AURUS MINING

From Study to Sanction

FEED-to-FID de-risking for major mining and infrastructure projects

WP05 | BUILD

MINING | INFRASTRUCTURE | ENGINEERING | ENVIRONMENT

OUR POSITION

A study becomes sanctionable when definition is complete enough to predict outcomes, the basis is controlled, estimates are mature, and interfaces are closed at explicit gates supported by auditable evidence.

EVIDENCE FIRST | DECISIONS MADE EXPLICIT | DELIVERY CONDITIONS STATED

Contents

Executive summary

Many capital programs fail late because they commit early. Independent Project Analysis defines front-end loading as the early planning work, or definition, of a capital project, and frames it as a phase ladder closed by decision gates. The same logic sits behind the common FEED-to-FID shorthand used in this paper: move from study work to a commitment only when definition is demonstrably complete. This is a capability-framing synthesis from public sources, not a claim of delivered FEED or FID mandates. The central edit is decision-led: each gate asks what must be true, what evidence proves it, and what residual uncertainty remains acceptable to carry forward.

Sources: WP05-01, WP05-02

The front end matters because it predicts outcomes. Independent Project Analysis states that completeness of front-end loading is the single best predictor of safety, cost, schedule, and operability outcomes, and reports that more than 30 percent of projects proceed through a key gate with incomplete scope development, leading to underestimated capital costs. That combination explains why sanction discipline is not a paperwork exercise. It is a control problem: if scope is not settled, later estimates and schedules are forced to absorb unknowns as contingency, optimism, or rework. The paper treats completeness as something a leadership team can test, score, and either accept or reject at a gate.

Sources: WP05-03, WP05-05

Public megaproject evidence sets a sober baseline for confidence discussions. Flyvbjerg and Gardner report, from a database of more than 16,000 large projects, that 47.9 percent of projects come in on budget or better, 8.5 percent come in on budget and on time, and only 0.5 percent come in on budget, on time, and with the promised benefits. They also report that mean cost overrun varies widely by category, from solar power at plus 1 percent to nuclear waste storage at plus 238 percent. The lesson for sanction is not fatalism. It is to treat prediction as a managed capability supported by evidence and gate discipline, not by confidence alone.

Sources: WP05-08, WP05-09, WP05-10

Scope definition needs an instrument, more than narrative. The Construction Industry Institute describes the Project Definition Rating Index as intended for use during front end planning, covering feasibility, concept, and detailed scope definition. CII also states that PDRI helps teams identify project risk factors related to desired outcomes for cost, schedule, and operating performance, and evaluate the completeness of scope definition. In this paper, PDRI serves as a model for how to turn definition into a testable set of elements that can be closed, evidenced, and governed through change. The chapters that follow translate these source statements into a decision method, section by section, with exhibits designed for gate packs and evidence rooms.

Sources: WP05-06, WP05-07

At a glance

Six evidence markers establish the scale, threshold or decision condition carried into the chapters that follow.

FEL

FRONT-END LOADING IS EARLY PLANNING AND DEFINITION OF A CAPITAL PROJECT

Source: WP05-01

FEL 1-2-3

PHASE LADDER CLOSED BY DECISION GATES BEFORE AUTHORIZATION

Source: WP05-02

25,000+

IPA RESEARCH SPAN ACROSS CAPITAL PROJECTS (SCALE OF CITED RESEARCH)

Source: WP05-04

>30%

PROJECTS PROCEEDING THROUGH A KEY GATE WITH INCOMPLETE FEL 2

Source: WP05-05

16,000+

LARGE PROJECTS IN FLYVBJERG AND GARDNER DATABASE (SECONDARY TRANSCRIPTION NOTED)

Source: WP05-08

47.9%

PROJECTS ON BUDGET OR BETTER (FLYVBJERG AND GARDNER, 2023 VIA SECONDARY CAPTURE)

Source: WP05-09

Method and boundaries

This paper is a bounded synthesis of registered public evidence. Source identifiers remain visible so that each quantitative or framework statement can be traced to its dossier row.

INTENDED READERS

- Project sponsors and investment committees
- Study managers and project directors
- Owners engineering and technical services leads (mining and infrastructure)

READING METHOD

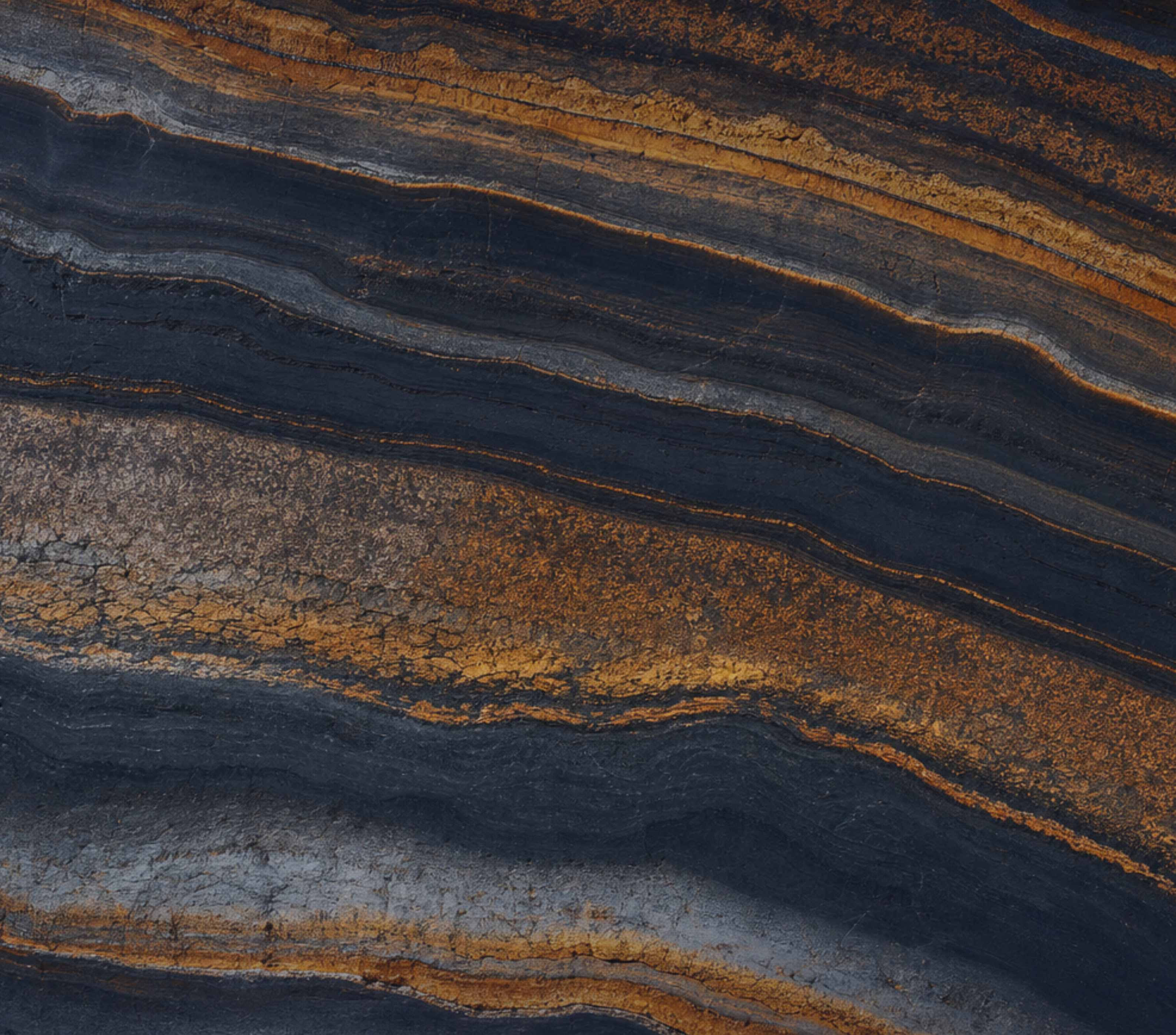
- Read each chapter opener as a decision frame.
- Use the three section exhibits as working review instruments.
- Return to the evidence ledger before reusing any number or requirement.

BOUNDARIES

- Evidence dossier status is SEED and contains only rows WP05-01 to WP05-11. Topics listed as “pre-registered pulls owed” are not cited.
- Flyvbjerg and Gardner (2023) statistics are cited through a secondary transcription vehicle captured in 2026; they are treated as indicative context, not as project-specific prediction.
- No Aurus FEED or FID delivery mandate, credential, or client anecdote is claimed or implied; the paper is capability framing only based on public sources.
- The Construction Industry Institute PDRI overview capture does not include scoring mechanics; therefore this paper uses PDRI as an instrument concept rather than reproducing point scales or thresholds.

PUBLICATION DISCIPLINE

- No client identity or company-age claim is published.
- No Aurus delivery result is inferred from public guidance.
- Dated forecasts retain their institution and vintage.



01

PROBLEM FRAMING

The sanction problem

Sanction failure often starts as definition failure: the gate is passed without sufficient evidence that outcomes are predictable.

>30%

PROJECTS REPORTED TO PROCEED THROUGH A GATE WITH INCOMPLETE SCOPE DEVELOPMENT (F | WP05-05

0.5%

PROJECTS REPORTED TO MEET BUDGET, TIME, AND BENEFITS SIMULTANEOUSLY (SECONDARY) | WP05-09

Gate

AUTHORIZATION GATES CLOSE PHASES IN THE CITED FEL LADDER | WP05-02

1.1 Sanction is a decision quality test

A sanction decision converts uncertainty into exposure. The technical question is not whether a project can be described, but whether it has been defined to a level that can predict safety, cost, schedule, and operability outcomes. Independent Project Analysis calls that early definition work front-end loading and makes it explicit that phases close through decision gates before authorization. In practice, sanction fails when the gate is treated as a date, not as a proof point. This paper treats sanction as a decision quality test: can the sponsoring team show that definition is complete enough to support authorization, and can it show that the remaining uncertainty has been identified and accepted consciously.

WP05-01, WP05-02

The cost of weak definition is visible in two different public lenses. IPA reports that more than 30 percent of projects proceed through a key gate with incomplete FEL 2 and that this leads to underestimated capital costs. Flyvbjerg and Gardner report that only 8.5 percent of projects come in on budget and on time, and only 0.5 percent come in on budget, on time, and with the promised benefits. These figures are not a verdict on any single project. They are a baseline that should shape how hard a gate pack must work. If success is statistically rare at scale, then sanction discipline must be designed to be auditable, repeatable, and resistant to persuasion.

WP05-05, WP05-09

DECISION INSTRUMENT

Exhibit 1.1: Sanction decision test (evidence first)

A gate is passed only when evidence demonstrates definition completeness and outcome predictability, consistent with the cited gate ladder and completeness claims.

TEST	EVIDENCE READING	DECISION RESPONSE
Decision statement	What is the specific authorization sought at this gate, and what becomes irrevocable after approval?	Do not vote until the authorization boundary is written and signed.
Predictability claim	Where is the evidence that definition completeness predicts safety, cost, schedule, operability outcomes?	Require an explicit mapping from completeness to the outcomes the gate controls.
Known incompleteness	Which scope-development elements are incomplete today, and do they match the failure mode described for incomplete FEL 2?	If incompleteness would drive underestimation, hold or rescope.
Success baseline	Do decision makers acknowledge how uncommon combined budget, time, and benefit success is in the cited megaproject data?	If not acknowledged, pause and restate the risk appetite in writing.

Sources: WP05-02, WP05-03, WP05-05, WP05-09

1.2 Gate erosion mechanisms

Gate erosion starts when phase language becomes decoration. IPA provides a simple discipline: FEL 1, FEL 2, and FEL 3 each close with a decision gate before authorization. That structure implies that each phase produces something that can be judged as complete or incomplete. Erosion happens when a team carries unresolved choices forward and calls them assumptions, or when it replaces closure with optimism about later engineering. The remedy is to treat the gate as an audit of closure, not a review of effort. If the decision cannot be defended to an independent reader using the gate evidence alone, the gate is not ready to pass.

WP05-02

A second erosion mechanism is arguing from activity instead of completeness. IPA states that completeness of FEL is the single best predictor of safety, cost, schedule, and operability outcomes. That is a direct challenge to common gate narratives that emphasize progress, burn rate, or percentage design complete without stating what is complete. This paper therefore uses completeness as the control variable. It asks leaders to define completeness criteria for scope, basis, estimating, and interfaces, then to show evidence of closure. When evidence is missing, the decision is not to debate; it is to either close the gap or change the authorization ask.

WP05-03

DECISION INSTRUMENT

Exhibit 1.2: Gate erosion diagnostic

Questions that distinguish a real gate from a calendar checkpoint, aligned to the cited FEL gate ladder and completeness claim.

TEST	EVIDENCE READING	DECISION RESPONSE
Phase intent	Does the pack state which FEL phase is being closed and what that phase is meant to complete?	If phase intent is unclear, reframe the pack to the gate ladder.
Closure list	Is there a finite list of elements that are closed at this gate, more than worked on?	If no closure list exists, do not authorize.
Completeness evidence	Does the pack show why definition completeness supports outcome predictability?	If evidence is implicit, require explicit cross-references.
Incomplete scope risk	Are there scope-development gaps that match the incomplete FEL 2 underestimation warning?	If yes, require mitigation or re-authorization scope.

Sources: WP05-02, WP05-03, WP05-05

1.3 A capability framing for FEED-to-FID

This paper uses FEED-to-FID as a familiar shorthand for moving from study work toward an authorization gate. The public sources cited here use different labels, but they are explicit about the core work: front-end loading is early planning and definition, structured into phases that close through decision gates. That allows a capability framing that does not depend on any specific delivery claim. The capability is the ability to run a definition ladder with controlled basis, mature estimates, and closed interfaces, then to present that work as evidence suitable for an authorization decision. The rest of the paper decomposes that capability into decision tests and exhibits that can be inserted into gate packs.

WP05-01, WP05-02

A useful mental model is that a sanction-ready project is one whose definition can be read cold and still make sense. IPA states that its research spans more than 25,000 capital projects. Flyvbjerg and Gardner report results across more than 16,000 large projects, as transcribed by a secondary capture. The scale and tenor of these sources does not remove the need for judgment, but it does justify discipline. If large samples still show frequent disappointment, then local confidence must be backed by local evidence. The evidence room concept in later chapters is simply that: an organized set of traceable artifacts that defend the gate decision under scrutiny.

WP05-04, WP05-08, WP05-09

DECISION INSTRUMENT

Exhibit 1.3: FEED-to-FID capability map to FEL ladder

A translation table that anchors this paper's FEED-to-FID framing to the cited FEL phases and gates, without adding new phase claims.

TEST	EVIDENCE READING	DECISION RESPONSE
Work label used in this paper	FEED-ready study discipline	Anchor the label to the early planning and definition concept.
Source anchor	FEL as early planning and definition	Use the FEL definition to scope what must be evidenced.
Phase progression	FEL 1 to FEL 2 to FEL 3 with gates before authorization	Define what closure means for each phase in your context.
Gate output	Authorization pack	Treat the pack as an evidence set that can be audited.

Sources: WP05-01, WP05-02

02

PROGRESSION CONTROL

The maturity ladder

A maturity ladder converts study activity into gateable closure, aligned to an explicit phase model.

FEL 1-2-3

BUSINESS PLANNING TO SCOPE DEVELOPMENT TO PROJECT DEFINITION | WP05-02

Predict

COMPLETENESS IS STATED TO BE THE BEST PREDICTOR OF OUTCOMES | WP05-03

Hold

DECISION LABEL FOR STOPPING WHEN COMPLETENESS EVIDENCE IS MISSING | WP05-03

2.1 Define maturity as completeness, not effort

Maturity is often described as time spent or documents produced. The cited sources argue for a different control variable. IPA defines front-end loading as early planning and definition, then asserts that completeness of FEL is the single best predictor of safety, cost, schedule, and operability outcomes. If completeness predicts outcomes, then maturity should be managed as completeness. The practical step is to define a small set of completeness criteria for each phase and to require direct evidence at the gate. If a criterion is not met, the gate decision becomes a choice about risk, not a debate about progress. That keeps the ladder honest.

WP05-01, WP05-03

IPA's ladder structure supports this approach: FEL 1, FEL 2, and FEL 3 close through decision gates before authorization. A ladder is valuable only when each rung has a test. The test must be independent of narrative persuasion and must survive re-reading months later. For study-to-sanction work, the maturity ladder can be expressed as three questions aligned to the phase rungs: What decision is being prepared, what is the scope being fixed, and what is the definition being frozen? The answers do not need to mimic any single industry template. They do need to be explicit enough that incompleteness can be named and managed.

WP05-02

DECISION INSTRUMENT

Exhibit 2.1: Maturity ladder test per phase

Phase tests derived from the cited FEL ladder and completeness-as-predictor statement.

TEST	EVIDENCE READING	DECISION RESPONSE
FEL 1 test	Is the decision statement clear, including what is being authorized and why?	If the decision statement shifts, keep work in FEL 1.
FEL 2 test	Is scope development complete enough to avoid the underestimation warning tied to incomplete FEL 2?	If gaps remain, restrict authorization or defer the gate.
FEL 3 test	Is project definition complete enough to support outcome predictability?	If definition is partial, treat estimates and schedules as exploratory, not sanctionable.
Completeness evidence	Is completeness evidenced, not asserted?	If evidence is missing, hold.

Sources: WP05-02, WP05-03, WP05-05

2.2 Use a gate to stop value leakage

Value leakage occurs when uncertainty is allowed to flow downstream and later gets paid for as redesign, claims, or schedule compression. The IPA warning is specific: more than 30 percent of projects proceed through a gate with incomplete FEL 2 and that leads to underestimated capital costs. That does not mean every incomplete scope is fatal. It does mean incompleteness has a predictable direction of error. A maturity ladder should therefore include a hard rule: if incompleteness is present in elements that drive quantities, productivity, or procurement strategy, the authorization ask must be reduced or deferred. This turns a gate from a social ceremony into a financial control.

WP05-05

The megaproject performance data provides the reason to be strict. Flyvbjerg and Gardner report that fewer than half of projects come in on budget or better, and that combined budget and time success is far less common. This is secondary captured material, and it should be treated as indicative rather than a guarantee of rates in any portfolio. Still, it encourages a gate posture that assumes bias and error until proven otherwise. The maturity ladder should therefore include a bias check: what parts of the estimate and schedule rely on best-case assumptions that are not secured by definition? Those parts should not be carried as quiet optimism.

WP05-09

DECISION INSTRUMENT

Exhibit 2.2: Leakage stop rules at the gate

Decision rules that respond directly to the cited incomplete-FEL-2 underestimation warning and to the cited megaproject baseline statistics.

TEST	EVIDENCE READING	DECISION RESPONSE
Underestimation trigger	Any known incomplete FEL 2 element that affects major quantities or procurement packages	Reduce scope, increase definition, or do not pass the gate.
Bias trigger	Schedule or cost relies on assumptions not evidenced by definition completeness	Reclassify as risk and treat it explicitly in the decision pack.
Residual uncertainty	Uncertainty that is accepted must be written as a conscious decision	Require sign-off that the uncertainty is being carried knowingly.
Evidence quality	Secondary statistics are used as baseline awareness, not as local prediction	Do not convert baselines into promises.

Sources: WP05-05, WP05-09

2.3 Align tools to the ladder

A ladder needs instruments that translate definition into a scoreable condition. CII describes PDRI as intended for use during front end planning, including feasibility, concept, and detailed scope definition. It also states that PDRI helps identify project risk factors related to cost, schedule, and operating performance, and evaluate completeness of scope definition. The specific scoring mechanics are not provided in the cited overview, so this paper uses PDRI as a concept model rather than a numerical system. The principle is what matters: list scope elements, assess definition, and let gaps drive decisions. A maturity ladder without an instrument becomes narrative again.

WP05-06, WP05-07

Tool alignment also means aligning what the gate asks to what the tool can answer. IPA provides a phase ladder with decision gates, and CII provides an example of a scope completeness instrument used during front end planning. Combined, they support a simple governance design: at each gate, the pack must include a definition completeness assessment that highlights risk factors tied to cost, schedule, and operating performance. Leaders then decide whether those gaps are acceptable at that authorization point. This is not a promise of outcome. It is a method of keeping the authorization decision consistent with the claim that completeness predicts outcomes.

WP05-02, WP05-03, WP05-07

DECISION INSTRUMENT

Exhibit 2.3: Gate pack minimum tool set (conceptual)

A minimal set of instruments anchored to the cited FEL gate model and the cited purpose of PDRI.

TEST	EVIDENCE READING	DECISION RESPONSE
Phase and gate statement	Declare the FEL phase being closed and the decision being requested	If unclear, the pack is not gateable.
Completeness assessment	Use a structured list to evaluate scope definition completeness (PDRI concept)	If not assessed, do not authorize.
Risk factor register	Identify risk factors tied to cost, schedule, operating performance	If risks are not linked to definition gaps, rework the pack.
Authorization conditions	State conditions that must be met post-gate if any incompleteness is accepted	If conditions cannot be monitored, defer the gate.

Sources: WP05-02, WP05-06, WP05-07

03

DEFINITION CONTROL

Scope definition

Scope definition is not a narrative. It is a bounded set of elements whose completeness can be evaluated and used to drive decisions.

PDRI

CII INSTRUMENT INTENDED FOR FRONT END PLANNING AND SCOPE DEFINITION WORK | WP05-06

Trace

DECISION LABEL FOR MAPPING SCOPE ELEMENTS TO EVIDENCE AND CHANGE CONTROL | WP05-07

Risk

PDRI DESCRIBED USE: IDENTIFY RISK FACTORS TIED TO OUTCOMES | WP05-07

3.1 Turn scope into a checklist of elements

Scope remains unstable when it lives only as prose. CII positions PDRI for front end planning, covering feasibility, concept, and detailed scope definition, and states that it evaluates the completeness of scope definition. That framing implies a practical discipline: express scope as discrete elements that can be assessed for definition, rather than as a broad description. Each element should have an owner, a definition status, and a reference to the artifact that proves it is defined. The goal is not bureaucracy. It is to replace interpretation with visibility. When elements are explicit, the gate can ask which elements are closed and which are not, then decide what level of incompleteness is acceptable.

WP05-06, WP05-07

Element-based scope definition also supports better conversations about risk. CII states that PDRI helps identify project risk factors related to desired outcomes for cost, schedule, and operating performance. That statement can be operationalized by requiring each incomplete scope element to declare the outcome dimension it threatens. For example, an incomplete operating scenario threatens operability, while incomplete quantities threaten cost and schedule. This does not require new statistics. It requires consistent naming. When the pack ties every major risk factor back to an incomplete scope element, leaders can see whether risk is being managed at the source or simply listed. That is the difference between a study and an investment case.

WP05-07

DECISION INSTRUMENT

Exhibit 3.1: Scope element record (template)

A scope element record supports completeness evaluation consistent with the cited PDRI purpose statements.

TEST	EVIDENCE READING	DECISION RESPONSE
Element statement	Write the element as a bounded item that can be defined or not defined	Reject elements that cannot be tested for completeness.
Definition status	Defined, partially defined, or undefined with clear criteria	If criteria are missing, the status is not meaningful.
Evidence link	Reference the artifact that proves current definition	If no artifact exists, treat as undefined.
Outcome linkage	State which outcomes the element affects: cost, schedule, operating performance	Use linkage to prioritize closure before authorization.

Sources: WP05-07

3.2 Use completeness to control underestimation risk

The most expensive scope problem is the one that hides inside the estimate. IPA reports that more than 30 percent of projects pass a gate with incomplete FEL 2 and that this leads to underestimated capital costs. That suggests a decision rule: if an incomplete scope element can change quantities, productivity, or procurement strategy, then the estimate is at risk of systematic understatement. The gate should not accept that risk by accident. It should either require closure of the element or explicitly narrow the authorization to exclude it. This is not a guarantee against overruns. It is a direct response to the specific failure mode described in the cited research statement.

WP05-05

Completeness discipline also makes later change control easier. When a team can point to a scope element and show its definition status at the time of the gate, it becomes possible to distinguish a true change from a late discovery of something that was never defined. That distinction matters because it influences how leadership responds: correction, change, or scope creep. IPA's phase ladder with gates provides the governance rhythm for this. Close scope development at the appropriate rung, then protect it. If leadership expects to authorize while key scope elements remain incomplete, it should also expect that underestimation and change pressure will follow, because the cited evidence warns that this pattern is common.

WP05-02, WP05-05

DECISION INSTRUMENT

Exhibit 3.2: Underestimation screen for incomplete scope

A gate screen anchored to the cited incomplete-FEL-2 underestimation warning.

TEST	EVIDENCE READING	DECISION RESPONSE
Quantity sensitivity	Could this incomplete element change major quantities or design basis assumptions?	If yes, treat as gate-stopping unless authorization is narrowed.
Productivity sensitivity	Could this incomplete element change methods, access, or sequencing?	If yes, require closure or add explicit conditions and risks.
Procurement sensitivity	Could this incomplete element change long-lead packages or contracting strategy?	If yes, do not proceed without a defined mitigation plan.
Authorization boundary	Is the authorization ask written to match what is actually defined?	If mismatch exists, rewrite the ask before voting.

Sources: WP05-05

3.3 Choose an instrument and keep it stable

The specific instrument can vary, but the discipline must not. CII offers PDRI as an established approach to evaluating completeness of scope definition during front end planning. IPA offers a phase ladder that closes with gates. Together, they point to a stable approach: use a consistent scope completeness instrument across phases so that changes in score reflect real closure, not changes in yardstick. Because the cited PDRI overview does not provide scoring mechanics, this paper focuses on the structural requirement: a fixed list of scope elements, consistent evaluation criteria, and a repeatable reporting format. Stability is what allows trend reading across FEL 1, FEL 2, and FEL 3 closure steps.

WP05-02, WP05-06, WP05-07

A stable instrument also supports independent review. IPA states that its research spans more than 25,000 capital projects. Even without importing any additional IPA benchmark numbers, that scale implies an important governance idea: an external or independent reader should be able to understand what was defined, what was not, and why the gate was passed. An instrument that is stable and explicit makes that possible. It also prevents the evidence room from becoming a filing cabinet. Instead, evidence is organized against a known structure. For sanction, the key is that the structure is agreed before the project tries to persuade anyone, not after gaps are discovered.

WP05-04, WP05-06

DECISION INSTRUMENT

Exhibit 3.3: Instrument stability rules

Rules for keeping a scope definition instrument decision-useful across the cited FEL phases and gates.

TEST	EVIDENCE READING	DECISION RESPONSE
Fixed element list	Maintain a fixed scope element list across phases unless governance approves changes	Do not allow element list drift to hide incompleteness.
Fixed criteria	Use consistent criteria for defined versus undefined	If criteria change, restate prior assessments under the new criteria.
Trend reporting	Report completeness trend by phase and gate	If trend worsens without explanation, stop and reconcile.
Independent readability	Ensure an independent reader can trace each element to evidence	If trace fails, the pack is not ready.

Sources: WP05-02, WP05-06, WP05-07

04

BASIS CONTROL

The basis of design

A controlled basis turns definition into a stable reference. Without basis control, completeness claims cannot be defended at a gate.

Define

FRONT-END LOADING IS PLANNING AND DEFINITION WORK | WP05-01

Predictor

COMPLETENESS IS STATED TO BE THE BEST PREDICTOR OF OUTCOMES | WP05-03

Gate

DECISION GATES CLOSE PHASES BEFORE AUTHORIZATION | WP05-02

4.1 Treat basis as a gate artifact

A basis of design is the written set of assumptions and choices that make a study internally consistent. Even when teams use different labels, the cited sources point to why basis control matters: front-end loading is definition work, and completeness of that work is stated to predict safety, cost, schedule, and operability outcomes. If definition is incomplete or unstable, then outcomes become hard to predict. The practical response is to treat the basis as a gate artifact, not as background. At each gate in the cited phase ladder, the pack should identify which basis items are frozen, which are provisional, and which remain open decisions. That makes residual uncertainty visible and governed.

WP05-01, WP05-02, WP05-03

Basis control is also a way to keep scope completeness assessments honest. CII states that a PDRI-style approach evaluates completeness of scope definition and helps identify risk factors tied to cost, schedule, and operating performance. Many of those risk factors originate in basis choices: operating scenarios, design standards, acceptance criteria, and boundary conditions. If basis items are not tracked, a scope element can appear defined while still resting on shifting assumptions. The cure is to require cross-reference: each major scope element points to the basis items it depends on. When a basis item changes, the affected scope elements are automatically reopened, and the gate posture is revisited.

WP05-07

DECISION INSTRUMENT

Exhibit 4.1: Basis control register (template)

A gate artifact that supports completeness and predictability claims without introducing new external requirements.

TEST	EVIDENCE READING	DECISION RESPONSE
Basis item	Write the assumption or design choice as a testable statement	Reject vague basis statements that cannot be verified.
Status at gate	Frozen, provisional, or open decision with due date	If critical items are open, restrict authorization.
Dependencies	List scope elements that depend on this basis item	If dependencies are unknown, treat impacts as uncontrolled risk.
Evidence link	Reference the source artifact that justifies the basis choice	If no justification exists, escalate for decision.

Sources: WP05-03, WP05-07

4.2 Use basis control to manage decision reversals

Decision reversals are costly because they re-open settled work. IPA's phase ladder implies that gates exist to close phases before authorization. A reversal after a gate means something was not truly closed or was closed on weak evidence. Basis control reduces that risk by recording the chosen direction and the reasons and constraints. The pack can then show why the chosen basis was acceptable at the time and what would need to change to revisit it. This keeps later debates anchored to evidence instead of memory. It also supports disciplined exception handling: if a basis item must change, leadership can see which parts of scope definition and estimate maturity are now affected and can decide whether to re-gate.

WP05-02

The incomplete-FEL-2 warning provides a specific reason to treat basis changes as estimate risk. IPA states that incomplete scope development leads to underestimated capital costs. A basis item that remains open is a form of incomplete scope development if it can shift quantities, productivity, or procurement. Therefore, basis control should include an estimate impact flag. When an open basis item is carried across a gate, the pack should state how the estimate treats it: excluded, assumed, or ranged. This does not require adding unregistered accuracy percentages. It requires clarity about what the estimate is actually estimating. Clarity is what makes sanction defensible.

WP05-05

DECISION INSTRUMENT

Exhibit 4.2: Basis change impact screen

A decision screen that links basis changes to the cited underestimation risk mechanism for incomplete definition.

TEST	EVIDENCE READING	DECISION RESPONSE
Change trigger	Which basis items have changed since the last gate?	If changes are not enumerated, stop and reconcile.
Scope impact	Which scope elements depend on the changed basis items?	Reopen affected elements in the completeness assessment.
Estimate treatment	How does the estimate treat each changed or open basis item?	If treatment is unclear, reissue estimate assumptions.
Gate implication	Does the change invalidate the closure claim for the current phase?	If yes, require re-gating or revise authorization ask.

Sources: WP05-02, WP05-05, WP05-07

4.3 Make basis readable to non-authors

A gate pack will be read by people who did not write the study. The cited megaproject results show that combined success on budget, time, and benefits is rare in the large dataset reported by Flyvbjerg and Gardner, as captured through a secondary transcription. That is a reason to make the basis readable and explicit, because skeptical readers will look for hidden optimism. Readability means that each basis item is stated plainly, that the status at gate is clear, and that evidence is accessible. The goal is not to persuade with volume. It is to allow a reader to test whether the definition is complete enough to support the authorization decision and whether remaining uncertainty has been surfaced honestly.

WP05-09

Readability also supports consistency across phases. IPA describes FEL as early planning and definition and provides a ladder with gates. A readable basis makes it possible to compare what changed from FEL 1 to FEL 2 to FEL 3. That comparison is important because it reveals whether the project is converging or oscillating. Convergence is what the gate model expects. Oscillation is a signal that external constraints, internal requirements, or scope boundaries are not settled. When oscillation is present, the correct response is often to slow down and close decisions, not to accelerate into procurement. In a sanction context, readability is part of control because it enables independent challenge.

WP05-01, WP05-02

DECISION INSTRUMENT

Exhibit 4.3: Basis readability test (gate checklist)

A non-technical reader test aligned to the cited gate discipline and the need for evidence-backed predictability.

TEST	EVIDENCE READING	DECISION RESPONSE
Plain statements	Can a reader restate each basis item without interpretation?	Rewrite items that require insider context.
Status clarity	Is the frozen versus provisional boundary clear at this gate?	If unclear, the gate decision cannot be bounded.
Evidence access	Can the reader reach the justification artifact in one step?	If not, fix evidence indexing before approval.
Change trace	Can the reader see what changed since the prior gate?	If not, provide a basis change log.

Sources: WP05-02, WP05-03, WP05-09

05

PREDICTION DISCIPLINE

Cost and schedule confidence

Confidence improves when estimates and schedules are tied to definition completeness and are presented as decision instruments, not promises.

47.9%

PROJECTS ON BUDGET OR BETTER IN CITED MEGAPROJECT DATASET (SECONDARY) | WP05-09

+1% to +238%

MEAN COST OVERRUN RANGE ACROSS CATEGORIES IN CITED DATASET (SECONDARY) | WP05-10

Predict

COMPLETENESS OF FEL STATED AS BEST PREDICTOR OF OUTCOMES | WP05-03

5.1 Start from the base rate, then justify departure

A sanction pack often presents a single number and a single date. The public megaproject data argues for humility. Flyvbjerg and Gardner report, from a large database of more than 16,000 large projects as captured secondarily, that fewer than half come in on budget or better, and that success on both budget and time is far less common. They also report wide variation in mean cost overrun by category, from plus 1 percent to plus 238 percent. These figures do not predict any one mining or infrastructure project. They set a base-rate posture: error is normal. A credible pack therefore explains why this specific project should be expected to perform better than the base rate, and what evidence supports that claim.

WP05-08, WP05-09, WP05-10

The strongest justification offered by the cited sources is definition completeness. IPA states that completeness of front-end loading is the single best predictor of safety, cost, schedule, and operability outcomes. That is a clear instruction for how to build confidence: tie estimate and schedule confidence to evidence of scope and basis completeness, not to the eloquence of the narrative. Where completeness is high, the pack can argue for tighter uncertainty. Where completeness is low, the pack should present ranges and conditions, and should avoid converting wish into contingency. This approach does not require unregistered accuracy-class numbers. It requires a disciplined link between what is defined and what is being predicted.

WP05-03

DECISION INSTRUMENT

Exhibit 5.1: Confidence argument structure (base rate to evidence)

A decision structure anchored to the cited megaproject baseline statistics and the cited completeness-as-predictor claim.

TEST	EVIDENCE READING	DECISION RESPONSE
Base-rate acknowledgement	State the relevant baseline from cited megaproject outcomes to frame expected error	If the pack ignores base rates, require a rewrite.
Project-specific departure	List reasons this project is expected to outperform the baseline	Reject reasons that are not supported by definition evidence.
Completeness linkage	Show how scope and basis completeness supports the confidence level claimed	If linkage is missing, widen ranges or hold the gate.
Conditions	State conditions that must remain true for the confidence claim to hold	If conditions are not monitorable, treat as risk.

Sources: WP05-03, WP05-09, WP05-10

5.2 Treat incomplete definition as a directional error risk

Many estimate failures are not random. IPA provides a directional warning: more than 30 percent of projects proceed through a gate with incomplete FEL 2, leading to underestimated capital costs. That statement supports a practical rule for cost confidence: when key scope development is incomplete, the central estimate should be assumed biased low unless corrected by explicit treatment of unknowns. The gate discussion should focus on what remains incomplete and how the estimate accounts for it. If the pack cannot show this, then the estimate is not yet a decision instrument. The right action is to close definition or reduce the authorization to match what is defined. Passing the gate while hoping the estimate will improve later matches the cited failure mode.

WP05-05

Schedule confidence follows the same logic, even without new schedule statistics. If completeness predicts schedule outcomes, as IPA states for overall outcomes, then an incomplete definition implies schedule risk. The gate pack should therefore treat schedule as conditional when scope development is incomplete. That does not mean adding speculative float claims. It means writing schedule assumptions as basis items, tying them to scope elements, and identifying which incomplete elements threaten critical path. Leaders can then decide whether to authorize early works, hold the full sanction, or change the plan. This approach is consistent with the cited gate ladder: close phases before authorization, and do not treat a calendar as evidence.

WP05-02, WP05-03, WP05-05

DECISION INSTRUMENT

Exhibit 5.2: Directional risk test for cost and schedule

A gate test derived from the cited incomplete-FEL-2 underestimation warning and completeness-as-predictor claim.

TEST	EVIDENCE READING	DECISION RESPONSE
Incomplete driver list	List incomplete scope development items that affect cost or schedule drivers	If not listed, the confidence claim is not credible.
Estimate treatment check	For each item, state whether it is excluded, assumed, or ranged	If treatment is not explicit, hold or narrow authorization.
Schedule conditionality	State which schedule dates depend on closure of which definition items	If dependencies are hidden, rework the schedule narrative.
Gate boundary	Ensure the authorization ask matches what is actually defined and treated	If mismatch exists, revise before approval.

Sources: WP05-03, WP05-05

5.3 Use definition instruments to back confidence claims

Confidence claims need a traceable foundation. CII states that PDRI is intended for use during front end planning and that it evaluates completeness of scope definition, while helping identify risk factors related to cost, schedule, and operating performance. IPA states that completeness of FEL predicts outcomes. Together, these statements support a defensible practice: link estimate and schedule confidence statements to a structured completeness assessment and to the identified risk factors. The pack can then show, for example, which scope areas are well defined and which remain open, and how that distribution informs the uncertainty range presented to decision makers. The result is not a guarantee. It is a clear argument that can be challenged and improved.

WP05-03, WP05-06, WP05-07

The alternative is persuasion without control, which the megaproject statistics caution against. If only 8.5 percent of projects come in on budget and on time in the cited dataset, then a single-point schedule and cost promise should trigger demand for evidence. The completeness instrument becomes that evidence. It also helps keep the team aligned, because it forces agreement on what “defined” means. When definitions are contested, confidence is artificial. When definitions are explicit, uncertainty can be priced and scheduled deliberately. That is the practical meaning of moving from study to sanction: not fewer unknowns, but fewer unknown unknowns, and clearer ownership of what remains.

WP05-07, WP05-09

DECISION INSTRUMENT

Exhibit 5.3: Confidence statement template (evidence-backed)

A template that forces cost and schedule confidence statements to cite completeness evidence and risk factors.

TEST	EVIDENCE READING	DECISION RESPONSE
Confidence statement	Write the confidence claim as a conditional statement, not a promise	Reject unconditional claims unsupported by evidence.
Completeness reference	Cite the completeness assessment sections that support the claim	If no reference exists, widen uncertainty or hold.
Risk factor linkage	List top risk factors tied to cost, schedule, operating performance	If risks are generic, rewrite to tie to definition gaps.
Decision implication	State what authorization is safe given the confidence level	Align authorization scope to confidence evidence.

Sources: WP05-03, WP05-07, WP05-09

06

BOUNDARY CONTROL

Interfaces and change

Interfaces are where definition meets reality. If interfaces are not closed, change will substitute for design and the gate will be bypassed in practice.

Complete

COMPLETENESS OF FEL STATED AS THE BEST PREDICTOR OF OUTCOMES | WP05-03

Gate

DECISION GATES CLOSE PHASES BEFORE AUTHORIZATION | WP05-02

Scope

PDRI EVALUATES COMPLETENESS OF SCOPE DEFINITION | WP05-07

6.1 Define interfaces as scope elements

Interfaces are often treated as coordination tasks rather than definition items. A decision-led approach treats each interface as a scope element that can be defined and evidenced. CII states that PDRI evaluates completeness of scope definition and helps identify risk factors related to outcomes for cost, schedule, and operating performance. An interface is a risk factor when it is undefined, because it creates conditions for late rework and misaligned assumptions. The practical step is to list key interfaces explicitly, assign an owner for each boundary, and define what "complete" means at the current gate. This is consistent with the idea that definition completeness predicts outcomes. If interfaces are left to "work out later," completeness is overstated and the gate decision is weakened.

WP05-03, WP05-07

Treating interfaces as scope elements also makes them gateable. IPA's ladder closes phases through decision gates. An interface can be closed at a gate if its boundary conditions, responsibilities, and acceptance criteria are written and agreed. Closure does not require that all downstream detail is finished. It requires that the boundary will not change without change control. This supports a practical governance rule: no gate pass if a critical interface remains undefined and can change quantities, sequence, or operability. The gate should either force closure or explicitly carve the uncertain interface out of the authorization ask. That is a decision discipline, not an administrative preference.

WP05-02, WP05-03

DECISION INSTRUMENT

Exhibit 6.1: Interface definition card (template)

A template that makes interfaces scoreable for completeness, aligned to PDRI-style completeness intent and gate discipline.

TEST	EVIDENCE READING	DECISION RESPONSE
Boundary statement	Define what is in scope and out of scope at the interface	Reject boundaries that rely on informal understanding.
Responsibilities	State who provides, who receives, and who verifies	If accountability is split, assign a single interface owner.
Acceptance criteria	Write measurable acceptance or handover criteria where possible	If criteria are missing, the interface is not closed.
Gate status	Closed, provisional, or open with decision date	Open critical interfaces block full authorization.

Sources: WP05-02, WP05-07

6.2 Change control starts at the gate, not after it

Change control is often introduced after sanction, when the cost of change is already high. A gate-led model sets expectations earlier. IPA describes gates closing phases before authorization. That implies that what is being authorized is bounded. If the boundary is not stated, change control has nothing to control. The gate pack should therefore include a change baseline: the set of scope elements and basis items that are being frozen at this decision point. This baseline turns later change into a visible event rather than a quiet drift. The practice is consistent with the cited warning that incomplete scope development leads to underestimated capital costs, because it forces a choice: close definition or acknowledge that the estimate boundary is provisional.

WP05-02, WP05-05

Change control also relies on history. If a later debate cannot reconstruct what was known at the time of sanction, then the organization cannot learn. The cited megaproject statistics indicate that disappointment is common at scale, which makes learning essential. A disciplined baseline allows post-gate reviews to ask a precise question: did outcomes diverge because the project changed, or because the original definition was not complete? IPA's claim that completeness predicts outcomes suggests that this distinction matters. It is not enough to say "things changed." The evidence room should preserve the state of definition at each gate so that change can be classified and managed, not retroactively rationalized.

WP05-03, WP05-09

DECISION INSTRUMENT

Exhibit 6.2: Change baseline declaration (gate artifact)

A gate artifact that creates the reference needed for later change control and learning.

TEST	EVIDENCE READING	DECISION RESPONSE
Frozen list	List scope elements and basis items frozen at this gate	If the frozen list is missing, do not call the decision a sanction gate.
Provisional list	List items carried as provisional, with explicit conditions	If provisional items are critical, narrow authorization.
Open decisions	List open decisions with owners and dates	If owners or dates are missing, do not pass the gate.
Evidence snapshot	Archive the completeness assessment and key assumptions as of the gate date	If snapshot is not controlled, later change control will fail.

Sources: WP05-02, WP05-05, WP05-07

6.3 Interface closure reduces underestimation pressure

Undefined interfaces are a route to hidden scope. IPA warns that incomplete FEL 2 leads to underestimated capital costs. Interfaces that are not closed are a form of incomplete scope development because they can shift quantities, methods, and responsibilities without being visible in the estimate. The practical test is simple: for each critical interface, can the team point to an agreement artifact that fixes the boundary and defines acceptance? If not, the estimate is exposed to later scope discovery. The gate choice is then explicit. Either close the interface before passing, or adjust the authorization ask and the estimate framing to match the uncertainty being carried. This keeps the organization honest about what it is funding.

WP05-05

Interface closure also supports operability, which IPA includes in its outcomes claim for completeness. Operability failures often arise where ownership and acceptance are unclear. CII notes that scope completeness assessment helps identify risk factors related to operating performance. That provides a rationale for treating interface closure as an operating performance control, more than a construction convenience. The evidence room should therefore include interface registers, signed boundary definitions where feasible, and a clear mapping from each interface to the scope completeness assessment. When a gate pack can show that interfaces are defined and stable, decision makers have a better basis to accept residual risk elsewhere. When interfaces are left vague, residual risk expands without being priced or scheduled.

WP05-03, WP05-07

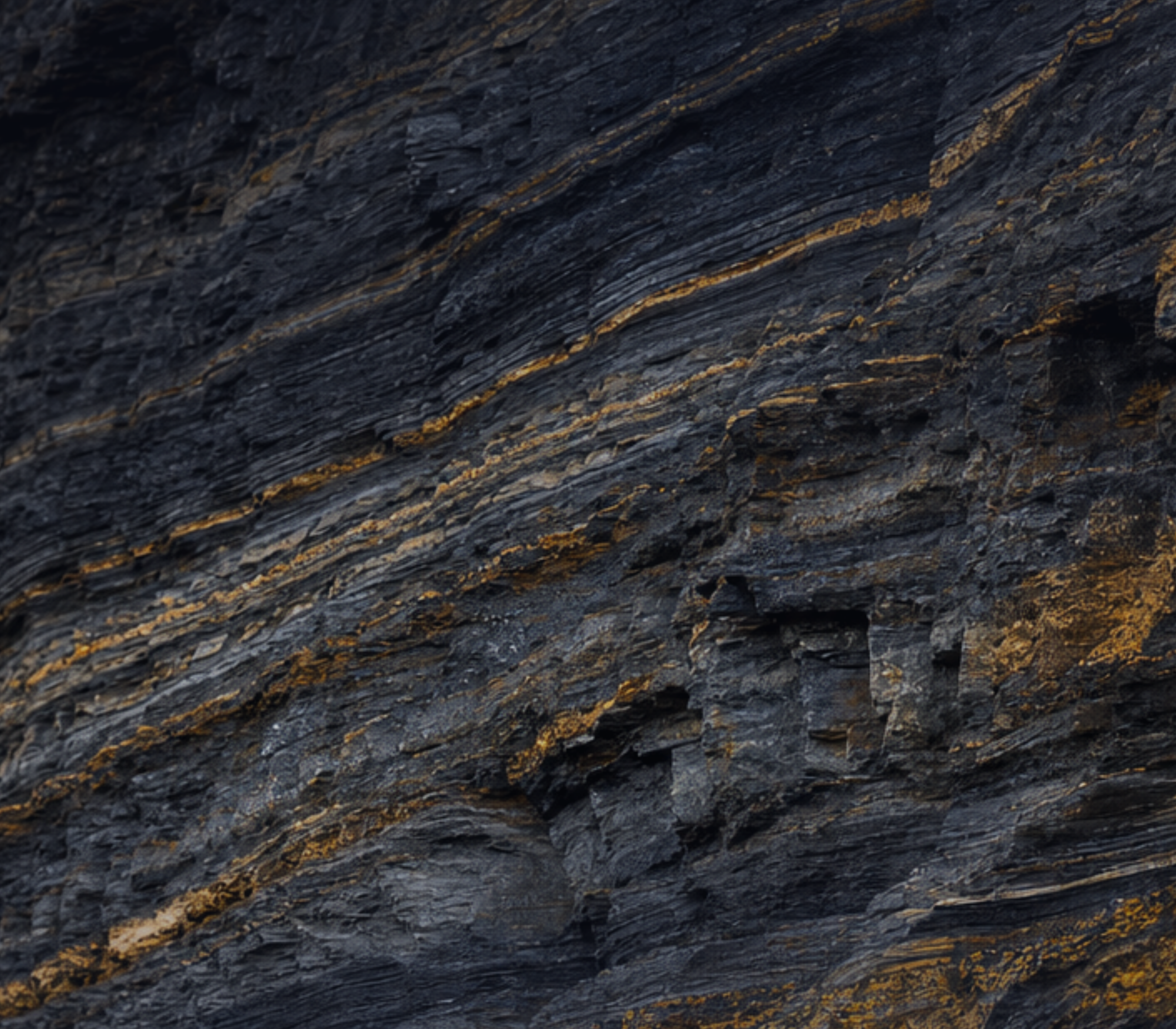
DECISION INSTRUMENT

Exhibit 6.3: Interface closure gate test

A gate test that treats interfaces as completeness items due to their cost and operability risk implications in the cited sources.

TEST	EVIDENCE READING	DECISION RESPONSE
Interface inventory	Is there a complete list of critical interfaces for this phase?	If the inventory is incomplete, the completeness assessment is incomplete.
Closure evidence	Does each critical interface have an evidence artifact and acceptance criteria?	If not, hold the gate or narrow authorization.
Estimate linkage	Does the estimate explicitly assume the closed interface boundaries?	If assumptions differ, reconcile before approval.
Operating performance linkage	Are interface risks tied to operating performance risk factors?	If not, expand the risk factor mapping.

Sources: WP05-03, WP05-05, WP05-07



07

AUDITABILITY

The FID evidence room

An evidence room is an indexed set of artifacts that allows an authorization decision to be defended without relying on personalities or memory.

Evidence
FRONT-END LOADING IS DEFINITION WORK THAT MUST BE EVIDENCED FOR GATE DECISIONS | WP05-01

25,000+
IPA RESEARCH SPAN SUGGESTS THE VALUE OF REPEATABLE EVIDENCE DISCIPLINE | WP05-04

Gate
DECISION GATES CLOSE PHASES BEFORE AUTHORIZATION | WP05-02

7.1 Evidence room purpose and boundaries

An evidence room is not a data dump. It is the minimum set of artifacts required to defend a gate decision. IPA defines front-end loading as early planning and definition, and describes phases closed by decision gates before authorization. Those statements imply that a gate should be defendable using definition evidence that corresponds to the phase being closed. The evidence room therefore has a clear boundary: it contains only what is needed to demonstrate completeness and to justify the authorization ask. It should be indexed so an independent reader can trace from a gate claim to the supporting artifact quickly. This is especially important when decisions will be revisited under pressure, because memory and narrative shift. Evidence creates stability.

WP05-01, WP05-02

The evidence room also supports governance at scale. IPA notes that its research spans more than 25,000 capital projects. Without importing any additional benchmark results, that scale still supports a practical inference for governance design: repeatable disciplines are possible, and they can be applied consistently across portfolios. An evidence room structure is one such discipline. It allows leadership to compare gate packs across projects and to identify recurring weaknesses, such as incomplete scope development at the same gate. It also supports learning, which is important given the cited megaproject performance baseline. If success is not common, then the organization needs a way to diagnose why, using records rather than stories.

WP05-04, WP05-09

DECISION INSTRUMENT

Exhibit 7.1: Evidence room index (minimum set)

A minimum evidence index aligned to the cited gate ladder and completeness logic, without adding unregistered deliverable requirements.

TEST	EVIDENCE READING	DECISION RESPONSE
Gate statement	Decision being requested, authorization boundary, and phase being closed	If missing, the evidence set cannot be bounded.
Completeness assessment	Structured scope completeness assessment and gap list	If not present, do not pass the gate.
Basis control set	Assumptions and choices with status at gate	If not controlled, the estimate and schedule are not defensible.
Risk factor mapping	Risk factors tied to cost, schedule, operating performance	If risks are not linked to definition gaps, rework before approval.

Sources: WP05-02, WP05-07

7.2 Traceability: claim to artifact to decision

Traceability is the core property of a sanction pack. CII states that PDRI helps evaluate completeness of scope definition and identify risk factors related to cost, schedule, and operating performance. Those two outputs can be made traceable by a simple rule: every completeness gap and every top risk factor must point to a specific artifact in the evidence room, and every artifact must map back to at least one scope element or basis item. This prevents orphan documents and prevents ungrounded claims. It also makes review efficient, because reviewers can test the pack by sampling traces rather than reading everything. In a gate model, traceability reduces the chance that incomplete definition is hidden under volume or polish.

WP05-07

Traceability also makes disagreement productive. IPA's claim that completeness predicts outcomes is not a call for blind compliance. It is a call for disciplined debate about what is complete. When two reviewers disagree, traceability lets them locate the exact assumption, scope element, or boundary condition that is driving the difference. That shortens dispute cycles and improves the pack. It also supports later accountability. If a project underperforms, leaders can return to the evidence room and ask whether the decision was sound given the evidence at the time, or whether evidence was missing. That distinction is essential for learning and for improving the next gate pack.

WP05-03

DECISION INSTRUMENT

Exhibit 7.2: Traceability matrix (template)

A template that forces traceability between completeness, risks, and artifacts, consistent with the cited PDRI and completeness claims.

TEST	EVIDENCE READING	DECISION RESPONSE
Row key	Scope element or basis item identifier	If identifiers are inconsistent, stop and standardize.
Completeness status	Defined, partial, undefined with criteria	If criteria are absent, status is not acceptable.
Risk factor link	Tie the item to cost, schedule, operating performance risk factors	If no link exists, justify why the item is not a risk driver.
Artifact link	Evidence room artifact ID and location	If artifact is missing, treat as incomplete.

Sources: WP05-03, WP05-07

7.3 Secondary evidence and how to use it safely

Some evidence is broad and statistical rather than project-specific. The Flyvbjerg and Gardner megaproject figures cited in this paper are captured through a secondary transcription source. They should therefore be used as context, not as a deterministic predictor for any specific project. Used correctly, they serve two purposes. First, they set a base-rate awareness: schedule and cost disappointment is common at scale. Second, they justify a demand for local evidence: if base rates are unfavorable, then local claims of confidence must be anchored to definition completeness and traceability. The evidence room should separate base-rate context from project-specific artifacts so that decision makers do not confuse external baselines with internal proof.

WP05-08, WP05-09

The same rule applies to any broad research statement. IPA's research scale and completeness claims are useful because they point to what tends to matter across many projects, but they do not remove the need to show work on the specific project. Therefore, when the evidence room uses external sources, it should place them in a methods section and tie them to explicit decision rules. For example, the incomplete-FEL-2 warning can justify a rule that incomplete scope elements affecting quantities must block full authorization. The rule is the project's own governance choice. The external evidence is the rationale for why such strictness is warranted. This keeps the pack rigorous without overstating what the sources say.

WP05-04, WP05-05

DECISION INSTRUMENT

Exhibit 7.3: External evidence use protocol

A protocol for using broad research and secondary transcriptions without converting them into project promises.

TEST	EVIDENCE READING	DECISION RESPONSE
Classify evidence	Project-specific artifact versus external baseline research versus secondary transcription	If classification is unclear, do not cite it as proof.
Use purpose	Context, rationale for a decision rule, or direct project evidence	Do not use context evidence as direct project validation.
Decision rule link	Link external evidence to a specific internal gate rule	If no rule exists, move the citation to background only.
Overclaim check	Ensure the pack does not imply outcomes are guaranteed by cited statistics	Remove any language that converts baselines into forecasts.

Sources: WP05-05, WP05-08, WP05-09

08

METHOD

A decision-gate method

A decision-gate method formalizes what must be true at each rung of the maturity ladder and requires evidence that those conditions are met.

FEL ladder

PHASE LADDER WITH GATES: FEL 1 TO FEL 2 TO FEL 3 | WP05-02

Complete

COMPLETENESS STATED AS BEST PREDICTOR OF OUTCOMES | WP05-03

PDRI

INSTRUMENT CONCEPT FOR EVALUATING SCOPE COMPLETENESS AND RISK FACTORS | WP05-06

8.1 Define gates as falsifiable conditions

A gate that cannot fail is not a gate. IPA's phase ladder model explicitly closes phases through decision gates before authorization. To make that real, each gate must have falsifiable conditions: statements that can be proven true or false using the evidence room. IPA also states that completeness of FEL predicts outcomes. That provides a criterion for gate conditions: they should test completeness, not effort. For example, instead of "study completed," a falsifiable condition is "scope elements that drive quantities are defined and evidenced." Where falsifiable conditions are not met, the decision choices should be explicit: hold, reduce authorization, or accept defined residual risk with conditions. This method keeps the project honest and protects decision makers from narrative drift.

WP05-02, WP05-03

Falsifiable conditions also improve team focus. CII states that a PDRI-style instrument evaluates completeness of scope definition and identifies risk factors tied to cost, schedule, and operating performance. Those two outputs can be turned into gate conditions directly: target completeness closure in high-risk areas first, and require that top risk factors have defined owners and mitigation plans that are consistent with the current level of definition. The method does not require a specific score threshold, which is not present in the cited overview. It requires a consistent set of conditions and a consistent evidence standard. When teams know exactly what evidence will be demanded at a gate, they can plan work to close it, rather than to decorate it.

WP05-07

DECISION INSTRUMENT

Exhibit 8.1: Gate condition writing guide

A guide for writing gate conditions that can be tested using completeness instruments and evidence room artifacts.

TEST	EVIDENCE READING	DECISION RESPONSE
Condition form	Write as: "At this gate, X is complete as evidenced by Y"	Reject conditions that do not name evidence.
Completeness focus	Prioritize conditions that test definition completeness	If conditions test effort only, rewrite.
Risk linkage	Tie conditions to cost, schedule, operating performance risk factors	If linkage is missing, the condition set is incomplete.
Fail path	State the action if the condition is not met	If no fail path exists, the gate cannot function.

Sources: WP05-02, WP05-03, WP05-07

8.2 Run the ladder: prepare, test, decide, baseline

A gate method is a cycle: prepare evidence, test against conditions, decide, and baseline what was decided. IPA provides the ladder and the gate concept. CII provides the idea of an instrument that evaluates completeness of scope definition and identifies risk factors. Together, they support a practical rhythm. Preparation produces the scope element list, the completeness assessment, and the risk factor mapping. Testing checks whether the gate conditions are met, with explicit attention to the incomplete-FEL-2 warning about underestimation. Decision then selects one of three actions: pass, hold, or pass with restricted authorization and conditions. Baseline captures the completeness state and the basis at the time of the decision. This last step is often skipped, but it is what allows later change control and learning. Without baselining, the organization cannot distinguish change from rework.

WP05-02, WP05-05, WP05-07

The method also benefits from a discipline of naming what is not known. Flyvbjerg and Gardner report that combined success on budget, time, and benefits is rare in the large dataset cited through a secondary transcription. That is a reason to avoid treating unknowns as minor. In this gate method, unknowns must be listed as open decisions or as defined risks tied to incomplete scope elements. If the unknown affects authorization scope materially, the pack should either narrow the authorization or hold. This is not pessimism. It is governance aligned to a reality where error is common. The method aims to improve decision quality by making uncertainty visible and bounded, rather than by promising certainty.

WP05-09

DECISION INSTRUMENT

Exhibit 8.2: Gate cycle worksheet (one page)

A one-page worksheet that forces the prepare-test-decide-baseline cycle and makes underestimation risk visible.

TEST	EVIDENCE READING	DECISION RESPONSE
Prepare	Completeness assessment and top risk factors assembled	If missing, do not schedule the gate.
Test	Gate conditions evaluated with evidence links	If evidence links fail, hold.
Decide	Pass, hold, or pass with restrictions and conditions	Do not allow “pass with hope” as an option.
Baseline	Snapshot of scope, basis, and completeness state at gate date	If not baselined, the decision is not auditable.

Sources: WP05-02, WP05-05, WP05-07

8.3 Decision rights and independence

A decision-gate method needs clear decision rights. IPA's model emphasizes gates before authorization, which implies that someone has the authority to say no. The method should therefore define who owns the gate conditions, who prepares the evidence, who tests it, and who decides. Independence matters because the people who produce a study are not best placed to judge their own completeness. This is not a critique of competence. It is a control design aligned to the claim that completeness predicts outcomes. Independent testing increases the chance that incompleteness is identified before it becomes expenditure. The evidence room supports independence by making review possible without dependence on meetings. If a reviewer needs verbal explanation to accept the pack, the pack is not ready.

WP05-02, WP05-03

Independence also supports consistency across a portfolio. IPA cites research across more than 25,000 capital projects. CII frames PDRI as a repeatable instrument for front end planning. These source statements support a practical governance posture: define a common gate method and apply it consistently so that decisions are comparable. Consistency does not mean uniform projects. It means uniform tests for completeness and traceability. When the same gate method is used across projects, leadership can identify systematic weaknesses, such as repeated incomplete scope development at the same rung, which IPA warns is common and leads to underestimation. The method then becomes an organizational learning system, more than a project procedure.

WP05-04, WP05-05, WP05-06

DECISION INSTRUMENT

Exhibit 8.3: Decision rights matrix (gate governance)

A simple governance matrix aligned to the cited gate model and the need for independent completeness testing.

TEST	EVIDENCE READING	DECISION RESPONSE
Prepare role	Accountable for completeness assessment and evidence room indexing	Assign a single accountable role per gate pack.
Test role	Independent reviewer tests evidence links and completeness claims	If no independent test exists, the gate is advisory only.
Decide role	Authority to pass, hold, or restrict authorization	Clarify authority before the gate meeting.
Baseline custodian	Controls the snapshot of artifacts at the gate date	If custody is unclear, change control will fail.

Sources: WP05-02, WP05-03, WP05-06

Decision checklist

Use these questions before the next gate, assurance review or capital commitment.

01 Write the authorization ask as a bounded decision with explicit irrevocable commitments. [Gate discipline]

02 Align the pack to a phase ladder with an explicit gate and a clear pass or hold outcome. [FEL gate model]

03 Assess scope definition completeness using a structured element list, not narrative alone. [PDRI intent]

04 Tie each incomplete scope element to its cost, schedule, or operating performance risk impact. [Risk factor mapping]

05 Apply a gate stop rule when incomplete scope development could bias capital cost low. [Incomplete FEL 2 warning]

06 Control the basis items that underwrite the definition, and record frozen versus provisional assumptions at the gate. [Completeness and predictability]

07 Treat interfaces as scope elements, define boundaries, and record closure evidence. [Completeness discipline]

08 Build an evidence room index that allows an independent reader to trace claims to artifacts quickly. [Gate auditability]

09 Use megaproject statistics as context only; do not convert baselines into project promises. [Secondary baseline]

10 Baseline the gate snapshot so later change is distinguishable from late discovery. [Gate method]

11 When evidence is missing, choose hold or restrict the authorization rather than debating confidence. [Decision-led method]

12 Record the residual uncertainty that leadership accepts, with conditions that can be monitored post-gate. [Gate governance]

Evidence ledger 1 of 2

Only dossier rows used in this edition are listed. Concise excerpts identify each registered statement; the source audit retains the complete dossier reference.

ROW	REGISTERED EVIDENCE EXCERPT	REGISTERED SOURCE
WP05-01	Front-end loading (FEL) is the early planning work, or definition, of a capital project.	Independent Project Analysis, "What Is Front-End Loading (FEL) in Project Management?",...
WP05-02	FEL phase ladder: FEL 1 (Business Planning) → FEL 2 (Scope Development) → FEL 3 (Project Definition), each closed by a decision gate before authorization	Independent Project Analysis, 2026 (archived capture)
WP05-03	The completeness of FEL is the single best predictor of safety, cost, schedule, and operability outcomes.	Independent Project Analysis, 2026 (archived capture)
WP05-04	IPA's research spans more than 25,000 capital projects	Independent Project Analysis, 2026 (archived capture)
WP05-05	More than 30 percent of all projects proceed through this gate with incomplete FEL 2, which leads to underestimated capital costs.	Independent Project Analysis, 2026 (archived capture)
WP05-06	The Project Definition Rating Index (PDRI) is intended for use during front end planning (FEP), the project phase that encompasses activities such as feasibility, concept, and...	Construction Industry Institute, "PDRI Overview", 2026 (archived capture)

Evidence ledger 2 of 2

Only dossier rows used in this edition are listed. Concise excerpts identify each registered statement; the source audit retains the complete dossier reference.

ROW	REGISTERED EVIDENCE EXCERPT	REGISTERED SOURCE
WP05-07	PDRI helps teams identify the project risk factors related to desired outcomes for cost, schedule, and operating performance and evaluate the completeness of scope definition.	Construction Industry Institute, 2026 (archived capture)
WP05-08	Megaproject performance database assembled over decades holds more than 16,000 large projects	budgetoverrun.com, transcribing Flyvbjerg & Gardner, How Big Things Get Done (2023), 2026...
WP05-09	47.9% of projects come in on budget (or better); 8.5% come in on budget and on time; Only 0.5% of the projects in it come in on budget, on time, and with the promised benefits	Flyvbjerg & Gardner (2023), via budgetoverrun.com capture, 2026
WP05-10	Mean cost overrun by category ranges from solar power (+1%) to nuclear waste storage (+238%) across the database's ten categories	Flyvbjerg & Gardner (2023), via budgetoverrun.com capture, 2026
WP05-11	Methodology basis: Flyvbjerg, What You Should Know About Megaprojects and Why: An Overview, Project Management Journal, 2014	named in budgetoverrun.com capture, 2026 (primary paper to be archived : see B)

Glossary

Front-end loading (FEL)
Early planning work, or definition, of a capital project, described with phases that close through decision gates before authorization. (WP05-01, WP05-02)

FEL 1, FEL 2, FEL 3
A phase ladder described as Business Planning, Scope Development, and Project Definition, each closed by a decision gate before authorization. (WP05-02)

Front end planning (FEP)
Project phase encompassing activities such as feasibility, concept, and detailed scope definition, as described in the PDRI overview. (WP05-06)

Project Definition Rating Index (PDRI)
An instrument intended for use during front end planning to evaluate completeness of scope definition and identify project risk factors related to cost, schedule, and operating performance. (WP05-06, WP05-07)

Completeness (of definition)
The degree to which front-end definition work is complete, stated as the single best predictor of safety, cost, schedule, and operability outcomes. (WP05-03)

Evidence room
In this paper, an indexed set of artifacts used to support gate decisions with traceability from claims to evidence, aligned to the cited gate model. (WP05-02)

FID
An investment authorization gate referenced in the paper identity. This paper treats it as a decision gate supported by evidence room discipline, without adding a sourced definition beyond the cited gate concept. (WP05-02)

FEED
A common label used in the paper identity to denote late front-end definition work in the path to an authorization gate. This paper anchors the method to the cited FEL definition and ladder without claiming a sourced FEED definition. (WP05-01, WP05-02)

Megaproject performance baseline
Outcome statistics reported by Flyvbjerg and Gardner (2023) as captured via a secondary transcription, used here as context for decision discipline. (WP05-08, WP05-09, WP05-10)

Secondary transcription vehicle
A captured web transcription used to cite Flyvbjerg and Gardner (2023). It is treated as secondary and used cautiously. (WP05-08)

Decision gate
A formal authorization checkpoint that closes a phase in the cited FEL ladder. (WP05-02)

Scope development incompleteness risk
A cited condition where projects proceed through a gate with incomplete FEL 2, leading to underestimated capital costs. (WP05-05)

Risk factors (cost, schedule, operating performance)
Factors identified through a PDRI-style approach that relate to desired outcomes for cost, schedule, and operating performance. (WP05-07)

Operability outcome
One of the outcomes stated to be predicted by completeness of front-end loading. (WP05-03)

Authorization boundary
The explicit description of what is being authorized at a gate, implied by the cited gate model and used throughout this paper as a control device. (WP05-02)

Outcome predictability
The ability to forecast safety, cost, schedule, and operability outcomes, stated to be best predicted by completeness of FEL. (WP05-03)

Base-rate posture
A decision posture that acknowledges broad outcome statistics as context, then requires project-specific evidence to justify confidence. (WP05-09)

Underestimation bias
A directional estimate risk associated with proceeding through a gate with incomplete FEL 2, leading to underestimated capital costs. (WP05-05)

References and limitations

Independent Project Analysis (2026)

What Is Front-End Loading (FEL) in Project Management?. Archived capture cited for FEL definition, FEL phase ladder and research statements. (WP05-01 to WP05-05)

Construction Industry Institute (2026)

Project Definition Rating Index (PDRI) Overview. Archived capture cited for PDRI intended use and stated benefits. (WP05-06 to WP05-07)

Flyvbjerg, Bent (2014)

What You Should Know About Megaprojects and Why: An Overview (Project Management Journal). Named in the captured transcription page as methodology basis; primary paper capture is noted as owed in the dossier. (WP05-11)

Flyvbjerg, Bent and Gardner, Dan (2023)

How Big Things Get Done. Outcome statistics and category mean overrun ranges cited via a secondary transcription capture. (WP05-08 to WP05-10)

budgetoverrun.com (2026)

Study page transcribing Flyvbjerg and Gardner megaproject database statistics. Archived capture used as secondary transcription vehicle; attributed in text to Flyvbjerg and Gardner (2023). (WP05-08 to WP05-11)

Independent Project Analysis (2026)

Public research statements on FEL completeness and project outcomes (as cited in archived article). Cited for completeness-as-predictor and incomplete FEL 2 warning. (WP05-03, WP05-05)

USE LIMITATIONS

- Evidence dossier status is SEED and contains only rows WP05-01 to WP05-11. Topics listed as “pre-registered pulls owed” are not cited.
- Flyvbjerg and Gardner (2023) statistics are cited through a secondary transcription vehicle captured in 2026; they are treated as indicative context, not as project-specific prediction.
- No Aurus FEED or FID delivery mandate, credential, or client anecdote is claimed or implied; the paper is capability framing only based on public sources.
- The Construction Industry Institute PDRI overview capture does not include scoring mechanics; therefore this paper uses PDRI as an instrument concept rather than reproducing point scales or thresholds.

EDITION STATUS

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