acceptance the "this is not what we ordered" surfaces.

ADAPT is the bridge across this gap. It has two sides: **forward interpretation** ("we understood §4.2 of the TZ as follows") and **backward findings** ("§4.3 does not set a deadline — please clarify"), which go to the client and come back as answers. When both sides are agreed and signed — by the client and by the Architect — ADAPT freezes **with respect to its subject**, and the affected BR / SR / SPEC are derived from it. This makes the TZ interpretation explicit, recorded, and verifiable, rather than living in the implementer's head.

ADAPT need not precede all derivation. The typical occasion to create it is TZ import, but a question to the client rooted in the TZ may also surface **later** — during the BR → SR → SPEC decomposition, or while developing test cases. A **new** ADAPT then arises, bound to the stage where the finding was discovered, while previously derived artifacts remain valid. ADAPT is not always created: if the conversion of the relevant TZ fragment is unambiguous and there are no questions, it is not needed (§7.4.1).

ADAPT is a consequence of Statement 2 of §2.4 (RENAR is a waterfall-form ≠ classical waterfall, because ADAPT provides two-way adaptation instead of "throwing the specification over the wall").

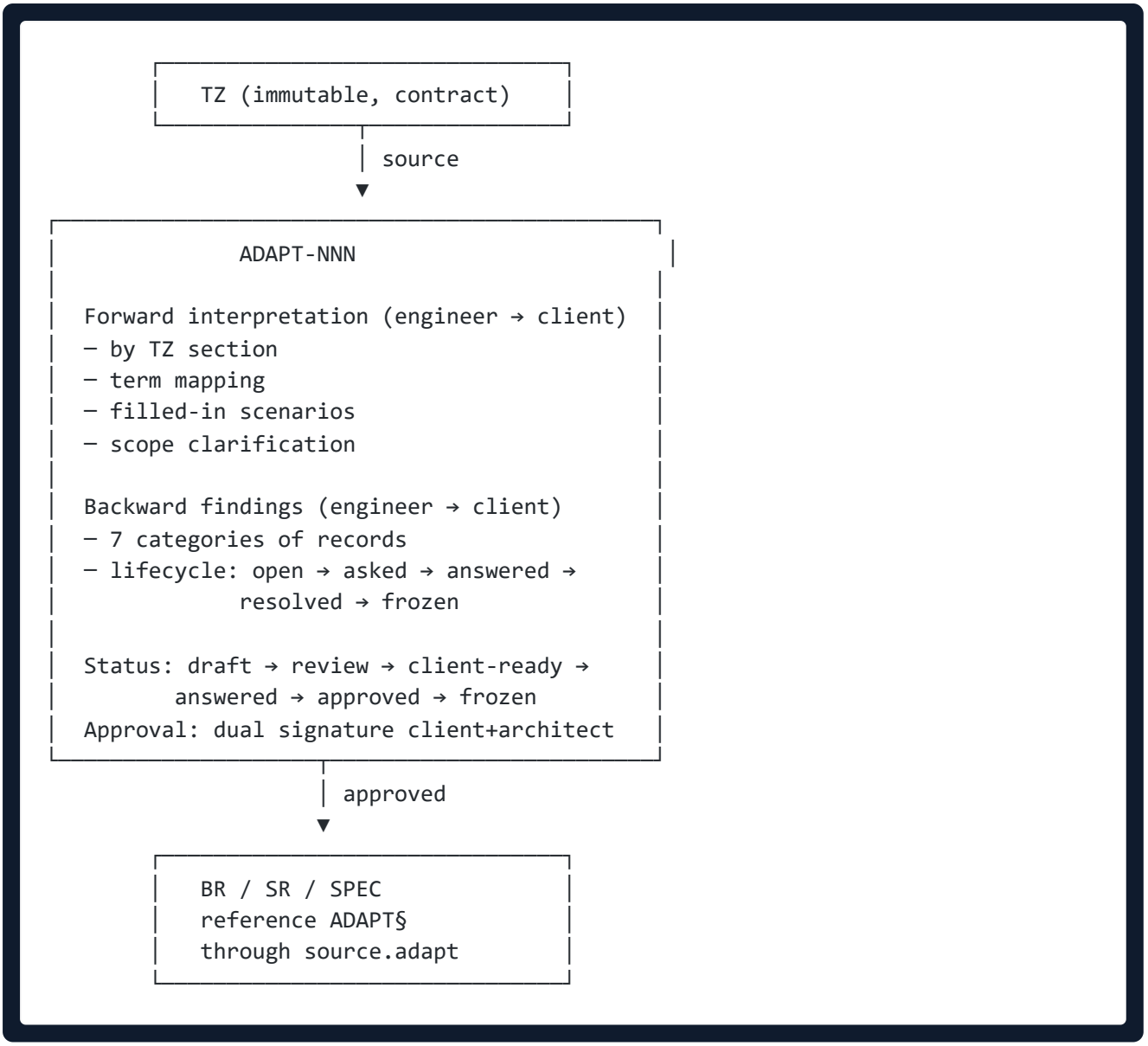
7.2 The problem ADAPT regulates

Without a formalized intermediate artifact between the TZ and BR/SR, one of two negative outcomes arises:

Outcome	What happens
TZ drift	The TZ is edited after signing → the contract is breached
Hidden interpretation	Engineering assumptions silently seep into BR/SR/SPEC → the trace chain and provenance break down

ADAPT eliminates both outcomes: the TZ remains an immutable contractual document, **all** interpretations, clarifications, and backward findings are registered in ADAPT, which itself becomes immutable after the dual signature (§7.5).

7.3 The two-way adaptation cycle



The TZ is the primary source; ADAPT is the canonical source of interpretation; BR/SR/SPEC reference ADAPT, not the TZ directly.

The "TZ → ADAPT" input shown is the typical one (TZ import), but **not the only one**. The cycle trigger is stage-agnostic: if a question to the client rooted in the TZ surfaces later — at the BR → SR → SPEC decomposition stage or while developing TC — the cycle runs again and produces a **new** ADAPT-NNN, bound to the stage at which the finding was discovered (§7.4.1.1). A single TZ may have several such ADAPTs (MVR-3, §0.5).

7.4 Normative requirements for ADAPT

7.4.1 Reactive obligatoriness

ADAPT is a **reactive artifact**: it is created if and only if converting the TZ → RENAR description produces a gap between the client's language and the requirements language (§7.12). If the conversion is unambiguous, no ADAPT is created; BR / SR / SPEC are derived directly from the TZ through the mandatory `source.tz-section` field.

7.4.1.1 Conditions for ADAPT obligatoriness

ADAPT is REQUIRED **if and only if** at least one of the conditions holds:

1. **A backward finding is discovered.** The adversarial reviewer (§7.10.2) at any stage of the requirements lifecycle (TZ import or BR → SR → SPEC → TC decomposition) has identified ≥ 1 record under at least one of the 7 categories of §7.4.4 (`contradiction` , `gap` , `hidden-assumption` , `feasibility` , `regulatory` , `terminology` , `scope`) rooted in the language or intent of the TZ.
2. **Term mapping is required.** The TZ uses a term that has no unambiguous engineering interpretation (requires a "client → engineer" mapping).
3. **Scope clarification is required.** The scope from the TZ is ambiguous and requires fixing "in / out".

If none of the conditions holds (the adversarial reviewer returned a "no findings, no clarifications" verdict), no ADAPT **is created**. BR / SR / SPEC reference the TZ directly through `source.tz-section` (§6.5.2, §6.6.2, §8.5).

7.4.1.2 The adversarial reviewer as a mandatory gate

The adversarial review of the TZ (§7.10.2) is a **mandatory step** for every TZ at import, regardless of whether ADAPT is created or not. The verdict at import is one-time but **not final**: at the derivation stages (BR → SR → SPEC → TC) the adversarial reviewer issues the verdict again as decomposition uncovers new questions about the TZ. A "no findings" verdict at import does not block the appearance of ADAPT later, if a finding rooted in the TZ is discovered at the decomposition stage (§7.7.3). The adversarial reviewer issues a formal verdict in one of two forms:

Verdict	What is recorded	Consequence
"findings present"	A list of concrete findings across the 7 categories + an indication of TZ sections	ADAPT is REQUIRED; the lifecycle of §7.4.5 starts
"no findings, no clarifications"	Confirmation by the adversarial reviewer (a different model, §9.4) that the TZ converts to RENAR unambiguously	ADAPT MAY be omitted; the verdict is recorded in substrate evidence (V6 author + timestamp), available for audit

The hook (§10.11.1 `adapt-applicability validation`), when BR / SR / SPEC are created without `source.adapt` , checks for the presence of evidence of a "no findings" verdict for the corresponding TZ. The absence of evidence is fatal: creation is blocked until the adversarial review is passed.

7.4.1.3 Prohibition of silent skipping

Creating BR / SR / SPEC from a TZ **without an adversarial review** (skipping ADAPT without a verdict) is a violation of the standard. This preserves the Source-of-Truth inversion (§2.3): "no findings" is a **recorded assertion** by the adversarial reviewer, not a silent assumption by the Architect. The verdict MUST be recorded by a substrate-native mechanism V6 (author + timestamp) and be available on an auditor's request (§13.5).

When a delta-TZ is present, the same rule applies: a delta-ADAPT is created reactively, upon findings during the adversarial review of the delta-TZ (§7.6).

7.4.1.4 Multiplicity of ADAPTs per single TZ

Since the trigger is stage-agnostic (§7.4.1.1), a single unmodified TZ may have **zero or more** root ADAPTs (cardinality 0..N — a reformulation of MVR-3, §0.5):

- **zero** — adversarial review at all stages returned "no findings";
- **one** — a finding was discovered once (typically at import);
- **several** — findings rooted in the TZ arose at different derivation stages (import, then BR → SR decomposition, etc.).

Each ADAPT keeps a stable end-to-end `ADAPT-NNN` and records a `trigger-stage` field — the stage at which it was produced (§7.8.1). Multiplicity is the **regular** case, not an exception, and it does not weaken provenance: each BR / SR / SPEC still references exactly one ADAPT (through `source.adapt`) or the TZ directly (through `source.tz-section`) from which it is derived.

7.4.2 Immutability of the TZ

The TZ is a contractual document. After a TZ is registered in the substrate, its content **is not edited**. If during work it turns out that the TZ has an error / gap / contradiction, this is registered as a backward finding in ADAPT (§7.4.4), the client gives an answer, and the answer becomes part of ADAPT. The TZ remains immutable.

With a large number of edits, or when the scope changes, the client signs a delta-TZ as a new immutable document (§7.6).

7.4.3 Forward adaptation of the TZ

For each TZ section, the forward-interpretation section of ADAPT MUST contain:

Element	Obligatoriness	Purpose
Exact reference to TZ§N.N	REQUIRED	provenance
Quote from the TZ (or a paraphrase with an explicit marker)	REQUIRED	Context
Engineering interpretation of the section	REQUIRED	Translation of the client's language → the requirements language
Term mapping (client → engineer)	REQUIRED if applicable	Term disambiguation
Filled-in scenarios	REQUIRED if the TZ implies them	Explicit recording of implicit cases
Scope clarification (in / out)	REQUIRED	Scope
References from the forward interpretation to BR/SR/SPEC	auto-derived	Trace chain (§7.7)

7.4.4 Backward findings and their categories

The backward-findings section of ADAPT records discovered problems across seven normative categories. **The list of categories is closed at v1.0**; adding new categories is done through the formal change procedure of the standard (see chapter 13). The general closed-list policy and the master index — §1.7.5.

ID	Category	What is recorded

`contradiction`	Contradiction	Internal contradictions in the TZ (§A vs §B)
`gap`	Gap	The TZ is silent about something without which implementation is impossible
`hidden-assumption`	Hidden assumption	An engineer's assumption that may be wrong
`feasibility`	Feasibility	A technically infeasible or disproportionately expensive requirement
`regulatory`	Regulatory	A requirement that touches legislation / compliance
`terminology`	Terminology	An unclear TZ term with several possible meanings
`scope`	Scope	An unclear scope

Each backward-finding record has a **stable ID** (`B-NNN`), immutable after creation. The ID is not reused even for withdrawn records (audit log).

7.4.5 Lifecycle of a single backward-finding record

```
open → asked-to-client → answered → resolved → frozen
              ↑                          │
              └──────── revised ─────────┘   (if the answer needs clarification)
```

Status	What it means
`open`	The engineer recorded it; not sent to the client
`asked-to-client`	The question is sent to the client, an answer is awaited; the date is recorded
`answered`	The client answered; the answer is recorded in the document with author + timestamp (substrate capability V6)
`resolved`	The engineer integrated the answer into the forward interpretation
`revised`	The client's answer is vague; a repeat question. Transition back to `asked-to-client`
`frozen`	After ADAPT approval — changes are impossible

ADAPT approval (§7.5) is prohibited while at least one backward-finding record is in status `open` / `asked-to-client` / `answered` / `revised` . All such records MUST be in `resolved` before approval.

7.5 ADAPT approval — the dual signature

ADAPT moves from status `answered` to `approved` only after a **dual signature** (an atomic change unit, substrate capabilities V2 + V3 from §3.3):

Signature	Who	What it confirms
Client signature	The client or a client representative with authority	The forward interpretation of the TZ matches what the customer had in mind; the answers to backward-finding questions are final
Architect signature	The Architect on the implementer's side	All backward findings are handled (none unresolved); the forward interpretation is technically feasible

The substrate-native implementation of the signature is a combination of V3 (diff & review) + V6 (author + timestamp). The concrete mechanism (digital signature / approval process / dual review attestation) is chosen by the implementation and recorded in the conformance manifest (§3.7).

After approval, ADAPT is **immutable** on par with the TZ. Further changes are made only by adding a new artifact with a typed link, through one of three non-overlapping mechanisms: delta-ADAPT for a delta-TZ (§7.6.1), errata for an interpretation error (§7.6.3), or supersession of a previously correct decision (§7.6.4). The frozen ADAPT itself is not edited in any of them.

7.6 Delta-TZ and delta-ADAPT

7.6.1 Workflow

A delta-ADAPT follows the same reactive rule of §7.4.1 as the root ADAPT: it is created upon findings during the adversarial review of the delta-TZ.

When a delta-TZ arrives from the client:

1. The client registers the delta-TZ in the substrate as a new immutable document (`TZ-YYYY-NNN-delta-N`).
2. The client signs the delta-TZ (V6 author + timestamp).
3. The adversarial reviewer (§7.10.2) conducts a review of the delta-TZ and issues a verdict.
4. **If the verdict is "findings present"** — the Architect / AI agent creates a delta-ADAPT (`ADAPT-NNN-delta-N`) with the frontmatter field `parent-adapt: ADAPT-NNN` and `source-tz: TZ-YYYY-NNN-delta-N` . The Forward interpretation covers only the delta-TZ sections. Backward findings are recorded against the delta-TZ. Approval — the dual signature of §7.5.
5. **If the verdict is "no findings, no clarifications"** — no delta-ADAPT is created. The verdict is recorded in the substrate with V6 author + timestamp. BR / SR / SPEC changed as a result of the delta-TZ reference `source.tz-section: TZ-YYYY-NNN-delta-N` directly.

In both cases the evidence of the adversarial review (the verdict) MUST be machine-accessible for audit (hook §10.11.1 reference-validation).

7.6.1bis Example: a trivial delta-TZ

Delta-TZ: "rename the 'username' field on the registration form to 'email'".

1. The client signs `TZ-YYYY-NNN-delta-1` .
2. The adversarial reviewer checks: the term is unambiguous (`email` is a standard engineering term), the scope is clear (one field on one form), there are no questions for the client.
3. Verdict: "no findings, no clarifications"; recorded in the substrate.

4. The delta-ADAPT **is not created**.
5. SR-NN with the behavior "POST /auth/sign-up accepts email" receives an update: `source.tz-section: TZ-YYYY-NNN-delta-1 §1`. The SR `parent` BR-NN does not change.

7.6.2 Delta-ADAPT chain

```
ADAPT-001 (from TZ-YYYY-NNN main)
  └─ ADAPT-001-delta-1 (from TZ-YYYY-NNN-delta-1)
       └─ ADAPT-001-delta-2 (from TZ-YYYY-NNN-delta-2)
            └─ ADAPT-001-delta-3 (from TZ-YYYY-NNN-delta-3)
```

The chain is strictly sequential: applying delta-ADAPTs MUST proceed in order (see the cross-substrate version pin V5 in §3.3.5). Renumbering or reordering delta-ADAPTs in the chain is prohibited.

7.6.3 Errata for an already approved ADAPT

If, a considerable time after approval, it is discovered that the forward interpretation of the TZ in ADAPT-NNN is wrong, or the resolution of a backward finding is recorded incorrectly — two permissible outcomes:

Outcome	Artifact
The TZ contains an ambiguity discovered late	delta-ADAPT with a new backward-finding record and a client answer
Wrong interpretation (an engineer's error)	errata-ADAPT-NNN-M as a separate artifact with the client signature (if it changes the contractual outcome) or the Architect signature only (if the fix is cosmetic)

In both outcomes the **frozen ADAPT is not edited**. Only the addition of new artifacts with an explicit typed link.

7.6.4 Supersession of an approved ADAPT

Delta and errata do not cover one case: a previously accepted decision was **correct**, but requirements formed later **contradict** it under a new understanding. This is not an engineer's error (errata) and not a new contract from the client (delta) — it is the cancellation of a previously correct decision. For it, a third mechanism is introduced — **supersession** (`supersession`).

Mechanism	When	Nature
delta-ADAPT (§7.6.1)	a delta-TZ arrived from the client	new source: the contract changed
errata-ADAPT (§7.6.3)	the former interpretation was **erroneous**	a correction of what was always wrong
superseding ADAPT (§7.6.4)	the former decision was **correct**, but requirements formed later contradict it	cancellation of a previously correct decision under a new understanding

Supersession rules:

1. **Superseding artifact.** A new `ADAPT-NNN` is created with the frontmatter field `supersedes: ADAPT-MMM` and a mandatory `supersession-rationale` referencing the concrete contradicting requirement (`BR` / `SR` / `SPEC` ID) and its source. The superseded ADAPT receives an automatically derived back-reference `superseded-by: ADAPT-NNN` (§7.8.1).
2. **Signature.** If the superseded decision had a **contractual outcome** (was signed by the client — the typical case for an approved ADAPT) — supersession REQUIRES a **new client signature**: a decision agreed with the client cannot be cancelled unilaterally. If, however, the fix is strictly cosmetic and does not touch the contractual outcome, the Architect signature alone is permitted, without the client (by analogy with the errata rule, §7.6.3). No separate QG is introduced — supersession passes through the same QG-3 (dual signature, §7.5, §10.8.5).
3. **State.** The superseded `ADAPT-MMM` moves to the dedicated terminal state `superseded` — separate from `obsolete` (becoming outdated) and from `frozen` . `superseded` is immutable and is **retained** for audit (immutable history, substrate capability V1); it is not deleted. The transition is regulated in §10.8.5.
4. **Redirection of derivatives.** All `BR` / `SR` / `SPEC` with `source.adapt: ADAPT-MMM` MUST be either redirected to the superseding ADAPT or re-derived. A dangling `source.adapt` reference to an ADAPT in status `superseded` is **fatal**: the gate `check-adapt-supersession.js` blocks it (§10.11.1), by analogy with reference-validation.
5. **Additivity.** Like delta and errata — the superseded ADAPT **is not edited**; only a new artifact and the typed link `supersedes` / `superseded-by` are introduced.

Supersession is an extending capability: a single ADAPT without supersessions remains a valid special case, and migration of existing projects is not required.

7.7 Relationship of ADAPT to other artifacts

7.7.1 BR / SR / SPEC reference ADAPT through `source.adapt`

```
# Frontmatter SR (example)
source:
  adapt: ADAPT-001
  adapt-section: "Forward §3"   # forward interpretation; canonical section
identifier — Forward §*
  tz-section: "§3.4"            # for traceability; the primary source remains
the TZ
```

The `source.adapt` field is conditional: present when the TZ → RENAR conversion required ADAPT; omitted when the adversarial reviewer returned a "no findings" verdict — then the `source.adversarial-review-ref` field is REQUIRED (§7.4.1). The `source.tz-section` field is REQUIRED always (the dual trace chain).

7.7.2 The full trace chain

```
TC-NN  →  verifies SR-12  →  derived from ADAPT-001 §4 (forward interpretation)
                                  │     │
                                  │     └─ resolves B-007 (was: contradiction,
                                  │                answered by client 2026-03-15)
                                  │
                                  └─ interprets TZ-YYYY-NNN §3.4
```

When verifying from a test case, one can reach: (a) the source TZ section, (b) the forward interpretation of that section, (c) the implementer's questions on backward findings, (d) the client's answers, (e) the derived BR / SR / SPEC.

7.7.3 TR does not reference ADAPT directly

A TR (task) references SR / SPEC, and those already reference ADAPT. The task implementer **does not access ADAPT directly** — all necessary interpretations are already contained in SR / SPEC. If the implementer discovers an ambiguity in an SR, the root determines the outcome (Q1, §7.4.1.1):

- **root in decomposition** (not in the TZ — for example, an imprecise SR wording, a missed `constrained-by[]` link) — resolved by clarifying the SR / SPEC **without** ADAPT;
- **root in the language or intent of the TZ** — a backward finding is registered in ADAPT. If an ADAPT for this TZ already exists, a new record is added; if an ADAPT has not yet been created (the verdict at import was "no findings"), a **new** ADAPT is created at the current stage (§7.4.1.1). This is the regular case, not an exceptional one.

7.8 ADAPT schema

7.8.1 frontmatter (mandatory fields)

```yaml
---
id: ADAPT-NNN                          # immutable; NNN sequential per project
title: "TZ adaptation <name>"
type: ADAPT
trigger-stage: import-tz               # stage that produced the ADAPT (§7.4.1.4):
                                       # import-tz | decompose-br | decompose-sr |
spec | tc

source-tz:
  id: TZ-YYYY-NNN
  signed-date: "<ISO-date>"
  signed-by-client: "<name + role>"
  document-version-ref: "<substrate-native version identifier>"   # V5 pin (see
§3.3.5)

parent-adapt:                          # for delta-ADAPT
  id: ADAPT-NNN
  delta-tz: TZ-YYYY-NNN-delta-N
```

```yaml
supersedes: ADAPT-MMM                # only for a superseding ADAPT (§7.6.4);
omitted otherwise
superseded-by: ADAPT-NNN             # auto-derived; set on the superseded ADAPT
supersession-rationale: >            # mandatory if supersedes: is present
  "<reference to the contradicting BR/SR/SPEC ID + its source; rationale for
cancellation>"

status: draft | review | client-ready | answered | approved | frozen | superseded
| obsolete
created: "<ISO-date>"
last-updated: "<ISO-date>"

approval:                            # mandatory for approved
  client-signature:                  # mandatory for approved
    signed-by: "<name>"
    role: "<role>"
    organization: "<client-org>"
    signed-at: "<ISO-datetime>"      # V6 timestamp
    signature-ref: "<substrate-native reference>"
  architect-signature:               # mandatory for approved
    signed-by: "<name>"
    role: architect
    signed-at: "<ISO-datetime>"

generates-requirements: []           # auto-derived; BR/SR from this ADAPT
generates-specs: []                  # auto-derived; SPEC-* from this ADAPT
open-questions-count: integer        # auto-derived; mandatory 0 for approved
resolved-questions-count: integer

ai-provenance:                       # mandatory if the ADAPT draft was AI-
generated
  generated-by: "<vendor>-<model>@<date>"
  prompt-template: "<template-path>@<version>"
  context-tokens: integer
  output-tokens: integer
  human-edits: boolean               # mandatory true for approved — the client
saw the text
---
```

Note: ADAPT exists in only one mode (dual signature, the full lifecycle of §7.4.5). Reactivity (§7.4.1) is expressed **at the level of creation**: if the adversarial reviewer returned a "no findings, no clarifications" verdict, ADAPT is not created at all, rather than being created in a simplified form.

7.8.2 Body structure (mandatory sections)

The mandatory sections of the ADAPT body:

1. **Summary** — 3–5 paragraphs for one-page reading by the client.
2. **Term mapping** — a "client → engineer" table.
3. **Forward interpretation (the Forward section)** — a section for each TZ section with the mandatory elements from §7.4.3.
4. **Backward findings** — all records with the lifecycle from §7.4.5.
5. **Backward-findings summary** — a statistical table by categories and statuses.

6. **Derived-artifacts table** — an auto-derived list of BR / SR / SPEC.
7. **ADAPT change history** — substrate-native, auto-generated.

Optional sections are at the implementation's discretion and are not regulated.

7.9 Quality Gates for ADAPT

ADAPT has a dedicated state machine. Details in chapter 10 §10.4. Brief summary:

Gate	Precondition	Postcondition
QG-ADAPT-draft	ADAPT created; frontmatter present	The forward interpretation covers all TZ sections
QG-ADAPT-review	Forward interpretation filled in; initial backward findings in `open`	All backward findings in `open` or `asked-to-client`
QG-ADAPT-client-ready	All backward findings in `asked-to-client`; the question package is formed	Ready to send to the client
QG-ADAPT-answered	All backward findings in `answered`; resolution begun	Ready for finalization
QG-ADAPT-approve	All backward findings in `resolved`; the dual signature is ready	ADAPT immutable; generation of BR / SR / SPEC is permitted
QG-ADAPT-frozen	`approved`	Further changes — only through delta-ADAPT or errata

The substrate hooks (§3.3.3 V3, §3.3.5 V5) MUST:

- Block the transition to `approved` when `open-questions-count > 0`.
- Block the creation of BR / SR / SPEC with `source.adapt` on an ADAPT in a status below `approved`.
- Recompute `open-questions-count` / `resolved-questions-count` after each change.

7.10 ADAPT and AI generation

7.10.1 The AI agent creates a draft ADAPT

At TZ import, the AI agent creates a **draft ADAPT** automatically: the forward interpretation by section, an attempt to detect contradictions / gaps / terminology ambiguities, a first version of the term mapping. This draft is a starting point for the Architect, not the final artifact.

7.10.2 The adversarial reviewer

Application of the **adversarial review principle** (a separate AI agent-critic with a **different model**; the procedure — guide/07 §4.5): it looks for what the primary agent missed — missing backward findings. If the adversarial reviewer finds at least three serious new findings, the primary draft is returned for rework.

7.10.3 The client does not communicate with the AI directly

Questions on backward findings are aggregated by the Architect into a human format **before being sent to the client**. The Architect MAY remove duplicates, rephrase into the client's language, merge related ones. The client sees a prepared list of questions, not the raw output of the AI agent. The client's answer (in any form: text, video call, letter) is transcribed by the Architect into ADAPT with an indication of the channel and authentication.

7.11 Storage scheme

ADAPT documents are stored in the `adapt/` subfolder of the requirements substrate:

```
[project]/
  adapt/
    ADAPT-001-main.md
    ADAPT-001-delta-1.md
    ADAPT-001-delta-2.md
    ADAPT-002-main.md
    errata/
      errata-ADAPT-001-1.md
  tz/
    TZ-YYYY-NNN.md
    TZ-YYYY-NNN-delta-1.md
```

The concrete file structure on a concrete substrate is substrate-specific (see guide/03 for distributed VCS; guide/04 for a document-oriented store).

7.12 The relationship of the TZ and the RENAR description

7.12.1 Two languages with a variable distance

The TZ and the RENAR description are two different artifacts with different natures:

Parameter	TZ	RENAR description
Target reader	The client (human)	The AI agent (§0.2.1) and the human verifier
Language	The client's language (business domain, contractual vocabulary)	The requirements language (canonical IDs, closed lists, formal frontmatter and graph links)
Completeness	Allows defaults, incompleteness, ambiguity of wording	Allows no defaults; completeness is the lower bound of machine-enforceability (§0.3)
Evolution	Incremental: the first TZ describes the system completely, the subsequent ones — only the delta (§7.6)	Non-incremental: before changing the system, a new full version of the RENAR description is created, and only then does the AI agent make changes in the implementation

Status after signing	An immutable contractual document (§7.4.2)	Evolves through an approved delta-ADAPT or (when no ADAPT is created, §7.4.1) through source.tz-section directly

The distance between the two languages is **variable**. Sometimes TZ sections are worded unambiguously enough for the AI agent to convert them into BR/SR/SPEC without loss of meaning. Sometimes the reverse: the TZ contains a contractual phrase that has several engineering interpretations, or omits behavior without which implementation is impossible.

7.12.2 ADAPT — a reactive bridge between languages

ADAPT exists only when a gap arises between the languages. Its forward interpretation (forward, §7.4.3) is a **translation** of concrete TZ sections from the client's language into the requirements language. The backward findings (backward, §7.4.4) are a formalization of the fact that, during translation, gaps, ambiguities, or contradictions were discovered that require agreement with the client.

Three consequences follow from this nature:

1. **ADAPT is a reactive artifact by design.** The existence of a gap between the languages is a necessary condition for creation (§7.4.1.1); a formal ADAPT without content loses its meaning for audit and devalues the other ADAPTs.
2. **The adversarial reviewer is the only one who declares the absence of a gap.** "ADAPT is not needed" is a recorded verdict by a different model (§7.10.2, §7.4.1.3), not a silent assumption by the Architect.
3. **The form of ADAPT is the only one.** It is created in the full form (dual signature §7.5, all body sections §7.8.2, the full lifecycle §7.4.5); intermediate "light" forms do not exist.

7.12.3 Why the RENAR description is always complete

The RENAR description is non-incremental by design: the AI agent (§0.2.1) is unable to reliably "fill in" changes relying only on the delta. A full new version of the RENAR description is the only form that guarantees that:

- machine-enforceable invariants (completeness, graph consistency, lifecycle states) are applicable to the description **as a whole**, not to the diff;
- the adversarial reviewer works on the full artifact, not on the delta;
- the subsequent steps (decomposition, TC generation, implementation — `guide/00-quickstart §"The two regular scenarios"`) are performed on the up-to-date full picture of the system.

A delta-TZ is incremental at the **source** level (the contractual side); the full new version of the RENAR description is assembled by the AI agent from the parent RENAR + either the delta-ADAPT (if it was created) or directly accounting for the delta-TZ through `source.tz-section`.

7.12.4 Relationship to the Source-of-Truth inversion

The TZ is a contractual artifact but **not** the Source of Truth about system behavior (§2.3). The Source of Truth is the RENAR description (BR / SR / SPEC / TR / TC). The TZ is the source from which the RENAR description is derived **either** through ADAPT (when there is a gap) **or** directly through `source.tz-section` (when there is no gap); code is a derived artifact of the implementation of the RENAR description. ADAPT and §7.12 fix the dual inversion: the contractual source (TZ) → the Source of Truth

(RENAR description) → code. ADAPT is embedded in the chain reactively, when the bridge between the languages is needed.

7.13 Relationship to other chapters

Chapter	Relationship
02 Methodology positioning	ADAPT is a consequence of Statement 2 (two-way adaptation instead of "throwing the specification over the wall")
06 Requirements hierarchy	BR / SR reference ADAPT through `source.adapt`
08 Specifications	SPEC-* also reference ADAPT through `source.adapt`
09 Test cases	TC, through SR / SPEC, returns to ADAPT for the full trace chain
10 Lifecycle and QG	the ADAPT state machine + QG-ADAPT-* gates
03 Substrate versioning	Dual signature (V6) + atomic approval (V2 + V3); immutability after approved (V1); delta-ADAPT through V4
13 Conformance	ADAPT for each TZ is a mandatory clause

08. Specifications — 9 SPEC types

> ***Part of the RENAR Standard v1.0-draft*** · *← Table of contents*

8.1 Why a separate specification axis

Take the requirement "the system creates an order." It says **what** must happen — but it is silent about **how** the system is built to do it: what its API contract is, in which table the order lives, under which access rules, on which screen. Cramming all of that into the requirement itself does not work — it turns into mush. So RENAR splits the description into two axes: **behavior** (BR / SR / TR, chapter 6) and **structure** — specifications, SPEC.

A specification is not a "more detailed SR" and not its child. A single "create order" requirement typically rests on five to seven specifications at once (architecture, API, data, process, security, screen), so the link between the axes is a graph of typed edges (`constrained-by[]` , `implements-spec[]`), not a tree. There are exactly nine specification types, and the list is closed: `SPEC-ARCH` , `API` , `DATA` , `INT` , `PROC` , `UI` , `AI` , `SEC` , `OPS` — a new type is introduced only through the formal change procedure of the standard (chapter 13).

8.2 Architectural decision: SPEC is a parallel axis, not children of SR

8.2.1 Two axes of describing the system

Requirements and specifications answer different questions:

Axis	Artifacts	Question
Behavioral	BR / SR / TR (chapter 6)	What the system must do
Structural	SPEC-* (9 types)	How the system is structurally built to fulfill those requirements

8.2.2 SPEC as a parallel axis: links through a typed graph

The links between the requirements axis (BR / SR / TR) and the SPEC axis are organized as a **dependency graph**, not a tree of parents. An SR has exactly one parent in the requirements tree (BR), but many typed `constrained-by[]` edges to SPEC. A single SR MUST reference every SPEC that constrains its behavior on the API / data / UI / process / security / ops axes; conversely, one SPEC MAY constrain many SR.

Example: the SR "create order" rests on SPEC-ARCH (where the orders component lives), SPEC-API (the endpoint contract), SPEC-DATA (the table schema), SPEC-PROC (workflow), SPEC-SEC (access rules), SPEC-UI (the form).

Normatively: every `SR.constrained-by[]` and `TR.implements-spec[]` edge MUST reference one of the closed SPEC categories listed in §8.3; ad-hoc categories are not allowed (see §1.7 closed-list policy).

```
Requirements tree (behavioral axis):        Parallel specification axis:

BR                                           SPEC-ARCH    SPEC-API
 └── SR  ←──── constrained-by[] ────►        SPEC-DATA    SPEC-INT
      └── TR ─── implements-spec[] ────►     SPEC-PROC    SPEC-UI
                                             SPEC-AI      SPEC-SEC
                                             SPEC-OPS

Requirements tree:
  SR.parent              → BR              (single parent)
  TR.parent              → SR              (single parent)

Link graph (typed edges):
  SR.constrained-by[]    → SPEC-*
  TR.implements-spec[]   → SPEC-*
  SPEC-*.depends-on[]    → SPEC-*          (between specifications)
  SPEC-*.referenced-by[] → SR / TR          (auto-derived inverse)
```

8.2.3 Rationale

Argument	Consequence
SPEC and SR answer different questions	SPEC does not refine an SR at a deeper level — it is a separate category of description
One SR rests on 5–7 SPEC	A "SPEC as parent of SR" tree leads to multiple parenthood
Industry standards (arc42, C4, OpenAPI, BPMN, ERD) live in parallel with requirements	RENAR follows this proven practice
An AI agent can parallelize SR and SPEC generation	Without one type blocking the other

8.3 The closed list of nine SPEC types

Type	Purpose	Industry reference
`SPEC-ARCH`	System / subsystem architecture: contexts, containers, components, deployment view, quality attributes	arc42, C4 model (Brown), ISO/IEC/IEEE 42010
`SPEC-API`	API contracts: REST / GraphQL / gRPC / async events; versioning, error model, rate limits	OpenAPI 3.x, AsyncAPI 2.x, gRPC IDL
`SPEC-DATA`	Data model: schema, ERD, indices, migrations, retention, PII classification	ISO/IEC 11179, JSON Schema
`SPEC-INT`	Integration: interaction between subsystems and external systems; protocols, contracts, SLA	Enterprise Integration Patterns (Hohpe)

`SPEC-PROC`	Process / workflow: business processes, state machines, saga, choreography, orchestration	BPMN 2.0, ISO/IEC 19510
`SPEC-UI`	UI / UX: screens, navigation, user journeys, accessibility, i18n, baseline images	Material Design / Apple HIG, WCAG 2.2
`SPEC-AI`	AI / ML: model cards, RAG, prompt engineering, eval strategy, cost budget	ISO/IEC 23894, NIST AI RMF
`SPEC-SEC`	Security: authn / authz, threat model, secrets management, data classification	STRIDE, OWASP ASVS, ISO/IEC 27001
`SPEC-OPS`	Operations: deployment, observability, SLO / SLA, runbook, disaster recovery	Google SRE, ITIL v4, ISO/IEC 20000

8.3.1 What did NOT make it into v1.0 (with rationale)

Candidate	Decision	Rationale
`SPEC-EVENT`	Not a separate type	Events / queues — part of SPEC-API (asynchronous APIs)
`SPEC-CONFIG`	Not a separate type	Feature flags / env vars / secrets — part of SPEC-OPS
`SPEC-PERF`	Not a separate type	Performance / NFR — part of SPEC-ARCH (quality attributes) or SPEC-OPS (SLO)
`SPEC-TEST-ENV`	Not a separate type	Test environments — part of SPEC-OPS
`SPEC-DOMAIN`	Not a separate type	Domain model — absorbed into SPEC-ARCH (decomposition) + SPEC-DATA (entities)
`SPEC-MIGRATION`	Not a separate type	Migration — part of SPEC-DATA (lifecycle)
`SPEC-COMPLIANCE`	Not a separate type	Compliance — links between SR/SPEC and regulations through `compliance-refs[]`, not a separate artifact

Closed-list policy: if subsequent work reveals that one of the excluded types is genuinely needed — it is added through the formal change procedure of the standard with rationale.

8.4 Common schema (shared frontmatter fields)

All 9 SPEC types share a common set of frontmatter fields. Type-specific fields are added as extensions on top (§8.5). The full machine-readable data model — in reference/02-schemas.md.

```
---
# === Identity (mandatory) ===
id: SPEC-<TYPE>-NN[.N]              # immutable; TYPE ∈
{ARCH,API,DATA,INT,PROC,UI,AI,SEC,OPS}
```

```yaml
title: "<short, descriptive>"
type: SPEC-ARCH | SPEC-API | SPEC-DATA | SPEC-INT | SPEC-PROC | SPEC-UI | SPEC-AI
| SPEC-SEC | SPEC-OPS
slug: "<kebab-case>"                # auto-derived

# === Scope (mandatory) ===
level: system | subsystem | module
scope:
  system: "<system-id>"
  subsystem: "<subsystem-id>"      # null if level=system

# === Lifecycle (mandatory) ===
status: draft | review | approved | verified | obsolete
priority: must | should | could    # not all types use; mostly SPEC-SEC / SPEC-
OPS

# === Source: provenance (conditional, see chapter 7 §7.4.1) ===
# source.adapt — conditional (present when an ADAPT was created; §7.4.1.1).
# source.tz-section — always mandatory.
# source.adversarial-review-ref — mandatory when source.adapt is omitted.
source:
  adapt: ADAPT-NNN                 # conditional
  adapt-section: "Forward §N"      # mandatory if adapt is present
  tz-section: "§N.N"               # always mandatory
  adversarial-review-ref: "<substrate-native reference>"   # mandatory if adapt
is omitted

# === Link graph (auto-managed except mandatory ones) ===
referenced-by: []                  # auto-derived; SR/TR/SPEC referencing here
depends-on: []                     # mandatory if present; SPEC-* this SPEC
rests on
verified-by: []                    # auto-derived; list of verifying TC IDs

# === AI provenance (mandatory at RENAR-4+; canonical schema — §4.10.1) ===
ai-provenance:
  generated-by: "<vendor>-<model>@<date>"
  generated-at: "<ISO-8601>"
  prompt-template: "<template-path>@<version>"
  context-tokens: integer
  output-tokens: integer
  human-edits: boolean
  generation-time-ms: integer       # optional; see §4.10.1
  # optional at RENAR-4, mandatory at RENAR-5:
  # cost-budget, cost-actual

# === Replacement (mandatory if applicable) ===
replaces: "<old-id>"
replaced-by: "<new-id>"
deprecated-date: "<ISO date>"

# === Compliance (optional) ===
compliance-refs: []                # references to ISO/GDPR/AI Act/NIST AI RMF
---
```

8.4.1 Mandatory body sections

The body of any SPEC MUST contain:

1. **Purpose** — 1–3 paragraphs.
2. **Scope** — what is in, what is out.
3. **Type-specific sections** — see §8.5.
4. **Link to requirements** — which SR/BR reference it.
5. **Link to other SPEC** — `depends-on[]`.
6. **Verification** — which TC verify this SPEC.

8.5 Schema extensions by SPEC type

A brief description of type-specific fields and mandatory body sections. The full machine-readable extension schema — in reference/02-schemas.md. Industry references in detail — in the listed standards.

8.5.1 SPEC-ARCH

Type-specific frontmatter: `arch-style`, `deployment-model`, `tech-stack`, `quality-attributes`.

Mandatory body: system context (C4 L1), containers (C4 L2), components (C4 L3) for critical containers, quality attributes (latency / throughput / availability), ADR log.

Spec-specific TC (chapter 9): architecture conformance tests (zoning), reference tests of quality attributes.

8.5.2 SPEC-API

Type-specific frontmatter: `api-style` (rest / graphql / grpc / async-events), `api-version`, `versioning-strategy`, `authentication`, `rate-limits`, `contract-file` (location of machine-readable contract).

Mandatory body: endpoints / operations with payload / response / errors, versioning rules (breaking vs non-breaking), error model, authn/authz reference to SPEC-SEC, rate limits, 2–3 example requests per endpoint.

Spec-specific TC: contract tests, authentication negative, rate limit tests.

8.5.3 SPEC-DATA

Type-specific frontmatter: `data-style` (relational / document / graph / columnar), `storage-engine`, `schema-version`, `pii-classification[]`, `retention-policies[]`, `migration-strategy`.

Mandatory body: domain entities, ERD (text / Mermaid / link), entity fields (type / constraints / indices / defaults), relationships (FK / cardinality / cascade), PII / sensitive data classification + encryption at-rest + retention, migration approach, index strategy.

Spec-specific TC: migration tests, constraint tests (FK / NOT NULL / unique), PII handling tests, data retention tests.

8.5.4 SPEC-INT

Type-specific frontmatter: `integration-pattern` (request-response / event-driven / message-queue / webhook / file-transfer), `direction`, `counterparty`, `sla`, `idempotency`.

Mandatory body: integrated systems, exchange contract, failure modes + retry strategy, idempotency + dedup, security between systems, observability (correlation IDs).

Spec-specific TC: contract tests with a counterparty mock, failure injection, idempotency, end-to-end TC `tc-type: contract`.

Note: SPEC-INT replaces the existing `INT-SR` (§8.7 migration).

8.5.5 SPEC-PROC

Type-specific frontmatter: `process-style` (bpmn / state-machine / saga / choreography / orchestration), `state-count`, `participants[]`, `sla` end-to-end and per step, `compensation` (defined / not-applicable / manual).

Mandatory body: process diagram (BPMN-flavor / Mermaid / link), states and transitions (for a state machine), participants and their roles, happy path, alternative scenarios and exceptions, timeouts and compensation (for saga), SLA.

Spec-specific TC: happy path E2E, alternative paths, compensation tests (for saga), SLA tests.

8.5.6 SPEC-UI

Type-specific frontmatter: `ui-platform`, `target-users[]` (with references to ADAPT persona sections), `design-system`, `accessibility-level` (WCAG-A / AA / AAA), `i18n`, `mockup-links[]`, `baseline-images[]` for VLM-judge tests.

Mandatory body: overall interface structure, key screens, user journeys without technical details, cross-cutting elements (access rights / notifications / error / empty states), tone and style, accessibility, i18n.

Spec-specific TC: VLM-judge against a baseline (judge ≠ production isolation), accessibility (axe-core / Pa11y), i18n (string overflow / RTL), user journey E2E.

Note: SPEC-UI replaces the existing `UIC` (§8.7 migration).

8.5.7 SPEC-AI

Type-specific frontmatter: `ai-pattern` (rag / fine-tuning / prompt-engineering / tool-use / multi-agent), `production-model` (vendor / model / version), `judge-model` (MUST differ from production), `context-strategy`, `eval-strategy` (metric / threshold / baseline-dataset), `cost-budget`.

Mandatory body: AI component architecture (pipeline / orchestration / fallback), model card (capabilities / limits / known failure modes), context strategy, eval strategy with judge ≠ production isolation, cost management, hallucination mitigation, adversarial aspects.

Spec-specific TC: eval against a baseline (judge isolated), adversarial (prompt injection as a negative TC), cost regression, hallucination tests.

Note: SPEC-AI replaces the existing `AIC`. Isolation judge ≠ production model is a mandatory requirement of the standard for all eval-TC.

8.5.8 SPEC-SEC

Type-specific frontmatter: `security-domains[]`, `auth-model` (authn / authz strategies), `data-classification[]` (PII-high / PCI / internal), `threat-model-method` (STRIDE / PASTA / OCTAVE), `compliance[]`, `incident-response` reference in SPEC-OPS.

Mandatory body: auth model (authn flow / authz rules), data classification with protection, threat model (STRIDE table with a mitigation for each threat), secrets management, audit (what is logged / retention / access), encryption (at-rest / in-transit / key management), compliance mapping (references to specific clauses).

Spec-specific TC: authn (pos + neg), authz (RBAC matrix), threat-test (each STRIDE threat → at least 1 negative TC), audit log, secrets leakage.

8.5.9 SPEC-OPS

Type-specific frontmatter: `deployment-style`, `environments[]` (dev / staging / prod with purpose and scale), `slo`, `observability` (logs / metrics / traces / alerting), `runbook-link`, `disaster-recovery` (rto / rpo / backup-strategy).

Mandatory body: environments, deployment process (CI/CD pipeline / gating / rollout strategy), SLO (availability / latency / error budget), observability, alerting (critical alerts / escalation), runbook, capacity planning, disaster recovery.

Spec-specific TC: deployment tests (smoke), SLO regression (load testing), failover (DR drills), observability (alerts fire when expected).

8.6 Link to requirements and tasks

8.6.1 SR.constrained-by[]

An SR receives a `constrained-by[]` field in its frontmatter — typed references to SPEC. This is a **graph**, not a tree of parents. The SR's parent in the requirements tree is single (BR).

```yaml
# SR frontmatter (example)
id: SR-05
parent:
  id: BR-02
constrained-by:
  - SPEC-UI-01
  - SPEC-API-02
  - SPEC-DATA-03
  - SPEC-PROC-01
  - SPEC-SEC-01
verified-by:
  - TC-12
  - TC-13
```

```yaml
source:
  adapt: ADAPT-001
  adapt-section: "Forward §3"       # see canonical identifier §8.4
```

8.6.2 TR.implements-spec[]

A TR (task) references its SR (parent in the tree) + one or more SPEC through `implements-spec[]`:

```yaml
id: TR-42
title: "Implement endpoint POST /orders"
parent:
  id: SR-05
implements-spec:
  - SPEC-API-02
  - SPEC-DATA-03
verified-by:
  - TC-14
```

8.6.3 SPEC.depends-on[]

A SPEC MAY rest on another SPEC:

```yaml
id: SPEC-API-02
title: "Orders REST API"
type: SPEC-API
depends-on:
  - SPEC-DATA-03         # stable data schema
  - SPEC-SEC-01          # auth model for endpoints
```

When an upstream SPEC changes (for example SPEC-DATA-03), all downstream artifacts (SPEC-API-02 and the SR linked through it) MUST be reviewed: either `verified` is reconfirmed (the change is compatible), or the downstream artifact passes re-verification through its own state machine (§10.7) and, until that completes, is not considered `verified` with respect to the new upstream version.

8.6.4 Auto-derived inverse edges

`SPEC.referenced-by[]` is recomputed by a substrate hook after each change to SR / TR / SPEC. An orphan SPEC (without `referenced-by[]` and without an active status) is a warning in the quality report.

8.7 Migration UIC / AIC / INT-SR / TS → SPEC-*

8.7.1 Mapping table

Old type	New type	Migration kind
`UIC-NN`	`SPEC-UI-NN`	Rename ID + move to `specs/ui/`
`AIC-NN`	`SPEC-AI-NN`	Rename ID + move to `specs/ai/`
`INT-SR-NN`	`SPEC-INT-NN`	Rename ID + move to `specs/int/`
`TS-NN`	`SPEC-<TYPE>-NN` (distribution)	Manual review of each TS; an AI agent classifies the content, the architect approves in one click

8.7.2 Atomic migration

Migration is one atomic change unit (V2) at the project level. Parallel existence of the old types (UIC / AIC / INT-SR / TS) and SPEC-* as the source of truth is prohibited.

Procedure (substrate-independent):

1. Preparation: an AI agent classifies each existing TS-NN into one of the 9 SPEC types.
2. The architect approves the classification.
3. Atomic change: rename IDs (UIC→SPEC-UI; AIC→SPEC-AI; INT-SR→SPEC-INT; TS→SPEC-*), move files to `specs/<type>/`, update all references in BR / SR / TR / TC frontmatter (`parent: UIC-NN` → `constrained-by: [SPEC-UI-NN]`).
4. Regeneration of auto-derived files (REQUIREMENTS.md, SPECS.md, inverse edges).
5. CI check: absence of orphan references and old IDs.

8.7.3 ID immutability

After migration, SPEC IDs are **immutable** (see V1, §3.3.1). Renaming `SPEC-API-02` → `SPEC-API-08` is prohibited. Replacement is through `deprecated` + a new ID with `replaces[]`.

8.8 Quality gates for SPEC

A SPEC has a dedicated state machine (chapter 10 §10.3):

State	Transition condition
`draft`	Created; mandatory frontmatter fields are being filled
`review`	Ready for review; mandatory body sections (§8.4.1) and type-specific ones (§8.5) are present
`approved`	The architect confirmed; `depends-on[]` consistency checked
`verified`	All mandatory spec-specific TC (chapter 9 §9.7) are green
`obsolete`	Replaced or no longer relevant; `replaced-by` is mandatory

Link to QG-0 / QG-2 of SENAR:

- QG-0 (the task has a goal/AC) is extended: for tasks implementing a SPEC, `implements-spec[]` in the TR frontmatter is mandatory.

- QG-2 (a `done` task has evidence) is extended: for tasks implementing a SPEC, a TC of the corresponding spec-specific kind (chapter 9 §9.7) is mandatory.

8.9 Storage layout

8.9.1 At the system level

```
[requirements-substrate]/      # root of the requirements substrate (layout —
guide/03 or guide/04)
  br/
  sr/
  specs/
    arch/   SPEC-ARCH-NN-*.md
    api/    SPEC-API-NN-*.md
    data/   SPEC-DATA-NN-*.md
    ui/     SPEC-UI-NN-*.md
    ai/     SPEC-AI-NN-*.md
    int/    SPEC-INT-NN-*.md
    proc/   SPEC-PROC-NN-*.md
    sec/    SPEC-SEC-NN-*.md
    ops/    SPEC-OPS-NN-*.md
  adapt/
  tz/
  SPECS.md                # auto-generated index
```

> *All 9 SPEC types (§8.3) are allowed at any `level`; the `specs/<type>/` subfolders are created as needed — not all are mandatory at the system level.*

8.9.2 At the subsystem level

```
[subsystem-substrate]/         # subsystem scope
  br/                     # if it has its own business side
  sr/
  specs/
    arch/   SPEC-ARCH-NN-*.md      # subsystem architecture
    api/    SPEC-API-NN-*.md
    data/   SPEC-DATA-NN-*.md
    ui/     SPEC-UI-NN-*.md
    ai/     SPEC-AI-NN-*.md
    int/    SPEC-INT-NN-*.md
    proc/   SPEC-PROC-NN-*.md
    sec/    SPEC-SEC-NN-*.md
    ops/    SPEC-OPS-NN-*.md
  adapt/
  SPECS.md
```

The substrate-native storage implementation is substrate-specific (see guide/03, guide/04).

8.9.3 SPECS.md — auto-generated index

`SPECS.md` is an auto-generated registry of all SPEC: ID, type, title, status, link to the verifiable requirement, link to the file. Marked `linguist-generated=true`. Regeneration triggers — every change to SPEC frontmatter or every approve / verify gate.

8.10 Links to other chapters

Chapter	Link
02 Methodology positioning	SPEC as a parallel axis — a consequence of the Source-of-Truth inversion
06 Requirements hierarchy	`SR.constrained-by[]`, `TR.implements-spec[]`
07 ADAPT	SPEC references ADAPT through `source.adapt`
09 Test cases	Spec-specific TC types (the table of mandatory TC kinds for each SPEC type)
10 Lifecycle and QG	SPEC state machine + QG extensions for SPEC
03 Substrate versioning	SPEC IDs are immutable (V1); migration is atomic (V2)
11 Maturity model	RENAR-3+: all 9 SPEC types where applicable
reference/02 — schemas	Full machine-readable schema for each type-specific extension
reference/05 — knowledge graph schema	`constrained-by[]`, `implements-spec[]`, `depends-on[]` as edge types in the graph

09. Test Cases

> ***Part of the RENAR Standard v1.0-draft*** · *← Table of contents*

9.1 A test case is a first-class artifact

In RENAR a test is not a postscript at the end of the code, but a full-fledged document: it has its own version, status, and place in the trace chain, just like the requirement it verifies. The reason is simple: tests are written by an AI agent, and an AI happily covers the "happy path" ("entered the right password — let in") and quietly skips the unpleasant parts ("entered someone else's — MUST NOT let in, MUST NOT hint which field is wrong, MUST NOT write the password to the log"). It is precisely in the unhandled negative cases that defects live.

For this reason RENAR makes two requirements normative. **Pos/neg pairing**: for every verifiable statement — at least one positive test case and one negative one (what MUST happen and what MUST NOT happen). **Judge isolation**: if the result is assessed by another AI model (for the `ux`, `eval` types), it MUST differ from the one that produced the artifact under assessment — a model does not check itself. The TC (Test Case) closes the trace chain TZ → ADAPT → BR / SR / SPEC → TR → TC (see §2.3): from a test failure one can trace back to the TZ section it ultimately verifies.

The chapter builds on ISO/IEC/IEEE 29119 "Software testing" for the concepts of test design, test execution, test result reporting, and pos/neg coverage, but fixes a closed list of TC types, mandatory pos/neg pairing, and judge ≠ production isolation as normative requirements of v1.0 that are not present in formalized form in ISO 29119.

From the practices of Specification by Example (Adzic) and BDD / Gherkin — where executable examples also serve as a specification — RENAR differs in that it moves pos/neg pairing (§9.7), judge ≠ production isolation (§9.13), and version-pinning a TC to the requirement version (V5, §3.3.5) from a recommendation to blocking normative clauses (§14.5.2).

The clauses of this chapter are normative. The closed lists (principles, TC types, mandatory TC kinds per SPEC type) are RENAR mandatory clauses (chapter 13); extension is only through the formal change procedure of the standard.

> ***Dense chapter:*** *reference/09 · the decision tree below is informative routing.*

9.1.1 Decision tree: choosing `tc-type` (informative)

```
flowchart TD
  A[New TC for SR/SPEC] --> B{SPEC type?}
  B -->|SPEC-UI| C[tc-type: ux]
  B -->|SPEC-AI| D[tc-type: eval + adversarial negative]
  B -->|SPEC-API / INT / DATA| E[tc-type: contract]
  B -->|SPEC-SEC| F[tc-type: security — negative only]
  B -->|SPEC-ARCH / PROC / OPS| G[tc-type: system]
  B -->|BR acceptance| H[tc-type: acceptance]
  C --> I{pos/neg pair?}
  D --> I
```

```
  E --> I
  F --> J[security: negative mandatory; positive via system TC]
  G --> I
  H --> I
  I -->|SR normative claim| K[§9.7: pos + neg required]
  I -->|negative invariant only| L[§9.7 exception: single TC OK]
```

The adversarial-review procedure for TC — guide/07 §4.5; the agent panel (informative) — same place, §4.5.

9.2 Closed list of normative TC principles

#	Principle	Normative formulation
P1	First-class artifact (TC)	A TC is a standalone artifact of the standard, equal to a requirement in lifecycle and versioning. It is stored as a separate file in the `tests/` subfolder of the requirements substrate (§9.17).
P2	Document ≠ implementation	A TC describes **what is verified and how** (decoupled from the implementation). The implementation (code) is addressed by the `automation.location` field and stored in the code substrate. One TC — one implementation.
P3	AI-generated	TC are created and edited by an AI agent on the engineer's assignment; the engineer does not write TC by hand (see chapter 11 §11.N).
P4	AI-executed	All TC in status `ready` and above are automated. The run is performed by an automated runner (CI / AI-runner / specialized executor). Results in `last-run` are recorded only by the runner (a bot-managed actor) upon the run.
P5	Pos/neg pairing	For every statement of a requirement (BR / SR / SPEC), at least one positive + negative TC pair is created (§9.7).
P6	`last-run` — bot-managed	The `last-run` field (date / result / runner-id / requirement-version / judge-report) is filled in only by the automated runner. Manual editing of `last-run` by any actor is prohibited by the standard (§9.12).
P7	Judge ≠ production isolation	For TC types that use LLM-as-judge (ux, eval), the judge model **MUST NOT coincide** with the production model that generates the artifact under assessment. A coincidence is blocked by a substrate hook (§9.6.2).

The list is closed. New principles are added only through the formal change procedure of the standard (chapter 13).

9.3 General TC schema (frontmatter)

All TC types share a common set of frontmatter fields. Type-specific fields are added as extensions on top (§9.6). The full machine-readable schema — in reference/02-schemas.md.

```
---
# === Identity (mandatory) ===
```

```yaml
id: TC-NN                           # immutable; NN sequential within scope
title: "<short, descriptive>"
type: TC
slug: "<kebab-case>"                # auto-derived

# === Classification (mandatory) ===
tc-type: acceptance | ux | system | contract | eval | security
negative: boolean                   # true for the paired negative TC

# === Scope (mandatory) ===
level: system | subsystem | module
scope:
  system: "<system-id>"
  subsystem: "<subsystem-id>"       # null if level=system
  module: "<module-id>"             # null if level ≠ module

# === Lifecycle (mandatory) ===
status: draft | ready | passing | failing | obsolete

# === Verification target (mandatory; at least one) ===
verifies:
  - id: SR-NN | BR-NN | SPEC-<TYPE>-NN
    requirement-version: "<substrate-native version-ref>"   # V5 pinning (see
chapter 3)
  - id: ...

# === Pair link (mandatory if negative=false and a pair exists) ===
paired-with:                        # ID of the paired TC (positive ⇔ negative)
  - TC-NN

# === Automation (mandatory) ===
automation:
  status: automated | manual-pending
  location: "<substrate-native pointer to implementation>"  # mandatory if
automated
  manual-pending-until: "<ISO date>"                        # mandatory if
manual-pending
  manual-pending-reason: "<text>"                            # mandatory if
manual-pending

# === Execution (mandatory if type=ux | eval) ===
judge:
  vendor: "<provider>"              # mandatory; see P7 isolation
  model: "<model-id>"
  prompt-template: "<template-path>@<version>"

baseline:                           # mandatory for ux | eval
  artifact: "<substrate-native pointer>"
  perceptual-diff-threshold: float  # for ux
  metric-thresholds: {}             # for eval

# === Last run (auto-managed; bot-only) ===
last-run:
  date: "<ISO-datetime>"
```

```
  result: pass | fail | skipped | n/a
  runner-id: "<runner-name@version>"
  run-ref: "<substrate-native reference>"
  requirement-version: "<version-ref of verified artifact>"
  judge-report: "<inline or pointer>"

# === AI provenance (mandatory at RENAR-4+; canonical schema — §4.10.1) ===
ai-provenance:
  generated-by: "<vendor>-<model>@<date>"
  generated-at: "<ISO-8601>"
  prompt-template: "<template-path>@<version>"
  context-tokens: integer
  output-tokens: integer
  human-edits: boolean
  # optional at RENAR-4, mandatory at RENAR-5 (see §4.10.1):
  # cost-budget, cost-actual, generation-time-ms

# === Replacement / obsolescence ===
obsolete-pending: boolean            # true on detected delta-TZ invalidation
replaces: "<old-id>"
replaced-by: "<new-id>"
obsoleted-date: "<ISO date>"
---
```

`verifies[]` is a closed list of references to verifiable artifacts (BR / SR / SPEC). TR is not stated directly in `verifies` — a TR is verified through its parent SR (see §6.7). `verifies[].requirement-version` is the substrate-native pinning of the artifact (V5 capability, see chapter 3 §3.3.5); QG-2 (§9.10) requires `verifies[].requirement-version` to match the current version of the artifact.

9.4 TC body sections

The body of any TC mandatorily contains the following sections (regardless of substrate):

Section	Obligation	Content
Context	mandatory	Which clause of the verifiable artifact the TC references; a quotation or paraphrase of the statement.
Preconditions	mandatory	The state of the system and data required for the run; provided by a seed mechanism.
Steps	mandatory	Runner actions; for `tc-type: ux` — intents, not selectors (see §9.6.1).
Pass criterion	mandatory	Binary, observable, reproducible (see §9.11).
Fail criterion	mandatory	A list of observable signs of a violation (not the negation of Pass); includes leaks, side-effects, race conditions.
Postconditions	mandatory	What state is expected after the run; cleanup mechanism.

Out of scope	mandatory	What is **intentionally** not verified, with a reference to the paired TC where it is covered.
Related TC	optional	References to semantically related TC.

The "Out of scope" section is normatively mandatory: it guards against a false sense of coverage. The absence of the section blocks the TC's transition into `ready`.

The body section names are machine-detectable `##`-level headings. The canonical section identifiers for the criteria sections are `## Pass criterion` and `## Fail criterion`; it is precisely these that the change-of-criteria control hook detects (§10.11.3), so the names of these sections are fixed and not subject to local substitution.

9.5 Closed list of TC types

```
tc-type ∈ { acceptance, ux, system, contract, eval, security }
```

Type	What it verifies	Applied to	runner family
`acceptance`	Is the business goal achieved?	BR	E2E + AI validator
`ux`	Does the UX match the stated experience?	SPEC-UI	AI-driver + VLM-judge
`system`	Does the system behave as described?	SR, SPEC-PROC, SPEC-ARCH	xUnit family
`contract`	Is the contract honored?	SPEC-API, SPEC-INT, SPEC-DATA	Contract-testing framework
`eval`	Is the AI component quality achieved?	SPEC-AI	Eval-runner with a reference dataset
`security`	Are the security invariants honored?	SPEC-SEC	Authz/threat-test framework

The list is closed. New types are added only through the formal change procedure of the standard (chapter 13). Specific runner technologies are substrate-specific and fixed in the implementation conformance manifest.

9.6 Type-specific extensions

9.6.1 `tc-type: ux` — UX tests based on SPEC-UI

A UX test is normatively built as a two-layer structure:

Layer	Content	Executor

Scenario (intent)	" wants after "	AI-driver: translates the intent into actions, finds elements by semantics (without hard selectors)
Perceptual check	"On the rendered state, is visible"	Perceptual judge (VLM): takes the render + criterion, returns pass/fail with a rationale

Mandatory frontmatter extension: `judge.vendor`, `judge.model`, `baseline.artifact`, `baseline.perceptual-diff-threshold`.

Mandatory body sections in addition to §9.4: Scenario (intent, not selectors); Perceptual criterion (what the judge MUST see); Paired negative (empty state / error / lack of permissions).

Visual regression. In addition to the VLM-judge — a perceptual diff against `baseline.artifact` with the threshold `perceptual-diff-threshold`. Exceeding the threshold blocks the TC's transition into `passing`.

Baseline update. Changing `baseline.artifact` REQUIRES a substrate-native approval mechanism with the tag `[baseline-update]` (see §9.13); automatic update is prohibited.

9.6.2 `tc-type: eval` — Eval tests based on SPEC-AI

An eval test normatively verifies the quality of an AI component through a dataset with metrics and thresholds.

Mandatory frontmatter extension: `judge.vendor`, `judge.model`, `baseline.artifact` (versionable dataset), `baseline.metric-thresholds`.

Mandatory body sections: dataset provenance (how it was assembled, what labeling was applied); metric cluster (one eval-TC = one semantically coherent group of metrics; different families — different TC); regression rule (what counts as a failure — going outside the threshold or a regression of ≥ N% against the baseline).

Judge ≠ production isolation (normative). The `judge.vendor` + `judge.model` field MUST differ from the `production-model` of the SPEC-AI specification that normalizes the behavior under assessment. A substrate-native hook (chapter 3 §3.3.3) MUST block the merge of a change unit on a coincidence.

Dataset versioning. The eval dataset is a substrate-managed versionable artifact: every change is recorded as an atomic change unit with a description (what was added / removed / re-labeled) and authorship (generator agent / critic agent / human spot-check).

Cost gating. Eval is not run on every implementation change (cost): the runner is triggered on a change to SPEC-AI, the production model, or the dataset, or on a schedule. The triggers are fixed in the substrate-native runner configuration.

Two-stage dataset labeling. The generator agent creates candidates; the critic agent checks them against a checklist; the engineer performs a spot-check of ≥ 10% of random examples before merging the dataset.

9.6.3 `tc-type: contract` — Contract tests based on SPEC-API / SPEC-INT / SPEC-DATA

Mandatory body sections: machine-readable contract (a reference to OpenAPI / GraphQL SDL / Protobuf / JSON Schema from the SPEC); producer side / consumer side; mocked counterparty (for SPEC-INT —

sandbox / real environment as a separate TC).

Mandatory extension for SPEC-INT. Contract TC MUST be combined with an integration TC (`tc-type: contract` , `level: subsystem | system`) against a real or sandbox counterparty — a mocked contract is not sufficient to verify SPEC-INT.

9.6.4 `tc-type: security` — Security tests based on SPEC-SEC

Mandatory body sections: threat-model attributes (STRIDE category or equivalent); subject under test (authn / authz / data classification / secrets / audit / encryption); negative scenarios (bypass attempt, unauthorized access, leakage); expected system behavior on a violation.

A security TC normatively contains **only negative scenarios** (an attempt to bypass protection). The positive "grant correct access to the correct actor" is covered by `tc-type: system` with coverage scope SPEC-SEC.

9.7 Pos/neg pairing — normative requirement

For every statement of a requirement (BR / SR / SPEC) that describes observable behavior, at least one positive + negative TC pair is created.

Positive TC	Paired negative TC
`negative: false`	`negative: true`
Describes the happy path / success behavior	Describes boundary conditions, violations, bypasses
`paired-with: [TC-<neg-id>]`	`paired-with: [TC-<pos-id>]`

A negative TC normatively describes the observable signs of a violation (what MUST NOT happen), not the negation of the positive TC's Pass criterion. Examples:

Statement	Pos TC	Neg TC
"Authentication by email + password"	Correct credentials → 200 + JWT	Wrong password → 401 without disclosing which field is wrong; no record in the session-store; rate-limit after N attempts
"Order creation"	Valid payload → 201 + order-id	Invalid price < 0 → 422 with an explicit error; no record in the DB; no side-effect (notification, accrual)

QG-2 (§9.10) MUST block the promotion of an artifact to `verified` if at least one normative statement is covered only by a positive TC.

Single-TC coverage is permitted **only** in one case: the artifact describes a prohibition / negative invariant on its own (for example, a security TC by STRIDE category — it is negative by nature).

9.8 Spec-specific TC — mandatory kinds per SPEC type

A closed normative table: each SPEC type MUST have at least one TC of each "mandatory kind" before transitioning into `verified` (chapter 8 §8.8).

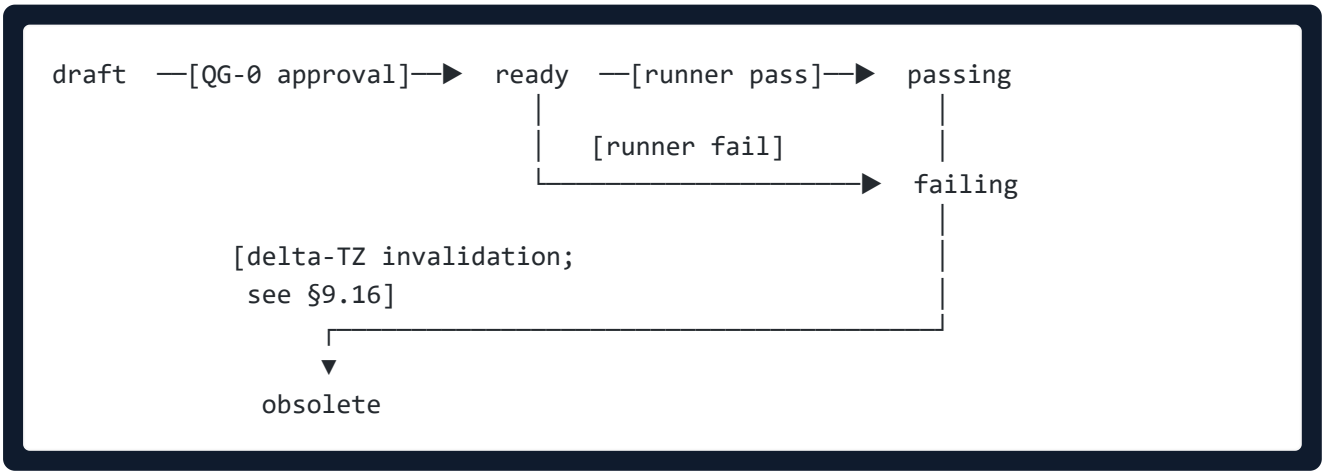
SPEC type	Mandatory TC kinds	Additional TC kinds
SPEC-ARCH	Conformance (zoning / dependency rules)	Reference quality-attribute values (latency / throughput / availability)
SPEC-API	Contract (against the contract from `contract-file`)	Auth negative; rate-limit; versioning compatibility
SPEC-DATA	Constraint (FK / NOT NULL / unique); Migration (forward pass + rollback)	PII handling; retention; index regression
SPEC-INT	Contract (mocked counterparty); contract TC `tc-type: contract` (real / sandbox counterparty)	Failure injection; idempotency; observability (correlation IDs)
SPEC-PROC	Happy path E2E; Alternative paths E2E	Compensation (for saga); SLA end-to-end
SPEC-UI	VLM-judge against a baseline (judge ≠ production); Accessibility (WCAG-AA minimum)	i18n (string overflow / RTL); Journey E2E
SPEC-AI	Eval against a reference dataset (judge isolated)	Adversarial (prompt injection as a negative TC); Cost regression; Hallucination tests
SPEC-SEC	Authz / RBAC matrix; Threat-test per STRIDE category	Audit log; Secrets leakage; Encryption invariants
SPEC-OPS	Smoke after deploy; SLO regression (load test)	Failover / DR drill; Observability (alert firing correctness)

The substrate-native hook `promote SPEC → verified` (chapter 3 §3.3.3) MUST check for the presence of at least one TC of each mandatory kind and block the transition in their absence.

The table is closed at v1.0. Extension is only through the formal change procedure of the standard (chapter 13).

9.9 TC lifecycle

9.9.1 State machine



Status	Meaning	Transition trigger
`draft`	Created, implementation in progress	Creation by the AI agent
`ready`	Implementation valid; dry-run runner passed; pos/neg pairing confirmed	QG-0 (§9.10): one-click approval
`passing`	The latest run had `last-run.result = pass` on the current `requirement-version`	Bot-managed upon the run
`failing`	The latest run had `last-run.result = fail`	Bot-managed upon the run
`obsolete`	Terminal; the covered behavior no longer exists	Delta-TZ invalidation (§9.16) or deprecation of the parent artifact

`obsolete` is a terminal status. A TC in `obsolete` is substrate-natively preserved as a historical trace: the substrate implementation **MUST** ensure the immutability of the TC identifier and **MUST NOT** allow its reuse for a new TC (V1 capability; see chapter 3 §3.3.1).

9.9.2 Relation to the status of the verifiable artifact

Moving a BR / SR / SPEC into `verified` normatively requires: all TC from the verifiable artifact's `verified-by` have `last-run.result = pass` and `last-run.requirement-version` matches the current version of the artifact (see §9.10 QG-2).

9.10 Quality Gates for TC

The canonical definitions of the Quality Gates — in chapter 10 §10.3. This section is a TC-local summary of the gates applicable to TC directly (QG-0, QG-1) or using TC as evidence (QG-2). The numbering and semantics MUST match the canonical §10.3; a project-level local override is prohibited (§10.10.2).

Gate (canonical)	Role of TC	Precondition (brief; full formulation — ch. 10)	Postcondition
QG-0 — approval (§10.3.1)	TC (`draft → ready`) — the "approval" part	The `verifies[]` reference — the artifact exists in the substrate in a state no lower than `approved` ; the general preconditions of §10.3.1; the approver's decision is recorded substrate-natively (V3 + V6)	The TC is admitted to the implementation-gate checks (QG-1)
QG-1 — verification implementation (§10.3.2)	TC (`draft → ready`) — the "implementation" part	`automation.status = automated` (or `manual-pending` with a deadline and reason); pos/neg pairing (§9.7); dry-run runner passed; the mandatory TC body sections (§9.4) are filled in	The TC moves into `ready` ; the production runner run is admitted
QG-2 — verification (§10.3.3)	Artifact (BR / SR / SPEC / TR) `→ verified` / `→ done` ; TC — evidence	All TC from the verifiable artifact's `verified-by` are in status `passing` ; pos/neg pairing for each normative statement; the mandatory	The verifiable artifact moves into `verified` (a TR —

		spec-specific TC kinds (§9.8) are present; `last-run.requirement-version` matches the current `version` of the artifact	into `done`); the TC stays `passing`

The substrate-native one-click promote `draft → ready` atomically checks the preconditions of both QG-0 and QG-1 as a single bundle (see §10.3.2 "Trigger") — the diagram in §9.9.1 shows the aggregate gate passage as "QG-0 approval".

Checking that `last-run.requirement-version` matches the current `version` of the verifiable artifact on every subsequent TC run is a runner-managed consistency check (§10.9.3), **not** a separate Quality Gate in the sense of §10.2.1. On a mismatch, the substrate automatically moves the TC into `failing` until a re-run on the current artifact version; the audit-trail record (§10.13) is recorded with the type `runner-fail`, not `gate-passage`.

The substrate-native hooks (chapter 3 §3.3) MUST block gate transitions that violate a precondition.

9.11 Pass / Fail / Out of scope — normative criteria

9.11.1 Pass criterion

The Pass criterion MUST be:

- **Binary** — yes or no, without interpretation.
- **Observable** — recorded without access to the system's internal structures.
- **Reproducible** — a repeated run under the same conditions yields the same result.

Bad	Good
"Login works correctly"	"`POST /auth/login` with valid credentials returns 200 and a JWT with `exp = now + 24h ± 1m`"
"Performance is acceptable"	"p95 latency < 200 ms at 100 RPS on `/search` over 5 minutes"
"The error is handled"	"On an invalid email, 422 is returned with body `{"field":"email","code":"invalid_format"}`"

9.11.2 Fail criterion

The Fail criterion is **not the negation** of Pass. It enumerates observable signs of a violation, including those the Pass criterion does not explicitly cover:

- Which response / state / event is recognized as a failure.
- Information leaks (for example, a 401 MUST NOT indicate exactly which credentials field is wrong).
- Side-effects that MUST NOT occur — a log record, an email being sent, mutation of other records.
- Race conditions: concurrent requests do not lead to a violation of invariants.

9.11.3 Out of scope

Every TC mandatorily contains an "Out of scope" section with an explicit enumeration of:

- What is intentionally not verified by this TC;
- Where it is covered (a reference to the paired TC or another TC).

The section guards against a false sense of coverage (see also chapter 11 — coverage matrix). The absence of an explicit "Out of scope" normatively blocks QG-0 (§9.10).

9.12 `last-run` — bot-managed only

The `last-run` field (date / result / runner-id / run-ref / requirement-version / judge-report) is filled in **only** by the automated runner (CI-bot / AI-runner / specialized executor). Manual editing of `last-run` by any human is a violation of the standard; the substrate hook (chapter 3 §3.3.6) MUST block a change unit that alters `last-run` from an author who is not a bot.

Composition of `last-run`:

Field	Mandatory	Content
`date`	yes	ISO-datetime of the run
`result`	yes	`pass | fail | skipped | n/a`
`runner-id`	yes	Runner identifier + version
`run-ref`	yes	substrate-native pointer to the full run log
`requirement-version`	yes	Version of the verifiable artifact at the time of the run (V5 pinning)
`judge-report`	yes for `ux | eval`	Inline or a pointer to the VLM/eval-judge report

9.13 Protection against test gaming

9.13.1 Normative rule

An AI agent MUST NOT simultaneously change the implementation code and the Pass / Fail criteria of an existing TC in a single change unit such that a `failing` TC becomes `passing`, without an explicit approval by the engineer of the TC change.

Without this rule, the AI agent has a trivial path to a green run — to weaken the criterion instead of fixing the code.

9.13.2 The `[test-spec-change]` mechanism

Change class	Tag	Approval
Change to the Pass / Fail criteria of an existing TC	`[test-spec-change]`	Mandatory: an explicit engineer approval of the change unit, separate from any implementation-code change

Change to `automation.location` (relocating the implementation without changing the verified behavior)	—	Without a separate approval
Change to the implementation code without TC edits	—	Standard workflow
Update of `baseline.artifact` / dataset / `mockup-baseline`	`[baseline-update]`	Mandatory: an explicit engineer approval
Creation of a new TC	—	QG-0 (§9.10)

The substrate-native implementation of the tags is substrate-specific (see guide/03, guide/04); the normative requirement is the atomicity of the change unit, an explicit designation of the change class, and the optional (but recommended) isolation of such changes into a separate change unit from implementation-code changes.

9.13.3 Audit

All change units with the `[test-spec-change]` tag are aggregated into a substrate-native audit-feed for the architect. The aim is to track a pattern: if the AI agent frequently requests a criteria change, this is a signal of a problem with the formulation of the source requirement (chapter 7 ADAPT, the backward-findings categories `terminology` or `gap`).

9.13.4 Judge isolation (P7) — a special case of protection

`judge.vendor` + `judge.model` mandatorily differs from the production model of the verifiable SPEC-AI (§9.6.2). A coincidence is blocked by a substrate hook.

9.14 Engineer's spot-check

9.14.1 Normative procedure

Once per iteration (by default — the regular implementation cycle; the specific interval is fixed in the project conformance manifest) the engineer performs a spot-check of 5 random TC in status `passing`. The aim is to catch the situation where the AI agent generated a "green" TC that verifies nothing meaningful (an `assert True` equivalent; a VLM-prompt that passes on a blank screen; an eval criterion that always returns pass on the baseline).

9.14.2 Sampling

Parameter	Normative requirement
Sample size	5 TC (by default); MAY be increased in the project conformance manifest
Distribution across types	Uniform across `tc-type` (acceptance / ux / system / contract / eval / security) — each type has a chance of being selected
Status	Only `passing`

Who selects	The AI agent at random (substrate-native randomness; the seed is fixed in the audit-feed)

9.14.3 What the engineer checks

1. Does the Pass / Fail criterion match the stated behavior in the verifiable artifact?
2. Is the VLM-judge or eval-judge criterion too lenient?
3. Are the preconditions real (not substituted via a seed that masks a bug)?
4. Does the Out-of-scope cover exactly what the paired TC is supposed to cover?

9.14.4 Recording the result

The spot-check result is recorded substrate-natively:

```
last-spot-check:
  date: "<ISO-date>"
  by: "<engineer-id>"
  sampled-tests: [TC-NN, TC-NN, ...]
  issues-found: integer
  issues:
    - test: "TC-NN"
      issue: "<short description>"
```

9.14.5 Reaction to findings

On `issues-found > 0`:

- The architect registers a change unit to fix the found TC.
- The AI agent MUST account for the identified pattern in subsequent TC generations; the pattern is added to the agent's system prompt or to the meta-style guide.
- On a repeated occurrence of the same pattern — escalation to a review of the TC generation template.

9.15 Coverage matrix (auto-generated)

9.15.1 COVERAGE artifact

`COVERAGE.md` (the substrate-native artifact name) is an auto-generated summary report of requirements and specifications coverage by test cases at the level of the requirements substrate. It is marked with a substrate-native auto-generated flag.

9.15.2 Mandatory metrics

Metric	Goal	Action on violation

`coverage-percent` (verified / total artifacts)	The target threshold is fixed in the conformance manifest	A substrate-native gate blocks promotion
`approved` without `verified`	0 before promotion	AI-agent backlog for the next iteration
Coverage by a paired negative TC	100% of statements	The AI agent creates a change unit with a paired negative
`passing-tests / total-tests`	100% before change-unit promotion	Blocks QG-2 (§9.10)
`manual-pending` overdue	0	Notification to the architect; blocking of the affected artifacts
Stale (`last-run.requirement-version` < current)	0	The AI agent re-runs the run

9.15.3 Regeneration triggers

`COVERAGE.md` is regenerated automatically on:

- Completion of a change unit with a change to requirement / SPEC / TC artifacts;
- Promotion of a change unit into the substrate main line;
- Every successful runner run (an update to `last-run`);
- On a schedule (a substrate-native scheduler).

9.16 Delta-TZ and TC

9.16.1 Impact analysis over tests

On a delta-TZ (chapter 7 §7.6) the AI agent performs an impact analysis over TC simultaneously with the impact analysis over requirements:

1. Finds all TC whose `verifies[].requirement-version` is below the new version of the verifiable artifact.
2. Marks them `obsolete-pending: true`.
3. Forms a table of affected TC in the frontmatter of the delta-ADAPT or the associated change unit:

TC	Verifies	Old version	New version	Action
TC-NN	SR-NN	v1.1	v1.2	Update (new step)
TC-NN	SR-NN	v1.1	v1.2	No change (still current)
TC-NN	BR-NN	v1.0	deprecated	Move to `obsolete`

4. Generates updated versions of the TC in the same change unit as the delta-ADAPT.

5. After running the updated TC and their transition into `passing` — removes `obsolete-pending` and updates `verifies[].requirement-version` to the new artifact version.

9.16.2 TC transition into `obsolete`

A TC moves into `obsolete` (terminally) if:

- The parent artifact (BR / SR / SPEC) was moved into `deprecated` without a replacement;
- The parent artifact was replaced by a new one (`replaced-by`) for which a new set of TC was created, **and** the old set does not cover the behavior of the new artifact;
- The behavior covered by the TC no longer exists in the new version of the artifact.

An `obsolete` TC is immutable and is not deleted (V1; see chapter 3 §3.3.1).

9.17 Storage layout

Test cases are stored in the `tests/` subfolder of the requirements substrate. The substrate-native storage implementation is substrate-specific (see guide/03 for distributed VCS; guide/04 for a document-oriented store).

9.17.1 At the system / subsystem level

```
[requirements-substrate]/      # system or subsystem scope (chapter 6 §6.11)
  br/   sr/   tr/                # chapter 6
  specs/                          # chapter 8
  adapt/                          # chapter 7
  tests/
    acceptance/  TC-NN-*.md
    system/      TC-NN-*.md
    ux/          TC-NN-*.md
    contract/    TC-NN-*.md
    eval/        TC-NN-*.md
    security/    TC-NN-*.md
    baselines/                    # for ux / eval
      <baseline-artifact>.png
      <eval-dataset>.jsonl
  COVERAGE.md                     # auto-generated (see §9.15)
```

9.17.2 Implementation in the code substrate

The TC implementation (code) lives in the code substrate, separately from the requirements substrate; it is addressed by the `automation.location` field (a substrate-native pointer). The TC↔implementation relationship: 1:1.

9.18 Relation to other chapters

Chapter	Relation
02 Positioning in the methodology typology	TC — the bottom layer of the trace chain (Statement 1, Source-of-Truth inversion); pinning the requirement through `verifies[].requirement-version` (Statement 3, substrate versioning)
06 Requirements hierarchy	TC verifies BR / SR; `verified-by[]` — an auto-derived inverse edge on the requirement side
07 ADAPT	TC → SR → ADAPT → TZ — the full trace chain; backward findings (`terminology` , `gap`) are fed by patterns from the `[test-spec-change]` audit (§9.13.3)
08 Specifications	Spec-specific TC per the table in §9.8; SPEC → `verified-by[]` auto-derived; type-specific extensions §9.6
10 Lifecycle and QG	the TC state machine; the QG-0 + QG-1 bundle for TC (`draft → ready`); QG-2 for the verifiable artifact requires pos/neg pairing and spec-specific TC kinds
03 Substrate versioning	Immutable IDs (V1); atomic change unit and hooks (V2 + V3); diff & review for `[test-spec-change]` (V3); TC versioning without loss of history (V4); pinning `verifies[].requirement-version` (V5); author + timestamp for `last-run` (V6)
11 Maturity model	RENAR-1: TC mandatory; RENAR-3+: pos/neg pairing 100%, spec-specific TC table mandatory; RENAR-4+: AI-generated + AI-executed
13 Conformance	Closed list of TC types (§9.5) — a mandatory clause of v1.0; spec-specific TC table (§9.8) — a mandatory clause of v1.0; pos/neg pairing — a mandatory clause of v1.0; judge ≠ production isolation — a mandatory clause of v1.0
reference/02 — schemas	The full machine-readable schema of the TC frontmatter + type-specific extensions

10. Lifecycle and Quality Gates

> ***Dense chapter:*** *read after §6–§9; passing the QGs — guide/00; density — reference/09.*

10.1 How artifacts move: statuses and gates

A RENAR artifact — a requirement, a specification, an ADAPT, a test — does not sit still. It moves through states: `draft → approved → verified → …`. And it cannot move arbitrarily: every transition is guarded by a **Quality Gate** — a condition that MUST be satisfied, or the transition does not happen. A requirement does not become `verified` until all of its tests have gone green on the current version; an ADAPT does not become `approved` without two signatures. A gate is not a "success checkmark" but a check that is entitled to say "no" and leave the artifact where it is.

This chapter brings together the state machines of all artifacts and normalizes the gates: what is checked before each transition, who MUST check it and when. The chapter fixes **only** states, transitions, and gates; artifact frontmatter is defined by chapters 6–09.

10.1.1 Decision tree: which gate now (informative)

```
flowchart TD
  S[Artifact change] --> T{Transition type?}
  T -->|draft → approved| Q0[QG-0 approval]
  T -->|approved → ready| Q1[QG-1 implementation]
  T -->|ready → verified| Q2[QG-2 verification]
  T -->|architecture sign-off| Q3[QG-3 optional]
  T -->|client accept| Q4[QG-4 optional]
  Q0 --> V0{preconditions §10.3.1}
  Q1 --> V1{TC automated §10.3.2}
  Q2 --> V2{passing-tests §10.3.3}
  V0 -->|fail| X[Stays draft]
  V1 -->|fail| X1[Stays approved]
  V2 -->|fail| X2[TC failing]
```

10.2 Normative definition of a Quality Gate

10.2.1 Quality Gate

Quality Gate (gate) is a normative condition whose check MUST be performed for a permitted transition of an artifact from one lifecycle state to another. Each gate consists of:

1. **Identifier** — `QG-N` or `QG-<artifact>-<state>` (closed list §10.3, §10.4).
2. **Precondition** — a set of checkable assertions about the artifact and related artifacts that MUST be true at the moment the gate is triggered.

3. **Postcondition** — the state the artifact transitions into after a successful gate pass, and the observable effects (for example, the appearance of a record in the transition log §10.13).
4. **Trigger** — who or what initiates the gate check (participant: AI agent / Architect / automated runner; event: approval / run completion / arrival of a delta-TZ).
5. **Control point** — the place in the substrate where the check MUST be automated (§10.11).

A gate is not a success event — it is a condition that **MUST be checked**. A gate pass MAY be negative (the precondition is not satisfied) — in that case the transition is prohibited and the artifact stays in its current state.

10.2.2 Who MUST check a gate

Gate type	Required participant	Substrate enforcement
Approval (QG-0)	Architect or authorized role-holder on the substrate	Atomic recording of authorship and time (V6, §3.3.6)
Implementation (QG-1)	Automated runner (CI, eval-runner)	Atomic recording of the run result pinned to the artifact version (V5, §3.3.5)
Verification (QG-2)	Automated runner with `version-pin` confirmation	V5 + V6
Architecture (QG-3, optional)	Dual signature (client + Architect)	V3 + V6
Acceptance (QG-4, optional)	Stakeholder with authority	V6

10.2.3 Relationship to SENAR

SENAR §8 describes Quality Gates as an abstract concept for AI-driven development. RENAR **extends** SENAR in the requirements-engineering domain:

- It keeps the identifiers QG-0 / QG-1 / QG-2 as mandatory.
- It normalizes **formal state machines** for each artifact type (SENAR does not do this).
- It binds every transition in a state machine to a concrete gate with preconditions and postconditions.
- It adds optional QG-3 / QG-4 for industries with extended audit requirements.

RENAR does not contradict SENAR; an implementation is SENAR-compatible with RENAR if the requirements of §10.3 + §10.11 are met.

10.3 Canonical RENAR gates (mandatory)

A closed list of three mandatory gates. Extensions outside this list are only the optional ones in §10.4 or through the formal standard change procedure §10.10.

10.3.1 QG-0 — approval gate

Purpose: permits an artifact to transition from draft into a state approved for development.

Precondition (common part, supplemented per-artifact in §10.5–§10.9):

- The artifact frontmatter is valid against the schema of its chapter.
- The artifact identifier is unique in the substrate (V1, §3.3.1).
- An adversarial review has been performed; or its non-applicability is explicitly recorded — permitted **only** for trivial artifacts (by the criteria declared in the conformance manifest, §13) with the reason recorded in the transition log (§10.13).
- If the artifact references a source (`source.adapt` for BR/SR/SPEC, `verifies[]` for TC) — the referenced artifact exists in the substrate in a state no lower than `approved` .

Postcondition:

- The artifact transitions into `approved` (for requirements / SPEC) or `ready` (for TC) or `approved` ADAPT (§10.8).
- A record in the transition log (§10.13).
- For requirements / SPEC: decomposition into child artifacts is permitted (for BR — SR; for SR — TR + SPEC via `constrained-by` / `implements-spec`).

Trigger: explicit approval by the Architect / role-holder through the substrate's native mechanism (V3 diff & review, §3.3.3).

Applicable artifacts: BR, SR, TR, SPEC, ADAPT, TC.

10.3.2 QG-1 — implementation gate (TC only)

Purpose: confirms that a valid implementation exists for the artifact — code, configuration, an infrastructure artifact — suitable for verification.

Precondition:

- The implementation is pinned to the artifact version via `version-pin` (V5, §3.3.5).
- `automation.status: automated` (with a valid `automation.location`) or `automation.status: manual-pending` (with `manual-pending-until` set and `manual-pending-reason`).
- All static checks of the implementation by the substrate agent (types, lint, schema) — passed.
- Pos/neg pairing for the artifact's covered assertions is ensured (chapter 9 §9.7).
- All mandatory body sections of the TC (chapter 9 §9.4) are filled in.

Postcondition:

- The TC transitions into `ready` .
- A record in the transition log.

Trigger: the approving participant (one-click promote `draft → ready`) upon the automated runner's confirmation of a passing dry-run.

Applicable artifacts: TC (`draft → ready`).

Note: TR does not pass a separate QG-1 gate. The implementation-validity conditions (impl scope, version-pin, static checks) for TR are part of the QG-2 preconditions (§10.6.2). **QG-1 applies only to TC.** For BR / SR / SPEC the `approved → verified` transition is governed by a single QG-2; there is no intermediate QG-1 implementation gate for requirements and SPEC.

10.3.3 QG-2 — verification gate

Purpose: confirms that the system's observed behavior conforms to the artifact: all TCs in the artifact's `verified-by` are in state `passing` on the artifact's current version.

Precondition:

- For BR / SR / SPEC: all TCs in `verified-by` have `last-run.result = pass`, and `last-run.requirement-version` (or the equivalent `spec-version` / `version`) matches the current `version` of the verified artifact.
- Pos/neg pairing on the artifact's normative assertions — satisfied.
- All mandatory spec-specific TC kinds for the artifact type are present (chapter 9 §9.8).
- For TR: all its AC are verified by bound TCs (`last-run.result = pass`).
- Spec-specific additional preconditions:
  - SPEC-UI / SPEC-AI: TC in state `passing` with `judge-isolation` observed (chapter 9 §9.13.4).
  - SPEC-SEC: a TC `tc-type: security` is present and `passing`.

Postcondition:

- The artifact transitions into `verified`.
- A record in the transition log with evidence-refs (a list of run IDs).
- The substrate MUST record the `version` of the verified artifact in the evidence record (V5).

Trigger: the automated runner confirms passing TCs and initiates the promote-transition on the author's request (one-click promote `approved → verified`).

Applicable artifacts: BR, SR, SPEC, TR.

10.4 Optional gates

QG-3 and QG-4 are normatively described but **not mandatory** for conformance (chapter 13). An implementation MAY declare in the conformance manifest either support for QG-3 / QG-4 or their absence. Conformance without QG-3 / QG-4 remains valid.

10.4.1 QG-3 — architecture gate (optional)

Purpose: permits an ADAPT to transition from `answered` to `approved` (§10.8). Also applicable to SPEC-ARCH decomposition decisions in projects with regulated architectural acceptance.

Precondition:

- All backward findings in the ADAPT are in status `resolved` (chapter 7 §7.4.5).
- The dual signature is ready: client signature + Architect signature (chapter 7 §7.5).
- For SPEC-ARCH (if QG-3 is applied): the decomposition decision is recorded in the substrate as an ADR-like artifact with a reference from the SPEC-ARCH (the ADR form is substrate-specific — fits in guide/).

Postcondition:

- The ADAPT transitions into `approved` (immutable, on a par with the TZ).

- A record in the transition log with both signatures (V6 author + timestamp records both participants).

Trigger: explicit dual approval; the substrate MUST atomically record both signatures (V2 atomic change unit, §3.3.2).

When to apply:

- ADAPT — always (but an implementation MAY declare QG-3 as a local alias for ADAPT approval, without carving it out as a separate gate).
- SPEC-ARCH — in projects with regulatory requirements for architectural acceptance.

10.4.2 QG-4 — acceptance gate (optional)

Purpose: records the client's acceptance of the business outcome after release. The transition of a BR from `verified` to `accepted`.

Precondition:

- BR in `verified` (QG-2 passed).
- The measurable business outcome (`business-outcome` in the BR frontmatter) — measured; `current-value` recorded.
- `achievement` ≥ the project-configurable threshold (80% by default, fixed in the conformance manifest).
- A formal Stakeholder signature.

Postcondition:

- The BR transitions into `accepted` (a terminal non-degradable status — a reverse transition requires a delta-TZ).
- A record in the transition log with the Stakeholder signature.

Trigger: formal acceptance by the Stakeholder upon release.

When to apply:

- Projects with explicit recording of post-release outcomes (product SaaS, regulated industries).
- In the absence of QG-4 — the `accepted` status is not used; the BR stays in `verified` until `deprecated`.

10.4.3 Conformance with optional gates

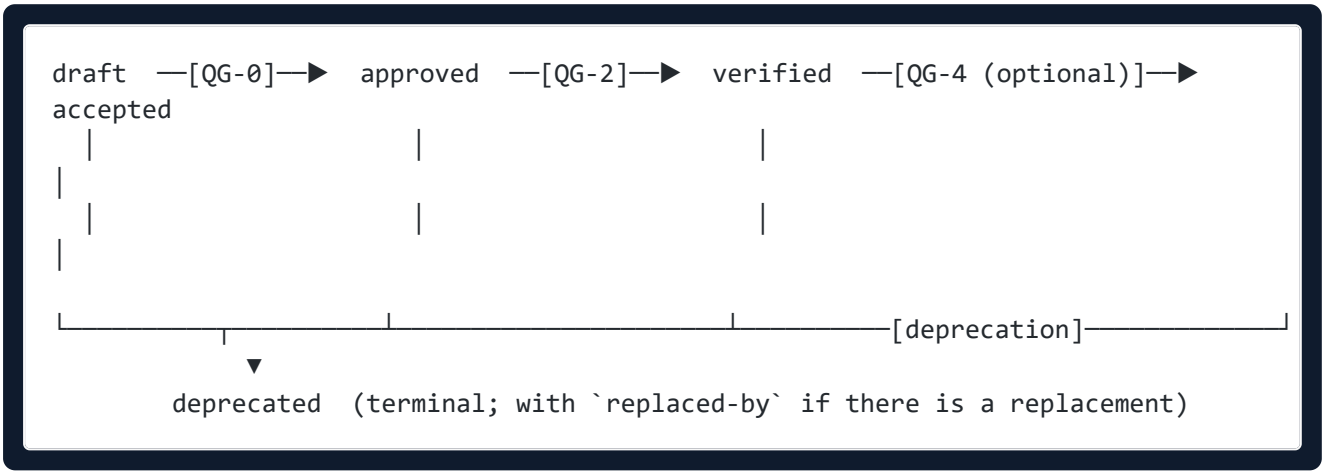
The conformance manifest (chapter 13) MUST explicitly declare:

```
quality-gates:
  qg-0: required          # always required
  qg-1: required
  qg-2: required
  qg-3: declared          # required | declared | absent
  qg-4: declared
```

`declared` means: the implementation supports the gate; artifacts MAY pass it, but conformance does not require passing it for all artifacts. `absent` — the gate is not applied in the implementation; the artifact's terminal state is `verified` (without `accepted`).

10.5 BR / SR state machine

10.5.1 States and transitions



Status	Semantics	Transition gate
`draft`	Created by an AI agent or the Architect; not yet approved	— (creation)
`approved`	Approved for decomposition / implementation	QG-0 (§10.3.1)
`verified`	All derived TCs `passing` on the current version	QG-2 (§10.3.3)
`accepted`	Post-release business outcome confirmed	QG-4 (§10.4.2, optional)
`deprecated`	Terminal; not deleted (V1 immutable history)	Deprecation transition (§10.5.3)

BR / SR frontmatter (including the mandatory status fields) is defined in chapter 6 §6.5.2 / §6.6.2. This section normalizes **only** the transitions between states and the binding to gates.

10.5.2 Per-transition preconditions

Transition	Gate	Additional preconditions (on top of §10.3)
`draft → approved`	QG-0	BR: `business-outcome` filled in. SR: the `parent` BR in a state no lower than `approved`. If the SR references a SPEC via `constrained-by[]` — all SPECs in `approved` or higher.
`approved → verified`	QG-2	At least one TC with `negative: true` in `verified-by`. All `last-run.requirement-version` match the current `version`.
`verified → accepted`	QG-4	Only if the implementation declared QG-4.

`* → deprecated`	Deprecation transition (§10.5.3)	See §10.5.3

10.5.3 Deprecation transition

Precondition:

- The artifact is in any non-`deprecated` state.
- `replaced-by` (if specified) exists in the substrate and is in a state no lower than `approved`.
- There are no active child TRs in state `approved` and no active implementer tasks on this artifact (atomic re-pointing of tasks to the replacement is a mandatory condition, V2 atomic change unit).

Postcondition:

- `status: deprecated`.
- `deprecated-date` recorded (V6).
- `replaced-by` specified, if there is a replacement.

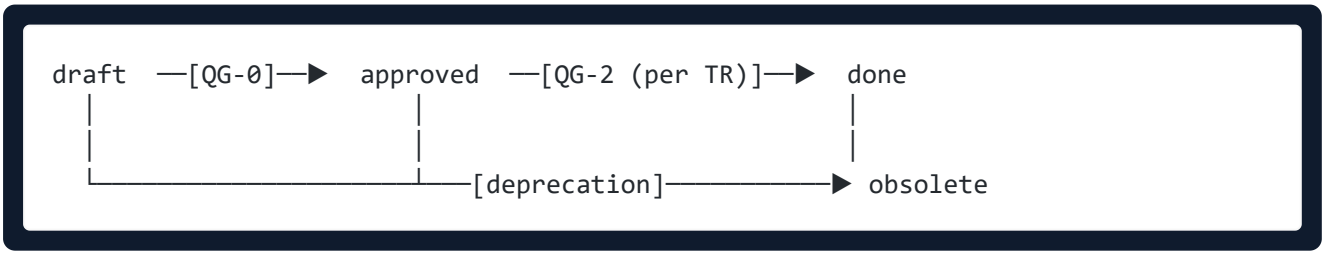
Trigger: the Architect or the Product Owner.

10.5.4 Reverse evolution of verification

If an artifact is already `verified` but its `version` has been incremented (for example, after applying a delta-ADAPT, chapter 7 §7.6) — the status MUST revert to `approved` before re-passing QG-2 on the new version. This transition is mandatory and automatic: the substrate MUST invalidate `verified` upon a change of `version` (chapter 6 §6.5.4 reverse evolution).

10.6 TR state machine

10.6.1 States and transitions



Status	Semantics	Gate
`draft`	TR created; AC not yet finalized	—
`approved`	AC approved; implementer work may start	QG-0 (§10.3.1) with the TR preconditions from §10.6.2
`done`	AC verified; all bound TCs `passing`	QG-2 (§10.3.3) with the TR preconditions from §10.6.2

`obsolete`	TR has lost relevance before completion (the parent SR changed)	Deprecation (Architect)

10.6.2 Preconditions for TR

QG-0 for TR (`draft → approved`) — in addition to the common part:

- A goal is stated (`goal`).
- AC are verifiable and independent (each AC is a separate check).
- At least one negative scenario is present.
- A reference to the parent SR (or BR for simple configurations) is established via `implements`.
- If the TR implements a SPEC — the mandatory field `implements-spec[]` (chapter 8 §8.6.2).
- If the task touches security — `threat-surface` is declared (chapter 8 §8.5.8).

QG-2 for TR (`approved → done`):

- All TR AC are confirmed by the passing of corresponding TCs (`last-run.result = pass`).
- Pos/neg pairing for each AC.
- For a TR implementing a SPEC: a TC of the corresponding spec-specific kind exists and is `passing` (chapter 9 §9.8).

10.6.3 TR deprecation

If the parent SR transitions into `deprecated` or its `version` has changed such that the TR's AC are no longer relevant — the TR transitions into `obsolete`. This is **not** degradation — it is an alternative terminal path. A TR in `obsolete` is not deleted.

10.7 SPEC state machine

10.7.1 States and transitions

Status	Semantics	Gate
`draft`	SPEC created; mandatory frontmatter fields being filled in	—
`review`	Mandatory body sections (§8.4.1) and type-specific ones (§8.5) present; ready for review	Review-transition (§10.7.2)
`approved`	Architect confirmed; `depends-on[]` consistent	QG-0

`verified`	All mandatory spec-specific TCs `passing`	QG-2
`obsolete`	Replaced or no longer relevant; `replaced-by` mandatory	Deprecation (§10.5.3 mutatis mutandis)

10.7.2 Review-transition (`draft → review`)

The review-transition is not a full-fledged gate in the sense of §10.2.1 — it is an automatic check of structural completeness. **Precondition**:

- All mandatory frontmatter fields §8.4 are filled in.
- All mandatory body sections §8.4.1 are present.
- Type-specific sections §8.5 are present for the corresponding `spec-type` .

Postcondition: `status: review` ; the artifact is visible to the Architect for review.

If the review-transition is not passed — the artifact stays in `draft` ; the substrate MUST return the list of missing sections (V3 diff & review supports structural feedback).

10.7.3 Preconditions for SPEC

QG-0 for SPEC (`review → approved`) — in addition to the common part §10.3.1:

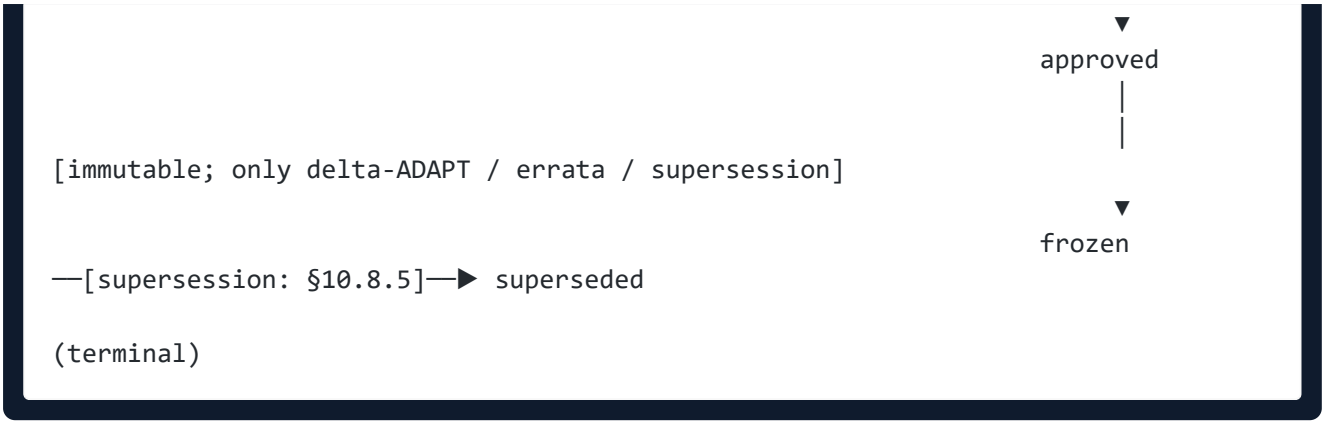
- The `depends-on[]` graph is acyclic (chapter 8 §8.6.3).
- All SPECs in `depends-on[]` are in a state no lower than `approved` .
- If the SPEC references an ADAPT via `source.adapt` — the ADAPT is in state `approved` .

QG-2 for SPEC (`approved → verified`):

- All mandatory spec-specific TC kinds for the `spec-type` are present and `passing` (chapter 9 §9.8).
- For SPEC-AI: pos/neg pair coverage over `evaluation-criteria` = 100%; judge-isolation observed.
- For SPEC-SEC: `tc-type: security` is present.
- For SPEC-DATA: `tc-type: contract` is present for published interface fields.

10.8 ADAPT state machine

10.8.1 Macro-states

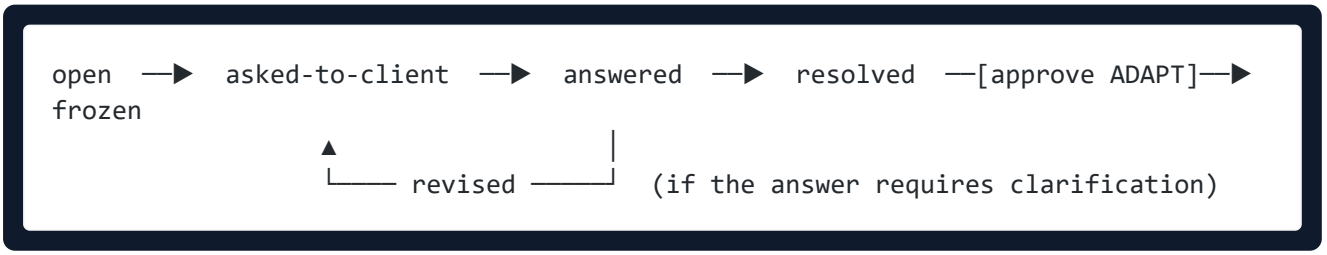


The ADAPT states (`draft → review → client-ready → answered → approved → frozen` , and the terminal `superseded` upon supersession) are defined in chapter 7 §7.4 and §7.6.4. This section normalizes the gates.

Transition	Gate	Precondition
`draft → review`	Review-transition	The Forward interpretation covers all TZ sections; the primary backward findings are recorded in `open`
`review → client-ready`	Backward-ready	All backward findings moved to `asked-to-client` ; the question package is formed
`client-ready → answered`	Client-return	All backward findings in `answered` with author + timestamp of the client's answer (V6)
`answered → approved`	**QG-3** (§10.4.1)	All backward findings in `resolved` ; the dual signature is ready
`approved → frozen`	Freeze-transition	Automatic after approve; the ADAPT is immutable; generation of BR / SR / SPEC with `source.adapt = approved` is permitted
`frozen → superseded`	**QG-3 of the superseding ADAPT** (§10.8.5)	The superseding ADAPT (`supersedes: ADAPT-MMM`) has reached `approved` ; derived BR / SR / SPEC are re-pointed or re-derived

10.8.2 Nested state machine for a backward-finding record

Each backward-finding record inside an ADAPT has its own subordinate state machine (chapter 7 §7.4.5):



Sub-state	Semantics
`open`	Recorded by the Engineer; not sent to the client

`asked-to-client`	Sent to the client; the question date is recorded
`answered`	The client answered; the answer recorded (V6 author + timestamp)
`resolved`	The Engineer integrated the answer into the Forward interpretation
`revised`	The answer is vague; a repeat question (return to `asked-to-client`)
`frozen`	After ADAPT approval; changes are impossible

Normative rule: QG-3 (approve ADAPT) is **prohibited** if at least one backward-finding record is in `open` / `asked-to-client` / `answered` / `revised`. All such records MUST be in `resolved` (chapter 7 §7.4.5).

10.8.3 QG-3 for ADAPT — detailed

Precondition (full):

- All Forward-interpretation sections are filled in (the forward-complete criterion).
- All backward-finding records in `resolved`.
- The client signature obtained and recorded by the substrate's native mechanism (V3 + V6).
- The Architect signature obtained and recorded.
- If the ADAPT is a delta-ADAPT: the parent-ADAPT in `frozen` (chapter 7 §7.6).

Postcondition:

- The ADAPT transitions into `approved`.
- A record in the transition log with both signatures.
- The substrate MUST atomically (V2) record both signatures: a partial signature (client only / Architect only) does **not** transition the ADAPT into `approved`.

Trigger: explicit approval by both participants.

10.8.4 Errata for a frozen ADAPT

`frozen` is a terminal state along the derivation line. Changes are possible only by adding a new artifact via one of three paths:

1. **Delta-ADAPT** (if the TZ contains an ambiguity discovered late) — a new artifact with an explicit `parent-adapt` link.
2. **Errata-ADAPT** (if there is an interpretation error by the engineer) — a separate artifact with the client signature (if the contractual outcome changes) or the Architect's alone (if cosmetic).
3. **Supersession** (if the prior decision was correct but later refuted) — a superseding ADAPT transitions the superseded one into `superseded` (§10.8.5, chapter 7 §7.6.4).

In all three cases the frozen ADAPT is **not edited**. This is a V1 requirement (immutable history) for contractual artifacts (chapter 7 §7.6.3).

10.8.5 The frozen → superseded transition (supersession)

Supersession of an approved/frozen ADAPT is normalized in chapter 7 §7.6.4. The lifecycle transition:

```
frozen ──[superseding ADAPT reached approved via QG-3]──▶ superseded (terminal,
immutable)
```

No separate QG is introduced. Supersession goes through the same **QG-3** (dual signature, §10.8.3) as an ordinary ADAPT — no additional control point is created.

Precondition of the `ADAPT-MMM → superseded` transition:

- A superseding `ADAPT-NNN` has been created with the field `supersedes: ADAPT-MMM` and a non-empty `supersession-rationale` (chapter 7 §7.6.4).
- The superseding ADAPT has passed QG-3 and reached `approved`. If the superseded decision had a contractual outcome (the typical case) — the dual signature MUST include the client signature; the Architect signature alone is permitted only for a strictly cosmetic correction without a contractual outcome.
- All derived `BR` / `SR` / `SPEC` with `source.adapt: ADAPT-MMM` are re-pointed to the superseding ADAPT or re-derived (no dangling references).

Postcondition:

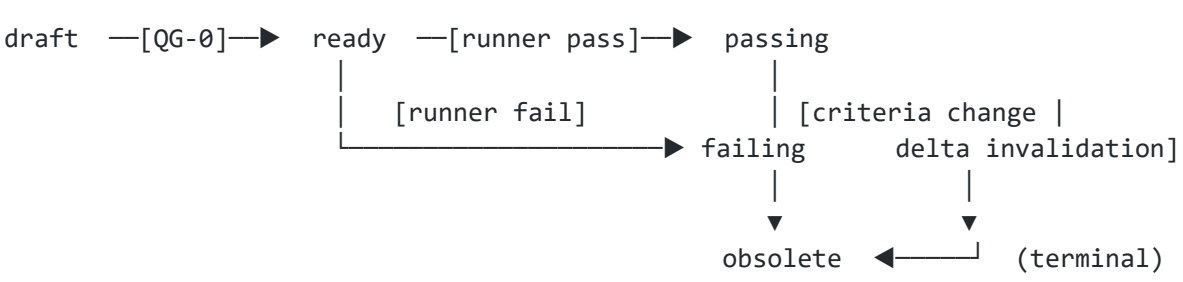
- `ADAPT-MMM` transitions into the terminal `superseded` — distinct from `obsolete` and from `frozen`; immutable and **retained** for audit (V1), not deleted.
- The field `superseded-by: ADAPT-NNN` on `ADAPT-MMM` is recorded automatically.
- A record in the transition log with the signatures of the superseding ADAPT (V6).

Trigger: approval of the superseding ADAPT via QG-3.

Hook obligation: after the transition, a dangling `source.adapt` reference to an ADAPT in status `superseded` is **fatal**; enforcement — the `adapt-supersession` validation (§10.11.1), the `check-adapt-supersession.js` gate.

10.9 TC state machine

10.9.1 States and transitions



Status	Semantics	Gate / trigger
`draft`	TC created; implementation in progress	—

`ready`	dry-run runner passed; pos/neg pairing confirmed	QG-0 (§10.3.1) with the TC preconditions from §10.9.2
`passing`	`last-run.result = pass` on the current `requirement-version`	runner pass; bot-managed
`failing`	`last-run.result = fail`	runner fail; bot-managed
`obsolete`	The covered behavior no longer exists	Deprecation (§10.9.4)

TC frontmatter and pos/neg pairing are defined in chapter 9.

10.9.2 Preconditions for TC

QG-0 for TC (`draft → ready`) — in addition to the common part:

- `automation.status: automated` (with a valid `automation.location`) OR `automation.status: manual-pending` (with `manual-pending-until` ≤ +1 sprint and a filled-in `manual-pending-reason`).
- Pos/neg pairing over the covered assertions confirmed (§9.7).
- The dry-run runner passed (structural validity only; not to be confused with a production run).
- All mandatory body sections of the TC (§9.4) are filled in.
- The citation in `verifies[]` — the artifact exists in the substrate in a state no lower than `approved` .

Postcondition:

- `status: ready` .
- The runner is permitted to do a production run.

10.9.3 Runner-managed transitions (not Quality Gates)

`ready → passing` , `ready → failing` , `passing → failing` , `failing → passing` — transitions that happen **only** upon a runner run (chapter 9 §9.12 `last-run` bot-managed). These transitions are **not** Quality Gates in the sense of §10.2.1: they are normative consequences of run results, not the passing of a gate with preconditions and postconditions. In particular, the check that `last-run.requirement-version` matches the current version of the verified artifact (see §9.10) is a runner-managed consistency check, not a separate gate.

Postcondition of each runner transition:

- `last-run` updated: `result` , `timestamp` , `requirement-version` , `evidence-refs` .
- The substrate MUST prohibit manual modification of `last-run` (runner-actor only).

10.9.4 TC deprecation

A TC transitions into `obsolete` if:

1. An artifact in `verifies[]` transitions into `deprecated` / `obsolete` .
2. A delta-TZ invalidates the test behavior (chapter 9 §9.16).

Postcondition: `status: obsolete`. The TC is not deleted (V1 immutable history).

10.9.5 Change-of-criteria — a separate normative path

Changing `## Pass criterion` or `## Fail criterion` in a TC is **not an ordinary transition**; it is a special path that requires a separate approval workflow (chapter 9 §9.13). Enforcement details — §10.11.3.

10.10 Closed-list policy

10.10.1 Normative rule

The closed list of RENAR Quality Gates is the mandatory {QG-0, QG-1, QG-2} and the optional {QG-3, QG-4}. Changing the list is possible **only** through the formal RENAR Standard change procedure (chapter 13).

This policy is a specialization of §1.7 Closed-list policy for Quality Gates; the general rule for all RENAR closed lists and the master index — §1.7.5.

10.10.2 What is prohibited

Action	Prohibited?	Why
Locally creating a new gate type `QG-N` at the project level	Prohibited	Violates the closed list; makes conformance non-portable
Locally overriding the preconditions of a canonical gate	Prohibited	Makes conformance incomparable across implementations
Additionally tightening the preconditions of a local gate	Permitted	The conformance manifest MAY declare stricter thresholds (for example, `qg-2.required-negative-tc: true`)
Locally weakening the preconditions of a canonical gate	Prohibited	Violates the standard's contract
Declaring QG-3 / QG-4 as `absent` in the conformance manifest	Permitted	Optional gates — §10.4
Declaring QG-0 / QG-1 / QG-2 as `absent`	Prohibited	Violates conformance §10.4.3

10.10.3 Extending the list

Adding a new gate type is possible through:

1. A standard change request with a rationale — a research draft with a typology and a comparison with the canonical gates.
2. Public review (the period and forum are fixed by the standard policy, chapter 13).
3. Inclusion in the next minor version of the standard (`v1.X` or `v2.0`).

Project-local extensions remain outside conformance — they are permitted as internal practices but do **not** affect the conformance manifest.

10.11 Substrate-independent enforcement

10.11.1 Normative requirements

A substrate implementing RENAR MUST ensure an automatic check of gate preconditions at the following points:

Control point	What MUST be checked	Relies on capabilities
Promote-transition (any transition to a higher status)	The preconditions of the corresponding gate (§10.3, §10.4, §10.5–§10.9)	V3 (diff & review) to block the transition until approve; V4 (branching) to separate WIP from the approved truth
Approve-transition (any approval action)	Authorship recorded (actor) and timestamp	V6 (author + timestamp)
Reference-validation (any creation/change of an artifact with a reference to another)	The referenced artifact exists and is in the required state	V1 (immutable history) for a stable identifier; V5 (version pin) for cross-substrate references
Change-of-criteria for TC (§10.11.3)	A separate approval process is applied	V3 + V6
Runner-transitions for TC (`ready → passing` / `failing`)	Only the runner-actor may write `last-run`	V6 (authorship); the substrate's native ACL or role-based restrictions
Lifecycle invalidation (artifact `verified` , version incremented)	The artifact is automatically reverted to `approved`	V5 (version pin) for detection
`implements` -edge validation (subsystem BR referencing a system BR, §6.5.2, §6.8.2)	(1) the target BR exists by `id + scope.system` ; (2) the target in `approved` + at the approval of this BR (a `deprecated` target — warning, not fatal; cascade-warning over `implemented-by[]`); (3) the `implements` chain forms no cycles; (4) `implements[]` is absent when `level: system`	V1 (stable identifier for target lookup); V3 (block approve until validation passes); V5 (cross-substrate ID resolution when the target is in another substrate)
`adapt-applicability` validation (§7.4.1)	(1) For each TZ, an adversarial-review verdict is recorded (V6 author + timestamp). (2) If the verdict is "findings present" — a corresponding ADAPT MUST exist in `approved` + with a dual signature; the BR/SR/SPEC derivatives have `source.adapt` . (3) If the verdict is "no	V3 (block approve until validation passes); V6 (verdict + signature attribution);

	findings, no clarifications" — no ADAPT, and the BR/SR/SPEC have `source.tz-section` + `source.adversarial-review-ref` evidence. (4) No mixing: artifacts with `source.adapt` omitted without verdict evidence — fatal.	V1 (verdict as immutable evidence)
`adapt-supersession` validation (§7.6.4, §10.8.5)	(1) `supersedes: ADAPT-MMM` references an existing ADAPT; the back-reference `superseded-by` is symmetric. (2) `supersession-rationale` is non-empty and references a concrete contradicting `BR` / `SR` / `SPEC`. (3) When the superseded decision has a contractual outcome — the superseding ADAPT has the client signature. (4) A dangling `source.adapt` reference to an ADAPT in status `superseded` — **fatal**.	V1 (stable identifier + immutable superseded history); V3 (block approve until validation passes); V6 (signature attribution)

10.11.2 A substrate without V3 / V4 / V6 is non-conformant

A substrate that does not provide V3 (diff & review) cannot implement gates: there is no way to separate a "proposed change" from the "approved truth" (chapter 3 §3.3.3). The same holds for V4 (branching, §3.3.4) and V6 (author + timestamp, §3.3.6) — without them the approval mechanics are impossible. A substrate that does not satisfy V3 / V4 / V6 **does not implement RENAR** regardless of other properties.

10.11.3 Change-of-criteria for TC — special enforcement

Changing the Pass / Fail criterion of a TC is a high-risk operation (protection against test-fitting, chapter 9 §9.13). The substrate MUST:

1. **Detect**: any change to the `## Pass criterion` / `## Fail criterion` sections in a TC artifact.
2. **Forcibly isolate**: a change-of-criteria MUST be a separate change-set (V4 atomic change unit), marked with a flag distinguishing it from ordinary edits (the substrate's native mechanism — a special case of V3 diff & review; the form of the flag is substrate-specific, deferred to guide/).
3. **Prohibit combining**: the same person MUST NOT approve both a change-of-criteria and the approval of a code fix that is tested by this same TC. The substrate MUST check this rule at the approve-transition.
4. **Register**: a change-of-criteria is recorded in the audit trail (§10.13) with explicit event typing.

10.11.4 Forms of substrate-native implementation

The concrete substrate-native mechanisms (how exactly a hook is implemented in a given substrate) are deferred to `guide/` and the conformance manifest. The standard does not normalize the **form** of a hook (this is a substrate-specific decision). The standard normalizes **what a hook MUST check and at which point**.

The `guide/` section MUST contain, for each supported substrate:

- A mapping of the enforcement points of §10.11.1 onto the substrate-native mechanisms.
- Example implementations.
- The known limitations of the substrate regarding the automation of each check.

10.12 Prohibited transitions

A closed list of transitions that violate the lifecycle. The substrate MUST block them.

From	To	Artifact	Why prohibited
`draft`	`verified`	BR / SR / SPEC	Skips QG-0; no approval evidence
`draft`	`accepted`	BR	Same; and skips QG-2
`draft`	`done`	TR	Skips QG-0
`draft`	`passing`	TC	Skips QG-0 (no dry-run runner)
`obsolete`	*	Any	Terminal status; "resurrection" is prohibited — a new artifact with `supersedes` is needed
`deprecated`	*	Any	Same
`frozen`	*	ADAPT	Same; changes only through a delta-ADAPT or errata (§10.8.4)
`verified`	`draft`	BR / SR / SPEC	Degradation across several steps — potential loss of trace; if rework is needed — `verified → approved` via delta or reverse evolution §10.5.4
`accepted`	`verified`	BR	Degradation after acceptance — impermissible without a delta-TZ
`accepted`	`approved`	BR	Same
`passing`	`draft`	TC	Degradation loses run history; use `passing → failing → obsolete` or the change-of-criteria path
`ready`	`draft`	TC	Degradation loses dry-run evidence (§10.9.2); weakening a TC via `[test-spec-change]` (chapter 9 §9.13) — is not a path back to `draft`
`failing`	`draft`	TC	Degradation loses runner history; re-diagnosis is via a new run (`failing → passing` runner-managed) or `obsolete`

10.12.1 Substrate reaction

On an attempt at a prohibited transition the substrate MUST:

1. Block the transition (V3 diff & review).
2. Return to the calling participant an error code indicating the concrete violated rule (by the row identifier of this table).
3. Not create a record in the transition log (§10.13).

10.13 Logging of gate-pass events

10.13.1 Normative requirement

Every successful gate pass (of any type: QG-0, QG-1, QG-2, QG-3, QG-4, runner-transition, deprecation, freeze-transition) MUST be recorded in the substrate as an immutable event with the following fields:

Field	Semantics	Obligation
`timestamp`	UTC ISO-8601 moment of the successful pass	Mandatory
`artifact-id`	Artifact identifier (immutable, V1)	Mandatory
`artifact-type`	`BR` / `SR` / `TR` / `SPEC-<type>` / `ADAPT` / `TC`	Mandatory
`artifact-version`	Artifact version at the moment of the transition (V5)	Mandatory
`from-status`	Source state	Mandatory
`to-status`	Target state	Mandatory
`gate-id`	`QG-0` / `QG-1` / `QG-2` / `QG-3` / `QG-4` / `deprecation` / `freeze` / `runner-pass` / `runner-fail` / `change-of-criteria`	Mandatory
`actor`	Initiator identifier (V6); for a dual signature — a list of participants	Mandatory
`evidence-refs`	References to evidence: runner run IDs, adversarial-review artifact IDs, signature IDs	Mandatory for QG-2 / QG-3 / QG-4
`notes`	Free text	Optional

10.13.2 Substrate-independent format

The event-storage format is substrate-specific (a separate log stream / append-only collection / other forms). The standard normalizes only the mandatory fields of §10.13.1, not their serialization.

The conformance manifest MUST specify the event-storage mechanism and the export format (for audit, chapter 13).

10.13.3 Retention

Events are **not deleted** throughout the entire artifact lifecycle and after its transition into `deprecated` / `obsolete` / `frozen`. This is required by V1 (immutable history) and the normative compliance clauses (chapter 13).

10.14 Relationship to other chapters

Chapter	Relationship
02	SENAR QG-0..QG-2 — the conceptual basis; RENAR extends it (§10.2.3)
06	frontmatter and body of BR / SR / TR (§6.5–§6.7); the state machines are detailed here (§10.5–§10.6)

07	ADAPT frontmatter (§7.8); backward sub-states (§7.4.5); dual signature (§7.5); delta-ADAPT (§7.6) — the state machine is here (§10.8)
08	SPEC frontmatter (§8.4); type-specific QG (§8.8); the state machine is here (§10.7)
09	TC frontmatter (§9.3); pos/neg pairing (§9.7); change-of-criteria (§9.13); the state machine is here (§10.9)
03	V1–V6 — the foundation of enforcement (§10.11); without V3 / V4 / V6 — no gate implementation
11	The maturity levels determine the scope of applicable gates (for example, RENAR-1 — QG-0 / QG-1 / QG-2 mandatory; at higher levels the QG-2 preconditions are strengthened: pos/neg pairing, spec-specific TC)
13	The conformance manifest declares gate support (§10.4.3); holds the event retention policy (§10.13.3)

11. Maturity Model

> ***Part of the RENAR Standard v1.0-draft*** · *← Table of contents*

11.1 Maturity as a ladder, not a label

Chapter 3 laid the foundation — a substrate capable of storing the history and provenance of requirements. But having a foundation says nothing about how maturely a team uses it. One project simply keeps its requirements in a substrate; another validates them against a schema, runs paired tests, and makes a second model challenge the first. These are different rungs of one ladder — and this chapter numbers them.

RENAR defines **five maturity levels** — `RENAR-1` .. `RENAR-5`, a closed list. A level is a **measurable characteristic** of how formalized requirements management is in a project. It is important not to confuse it with a **conformance claim** (conformance): the level describes *where* a project stands, while conformance is the procedure by which it *proves* this. The mechanics of the claim are in chapter 13.

Each next rung adds obligations on top of the previous one and closes its class of divergences; the chapter is best read in order: §11.4–§11.8 cover the rungs one at a time, §11.10–§11.11 answer "where to start" and "how to grow."

The chapter's boundary is strict. It governs **only** the level criteria and the transitions between them. The conformance claim procedures are chapter 13; the metrics for measuring a level are chapter 12; the substrate capabilities themselves are chapter 3.

11.2 RENAR-M as a domain-specific dimension in the SENAR maturity model

11.2.1 The SENAR maturity model (general maturity)

SENAR defines a one-dimensional model of five levels of the team's and methodology's general maturity: `Ad-hoc → Supervised → Measurable → Managed → Optimizing`. This model assesses the **process maturity of the team as a whole**, independently of any specific process area.

11.2.2 RENAR-M as a separate dimension

RENAR-M is a **separate dimension** within the general SENAR maturity, specializing it for the "requirements engineering" process area. A project is characterized by a **pair**:

```
project ──▶ (SENAR-N, RENAR-M)

where N ∈ {1, 2, 3, 4, 5} — general SENAR maturity
      M ∈ {1, 2, 3, 4, 5} — RENAR level of requirements management
```

The pairs `(SENAR-N, RENAR-M)` are normatively independent: a project at SENAR-4 (Managed) MAY be at RENAR-2 (Documented) — the team is mature in SENAR practices overall, yet **requirements management specifically** is weakly formalized. This is a permitted and observable scenario.

11.2.3 Alignment with the SENAR Reference

The SENAR Reference allows domain-specific maturity dimensions (authentication, security, observability, and other process areas). RENAR-M is one such dimension; it does not contradict SENAR and does not duplicate it.

In the industry it is typical for different process areas within one organization to have differing maturity. RENAR-M is the normative maturity dimension specifically for the "requirements engineering" area, with criteria drawn only from this chapter and adjacent sections of the standard.

11.2.4 Conformance as a pair

The conformance manifest (§13.4) records **only** the RENAR-M (the `level` field). SENAR-N remains within the scope of SENAR conformance and is not duplicated in the RENAR manifest.

11.3 The closed list of levels RENAR-1..RENAR-5

The list of five levels is closed. Changing the list is possible only through the formal change procedure of the standard (§13.9.3).

Level	Short name	Semantics (one line)
`RENAR-1`	Ad-hoc	A requirements substrate exists; artifacts are kept without a formal schema or lifecycle
`RENAR-2`	Documented	Artifacts have basic frontmatter and are stored structurally; the TZ is fixed
`RENAR-3`	Tracked	Full frontmatter schema; lifecycle statuses are used; delta-TZ workflow via ADAPT
`RENAR-4`	Verified	100% of `approved` have `verified-by`; pos/neg pairing; QG-2 is enforced; AI provenance
`RENAR-5`	Optimized	Adversarial review as a gate; multiple models for `priority: must`; knowledge graph; metrics

Intermediate levels (`RENAR-3.5`) and project-local levels are prohibited (§13.9.2). Local tightening of criteria within a declared level is permitted via `declared-stricter` (§13.4.2).

Each level includes the normative criteria of all lower ones. `RENAR-M` implies satisfaction of the requirements of `RENAR-1` .. `RENAR-(M-1)` .

11.4 RENAR-1: Ad-hoc

The first rung answers the question: **where do the requirements live?** The answer is "in the substrate, not in someone's head, an issue tracker, or a chat thread." There is no formal schema or lifecycle yet, but provenance is already recoverable.

11.4.1 Normative definition

RENAR-1 is the lowest conformant level. A project MUST satisfy: the substrate exists physically (V1–V6 §13.3.2 — an absolute mandatory clause regardless of level); requirements are kept as artifacts inside the substrate (not in issue trackers or chat threads); an ADAPT exists for each TZ (§13.3.3); substrate-independent language is applied (§2.5.4).

> ***RENAR-1 ≠ zero infrastructure.*** *"Ad-hoc" is about the absence of a formal schema / lifecycle, not of a substrate: V1–V6 are mandatory at any level. A flat file server, Notion, Google Docs, or Confluence without immutable history / atomic change / version pin* ***do not qualify*** *even for RENAR-1. The minimum is a distributed VCS or a document-oriented store with V1–V6 (§3, guide/03–04).*

11.4.2 What is NOT required at RENAR-1

Standardized frontmatter (a minimum of `id` + `title` is acceptable); lifecycle statuses; TC as separate artifacts (keeping them in code is acceptable); COVERAGE; substrate-native lifecycle hooks.

11.4.3 Observable signals

BR/SR/ADAPT artifact files in the substrate (not in a tracker/chat); on a "where does this requirement come from" query, the answer is given through the substrate; a manifest (§13.4) with `level: RENAR-1`.

11.4.4 QG application (enforcement)

QG-0/QG-1/QG-2 are normatively required (§13.3.6), but enforcement through hooks is **not mandatory** — a human checks manually as needed.

11.5 RENAR-2: Documented

RENAR-2 adds **structure** on top of existence: basic frontmatter, the TZ as an immutable artifact, a predictable location for artifacts. A requirement can be found, quoted, and referenced. There is no machine checking yet; discipline is held by people.

11.5.1 Normative definition

On top of RENAR-1: every BR/SR has frontmatter with the mandatory fields (§6.5.2, §6.6.2) — at minimum, without strict schema validation; the TZ is an immutable artifact (§7.4.2); structural storage (logical folders / native collections); a delta-TZ is an explicit artifact, not a verbal one.

11.5.2 What is NOT required at RENAR-2

CI validation of frontmatter against a schema; the full lifecycle (statuses are at the team's discretion); the `tc-type` TC extension; pos/neg pairing of TC.

11.5.3 Observable signals

All BR/SR have valid (at-minimum) frontmatter; the TZ is one native artifact; the delta-TZ is an explicit change-set (§7.6); a manifest with `level: RENAR-2`.

11.5.4 QG application (enforcement)

QG-0 (§10.3.1) is a procedural gate (an explicit approval with a V6 author + timestamp), without automatic blocking hooks.

11.6 RENAR-3: Tracked

At RENAR-3 the **machine** kicks in. Frontmatter is validated against a schema, lifecycle statuses work, and the delta-TZ goes through ADAPT. The substrate blocks a reference to a non-approved ADAPT and does not let an implementation reference a requirement without a version binding.

11.6.1 Normative definition

On top of RENAR-2: frontmatter is validated against the schema (reference/02-schemas.md) by a native mechanism (§10.11.1); lifecycle statuses are actually used (chapter 10); TC exist for all BR/SR/SPEC with `priority: must`; COVERAGE is auto-generated (§9.15); the delta-TZ is a change-set with impact analysis (§9.16); the reference-validation hook (§10.11.1) blocks the creation of an artifact referencing an ADAPT below `approved`; the implementation substrate binds `verifies[].version` (§9.4, V5).

11.6.2 Observable signals

The frontmatter-validation hook returns a structured response on a schema violation; every artifact ∈ { `draft`, `approved`, `verified`, `deprecated`, `obsolete` } (§10.5); COVERAGE is updated within a reasonable time; on a delta-TZ the architect automatically sees the affected SR/SPEC/TC; a manifest with `level: RENAR-3`.

11.6.3 QG application (enforcement)

QG-0 + QG-1 are enforced natively; QG-2 partially (the `verifies[]` check is mandatory, pos/neg pairing (§9.7) is not required to be automatic).

11.7 RENAR-4: Verified

RENAR-4 is the threshold of **trust in tests**. Every normative statement is covered by a pos/neg TC pair, QG-2 blocks promotion to `verified` without green tests on the current version, and a once-per-iteration spot-check catches tests faked to match the code.

11.7.1 Normative definition

On top of RENAR-3: 100% of artifacts in `approved` have `verified-by` referencing ≥ 1 TC (§9.4); pos/neg pairing (§9.7) is done for **every** normative statement (single-TC coverage is permitted only for invariants with negative semantics); QG-2 (§10.3.3) is **enforced** — promotion to `verified` is blocked unless all TC are `passing` on the current `requirement-version`; all TC are automated

(`automation.status: automated`) or marked `manual-pending` with a deadline (§9.5); for `tc-type: ux` — VLM judge isolation (§9.13.4); for `tc-type: eval` the judge model differs from the implementation model (Decision #8); AI provenance in frontmatter (§4.10.1): at minimum `generated-by` and `generated-at` are mandatory; source citation in the artifact body (`[TZ-XXX §Y line Z]` or a `derived` marker); a continuous-reconciliation hook (§2.4.2) on a schedule (no less than once a week); a spot-check of 5 random passing TC once per iteration (§9.14) in the audit-trail.

11.7.2 Observable signals

COVERAGE contains `verified-by-percent: 100%` for `approved` ; an attempt to promote a BR/SR/SPEC to `verified` without all passing TC returns a blocking error; a sample of 5 random artifacts shows source citation on all normative statements; a manifest with `level: RENAR-4` .

11.7.3 QG application (enforcement)

QG-0/QG-1/QG-2 are enforced natively. QG-3 (Architecture, §10.4.1) is declared if the project uses ADAPT with a dual signature (the default for regulated industries).

11.8 RENAR-5: Optimized

RENAR-5 closes the loop of **AI reliability**. A second model is set to challenge the first, critical requirements are generated by several models with mandatory analysis of divergences, and the hallucination rate is held below 1%. The standard becomes a system that checks itself.

11.8.1 Normative definition

On top of RENAR-4: **adversarial review** is a mandatory gate for `draft → approved` (the artifact passes review by a second AI model, recorded in the audit-trail); **multi-model agreement** for `priority: must` (the artifact is generated by ≥ 2 models; divergences are flagged `[multi-model-disagreement]` and MUST be analyzed); a **cost/latency budget** per artifact (`cost-budget` + `latency-budget` ; exceeding it triggers automatic decomposition); a **knowledge graph** (reference/05) as the primary search for AI agents; **continuous evaluation** for all SPEC-AI (§8.5.7); the **Hallucination Rate** (chapter 12) is measured and < 1%; the **Multi-model Disagreement Rate** (chapter 12) is measured and its trends are tracked; feeding template improvements back into the `requirements-library` is standard practice.

11.8.2 Observable signals

Every promoted artifact has an adversarial-review record in the audit-trail; for `priority: must` BR — a `[multi-model-agreement]` or `[multi-model-disagreement]` marker; a knowledge-graph dashboard is available; a Hallucination Rate dashboard shows < 1% over a rolling window; a manifest with `level: RENAR-5` .

11.8.3 QG application (enforcement)

All mandatory gates (QG-0/1/2) are enforced natively. Adversarial review is enforced as part of QG-0 — the substrate blocks `draft → approved` without confirmation. QG-3 is declared. QG-4 is declared if the project applies post-release outcomes (§10.4.2).

11.9 Comparative feature table

Everything spread across the five sections above, in one matrix. Cells: ❌ — not required; `partial` — partially; ✓ — normatively mandatory.

Feature	RENAR-1	RENAR-2	RENAR-3	RENAR-4	RENAR-5
Substrate with V1–V6	✓	✓	✓	✓	✓
ADAPT for each TZ	✓	✓	✓	✓	✓
Frontmatter standardized	❌	partial	✓	✓	✓
Lifecycle statuses used	❌	partial	✓	✓	✓
Frontmatter schema validation (substrate hook)	❌	❌	✓	✓	✓
TC as a full-fledged artifact	❌	❌	partial	✓	✓
Pos/neg pairing for every statement	❌	❌	❌	✓	✓
COVERAGE auto-generated	❌	❌	✓	✓	✓
Reference-validation hook	❌	❌	✓	✓	✓
`verifies[].version` binding (V5)	❌	❌	✓	✓	✓
QG-0 enforced natively by the substrate	❌	partial	✓	✓	✓
QG-2 enforced natively by the substrate	❌	❌	partial	✓	✓
AI provenance in frontmatter	❌	❌	❌	✓	✓
Source citation in artifact bodies	❌	❌	❌	✓	✓
Adversarial review as a gate	❌	❌	❌	❌	✓
Multi-model agreement for `priority: must`	❌	❌	❌	❌	✓
Cost and latency budget per artifact	❌	❌	❌	❌	✓
Knowledge graph as primary search	❌	❌	❌	❌	✓
Continuous reconciliation	❌	❌	❌	✓ (basic)	✓ (full)
Continuous evaluation (SPEC-AI)	❌	❌	❌	❌	✓

Hallucination Rate < 1%	n/a	n/a	n/a	n/a	measured and controlled
Multi-model Disagreement Rate trend	n/a	n/a	n/a	n/a	tracked

11.10 Minimum entry level (entry-level)

`RENAR-1` is the normative **lower bound** of the conformance manifest. A project that does not satisfy the mandatory clauses (§13.3) — in particular, without a substrate with V1–V6 or without an ADAPT for each TZ — has **no** RENAR-M level at all; a conformance manifest is not issued for such a project.

Project type	Recommended target level
Short experiment (spike), < 1 sprint, no contract	RENAR-2 — sufficient for documentation
Internal automation, 1–3 months	RENAR-3 — tracked lifecycle
Client product under contract	RENAR-4 — verified, with pos/neg pairing
AI-critical component (depends on eval)	RENAR-5 — mandatory
Regulated industries (medicine, fintech, the public sector)	RENAR-4 minimum, RENAR-5 recommended

The standard allows **different levels in different projects** of one organization — there is no requirement to unify the level across a portfolio.

Negative scenario: a substrate that lacks even one capability from V1–V6 (§3.2) cannot normatively implement any RENAR-M — not even `RENAR-1`. This is a structural constraint, not an operational one; the manifest of such a project is invalid (§13.3.2).

11.11 The path RENAR-1 → RENAR-5

The normative sequence of steps between adjacent levels. The times are an expected order of magnitude (for a small project; this is not a normative guarantee).

11.11.1 RENAR-1 → RENAR-2

1. Create structural storage of artifacts in the substrate (logical folders or substrate-native collections).
2. Migrate existing requirements from the issue tracker, chat, or documents into substrate-native artifacts with minimal frontmatter (`id` , `title`).
3. Fix the TZ as an immutable artifact (§7.4.2).
4. Agree within the team: new requirements only through the substrate, not through the issue tracker.

Expected time: 1–2 weeks for a small project; 1–2 months for a project with a large volume of accumulated requirements.

11.11.2 RENAR-2 → RENAR-3

1. Bring the frontmatter of all artifacts into line with the schema (a substrate-native normalizer).

2. Enable the substrate hook for schema validation (block the change-set on a violation).
3. Introduce the lifecycle: go through all artifacts and assign statuses.
4. Enable the reference-validation hook (§10.11.1).
5. Generate the initial auto-generated COVERAGE artifact (§9.15).
6. Create TC for artifacts with `priority: must`.
7. Introduce `verifies[].version` binding from the implementation substrate.

Expected time: 2–4 weeks, including team training.

11.11.3 RENAR-3 → RENAR-4

1. An AI agent goes through all artifacts and generates pos/neg TC pairs for every normative statement.
2. Implementation of TC in code / SPEC-runners — in parallel with product work; spread over 1–2 quarters.
3. Enable the QG-2 substrate hook (block promotion to `verified` without all passing TC).
4. Introduce the spot-check process (§9.14).
5. Enable the continuous-reconciliation hook on a weekly schedule.
6. Introduce AI provenance in frontmatter (the substrate hook blocks when it is missing for AI-generated artifacts).
7. Introduce source citation in artifact bodies (the substrate hook blocks when a citation is missing for normative statements).

Expected time: 1–2 quarters.

11.11.4 RENAR-4 → RENAR-5

1. Connect adversarial review by a second model (different from the primary one; the judge-isolation principle §9.13.4); enable it as QG-0 enforcement.
2. Enable generation by several models for artifacts with `priority: must`.
3. Deploy the knowledge graph (reference/05).
4. Set up the targeted Hallucination Rate and Multi-model Disagreement Rate metrics (chapter 12).
5. Introduce a cost and latency budget with automatic decomposition on overrun.
6. Establish the practice of feeding template improvements back into the `requirements-library`.
7. Continuous evaluation for all `SPEC-AI` artifacts (§8.5.7).

Expected time: 1–2 quarters after RENAR-4.

11.11.5 Reverse transitions (level downgrade)

A normative downgrade (§13.8.2) — issuing a new manifest version with a level lower than the current one — is permitted given a formal justification (for example, decommissioning an AI-critical component, simplifying the substrate). A downgrade MUST be accompanied by an audit-trail record; concealing a downgrade is a violation of a mandatory clause (§13.3.1).

11.12 Relationship to the SENAR ADR (Adversarial Detection Rate)

SENAR §9 defines ADR — Adversarial Detection Rate — as a general metric of a process's ability to detect errors before release to production. RENAR-M defines at which levels a normative adversarial-review infrastructure exists. The RENAR-specific subclass of ADR for the requirements zone is **ACR** (Adversarial Catch Rate, §12.3.6).

RENAR-M	Normative adversarial-review infrastructure	ADR / ACR measurability
RENAR-1, RENAR-2	Absent (§11.4, §11.5)	n/a
RENAR-3	Normatively absent; the team MAY introduce adversarial review as a local tightening (`declared-stricter` , §13.4.2)	optional
RENAR-4	Pos/neg TC pairing (§9.7) — a structural proxy for ADR; adversarial review of artifacts is not normatively required	optional (pos/neg coverage is measurable as a proxy)
RENAR-5	Adversarial review as a mandatory gate (§11.8.1) + multi-model agreement for `priority: must`	normatively measurable (ACR, §12.3.6)

RENAR-M maturity is linked to the SENAR ADR metric **continuously**, without duplication: SENAR ADR sets the concept of the metric; the RENAR-M level defines which adversarial cycles are normative; ACR (§12.3.6) is the domain-specific metric for the requirements zone.

11.13 Relationship to other chapters

The maturity model is the map onto which the requirements of all the other chapters are placed: each chapter "turns on" at its own level. The table below shows exactly where.

Chapter	Relationship
02 Positioning in the methodology typology	§2.3 Source-of-Truth inversion + §2.5 substrate-independent versioning — mandatory clauses regardless of level; §2.4 the four distinctions — observed at all levels, starting with RENAR-2
06 Requirements hierarchy	artifact frontmatter and mandatory fields are checked at RENAR-3+; the BR/SR/TR hierarchy — at all levels
07 ADAPT	ADAPT for each TZ — a mandatory clause regardless of level (§11.4.1); the QG-3 dual signature — declared at RENAR-4+
08 Specifications	The closed list of 9 SPEC types — mandatory; full type-specific coverage at RENAR-4+; continuous evaluation of SPEC-AI at RENAR-5
09 Test cases	TC for `priority: must` at RENAR-3; pos/neg pairing at RENAR-4+; the spot-check process at RENAR-4+
10 Lifecycle and QG	QG-0/QG-1/QG-2 declared required at all levels; substrate enforcement is gradual — partial at RENAR-2, full at RENAR-4+; QG-3 declared at RENAR-4+ if ADAPT is used
03 Substrate versioning	V1–V6 — an absolute mandatory clause for any level; a substrate without V1–V6 has no RENAR-M level (§11.10)
12 Metrics	the Hallucination Rate / Multi-model Disagreement Rate / Defect Escape Rate metrics are measured at RENAR-4+; the precise definitions are in chapter 12

13 Conformance	§13.2 references this chapter for the criteria of each level; §13.5 self-assessment uses the checklists of §§11.4–12.8 (one section per level); §13.9 the closed-list policy applies to the closed list RENAR-1..5 (§11.3)

12. Metrics

> ***Part of the RENAR Standard v1.0-draft*** · *← Table of contents*

12.1 What to measure in requirements

The general SENAR metrics (§9) will show that the team is fast and the tests are green. But they will not notice an AI agent quietly inserting into an SR a clause that was in neither the TZ nor the ADAPT — until it surfaces at acceptance as a dispute with the client. "The process as a whole" is healthy, yet the requirements work is not. So RENAR adds **ten metrics that look specifically at requirements**: how often an AI agent invents a clause without a source (Hallucination Rate), whether paired tests catch real defects, how quickly a delta-TZ reaches the code. This is an overlay on SENAR §9, not a replacement.

The list of metrics is closed; for each one, a formula, a target per maturity level (chapter 11), and a data source are specified. Metrics are collected natively for the substrate through V1–V6 (chapter 3); exactly how to render dashboards is an implementation question deferred to `guide/`. This chapter does not duplicate SENAR §9 but specializes it, and it does not touch ROI or pricing — those are not process indicators but business effects (§12.5).

12.2 Relationship to SENAR §9

SENAR §9 defines ten general-process metrics: Throughput, Lead Time, FPSR (First-Pass Success Rate), DER (Defect Escape Rate), KCR (Knowledge Capture Rate), Cost Predictability, Cost-per-task, MIR (Memory Integrity Rate), Cycle Time, ADR (Adversarial Detection Rate).

RENAR §12 does **not** edit and does **not** replace these metrics. The REQ-specific metrics of §12.3:

- **Refine** a SENAR metric for the requirements phase (for example, RDLT refines SENAR Lead Time for the requirements phase).
- **Add** observations specific to requirements engineering and not covered by SENAR §9 (Hallucination Rate, Multi-model Disagreement Rate).

The full mapping — §12.7.

The closed list of REQ metrics (§12.3) is maintained within RENAR; SENAR §9 is a separate closed list of general metrics. Changing either of the two lists is a formally independent change procedure of the respective standard.

12.3 Closed list of REQ-specific metrics

A closed list of ten REQ metrics. The list is changed only through the formal change procedure of the standard (§13.9.3); the general closed-list policy and master index — §1.7.5.

12.3.1 RDLT — Requirement Decomposition Lead Time

The time from registering a TZ in the substrate to the state "all BR/SR (the parent chain from this TZ) → `approved`, ready for QG-0 (§10.3.1)". **Formula:** `RDLT = timestamp(last BR/SR →`

`approved) – timestamp(TZ registered)`. Measured in hours/days. **Source:** the audit log of promote-transitions (§10.13). **Relationship to SENAR:** a refinement of SENAR `Lead Time` for the requirements phase. **Targets:** RENAR-3 < 1 week per 50-page TZ; RENAR-4 < 2 days; RENAR-5 < 4 hours.

12.3.2 Requirement-to-Task Latency

The time from the promote-transition SR → `approved` to the creation of the first TR with the reference `implements: SR-N`. **Formula:** `Latency = timestamp(first TR.created) – timestamp(SR → approved)`. Hours. **Source:** the substrate audit log + the cross-substrate references of the implementation substrate. **Relationship to SENAR:** a refinement of SENAR `Cycle Time` for the "requirement → executable task" pair. **Targets:** RENAR-3 < 3 days; RENAR-4 < 1 day; RENAR-5 < 1 hour (auto-create TR after approval).

12.3.3 Hallucination Rate

The percentage of normative assertions in an AI-generated artifact (BR/SR/SPEC) that are not traceable to a source (TZ/ADAPT/another normative artifact). Source citation is checked by a native citation parser (§13.3.1, REQUIRED at RENAR-4). **Formula:** `assertions_without_valid_citation / total_normative_assertions × 100%`. Per artifact; aggregated per project. **Source:** the citation parser (AST or regex over inline references `[TZ-XXX §Y]` / `[ADAPT-NNN §Z]`). **Relationship to SENAR:** a new metric; corresponds to ISO/IEC 5338 traceability for AI-generated artifacts. **Targets:** RENAR-1..3 n/a; RENAR-4 ≤ 5%; RENAR-5 ≤ 1%.

Negative scenario (loss-of-conformance trigger): a Hallucination Rate > 5% on a RENAR-4 project is a normative loss-of-conformance trigger (§13.8.1); remedy it through a release recovery plan or downgrade to RENAR-3.

12.3.4 Multi-model Disagreement Rate

The percentage of artifacts with `priority: must` where two (or more) generating AI models produced normative assertions diverging beyond a threshold (by default, embedding similarity < 85%; the threshold is fixed in the manifest under `declared-stricter`). **Formula:** `BRs_with_high_disagreement / total_must_BRs × 100%`. **Source:** the multi-model runs log; embedding similarity computed offline over "model A vs B" pairs. **Relationship to SENAR:** a new metric. **Targets:** RENAR-1..4 n/a; RENAR-5 tracked, with per-project baseline values in the first quarter. **Interpretation:** a high value is an indicator of weak prompt engineering or a complex problem domain; it warrants attention but is not in itself a negative indicator.

12.3.5 DRA — Dispute Rate at Acceptance

The percentage of BR/SR for which, at the QG-4 stage (§10.4.2), the client declared disagreement with the interpretation or coverage. **Formula:** `disputed_BRs_at_QG4 / total_BRs_in_release × 100%`. **Source:** the QG-4 audit log — a `gate-id: QG-4` event with `result: disputed`. **Relationship to SENAR:** a refinement of `DER (Defect Escape Rate)` for requirements. **Applicability:** only when QG-4 is in the manifest; when QG-4 = `absent` (§13.3.6) — not measured. **Targets:** RENAR-3 ≤ 10%; RENAR-4 ≤ 5%; RENAR-5 ≤ 2%.

12.3.6 ACR — Adversarial Catch Rate

The percentage of artifacts (BR/SR/SPEC) where the AI critic (a different model; REQUIRED at RENAR-5 per §11.8.1) found ≥ 1 high-severity issue before QG-0. **Formula:** `artifacts_with_critic_high_findings / total_reviewed_by_critic × 100%`. **Source:** the critic-runs audit log; severity (`high` / `medium` / `low`) in the critic output. **Relationship to SENAR:** a subclass of `ADR (Adversarial Detection Rate)` for requirements. **Targets:** RENAR-1..3 n/a; RENAR-4 optional (if `declared-stricter` — a baseline level of 20–30%; values < 20% are an indicator of a weak critic or of duplicating the primary); RENAR-5 tracked normatively, a rising ACR warrants attention to prompt quality.

12.3.7 Test-spec Drift Rate

The percentage of TC in status `passing` (§10.9.1) whose `last-run.requirement-version` (§9.12) differs from the current `version` of the verified artifact (`verifies[]`). **Formula:** `stale_passing_TCs / total_passing_TCs × 100%` (stale = `last-run.requirement-version` < current). **Source:** the COVERAGE artifact (§9.15). **Relationship to SENAR:** a new metric. **Targets:** RENAR-1..3 n/a; RENAR-4 ≤ 5%; RENAR-5 ≤ 1% (auto-rerun on delta-ADAPT).

12.3.8 Coverage Velocity

The rate of `approved` → `verified` transition (§10.5) per unit of time (default iteration; the substrate MAY define a different interval in the manifest). **Formula:** `(verified_count(end) − verified_count(start)) / approved_count(start) × 100%`. **Source:** the COVERAGE artifact history (§9.15). **Relationship to SENAR:** a refinement of `Throughput` for requirements. **Targets:** RENAR-3 ≥ 30%/iteration; RENAR-4 ≥ 50%/iteration; RENAR-5 ≥ 70%/iteration.

12.3.9 Cost per Approved Requirement

The AI-generation cost (input tokens + output tokens × tariff) normalized to one artifact in status `approved`, including rejected versions (which remain in the substrate by virtue of V1 immutable history). **Formula:** `total_AI_tokens_cost(period) / count(artifacts_approved_in_period)`. Project currency. **Source:** the `ai-provenance.cost-budget` + `ai-provenance.cost-actual` frontmatter fields (§11.7.1). **Relationship to SENAR:** a refinement of `Cost-per-task` for requirements. **Targets:** RENAR-1..3 n/a; RENAR-4 tracked, with per-project baseline values; RENAR-5 tracked + year-over-year reduction or a justification.

12.3.10 Reconciliation Findings per Week

The number of issues detected by the reconciliation agent (§2.4.2 continuous reconciliation) per week and registered as backward findings in a delta-ADAPT or a direct change-set requirement. **Formula:** `count(reconciliation_findings_registered) / weeks_in_period`. **Source:** the reconciliation-runs audit log + the ADAPT backward findings list (§7.4.5). **Relationship to SENAR:** a new

metric. **Targets:** RENAR-1..3 n/a; RENAR-4 tracked > 0 (zero = the reconciliation hook is not working or V5 is lost); RENAR-5 trending **down** over the long term (a mature process does not generate new drift).

12.4 Summary table of targets by level

The closed list of 10 metrics from §12.3 — target values for the applicable levels.

Metric	RENAR-3	RENAR-4	RENAR-5	Data source
RDLT (Decomposition Lead Time)	< 1 week	< 2 days	< 4 hours	promote-transitions audit log
Requirement-to-Task Latency	< 3 days	< 1 day	< 1 hour	audit log + cross-substrate refs
Hallucination Rate	n/a	≤ 5%	≤ 1%	citation parser
Multi-model Disagreement Rate	n/a	n/a	tracked	multi-model runs log
DRA (Dispute Rate at Acceptance)	≤ 10%	≤ 5%	≤ 2%	QG-4 audit log (if QG-4 declared)
ACR (Adversarial Catch Rate)	n/a	optional (if critic declared-stricter)	tracked normatively	critic-runs audit log
Test-spec Drift Rate	n/a	≤ 5%	≤ 1%	COVERAGE artifact
Coverage Velocity	≥ 30%/iteration	≥ 50%/iteration	≥ 70%/iteration	COVERAGE history
Cost per Approved Requirement	n/a	tracked	tracked + optimized	ai-provenance fields
Reconciliation Findings/Week	n/a	tracked (> 0)	trending down	reconciliation audit log

The concrete substrate-native presentation of these metrics in dashboards is substrate-specific and deferred to `guide/`.

> *The target values for RENAR-4 / RENAR-5 are **provisional**: set as normative direction markers, but subject to calibration against field data in version v1.1 (see guide/07 §8.1). These are guiding thresholds, not statistically validated values.*

12.5 Business outcomes

Six normative effects of adopting RENAR, expected at the RENAR-3 level and above. The outcomes are **normative expectations of the standard**, not process indicators; measuring them is substrate-specific and not mandatory (although the §12.3 metrics capture them indirectly).

> *ROI / cost-of-adoption is a **non-normative** topic and is not part of a normative chapter. A lightweight **illustrative** (not guaranteed) model of the cost and benefit of adoption for a decision-maker — in guide/02-transition-guide.*

12.5.1 Outcome 1 — Reduced TZ decomposition time

Measured through §12.3.1 RDLT. Expected reduction from the baseline: on the order of 5–10× at RENAR-4, 20–50× at RENAR-5.

12.5.2 Outcome 2 — Lower dispute frequency at acceptance

Measured through §12.3.5 DRA. Expected reduction: from 15–30% to ≤ 5% at RENAR-4, ≤ 2% at RENAR-5.

12.5.3 Outcome 3 — Audit readiness

The event audit log (§10.13) + AI provenance in frontmatter (§11.7.1) provide a compliance audit without separate preparatory work. Applicable to regulated industries (medicine, fintech, the public sector).

12.5.4 Outcome 4 — Lower cost of working with a delta-TZ

Impact analysis (§9.16) + reverse evolution of verification (§10.5.4) automate the handling of a delta-TZ. Expected reduction in human involvement: from tens of hours to an hour per delta.

12.5.5 Outcome 5 — Lower knowledge loss on team turnover

V6 author + timestamp (§3.3.6) records the author of all artifacts; the Source-of-Truth inversion (§2.3.1) moves knowledge out of people's heads into the substrate. Expected reduction in onboarding: from weeks to days.

12.5.6 Outcome 6 — The standard as a sellable product

At RENAR-4/5 a substrate-native implementation MAY be licensed to partners as an actionable product. A structural consequence of a formal standard, not a process metric.

12.6 Substrate-independent metric collection

12.6.1 Normative requirements

A substrate implementing RENAR at the RENAR-4+ level MUST provide **automatic collection** of the §12.3 metrics through:

Source	Capabilities	Accessible
Event audit log (§10.13)	V1 + V6	gate-passage events with timestamps, artifact-version, actor
COVERAGE artifact (§9.15)	V5 + V1	counts approved/verified/total; pos/neg coverage; stale-rate
AI-provenance frontmatter fields	V6	cost-budget, cost-actual, generated-by, generated-at
Reconciliation audit log	V1 + V6	reconciliation runs + findings list ID
Critic-runs audit log (RENAR-5)	V1 + V6	critic runs + severity classifications

A substrate without access to any of the sources above **cannot** implement RENAR-4/5 (§11.7.1, §11.8.1).

12.6.2 Substrate-native monitoring panels (dashboards)

The format (UI/CLI/report-generation) is substrate-specific; the standard does not regulate visualization. The substrate MUST export metrics in a machine-readable format for external audit (§13.6 third-party assessment). Dashboard templates — `guide/` .

12.6.3 Period aggregation

Per artifact — Hallucination Rate, Cost per Approved Requirement; per period (sprint/week/month) — Coverage Velocity, Reconciliation Findings/Week, ACR; per release — DRA; continuous trending — Multi-model Disagreement Rate, Test-spec Drift Rate. Period boundaries are fixed in the manifest (§13.4.2) under `declared-stricter` or are taken by default.

12.7 Mapping to SENAR metrics

The full mapping of the ten SENAR §9 metrics to the REQ refinements from §12.3.

SENAR metric (§9)	REQ refinement from §12.3
Throughput	+ Coverage Velocity (§12.3.8) — at the requirements level
Lead Time	+ RDLT (§12.3.1) — for the requirements phase
FPSR (First-Pass Success Rate)	+ REQ-FPSR (share of artifacts passing QG-0 without rework) — derived, not a separate §12.3 metric
DER (Defect Escape Rate)	+ DRA (§12.3.5) — defects at acceptance
KCR (Knowledge Capture Rate)	(used as-is; indirectly reinforced through the §12.5.5 outcome)
Cost Predictability	+ variance of Cost per Approved Requirement (§12.3.9)
Cost-per-task	+ Cost per Approved Requirement (§12.3.9) — for the requirements phase
MIR (Memory Integrity Rate)	(used as-is; reinforced through V1 + V6 at RENAR-4+)
Cycle Time	+ RDLT (§12.3.1) + Requirement-to-Task Latency (§12.3.2) — both within SENAR Cycle Time
ADR (Adversarial Detection Rate)	+ ACR (§12.3.6) — adversarial for the requirements zone

Metrics with **no** SENAR counterpart (new in RENAR):

- Hallucination Rate (§12.3.3) — specific to AI-generated artifacts.
- Multi-model Disagreement Rate (§12.3.4) — specific to multi-model generation.
- Test-spec Drift Rate (§12.3.7) — specific to V5 requirement-version pinning.
- Reconciliation Findings per Week (§12.3.10) — specific to continuous reconciliation.

12.8 Relationship to other chapters

Chapter	Relationship
02 Positioning in the typology of methodologies	§2.3 Source-of-Truth inversion + §2.4.2 continuous reconciliation — the foundation for §12.3.10 Reconciliation Findings
07 ADAPT	§7.4.5 backward findings — input for §12.3.10; delta-ADAPT — measured through §12.3.5 DRA
08 Specifications	§8.5.7 SPEC-AI continuous evaluation — related to §12.3.4 Multi-model Disagreement Rate
09 Test cases	§9.12 last-run — input for §12.3.7 Drift Rate; §9.15 COVERAGE — the source for §12.3.8 Velocity and §12.3.7
10 Lifecycle and QG	§10.13 event audit log — the basis for all §12.3 metrics; §10.4.2 QG-4 — the gate at which §12.3.5 DRA is captured
03 Substrate versioning	V1 + V5 + V6 — capabilities mandatory for substrate-native collection of the §12.3 metrics (§12.6.1)
11 Maturity model	§12.3 targets per RENAR-3/4/5 level — a concretization of the level criteria from §11.4–§11.8
13 Conformance	§12.3 metrics — input for the §13.5 self-assessment; exceeding thresholds (for example, Hallucination Rate > 5% at RENAR-4) — a loss-of-conformance trigger §13.8.1

13. Conformance

> ***Part of the RENAR Standard v1.0-draft*** · *← Table of contents*

> ***Dense chapter:*** *start with the reference/08 kit; the MVR↔§13.3 bijection is there too, in §1.*

13.1 How to prove conformance

Saying "we do everything the RENAR way" is easy — proving it is harder. This chapter is about how a project makes a verifiable claim: "we implement RENAR at the `RENAR-3` level" — and backs it up so that an external assessor can re-check it. The claim is not a slogan but a signed manifest with references to evidence in the substrate: here is the level, here is the evidence for each mandatory clause, here is who confirmed it and when.

The chapter normalizes three questions. **Who** is entitled to claim — the project Architect (self-assessment) or an independent assessor (third party). **On what basis** — the closed list of RENAR-1..5 levels plus the universal clauses mandatory for any level. **How the claim lives over time** — scheduled re-assessment, and upon a violation, loss of conformance. If the claim ceases to be true, this is a recorded event, not a silent omission.

The levels themselves are given here as a short semantic summary: the full RENAR-1..5 criteria are in chapter 11, and the substrate-native check mechanisms are in chapter 3 and `guide/06-compliance.md`. Here — the rules of the claim itself.

13.2 The closed list of RENAR levels

A closed list of five maturity levels. The full criteria are in chapter 11; below is the normative **semantic summary** for a conformance claim.

Level	Brief semantics	Conformance status
`RENAR-1`	Ad-hoc (spontaneous level): requirement artifacts are kept in a substrate with V1–V6 (§13.3.2); no formal `frontmatter` schema, no lifecycle statuses	Minimum entry level (§13.2.1)
`RENAR-2`	Documented (fixed in artifacts): a requirements substrate exists; artifacts have a basic `frontmatter`; the TZ is recorded	Conformance declarable (§13.2.2)
`RENAR-3`	Tracked (lifecycle and link accounting maintained): full `frontmatter` schema; lifecycle statuses are used; delta-TZ workflow through ADAPT	Conformance declarable (§13.2.2)
`RENAR-4`	Verified: 100% of `approved` artifacts have `verified-by`; pos/neg pairing (§9.7); QG-2 enforced; AI provenance	Conformance declarable (§13.2.2)
`RENAR-5`	Optimized: adversarial critic; multi-model generation; knowledge graph; Hallucination Rate measured	Conformance declarable (§13.2.2)

13.2.1 RENAR-1 as the minimum entry level

`RENAR-1` is the normative entry level. A project with no requirements substrate (where requirements live only in ticket systems or private correspondence) MUST NOT claim `RENAR-1`; a conformance claim against the standard begins with the actual presence of a requirements substrate.

`RENAR-1` is recorded in the conformance manifest only if the project explicitly declares the start of its RENAR journey; for projects with no intent to adopt RENAR, a conformance manifest is not required.

13.2.2 Closedness of the list

New levels (`RENAR-6`, `RENAR-N+`) MUST NOT be created locally at the project level. Changing the list of levels is possible only through the formal change procedure of the standard (§13.9).

An implementation MAY tighten requirements relative to the level (declare-stricter — see §10.10.2); this does not change the level and does not take the project outside the closed list.

13.3 Mandatory clauses, universal to all levels

Normative clauses mandatory for **any** conformance claim regardless of the declared level (including `RENAR-1`). Violating even one of them means the absence of conformance to the RENAR Standard as a whole.

13.3.1 Source-of-Truth inversion

An implementation MUST observe the **Source-of-Truth inversion** (§2.3): the requirement-artifact hierarchy is the source of truth about system behavior; code is a derived implementation artifact. Equivalent violations: reverse-engineering behavior from code into an SR without a bug-fix justification (§2.3.3 (1)); silent adaptation of an SR to the observed behavior of code (§2.3.3 (4)).

13.3.2 Substrate capabilities V1–V6

The project substrate MUST satisfy capabilities V1–V6 (chapter 3 §3.3):

Capability	Status for conformance
V1 — immutable history	**Mandatory absolutely**: without V1 an audit trail and V5 are impossible
V2 — atomic change unit	**Mandatory absolutely**: without V2 delta-ADAPT consistency is impossible
V3 — diff and review	**Mandatory absolutely**: without V3 there are no gates, no approval (§10.11.2)
V4 — branching / change-set	**Mandatory absolutely**: without V4 WIP and the source of truth are inseparable (§10.11.2)
V5 — cross-substrate version pin	**Mandatory absolutely**: without V5 `verifies[].version` and QG-2 are impossible (§10.3.3)
V6 — author and timestamp	**Mandatory absolutely**: without V6 the ADAPT dual signature and AI provenance are impossible (§10.11.2)

Negative scenario: a substrate in which at least one of the V1–V6 capabilities is missing normatively **cannot** implement any RENAR-N — including `RENAR-1`. This is a structural constraint (§3.2), not an operational one.

13.3.3 Reactive ADAPT

ADAPT is a reactive artifact (§7.4.1). Every TZ MUST pass an adversarial review (§7.10.2) with a verdict recorded in the substrate (V6 author + timestamp). What follows depends on the verdict:

Adversarial reviewer's verdict	Requirement for ADAPT	Requirement for `source` of BR/SR/SPEC
"findings present" — backward findings, term mapping clarification, or scope clarification were detected	ADAPT is REQUIRED, in status `approved`. Dual signature (Architect + client representative, §7.5). Lifecycle §7.4.5.	`source.adapt` mandatory; `source.tz-section` mandatory
"no findings, no clarifications" — the TZ → RENAR conversion is unambiguous	No ADAPT is created	`source.tz-section` mandatory; `source.adversarial-review-ref` mandatory (verdict evidence)

Delegation to the adversarial reviewer is the only permissible way to declare "no ADAPT is needed." Creating BR / SR / SPEC from a TZ without a recorded verdict is a violation of the standard; hooks (§10.11.1 `adapt-applicability validation`) MUST block such artifacts.

In the presence of a delta-TZ — the same rule (§7.6): a delta-ADAPT is created upon findings from the adversarial review of the delta-TZ.

Multiplicity and stage independence. The ADAPT trigger is stage-agnostic: the verdict is rendered not only at TZ import but also at the derivation stages (BR → SR → SPEC → TC, §7.4.1.1). A single TZ has **zero or more** root ADAPTs (cardinality 0..N, MVR-3, §7.4.1.4); each records a `trigger-stage`. Multiplicity is conformant to the standard and does not weaken provenance: each BR / SR / SPEC references exactly one ADAPT or a `source.tz-section`.

Supersession (`supersession`). An approved/frozen ADAPT MAY be superseded by a superseding ADAPT (§7.6.4). A conformant supersession MUST: (1) preserve the superseded ADAPT in the terminal `superseded` state (immutable, V1) — not delete it; (2) upon a contractual outcome, carry the client signature on the superseding ADAPT; (3) redirect or re-derive all derivatives so that no dangling `source.adapt` pointing at a `superseded` one remains (§6.10.3). A separate QG is not required — QG-3 is used (§10.8.5).

Negative scenarios (non-conformant):

- The manifest declares conformance, but BR/SR/SPEC are derived from a TZ without `source.tz-section` and without `source.adapt` — a violation of mandatory provenance.
- Creating BR/SR/SPEC with `source.adapt` omitted **without** the evidence `source.adversarial-review-ref` — a violation of §7.4.1.3 "no silent skip."
- An ADAPT created under a "no findings" verdict (evidence exists) — a contradiction: the verdict claims that no ADAPT is needed, yet an ADAPT is present.
- An ADAPT in status `superseded` deleted from the substrate — a violation of immutable history (V1).

- A dangling `source.adapt` reference to a `superseded` ADAPT (the derivative was not redirected or re-derived) — an invalid trace chain.
- Supersession of a decision with a contractual outcome without the client signature on the superseding ADAPT — a unilateral cancellation of what was agreed with the client, a violation of §7.6.4.

13.3.4 Closed list of 9 SPEC types

A SPEC type MUST belong to the closed list of nine types (§8.3): `SPEC-ARCH`, `SPEC-API`, `SPEC-DATA`, `SPEC-INT`, `SPEC-PROC`, `SPEC-UI`, `SPEC-AI`, `SPEC-SEC`, `SPEC-OPS`.

A project MUST NOT create new SPEC types locally. Changing the list is possible only through the formal change procedure of the standard (§8.3.1, §13.9).

13.3.5 TC pos/neg pairing for normative statements

Every normative statement of a verifiable artifact (BR / SR / SPEC / TR) that is covered by at least one TC MUST have a paired negative TC (§9.7). Single-TC coverage is permitted only in one case: the statement itself describes a negative invariant (for example, a `SPEC-SEC` STRIDE category).

QG-2 (§10.3.3) MUST block promoting an artifact to `verified` in the absence of at least one paired negative TC.

13.3.6 Closed list of Quality Gates

The closed list of Quality Gates (§10.3, §10.4):

Gate	Status in the conformance manifest
QG-0 — Approval	**Mandatory required**
QG-1 — Implementation	**Mandatory required**
QG-2 — Verification	**Mandatory required**
QG-3 — Architecture (opt.)	`declared` (supported) or `absent`; for projects with mandatory ADAPT — effectively always `declared`, since ADAPT approval operates with the QG-3 dual signature (§10.4.1)
QG-4 — Acceptance (opt.)	`declared` or `absent`; when `absent`, the artifact's terminal status is `verified` (without `accepted`)

Creating new gate types locally is prohibited (§10.10.2). Locally tightening the preconditions of a canonical gate is permitted (declare-stricter); locally weakening them is prohibited.

13.3.7 Closed lists of backward findings and SPEC decompositions

- The list of backward-findings categories in ADAPT is closed (§7.4.4) — 7 categories; adding new ones is the formal change procedure of the standard (§13.9).
- The closed list of SPEC types is additionally fixed by §13.3.4.
- The closed list of artifact lifecycle states (chapter 10) — is not extended locally at the project level.

13.3.8 Cross-level subsystem traceability (`implements` -edge)

For the "subsystem as a standalone product" scenario (§6.8.2), an implementation MUST provide a machine-readable trace chain `BR (subsystem) → BR (system)` through the typed `implements[]` edge (§6.5.2):

Conformance level	Requirement
v1.0: `recommended`	If `BR.level = subsystem` AND the parent system has ≥1 approved BR — the presence of `implements[]` is RECOMMENDED. Its absence is permitted but REQUIRES a justification in the `Context` section with a reference to ADAPT§.
v1.1+: `mandatory`	The same trigger makes `implements[]` mandatory. Its absence when the trigger fires is non-conformance.

In both versions the substrate MUST implement the `implements` -edge validation checkpoint from §10.11.1 (the target exists and is `approved` +, no cycles, deprecated target → warning, `implements[]` not on `level: system`).

Negative scenario: a project declares conformance to `RENAR-N` with `BR.level = subsystem` and an approved parent BR in the same system, but without `implements[]` and without a justification in the Context — non-conformant from v1.1 onward; on v1.0 — predictably-non-conformant upon upgrade (§13.9 migration guidance).

13.4 The conformance manifest

13.4.1 Location and format

The conformance manifest is stored at the root of the project's requirements substrate under the name `RENAR-CONFORMANCE.yaml` . The format is YAML 1.2; an alternative serialization (`.json`) is permitted as an **additional** artifact, not a replacement.

The manifest is **immutable** in the V1 sense: each conformance claim creates a new version of the manifest (`manifest-version` is incremented); previous versions are not deleted, they remain in the substrate as an audit trail. Replacing the manifest through `replaced-by` points to the new version.

13.4.2 Mandatory fields

```yaml
# RENAR Conformance Manifest schema (mandatory fields, v1.0)
renar-version: "1.0"           # the version of the RENAR Standard against which
conformance is claimed
senar-version: "1.0"           # the version of SENAR the implementation relies
on (mandatory, MVR-7)
manifest-version: 3            # incremented on each update; not re-used
manifest-id: "CFM-2026-001"    # stable substrate-native identifier (V1)

# Conformance level
```

```yaml
level: "RENAR-3"               # from the closed list §13.2 (RENAR-1..RENAR-5)
level-target: "RENAR-4"        # optional: the next target level (for path
planning)

# Assessment metadata
assessment-mode: "self"        # self | third-party
assessment-date: "2026-05-13"  # ISO-8601 date of completion of the current
assessment
assessor:
  id: "architect-andrey-y"     # V6 author identifier
  role: "architect"            # role from §13.5 (architect | authorized-role-
holder | external-assessor)
  signature-ref: "<substrate-native pointer to the signature event>"
next-assessment-due: "2026-08-13"  # §13.7

# Mandatory clauses confirmation (§13.3)
mandatory-clauses-confirmed:
  sot-inversion: true                                  # §13.3.1
  substrate-v1-v6: { v1: true, v2: true, v3: true, v4: true, v5: true, v6: true }
# §13.3.2
  adapt-per-tz: true                                   # §13.3.3
  spec-types-closed-list: true                         # §13.3.4
  tc-pos-neg-pairing: true                             # §13.3.5
  quality-gates-closed-list: true                      # §13.3.6
  closed-lists-backward-findings: true                 # §13.3.7

# Quality gates declaration (§10.4.3)
quality-gates:
  qg-0: required               # required (mandatory)
  qg-1: required
  qg-2: required
  qg-3: declared               # required | declared | absent
  qg-4: absent

# Substrate capabilities declaration (§13.3.2)
substrate-capabilities:
  v1-immutable-history: declared
  v2-atomic-change-unit: declared
  v3-diff-review: declared
  v4-branching: declared
  v5-version-pin: declared
  v6-author-timestamp: declared
  substrate-id: "<substrate-native pointer to guide/03..06>"   # cross-ref to
guide

# Spec types support (§13.3.4)
spec-types-supported: ["SPEC-ARCH", "SPEC-API", "SPEC-DATA", "SPEC-INT",
                       "SPEC-PROC", "SPEC-UI", "SPEC-AI", "SPEC-SEC", "SPEC-OPS"]
# All 9 types are mandatory as the minimum-supported; a declaration "type X is
not used in the project" is permitted,
# but it CANNOT be a declaration "type X is not supported substrate-natively."

# Optional fields
declared-stricter:             # §13.2.2, §10.10.2 — local tightening
```

```
  - clause: "QG-2"
    override: "required-negative-tc-per-clause"
    rationale: "regulated industry, double safety margin"
  - clause: "tc-pos-neg-pairing"
    override: "100% (no single-TC exception for security)"
    rationale: "mandatory requirement of the internal ISMS"

exceptions: []                # declared exceptions relative to the base level
(with justification in the audit trail)

# External conformance records per §14.4 (optional; for the value field see the
`claim` key below — substrate §14.6)
external-claims:
  - standard: "ISO/IEC 5338:2023"
    clause-ref: "§2.4.x"
    claim: "partial"          # full | partial | aligned
  - standard: "NIST AI RMF 1.0"
    clause-ref: "§2.4.x"
    claim: "aligned"

replaced-by: null             # substrate-native pointer to the next version of
the manifest, if released
replaces: "CFM-2026-001@v2"   # substrate-native pointer to the previous version
of the manifest
```

13.4.3 Field semantics

- `renar-version` — the version of the standard; conformance is claimed against a specific point of the standard; upon the release of a minor version of the standard (§13.9), a re-assessment is REQUIRED (§13.7) with an update of `renar-version`.
- `senar-version` — the version of SENAR the implementation relies on; mandatory per MVR-7 (§0.5); its absence from the manifest is non-conformance (§13.8).
- `manifest-id` — V1 immutable identifier; not re-used even after `replaced-by`.
- `level` — the closed list §13.2; a violation of the mandatory clauses (§13.3) means conformance is absent regardless of `level`.
- `level-target` — an optional declaration of the development path; it is not a normative obligation.
- `assessment-mode` — `self` (§13.5) or `third-party` (§13.6); `third-party` MUST contain a formal reference to the external assessment act.
- `assessor` — V6 author + role; for `third-party` — an external participant with explicit identification.
- `next-assessment-due` — `assessment-date + cadence` (§13.7); an overrun is a trigger for loss of conformance (§13.8).
- `quality-gates` — MUST contain all five gate-ids; the status of `qg-0..qg-2` ∈ {required}; `qg-3, qg-4` ∈ {required, declared, absent}.
- `mandatory-clauses-confirmed` — each field set to `true` is mandatory for any conformance claim; `false` makes the manifest invalid.

- `declared-stricter` — a list of local tightenings; MUST contain `clause`, `override`, `rationale`.
- `exceptions` — a list of declared exceptions relative to the base level; each exception REQUIRES a justification in the audit trail and MUST NOT touch the mandatory clauses.
- `external-claims` — an optional list of conformance records against external normative references (§14.4, §14.6); each record contains `standard`, `clause-ref`, and the field `claim` (value: full | partial | aligned) — a technical schema key, with no term substitution in the manifest.

13.5 Self-assessment procedure

13.5.1 Actor

Self-assessment is conducted by the project **Architect** or by an **authorized role holder** (chapter 5) explicitly declared responsible for conformance.

13.5.2 Methodology

Steps: (1) the §13.3 checklist — the actor checks each mandatory clause; the result goes into `mandatory-clauses-confirmed`; at least one `false` → the assessment is not completed, and a remediation plan for the violations is formed; (2) the chapter 11 §§11.4-11.8 checklist for the declared `level` — each level criterion = a separate check with evidence in the substrate; (3) filling in the manifest (all mandatory fields §13.4.2; `level` not higher than the passed checklist); (4) signing and publishing — the actor signs the manifest with the native mechanism (V6 author + timestamp); the manifest becomes part of the source of truth through V3 review (for self-assessment, self-approval is permitted, the evidence MUST be recorded).

13.5.3 Evidence

Each mandatory-clause check MUST be accompanied by references to evidence in `audit-trail/CFM-<id>/<clause>.md` (V1 — a stable identifier pointing to specific artifacts, runs, events). Evidence is retained indefinitely (V1 + §10.13.3 retention).

13.5.4 Cadence

The first claim (kickoff); the cadence is §13.7; the trigger is §13.8 (loss of conformance); the release of a minor version of the standard (§13.9).

13.6 Third-party assessment (optional)

An optional path to confirming conformance by an external assessor. It applies in regulatory contexts (medicine, fintech, the public sector, AI-critical systems) or under contractual obligations toward the client.

13.6.1 Actor

The external assessor is an independent participant with read-only access to the substrate for the assessment period. The formal qualification is substrate-specific and is recorded in `assessor.signature-ref` (an external auditor of a certified organization).

13.6.2 Methodology

The same as §13.5.2 (the §13.3 checklist + the chapter 11 checklist), plus: an audit trail — all of the assessor's actions (read-events) are recorded natively; independent verification — the assessor checks the evidence independently without relying on the self-assessment results; the outcome — a signed manifest (the assessor signs with the native V6 mechanism) **or** a denial with a justification and a list of specific violations.

13.6.3 Additional manifest fields

When `assessment-mode: third-party`, the following are mandatory:

```
third-party:
  assessor-organisation: "<name>"
  assessor-qualification-ref: "<pointer to the qualification document>"
  audit-report-ref: "<pointer to the full audit report>"
  audit-log-ref: "<pointer to the read-events log>"
```

13.6.4 Relationship between self / third-party

Third-party **does not cancel** the self-assessment cadence (§13.7); the paths are compatible. A project MAY run self-assessment quarterly and third-party annually; the manifest is versioned separately for each path with different `manifest-id` s.

13.7 Re-assessment cadence

13.7.1 Default

Self-assessment is **quarterly** (every 3 months from `assessment-date`); third-party is **annual**. It is declared in the manifest's `next-assessment-due` field.

13.7.2 Override

The cadence MAY be overridden in `declared-stricter`:

```
declared-stricter:
  - clause: "re-assessment-cadence"
    override: "monthly"
    rationale: "AI-critical project, eval dependency"
```

Weakening the cadence (`override: "annual"` for self under the default `quarterly`) is **prohibited** — a violation of §13.3.1 Source-of-Truth inversion (a hidden weakening = concealing a loss-of-conformance event).

13.7.3 Immediate re-assessment triggers

The release of a minor version of the RENAR Standard (`renar-version` shifts); a violation of a mandatory clause (§13.3, the loss-of-conformance trigger §13.8); a substantial change of substrate (substrate replacement — V1-V6 is re-assessed); a substantial change of scope (a new artifact class, a new SPEC type).

13.8 Loss of conformance

13.8.1 Triggers

Conformance is considered **lost** upon the occurrence of any of:

Trigger	Description
A mandatory clause is violated	Any of §13.3.1–§13.3.7 ceased to hold (for example, a BR without ADAPT appeared; the substrate lost V3 after migration)
Substrate capability degradation	V1, V2, V3, V4, V5, or V6 is no longer provided by the substrate (for example, migration to a substrate without diff & review)
The manifest expired	`next-assessment-due` passed without releasing a new version of the manifest
Level criteria violated	The criteria of the declared level (see chapter 11) ceased to hold without a formal downgrade
Metric threshold exceeded	A critical metric of chapter 12 exceeded the normative threshold for the level (for example, Hallucination Rate > 5% on RENAR-4 — §12.3.3 explicit trigger, line 94)
External denial	An external assessor (third-party assessor) returned a denial with justification

13.8.2 Procedure

Steps: (1) **recording the loss-event** in the audit trail (`audit-trail/CFM-<id>/loss-events/<timestamp>.md`); (2) **a formal downgrade or a declaration of unknown-state** — a downgrade (a new version of the manifest with a `level` below the current one, if the mandatory clauses hold) or unknown-state (an explicit declaration in public communications; the manifest is marked `replaced-by: "<unknown-state>"` with a sentinel value, distinct from the default `null` ; re-assessment is REQUIRED for recovery); (3) **a recovery plan** — `recovery/CFM-<id>-<timestamp>.md` specifying the deadline and the mandatory clauses / level criteria; (4) **re-assessment** after the recovery plan — self-assessment §13.5 with an updated manifest is REQUIRED; for third-party — a repeated external assessment.

13.8.3 Public communications

Loss of conformance, if the level is claimed publicly, MUST be recorded publicly within a reasonable time (the notification cadence — `guide/`). Concealing the fact of loss is a violation of §13.3.1 (the Source-of-Truth audit trail).

13.9 The closed-list policy for RENAR-N levels

13.9.1 Normative rule

The closed list of levels RENAR-1..RENAR-5 (§13.2) is **not extended** locally at the project level. Any project claiming conformance MUST specify `level` ∈ {RENAR-1, RENAR-2, RENAR-3, RENAR-4, RENAR-5}. This policy is a specialization of the §1.7 closed-list policy for maturity levels; the master index is §1.7.5.

13.9.2 What is prohibited

Action	Prohibited?	Why
Locally creating a level at the project level (`RENAR-6`, `RENAR-PRO`)	Prohibited	Violates the closed list; conformance is non-portable
Locally overriding criteria (weakening RENAR-4 without a formal downgrade)	Prohibited	Violates the contract of the standard
Locally tightening criteria (declare-stricter)	Permitted	See §13.4.2 `declared-stricter`
Claiming a level higher than the one actually achieved	Prohibited	Violates §13.3.1 Source-of-Truth inversion
A conformance claim without a manifest	Prohibited	§13.4 mandatory
Intermediate levels such as `RENAR-3.5`	Prohibited	The list is discrete

13.9.3 The path to adding a new level

Only through the formal change procedure of the standard: a research draft (justification, a typology of criteria, a comparison with existing RENAR-N) → public review → a minor-version bump (`v1.X` or `v2.0`) → migration guidance (for existing conformant projects: changes to the self-assessment checklist, new manifest fields).

Project-local extensions remain outside conformance — permitted as internal practices (`declared-stricter`), but they do **not** affect the formal `level` in the manifest.

13.10 Relationship to other chapters

Chapter	Relationship
02 Positioning in the typology of methodologies	§2.3 Source-of-Truth inversion — the mandatory clause §13.3.1; §2.7 the conformance consequence explicitly refers back to this chapter

06 Requirements hierarchy	the `frontmatter` of artifacts (BR / SR / TR) — the RENAR-2/-3 level criteria are checked per §6.5–§6.7 (chapter 11)
07 ADAPT	the mandatory clause §13.3.3 (ADAPT for each TZ); §7.4.4 the closed list of backward findings — §13.3.7
08 Specifications	the mandatory clause §13.3.4 (the closed list of 9 SPEC types); §8.3.1 the closed-list policy — §13.9
09 Test cases	the mandatory clause §13.3.5 (pos/neg pairing); §9.10 QG-2 — §13.3.6
10 Lifecycle and QG	§10.3 the canonical gates, §10.4.3 the conformance-manifest fragment — expanded here into the full manifest schema; §10.10 the closed-list policy for gates parallels §13.9 for levels
03 Substrate versioning	the mandatory clause §13.3.2 (V1–V6 declared); §3.4 the mapping table — non-normative, informational
11 Maturity model	detailed criteria for levels RENAR-1..5 — here §13.2 contains a semantic summary; the full per-level checklist is in §§11.4–11.8 (one section per level)
12 Metrics	the metrics on which self-assessment is built (`approved-without-verified` , `pos-neg-pairing-percent` , and others) — specified here as input data for §13.5

14. Normative references

14.1 Which standards RENAR builds on

An engineer who opens this chapter has one practical question: which of the listed standards must I actually comply with, and which are just background? RENAR answers directly. It does not rewrite other people's standards — it builds on them and claims conformance only in part, not in whole. Hence the split: **normative references** (§14.4) — what RENAR actually declares conformance to (ISO/IEC/IEEE 29148, ISO/IEC 5338, and others); **informative references** (§14.5) — methodologies and terminology used for positioning, not required for a conformance claim; **conformance positioning** (§14.3) — a single formulation that places RENAR among related standards; **what RENAR does not adopt** (§14.7) — a closed list of non-borrowed practices. The full extended catalog of informative mappings — reference/11.

If a normative reference conflicts with a clause of this chapter, the clause of this chapter prevails (RENAR is a specialization and adaptation). RENAR makes a conformance claim against an external standard **only** in the stated part, not in whole. All dates are the publication date of the referenced edition; the reference is **dated** (§14.4.1).

14.2 SENAR as the parent standard

RENAR is a **specialization of SENAR** (§2.1) in the requirements-engineering domain. RENAR does not duplicate the following SENAR clauses; they apply as-is:

SENAR clause	Used without rewriting
5 values and 14 rules	Context for all of RENAR; see §2.1
QG-0 / QG-1 / QG-2 as a concept	RENAR makes the state machines concrete in §10
10 common process metrics	RENAR adds 10 domain metrics in §12.3
5 levels of general maturity	RENAR-M is a separate dimension (§11.2)
5 roles (Supervisor, AI agent, Architect / Tech Lead, Reviewer, Stakeholder)	RENAR does not redefine the roles; see §5
Agent instrumentation (control levels, profiles)	RENAR extends it for requirements specifics

RENAR begins where SENAR ends: SENAR is the general methodology of AI-native development; RENAR is the normative requirements-management document for SENAR-compatible systems.

14.3 Conformance positioning

> ***RENAR — requirements management aligned with ISO/IEC/IEEE 29148:2018, adapted for development with AI agents, built on top of the SENAR methodology, and compatible with SAFe 6.0 coordination.***

This formulation is the point of reference for all conformance claims that projects issue based on RENAR (§13.4).

14.4 Normative dated references

Each entry in §14.4.2–§14.4.6 contains the blocks **"What it normalizes"**, **"How RENAR relates"**, and **"Conformance claim"**. The blocks **"What RENAR adapts"** and **"What RENAR does not adopt"** appear only in deep-adaptation entries (29148 and 5338); the other entries are shorter — this reflects the depth of the claim, not a structural defect.

14.4.1 The notion of a dated reference

RENAR uses **dated references**: each normative reference cites a specific edition of a standard (with its year). Undated references do not apply — semantics change between editions, and a conformance claim MUST be verifiable against a pinned edition.

Lifecycle of a normative reference. *Active* — the reference is cited in the current version of RENAR (`renar-version` in the conformance manifest, §13.4.2). *Updated* — the referenced standard has released a new edition; RENAR is updated within a reasonable timeframe (the project manifest pins a `renar-version`, which in turn pins the editions of external references). *Withdrawn upstream* — the referenced standard has been retired (like IEEE 830-1998); RENAR moves the reference to §14.5 and names the successor.

Triggers for immediate re-evaluation. When a new edition of one of the references in §14.4 is released, an immediate re-evaluation (§13.7.3) of project manifests is REQUIRED: checking the RENAR chapters for consistency (a changelog entry); updating `renar-version` in project manifests; an entry in the substrate audit-trail.

Negative scenario: a RENAR conformance claim of `renar-version: 1.0`, when a new edition of ISO/IEC 5338 is released, **without** updating `renar-version` in the manifest — is invalid; the substrate hook (§13.8.1) detects the stale version.

14.4.2 ISO/IEC/IEEE 29148:2018 (requirements engineering)

Official title (EN): Systems and software engineering — Life cycle processes — Requirements engineering.

What it normalizes: the international requirements-engineering standard — stakeholder needs, specification, validation, verification, attributes, traceability, lifecycle.

How RENAR relates:

29148	RENAR	Type
Requirement classes: stakeholder, system, software	BR, SR, TR	Borrows with renaming
Requirement attributes (18 in 29148)	Mandatory minimum in frontmatter (§6.5.2, §6.6.2) — 7–8 fields	Simplifies

SRS structure	The requirements substrate structure is isomorphic	Borrows
Verification methods: inspection, analysis, demonstration, test	TC (§9) — a full-fledged artifact; inspection — via the `[test-spec-change]` workflow (§9.13)	Adapts

What RENAR adapts:

- 29148 provides for 18 attributes; RENAR keeps 7–8 mandatory ones, the rest being auto-derived (§4.12) or optional. Rationale: in development with AI agents, excessive attribution increases the risk of hallucinations (§12.3.3).
- 29148 does not single out TC as a separate artifact. RENAR makes TC a full-fledged artifact (§9).

What RENAR does not adopt: the formal review meetings and walkthroughs of 29148 — replaced by QG-0 / QG-2 and adversarial AI review (§11.7 for RENAR-4+).

Conformance claim: RENAR claims conformance with ISO/IEC/IEEE 29148:2018 in the part covering requirement classes, attributes, lifecycle, and verification methods (pinned in the manifest, §13.4.2).

14.4.3 ISO/IEC 25010:2023 (product quality model)

Official title (EN): SQuaRE — Product quality model.

What it normalizes: nine software quality characteristics (the 2023 edition), including the new Safety.

How RENAR relates: the 25010 characteristics are **mandatory categories** for non-functional SR. The SR frontmatter (§6.6.2) MUST contain a `quality-characteristic` from the 25010 list.

Conformance claim: RENAR claims conformance with ISO/IEC 25010:2023 in the part covering the category vocabulary for NFRs.

14.4.4 ISO/IEC 25022:2016 / 25023:2016 (quality measures)

What it normalizes: formal measures for each 25010 characteristic (for example, response time in ms).

How RENAR relates: the Pass criteria in TC (§9.11.1) MUST be expressed through 25022/25023 measures where applicable. Example: "p95 < 200 ms at 100 RPS" instead of "performance is acceptable".

Conformance claim: RENAR claims conformance in the part covering measurable Pass criteria for TC.

14.4.5 ISO/IEC 5338:2023 (AI-system lifecycle)

What it normalizes: the first international standard for the AI-system lifecycle (an adaptation of ISO/IEC 12207).

How RENAR relates:

- **Decision logs** — material decisions by the AI agent are documented; implementation: audit-trail (§10.13) + `ai-provenance` (§4.10.1).
- **Data versioning** — eval-datasets with version pin V5 (§3.3.5).
- **Model versioning** — `ai-provenance.generated-by` is mandatory at RENAR-4+ (§11.7.1).
- **Continuous validation** — scheduled eval-runs (§11.8.1 for RENAR-5).

What RENAR adapts:

- 5338 describes the full lifecycle of an AI system (derived from ISO/IEC 12207); RENAR borrows from it only the processes concerning requirements and the provenance of AI-generated artifacts —

decision logs, data and model versioning, continuous validation — and expresses them through `ai-provenance` (§4.10.1) and the RENAR-4 / RENAR-5 levels (§11.7, §11.8).

What RENAR does not adopt: the operational layer of the AI-system lifecycle — model training, deployment, and operation — is outside the scope of RENAR (§1.3); the standard normalizes only the requirements axis and the provenance of AI-generated artifacts (`ai-provenance`).

Conformance claim: RENAR claims conformance in the part covering the AI-artifact lifecycle and AI-assisted artifact generation.

Negative scenario: a conformance claim against 5338 without `ai-provenance` (§4.10.1) — is invalid. RENAR MUST refuse to issue a manifest for such projects.

14.4.6 ISO/IEC 23894:2023 (AI risk management)

What it normalizes: AI risk classes and mitigation strategies.

How RENAR relates:

Risk (23894)	Mitigation in RENAR
Hallucinations in AI output	Source citation (§4.10.2), the Hallucination Rate metric (§12.3.3)
Model drift	pinning `last-run.requirement-version` (§9.12) + periodic re-run
Prompt injection via input data	Sanitization on TZ import (substrate-specific, in guide/)
Bias in AI generation	Multi-model agreement for critical BR (RENAR-5, §11.8.1)
Adversarial inputs	Adversarial review (§11.7.1, §11.8.3)
Single point of failure (one model)	Multi-model agreement; isolation of the judge model (§9.13.4)

Conformance claim: RENAR claims conformance in the part covering identification and mitigation of AI risks in the requirements domain; the full register — reference/03.

14.5 Informative references

Informative references are methodologies and terminology used for positioning; RENAR does **not** make a conformance claim against them.

14.5.1 The five key ones (start here)

Source	Why for RENAR
SAFe 6.0	Mapping of the Epic/Feature/Story hierarchy → BR/SR/TR (§4.13.1)
Spec-Driven Development	Source-of-Truth inversion (§2.3.1) as a formal paradigm
EARS (Mavin et al.)	Phrasing templates for SR and TC (§6.6.3)
BDD / Gherkin / Specification by Example	Prior art for a full-fledged TC (§9)

NIST AI RMF 1.0	Functional mapping of Govern/Map/Measure/Manage

Brief explanations — in reference/11 §1–§2.

14.5.2 Extended catalog

Source	Role for RENAR
IEEE 830-1998 (deprecated)	Historical reference; the normative successor — §14.4.2
BABOK v3	BA terminology; the elicitation gap — in guide/
PMBOK 7	Principles instead of processes (§2.5)
ISTQB Foundation	Testing vocabulary, compatible with `tc-type`
CMMI v2.0	Prior art for maturity levels (§11)
ISO/IEC 42001:2023	Organizational governance over RENAR
ISO/IEC 25059:2023	AI-system quality (an extension of 25010)
EU AI Act (Reg. 2024/1689)	The `ai-act.risk-class` field; legal conformance — outside RENAR
SysML / MBSE	Prior art for "requirements as a graph" (reference/05)

Detailed mappings — reference/11.

14.6 Conformance summary

14.6.1 Summary table

Standard	Type	Level	RENAR chapters
SENAR	Parent	Specialization	All
ISO/IEC/IEEE 29148:2018	Normative	High	06, 09
ISO/IEC 25010:2023	Normative	Medium	06, 08
ISO/IEC 25022/25023	Normative	Medium	09
ISO/IEC 5338:2023	Normative	High	04 §4.10, 11
ISO/IEC 23894:2023	Normative	Medium	11, reference/03
The rest (§14.5)	Informative	—	see reference/11

14.6.2 Aggregate claims

A manifest (§13.4.2) MAY contain **several** conformance claims against the references in §14.4 at the same time. Each is verified independently. A partial claim is not provided for: a project is either conformant through RENAR, or it is not.

Mandatory clauses and external standards. The mandatory clauses of §13.3 are RENAR's internal requirements. The claims of §14.4 are external, optional above the minimum (for example, RENAR-1 without a claim against 5338, if there is no AI generation of artifacts).

14.7 What RENAR fundamentally does not adopt

A closed list of practices from related standards:

Practice	Source	Why it is not adopted
Heavy document review meetings, IEEE 1028 inspections	RUP, SWEBOK	Incompatible with AI-agent speed; replaced by adversarial AI review (§11.7.1)
Manual verification only (29148 inspection meetings)	ISO/IEC/IEEE 29148 §6.4	Substrate hooks (§10.11) + AI review
Process-first CMMI (CCB, OSP)	CMMI v2.0	Principles + automated enforcement (§2.5)
Formal methods for all requirements (B, Z, TLA+)	Formal methods	Critical safety domains only, not the base level
Undated references to standards	Industry practice	Dated only (§14.4.1)
Self-declared conformance without a manifest	Industry practice	A manifest is mandatory (§13.4)

14.8 Relationship to other chapters

Chapter	Relationship
04 Terms	§4.13 — detailed mapping to related standards
02 Methodology	§2.3.4 SDD; §2.6 implications for mandatory clauses
06 Hierarchy	frontmatter — implementation of the 29148 attributes
09 Test cases	TC — an extension of 29148; ISTQB-compatible terminology
10 Lifecycle and QG	QG — concretization of SENAR QG-0..2
11 Maturity	The RENAR-1..5 levels
13 Conformance	`renar-version`, `external-claims[]`
reference/11	Full informative catalog of §14.5
reference/03 AI risk	Risk register per 23894 + NIST