

Custody Declarations & Auditability

A complete-looking record can conceal an unobserved operating decision

An operating-project case on a package-loss investigation that corrected its own headline figures and exposed gaps in declaration evidence. It connects event capture, physical verification, control workload and the test required before claiming recovered value.

DECLARATION OBSERVABILITY & CUSTODY EVIDENCE

BLUF / BOTTOM LINE UP FRONT

Establish the complete declaration population before sizing or funding a new control.

RECALCULATED FINDING

Analytical finding: a loss-selected removal distribution cannot establish how often a live threshold fires. Likewise, complete fields among emitted events do not establish that all decisions were captured or that their contents are true.

CONTRIBUTION IN THE SOURCE RECORD

Recorded contribution: owned the question, scope and deliverable; directed machine-executed analysis. Implementation remains unestablished.

EVIDENCE STATUS

Historical source artifacts were not recovered locally. This source-register reconstruction and proposed evaluation do not establish historical causal savings.

BLUF: analytical inference. Source contribution: historical record. Client and internal identities anonymized.

STRUCTURED ABSTRACT / DECISION BRIEF

Make the declaration observable before expanding the remedy

[AI] The investigation changes the investment question from choosing a loss-control threshold to establishing the decision and population that any threshold would govern.

Context

[HR] A logistics network investigated packages reported missing after recorded stow activity. The brief asked what happened between the recorded state and removal from a delivery itinerary. Its analytical corpus contained different populations, duplicate rows, evolving loss records and incomplete evidence about the declaring action.

Objective

[HR] Deliver a defensible explanation and a bounded operating ask. The recorded project owner constrained the work against unsupported theft assumptions and named employee rankings, required package-level traces and directed the correction of prior headline figures.

Approach

[HR] Machine-executed analysis compared entity grains, cohorts, event ordering, policy scope and earlier issue records. [AI] This case reconciles the register, tests the logic of its bounds and develops the Declaration-to-Outcome Evidence Contract (DOEC).

Findings

[AI] A distribution selected on subsequent loss cannot establish live control workload. Field completeness is conditional on emitted records; capture, joint completeness and truth require separate tests. Recorded scan states do not establish custody at the declaring moment. Different event anchors prevent direct pooling or cross-cohort ceilings.

Decision value

[PD] Assign an accepting owner to the declaration contract, enumerate decisions independently and reconcile item identity across event versions. Calibrate capture and physical verification before a bounded response test. Retain current customer remedies and account for verification workload and displaced ordinary work.

Implications

[AI] The recorded contribution is diagnostic leadership and publication discipline. Implementation, accepted control ownership and realized savings remain unestablished. The proposed evaluation measures original-promise outcomes independently of how many incidents the new logging reveals.

[HR] Evidence register S1, selected investigation records; source-version limitations and original-artifact status are detailed in the private annex. [AI]/[PD] are new analysis/design.

EXECUTIVE EXHIBIT 1 / CORRECT THE EVIDENCE UNIT

Correct the grain before interpreting the loss

[HR] The investigation withdrew inflated package and cost headlines after finding that stored rows, declared keys and physical items were different units of analysis.

ENTITY GRAIN / THREE COUNTS, THREE DIFFERENT QUESTIONS

Conceptual reconciliation: retain legitimate financial detail while removing duplicate storage



COUNT ITEMS AT ITEM GRAIN; RECONCILE MONEY AT FINANCIAL GRAIN
A blanket distinct-item operation can discard legitimate charges, credits or line items.

Source corrections demonstrate a grain problem; the exact accounting key still requires validation.

Question	Evidence contract
How many items?	Count the defined original item or lineage. Explain identifier reassignment and unresolved links; a row count is not an item count.
How much cost?	Reconcile legitimate financial line items and reversals at their accounting grain. Distinct packages alone cannot deduplicate money.
Which source version?	Preserve the original extract, query, key rule and read time. Retain conflicts and compare conclusions under each admissible version.

[AI] Repeating an aggregation through the same lineage is an arithmetic check, not independent authentication. A declared key may omit legitimate line-item distinctions; agreement with another view does not by itself settle the accounting rule.

EXECUTIVE ACTION

[PD] Accept the entity and cost bridges before comparing loss categories or allocating an intervention budget. Retire invalid headlines visibly; preserve their correction trail.

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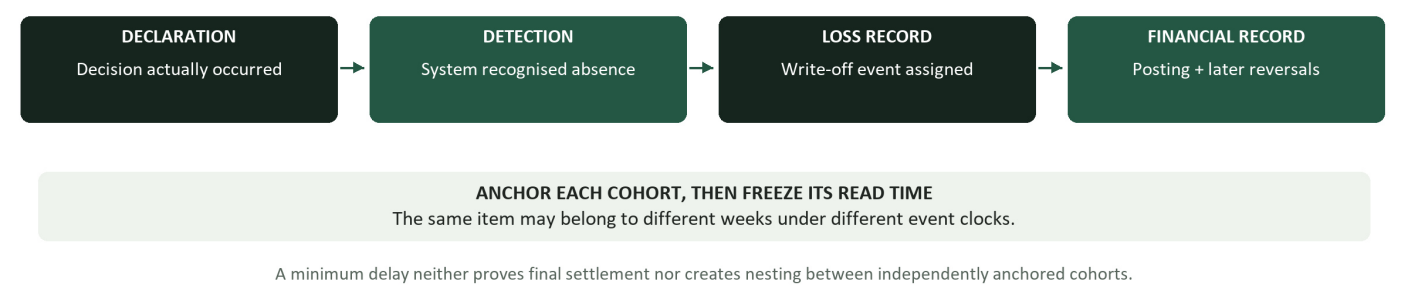
EXECUTIVE EXHIBIT 2 / POPULATIONS AND CLOCKS

Preserve the cohort and clock before comparing rates

[HR] The record contains a status-defined loss population and a separate scan-history population, with different anchors and classifications. Their shares answer different questions.

COHORT IDENTITY / EVENT CLOCK / READ VINTAGE

Conceptual event chain: a common week label does not make the populations identical



Potential shortcut	What the evidence must establish
Average the two shares	Common item universe, common definition, compatible exposure weights and matching maturity. Similar labels do not supply these conditions.
Use one total as a ceiling	Prove entity-level nesting across the two event windows. A loss-date cohort does not automatically contain a same-week declaration cohort.
Call a window closed	Show settlement and backfill behavior through the chosen horizon. A minimum processing lag does not bound the maximum lag.

[AI] Declining classification share does not prove declining class dollars. More total cost, changed membership, later reversals and missing values can move the numerator independently. Cross-week decay is a sensitivity assumption until the same original cohort is followed.

EXECUTIVE ACTION

[PD] Freeze cohort, identity, event clock and read vintage for each claim. Reconcile later revisions to that fixed population before calling a value mature, permanent or bounded.

[HR] Evidence register S1, selected investigation records; source-version limitations and original-artifact status are detailed in the private annex. [AI]/[PD] are new analysis/design.

EXECUTIVE EXHIBIT 3 / OBSERVABILITY CONTRACT

Complete fields do not prove captured decisions

[AI] A high completion rate among emitted records can coexist with missing declarations, inconsistent combinations of fields and incorrect physical assertions.

JOINT COMPLETENESS / A SHARP HYPOTHETICAL BOUND

100 independently enumerated declarations; 80 emitted events; five fields each 95% complete



Invented construction, not source counts. A populated record may still describe the wrong object or event.

[RC] In the invented example, five fields are each present on 76 of 80 emitted records. If the four missing values per field occur on different records, only 60 emitted records have all five fields. If the missing values coincide, 76 do. Against 100 independently enumerated declarations, joint completeness is therefore 60% to 76%.

[AI] This is a completeness bound, not a truth bound. A populated record may identify the wrong item, actor, time or physical check. An emitted-record denominator cannot reveal the declarations that produced no record.

Acceptance dimension	Independent test
Capture	Compare linked events with a probability sample or census of real declaration opportunities, including unlogged ones.
Joint validity	Validate all required fields together against independent event and physical evidence. Report unresolved and incorrect records.
Operational use	Verify authorized response, named ownership, deadline and original customer outcome. Logging alone is not recovery.

[RC] Wholly hypothetical construction, not historical counts or a rescaling. Sharp joint-completeness bounds and counterexamples are reproduced in the technical and private layers.

EXECUTIVE EXHIBIT 4 / CONTROL CALIBRATION

A loss-selected threshold cannot size the live control

[AI] The source compares a threshold with removals that subsequently became losses. That selection omits successful, recovered and unresolved removals that a live control may also process.

LOST-SELECTED REMOVALS / UNIDENTIFIED LIVE WORKLOAD

Invented one-day example: same five selected removals; live threshold requires more than ten

WORLD A

5 selected + 0 other removals

5 total: threshold not crossed

WORLD B

5 selected + 8 other removals

13 total: threshold crossed

THE LOSS-SELECTED EXTRACT IS IDENTICAL IN BOTH WORLDS

Nonlost removals can change the live decision without changing the selected evidence.

All events use the same day in this proof; a detection-day/action-day mismatch adds a separate problem.

[RC] Two invented operating worlds can share the same selected loss-removal count below a cap. In one, there are no additional removals; in the other, additional removals that do not become losses push the live count above the cap. The selected extract cannot distinguish them.

[AI] Aggregating by detection day compounds the issue when the rule operates on declaration day. A selected daily maximum does not bound the live daily maximum. Even approval workload depends on whether escalation occurs per item, request, breach or operating day.

Before calibration	Required evidence
Population and event	All eligible declarations on the rule's actual clock; original item identity and complete event scope.
Predicate and authority	Current inequality, aggregation window, role, exception route and effective regional policy.
Capacity and value	Observed full-population arrivals, service times, outcomes and incremental review cost.

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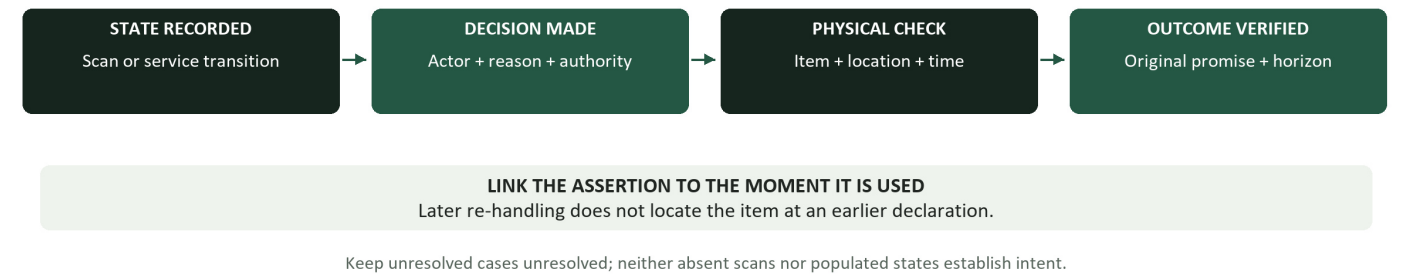
EXECUTIVE EXHIBIT 5 / CUSTODY INFERENCE

A recorded state does not locate the physical item

[HR] The investigation found incomplete provenance for declaring actions and recorded state transitions. It also reported later handling records for some items previously recorded absent.

RECORDED STATE / DECLARING DECISION / PHYSICAL TRUTH

Conceptual separation: a record is an assertion whose provenance must be tested



Evidence observed	Inference it does not establish
Stow or stage status	The item was physically present at the later declaration. A service-generated or wrongly linked state needs different validation from a physical scan.
Later handling record	The item was present at the original location and time, or no verification had occurred. Re-entry, relocation, timing and linkage remain alternatives.
No later scan	The item was absent. Search effort, event capture and identifier continuity govern what can be observed.

[AI] A proposed mechanism must match the state effective when the decision occurred. An eventual state flag cannot alone prove that an earlier gate had passed. Policy text, live implementation and actual execution are separate evidence objects.

EXECUTIVE ACTION

[PD] Observe the declaring moment, then link it to independent physical verification. Preserve actor privacy and avoid attributing intent from status codes or missing fields.

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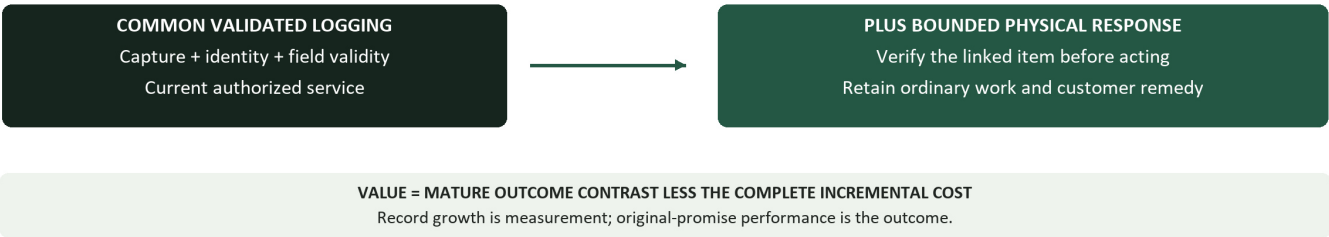
EXECUTIVE EXHIBIT 6 / EVALUATION AND ECONOMICS

Test the response against an independent customer outcome

[PD] First validate the measurement contract. Then compare common validated logging alone with logging plus an authorized physical-verification response, under a feasible randomized design.

COMMON LOGGING / PROSPECTIVE RESPONSE TEST

Proposed design: independent reference measures outcomes in both arms



Weak linkage can redirect effort to the wrong item. Test redesigned corroboration as a different treatment.

Decision gate	What must improve or remain protected
Mature outcome	Original-promise failures across all original booked items, including unlogged, denied, cancelled and unresolved cases.
Operating economics	Avoidable nonoverlapping failure cost less all verification, wrong-link work, displaced service and implementation cost.
Customer safeguard	A prespecified bound on harm to ordinary work; existing remedies remain available regardless of record status.

[AI] Better capture may increase recorded incidents with unchanged physical performance. The model separates that measurement change from a response effect and tests linkage quality. More sample size cannot make a harmful operating version economically sound.

EXECUTIVE ACTION

[PD] Require detectability at economic break-even and joint outcome, value and service acceptance. Evaluate the value of buying better evidence separately from the operating benefit it may help select.

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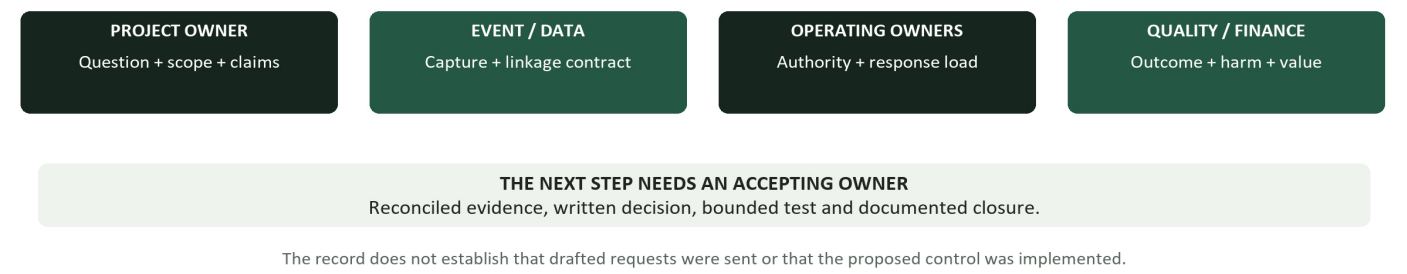
EXECUTIVE EXHIBIT 7 / OWNERSHIP AND CLOSURE

Own the question and obtain acceptance for the next action

[HR] The record attributes investigative scope, reporting constraints and the deliverable to its project owner. Analytical work was machine-executed under that direction; implementation was not established.

DIAGNOSTIC OWNERSHIP / IMPLEMENTATION ACCEPTANCE

Recorded project leadership is distinct from machine-executed analytical labor and future delivery



Responsibility	Concrete closure condition
Project owner	Accept reconciled claims, source corrections, unanswered questions and the bounded leadership ask.
Event / data owner	Accept declaration schema, capture denominator, item lineage, correction history and independent validation.
Policy / operations	Resolve actual authority, observe the physical workflow and accept capacity and escalation ownership.
Quality / Finance	Approve mature outcome, harm margin, cost basis, overlap treatment and the prospective decision rule.

[AI] Delivered analysis is distinct from accepted operating change. Drafted requests are not sent requests; proposed observation is not completed field work; repeated issue records do not prove one mechanism caused every case.

CONTRIBUTION AND DECISION

[AI] Credit diagnostic leadership and correction discipline within the documented attribution grade. [PD] Give the next action an accepting owner and verification date before describing the control as implemented.

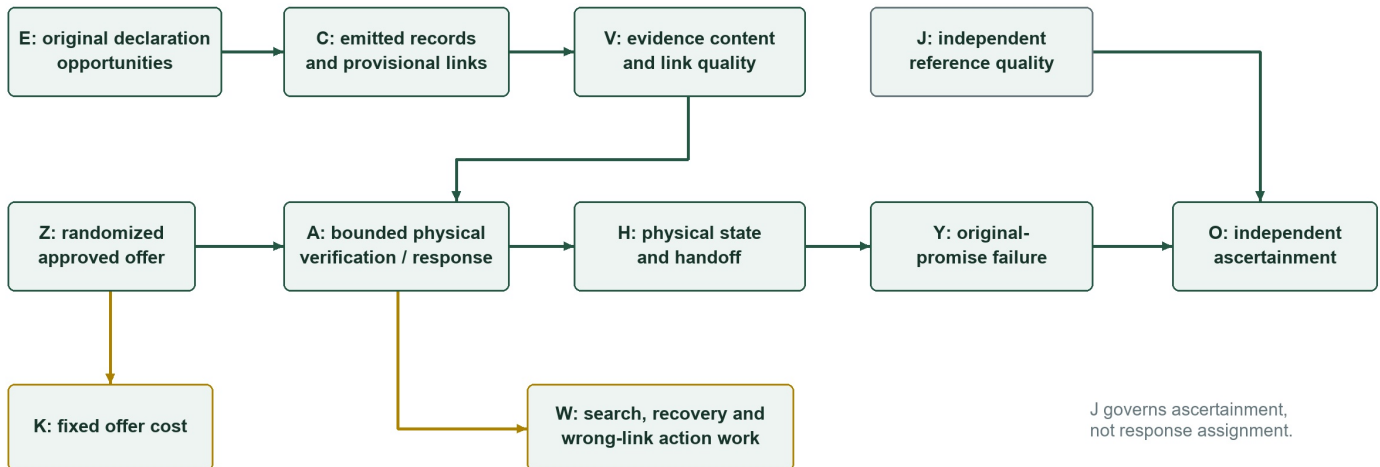
[HR] Evidence register S1, selected investigation records; source-version limitations and original-artifact status are detailed in the private annex. [AI]/[PD] are new analysis/design.

TECHNICAL ANALYSIS

A recorded declaration is the start of the test

[AI/PD] The Declaration-to-Outcome Evidence Contract (DOEC) separates independently enumerated opportunities, emitted records, valid linkage, approved physical response and original-promise customer outcomes. A digital state is evidence to validate, not a physical conclusion.

DOEC: RECORDED EVIDENCE AND PHYSICAL OUTCOMES NEED SEPARATE TESTS



Common logging; U (original physical state, source, workload) affects C, V, A, H, W and Y.

Historical selection: $Y \rightarrow R \leftarrow M$, where R is recorded loss and M is recording / policy.

Conditioning on R can open a noncausal path. A reported state is not a custody reference.

Cost paths: $Z \rightarrow K$ and $A \rightarrow W$. $J \rightarrow O$ and $Y \rightarrow O$ distinguish ascertainment quality from actual truth.

[PD] Actual opportunities E produce captured records C with linkage quality V. Assignment Z adds an authorized response A to common logging. A can change physical state H and deadline failure Y; independent ascertainment O depends on Y and reference quality J. Z also incurs fixed cost K, while searches, mistaken actions and recovery incur work W.

[AI] Context U affects capture, linkage, workload and physical outcomes. A service can write a state without physical handling. A later hard scan can follow re-entry, an earlier unsuccessful search or an incorrect link. None alone identifies what happened at the earlier declaration. Actor strings similarly require role, session and identity validation.

[AI] The historical loss-selected slice conditions on a result affected by physical failure and recording or policy processes. This can open a selection path. Holding station or cycle fixed does not remove that problem. The proposed trial retains all original bookings, including uncaptured, unresolved and unsuccessful cases.

[PD] Both arms receive the same validated observation system. Logging-only changes can alter reported counts without changing service. Physical benefit therefore requires an independent original-promise endpoint and fully charged response costs; existing customer remedies remain unchanged.

Basis: proposed DOEC graph [PD]; source limits [HR/AI]. Hernan et al. (2004), Mohan et al. (2013), OpenTelemetry and GS1. Arrows are hypotheses, not estimated historical effects.

TECHNICAL ANALYSIS

Two coherent tables can answer different questions

[HR/AI] The investigation combines a status-and-reason cohort with a scan-field cohort. Their entity keys, event anchors, proxy meanings and extraction vintages differ. Agreement on a smaller linked subset does not make the complete populations interchangeable.

Contract element	Required reconciliation
Unit and money	Unique package, tracking-ID version, financial line item and reversal identity are distinct grains.
Meaning of stow	A taxonomy label, service-written state and authenticated physical scan are different measurements.
Clock	Declaration, detection, loss booking, financial posting and extraction vintage need separate timestamps.
Reference cohort	Membership and deduplication must be reproduced before transferring a share, cost or maturation factor.

[AI] In an independent example, ten packages are declared in one calendar window and booked lost afterward; two others declared earlier are booked lost inside that window. Every delay meets a stated minimum. The declaration-window count can exceed the loss-window count because the sets are not nested. A minimum lag also does not prevent later backdated inserts.

[AI] A falling class share cannot cap its absolute cost. A class can fall from 40% of 100 resource units to 30% of 200 while its cost rises from 40 to 60. The same share decline with a final total of 100 instead gives cost 30. These synthetic worlds refute a share-only monetary ceiling.

[HR/AI] Short observed reversals cannot establish permanent write-off. Missing financial fields in one track do not certify another track as a lower bound. Deduplicate only against an authenticated business key; blanket distinct-row or primary-key deletion can remove legitimate line items. Preserve disputed versions and signed reversals.

[PD] Archive immutable cohort/vintage extracts and reconcile additions, removals and reclassifications at entity level. Sequential non-overlapping intervals can add; clocks sharing an anchor must not be counted twice. A later observation of the same cohort is still not an ultimate reference without tail validation.

Basis: source measurement forks [HR/AI]; exact independent anchor/share constructions [AI], counterexample.py/json. Suriadi et al.; OpenTelemetry; GS1. All displayed quantities are hypothetical.

TECHNICAL ANALYSIS

High field completion can coexist with weak usable coverage

[AI] Field completion is conditional on records that exist. It does not establish how many original declarations were captured, whether all required fields occur together, or whether their contents are true.

Independent hypothetical frame	Value
Original declarations independently enumerated	100
Uniquely linked emitted records	80
Complete entries in each of five fields	76 of 80, or 95%
All five complete: missing fields overlap	76 of the original 100
All five complete: missing fields are disjoint	60 of the original 100

[AI] In one construction every field is absent on the same four emitted records; in another, each field is absent on a different four. Identical capture and field margins give 60 through 76 jointly complete original records. The private exact solver constructs every intervening missing-union size. Complete records may still carry an incorrect actor, stale state or wrong package link, so these are not validity bounds from below.

[AI] If q is unique event capture and p_j is field- j completeness among captured events, joint completeness on the original frame lies between $q \cdot \max(0, \sum(p_j) - (k-1))$ and $q \cdot \min(p_j)$, for k required fields. The example attains both bounds. Valid evidence is a further subset; without truth information its lower bound can be zero.

[PD] Use a probability sample or independent census of declarations to estimate capture, not an emitted-log denominator. Report capture, joint completeness, correct linkage, timely availability and reference-confirmed validity separately, with weighted uncertainty. A filled placeholder must not count as a valid approver or reason.

[HR/AI] The inspected estate lacks important declaration fields, but that finding does not prove no declaration or physical check exists elsewhere. The source target is a proposed instrument requirement, not achieved coverage or a demonstrated prevention mechanism.

Basis: sharp marginal bounds and constructive enumeration [AI]; source instrumentation proposal [HR]. Mohan et al.; Suriadi et al. The numeric example is entirely independent of historical quantities.

TECHNICAL ANALYSIS

A loss-selected maximum cannot locate a live threshold

[HR/AI] The historical station-day distribution includes removals later labeled lost and uses a detection-related clock. It does not directly measure all live removal actions on the clock used by a permission gate.

Synthetic strict threshold: more than 10	World A	World B
Observed lost-selected counts by day	4, 6	4, 6
Additional nonlost declarations	0, 0	20, 20
All live counts by action day	4, 6	24, 26
Days exceeding the threshold	0	2

[AI] Even with identical entity definitions and aligned action days, a selected subset supplies a lower count, not an upper count. Its maximum below the threshold cannot show the live gate never fires. The source recorded that verdict; the defensible conclusion is that the supplied sample cannot determine live triggering.

[AI] Clock substitution creates another gap. Eighteen distinct hypothetical actions occur as nine on each of two days, but all are detected on the second day. Detection-day counts of zero and eighteen create an apparent breach absent from the action-day distribution. A detection-day total is not necessarily a lower bound for the corresponding action day.

[PD] Reconstruct the live event universe, event-level quantities, contemporaneous policy version and actual gate result. Specify whether a threshold is a maximum allowed quantity, minimum eligibility requirement, cumulative cap or approval trigger. A number increasing does not by itself establish the direction of enforcement. Batch approvals and per-package decisions also imply different workload.

[HR/AI] Eventual stage flags cannot establish the operative state or rule at the earlier decision. Draft policies, another region's practice and old code provide hypotheses to inspect, not proof of current authorized execution. Count controls must be tested against their own live predicate and clock.

Basis: new observational-equivalence and clock constructions [AI]; historical selection/policy limits [HR/AI]. All displayed counts and the threshold are synthetic.

TECHNICAL ANALYSIS

Validate the reference before judging the mechanism

[PD] DOEC needs two linked but distinct references: contemporaneous declaration evidence and independently observed physical service. Neither an algorithmic label nor a later customer outcome should define the other by circular construction.

Measurement	Validation requirement
Capture and linkage	Original opportunity ID; tracking-version crosswalk; emitted/unemitted record; independently verified package match.
Declaration evidence	Action time and observation time; actor/session/role; operative state; current policy and approval scope.
Physical response	Direct safe custody/accessibility check, customer acceptance, search result, handoff and attempted alternative routes.
Outcome and cost	Original deadline receipt; unresolved status; financial event/line item; effort and fixed-cost scope.

[PD] Draw a stratified probability sample from the original frame across channels, baseline cycles, device/service sources and emitted, unemitted or unresolved cases. Duplicate coders blinded to assignment and downstream outcome classify evidence; an independent reviewer resolves disagreement. Report weighted confusion tables, raw agreement and prevalence, plus kappa with domain-bootstrap uncertainty.

[PD] A simple independent sample of 400 offers worst-case approximate 95% precision of plus or minus 4.9 percentage points for a single agreement proportion. It is not a kappa-power calculation; clustering, unequal sampling and rare errors change precision. Prespecify precision for sensitivity, specificity and wrong-link risk, and test reference consistency across source versions and baseline strata.

[AI] QUADAS-2 motivates selection, index, reference and flow checks as an analogy, not a clinical score for this operation. Unknown proxy recall or precision cannot bound a true mechanism's contribution. No observed later event in a short, selected window is not proof of permanent absence.

[PD] Unresolved reference cases remain in the denominator with explicit worst-case bounds. Verification targeted only at suspicious or easy-to-find cases requires known sampling probabilities and assumptions; complete-case accuracy can otherwise be misleading. Explicitly failed mandatory checks preserve the existing protected response.

Basis: proposed measurement protocol [PD]; Whiting et al. (2011), Cohen (1960), Mohan et al. and source observability limits. Reference agreement does not establish physical truth.

TECHNICAL ANALYSIS

Separate population selection from process variation

[HR/AI] The record contains selected loss cohorts, changing vintages, differing taxonomy proxies and short sequences. A descriptive association in that estate is not an identified effect of stowing, actor behavior or a physical search.

[AI] Conditioning on later loss can induce an association between process features and other loss causes. Containerization among lost packages does not test whether containerization prevents loss in the original manifest. Adjusting station or cycle does not repair unmeasured mix, selection or exposure error. Likewise, a login is not a person, and a substring flag with unknown recall cannot cap a mechanism.

[PD] Prespecify baseline source system, channel, event volume, cycle, physical layout, staffing capacity and independently calibrated link quality as potential modifiers. Realized capture, successful linkage and completed recovery are postassignment measurements; retain the original randomized population rather than select on them. A changed logging version can change a measured outcome without physical change.

[AI] Under an assumed linear conditional-mean model, untreated follow-up is $m + \rho \cdot (x - m)$, where m is the population mean and ρ is persistence. Assumed ρ of 0.4, 0.7 or 0.9 implies 60%, 30% or 10% reversion of a selected excess. These are hypothetical sensitivities, not measured fractions of this investigation's movement.

[RC] The private inventory has 22 source/sensitivity screens, with 16 version audits, 10 design-shape audits and 13 cross-sectional/lag profiles separate. No fitted source individual or moving-range crossings occur; no stable operating phase is established. Missing daily vectors and an unavailable extended curve are not fabricated.

[PD/RC] For a coherent phase, $MR_t = |x_t - x_{(t-1)}|$; individual limits are $\text{mean}(x)$ plus or minus $2.66 \cdot \text{mean}(MR)$, with MR upper $3.267 \cdot \text{mean}(MR)$. Three mechanical two-as-of Laney calculations are ineligible: overlapping same-cohort snapshots, uncertain binary identity and only two points. Overdispersion adjustment cannot repair their population or maturity contract.

[PD] A later nonrandomized rollout could estimate group-time ATT under credible parallel trends, overlap, comparable versions and spillover assumptions. Plot pretrends and use equivalence and sensitivity checks; a nonsignificant pretrend test is not proof. That estimand remains distinct from the proposed randomized offer ITT.

Basis: source selection/variation limits [HR/AI]; Hernan et al., Barnett et al., NIST XmR, Laney and group-time ATT methods. Final screen inventory is private; no historical treatment effect is estimated.

TECHNICAL ANALYSIS

The contribution is an evidence request, not a recovered outcome

[HR/AI] Management contribution is a provisional registry-level hoop: commissioning and narrowing the investigation, directing the evidence formats, challenging unsupported actor claims, and drafting follow-up asks. Machine-produced analysis is not direct personal SQL authorship.

Recorded contribution	Decision boundary
Analytical delivery	A completed pack supports a delivery claim subject to original authentication; its internal checks can share lineage.
Follow-up and field work	Draft asks and calendar plans do not establish sending, accepted ownership, attendance or completed observation.
Instrumentation proposal	A proposed declaration schema is not implemented capture, valid actor identity or a functioning physical control.
Customer and financial results	No identified historical prevention effect or realized incremental savings is established.

[HR/AI] A teammate's separate trace and pre-existing dashboards are contextual evidence, not sole authorship or independent replication of the full study. Original query outputs, policy versions and sent communications are needed to strengthen the hoop. Reproducing one source five ways is computational checking, not five independent observations.

[AI] The new analysis changes the decision by invalidating three shortcuts: share decay does not cap money; a selected maximum does not characterize live triggering; field margins do not identify joint valid coverage. These are current methodological contributions, separate from what the historical manager demonstrably did.

[PD] Value the signed original-cohort physical contrast, not the disappearance of a concession label. Apply avoidability and non-overlap discounts only to favorable harm avoided; charge added ordinary-flow harm, unsuccessful searches, wrongly linked actions and coordination in full. Reconcile valuation units, financial lines, horizon and reversals. Historical loss expense is neither guaranteed cash avoidance nor an effect size.

[PD] Production verification and fixed implementation costs belong in the decision; research-only ascertainment is a separate budget. EVSI prices the next information action under explicit priors. It is not an additional benefit to add to the same avoided customer loss.

Basis: bounded contribution and process tracing [HR/AI], Collier; proposed signed economics [PD]. Authentication and accepted execution authority remain external gates.

TECHNICAL ANALYSIS

Test physical verification against common logging

[PD] The proposed randomized trial compares logging alone with the same logging plus an approved, bounded physical-verification response. It preserves the original manifest, customer promises and remedy rules. It tests the whole offer, not a favorable subset of captured records.

Element	Prospective contract
Assignment	Independent response-capacity domains; original bookings and pre-deadline declaration opportunities frozen upstream.
Mechanism	Correctly linked present opportunities may be recovered before the deadline; absent opportunities consume work; wrong links can harm ordinary flow.
Reference	Original-deadline physical receipt reconstructed by original promise plus 35 days; all unresolved outcomes retained.
Decision gates	Net resources beyond fixed package cost, all-manifest physical improvement and ordinary-flow harm below an approved margin.

[PD] The hypothetical finite law includes a common link-quality state, record capture, wrong-unit counterparts, unsuccessful actions and full effort. Conditional finite outcomes yield exact means and covariance. Selected studentized-normal planning and direct finite-process simulations remain conditional approximations, not universal finite-sample confidence guarantees. No probability is estimated from historical field completeness.

[PD] Compare the economically material break-even effect with an 80%-power two-sided MDE, then check all directional gates jointly. Simulations must generate the actual physical-null, economic-boundary and ordinary-harm-boundary laws and their variances. Report Monte Carlo uncertainty; do not substitute a shifted mean for the boundary mechanism.

[PD] Poor linkage can make added work and ordinary harm outweigh recovery. More observations cannot repair an adverse mean. A corroborated-ID design with explicit non-action for failed checks, additional verification work and a different fixed cost is a treatment redesign. Its evidence must be evaluated separately.

[PD] Before recruitment, calibrate the original opportunity frame, reference error, correlated outages, wrong-link collisions, shared staff effects and cost feasibility. The toy distinct-counterpart assumption does not prove the remaining ordinary population is immune to spillovers. Margin approval, operational authority and longer-tail sensitivity are unresolved field requirements.

Basis: new DOEC prospective design [PD]; author finite model and independent review. Margins, costs, horizons and sample sizes are planning hypotheses, not historical achievements.

TECHNICAL ANALYSIS

DOEC makes four operational claims falsifiable

[AI/PD] An instrument earns decision use through coverage, truth, temporal relevance and physical value. These properties require different evidence and can fail independently.

Proposition	Prespecified failure criterion
P1: Evidence covers the opportunity frame	Independent sampling fails the target for uniquely captured, jointly complete and reference-valid declarations on the original denominator.
P2: Records support the intended decision	Linked actor, time, operative state and policy evidence fail the approved reference-validity or timeliness target.
P3: The live control is characterized	Replayed live events on the correct action clock do not reproduce the gate's actual predicate and observed decisions within tolerance.
P4: The response creates customer value	Original-cohort economic or physical-benefit gates fail, or ordinary-flow harm exceeds its approved bound.

[AI] The sharp completeness construction and threshold worlds show why precise marginal reports can leave the decision unidentified. Additional assumptions may narrow those sets, but they must be independently tested. The cross-anchor and cost-share examples similarly distinguish a reproducible arithmetic identity from the target causal or financial claim.

[AI] Deming cautions against reacting to a logging-vintage artifact as process change. Campbell and Goodhart warn that field targets can reward placeholders and selective emission. Ittner, Larcker and Randall motivate validating the capture-to-response-to-outcome chain; Tucker and Edmondson motivate usable workflows before blaming workarounds. OECD guidance keeps coverage, accuracy, harm and cost visible rather than concealing them in a composite.

[AI] Event-log imperfection research and stochastic conformance distinguish observed traces from a complete physical process. OpenTelemetry and GS1 clarify time and correction semantics; missing-data graphs expose recoverability assumptions; selection and diagnostic-reference methods discipline the proposed test. None certifies the historical estate or supplies its effect size.

[PD] Reproducibility includes versioned source claims, exact counterexamples, frozen model primitives, independent numerical checks and final rendered-page hashes. Original authentication, unobserved declarations, imperfect references, interference and safe operating capacity remain limits even when every calculation reproduces.

Basis: DOEC synthesis [AI/PD], six fresh primary sources plus GS1 and continuing methods. Four propositions are prospective; no deployment or causal outcome is claimed.

A complete record still needs a correct identity

[PD] Randomize independent response-capacity domains: common validated logging versus the same logging plus bounded, authorized physical verification. Customer promises, remedy timing and authority remain unchanged. Known invalid identity never permits action.

[PD] Freeze 240 original bookings per domain: 40 pre-deadline declaration opportunities and 200 ordinary units. The synthetic truth has 20 present/intact and 20 absent opportunities; policy cannot see these classes. Each opportunity has one distinct potential wrong-link counterpart among the ordinary units. Unrecorded declarations and safely declined actions remain.

Wholly hypothetical primitive	Good / poor state
Capture probability	90% / 60%
Correct link among acted records	98% / 70%
Baseline miss: present / absent / ordinary	50% / 80% / 4%
Successful correction if present and linked	70%
Wrong link: harm to otherwise successful counterpart	25%

[PD] The common domain state is good with probability 80%; stress lowers this to 30%. Every acted record incurs search work, including true absences. Correctly linked absent units retain the usual remedy. The redesign corroborates every emitted record: 85% pass, with correct-link rates 99.5% / 96%; failed checks retain usual operations. These are joint conditional test assumptions.

OBSERVATION IS NOT PREVENTION

[PD] Correction must fit before the original deadline. Blinded reference through promise + 35 days reconstructs on-time receipt; late recovery remains a miss. Logging alone earns no physical benefit. Wrong links are residual undetected faults, never authorized experiments on customers.

[PD] All inputs are invented. Shared state creates within-domain dependence. Unique counterparts exclude collisions and broader labor spillover; calibrate these assumptions and reference truth before field testing.

Repair a mean failure before adding observations

[PD] Exact finite moments support approximate normal planning. Require economic lower confidence bound above fixed cost, positive physical benefit, and ordinary-harm upper bound below a candidate 0.6-percentage-point margin. The margin needs Quality approval.

Design / per arm	MDE index	BE index	BE detection	Joint floor
Initial / 32	>7.40	3.10	18.8%	0.0%
Base candidate / 384	2.33	3.10	96.0%	93.6%
Linkage stress / 384	>2.11	3.10	Outside path	0.0%
Corroborated redesign / 1536	1.14	3.38	>99.9%	92.6%

[PD] MDE targets 80% power for a two-sided 5% zero-effect test; > means this is not reached within the response path. Break-even uses its own variance. Directional gates use nominal 97.5% bounds; the joint floor subtracts three marginal failure probabilities without assuming endpoint independence. This is normal planning, not a finite-law guarantee.

[PD] The response path mixes whole-domain logging-only and active laws; it is neither observed compliance nor direct gate interpolation. Linkage stress improves physical risk yet makes net value negative and ordinary harm exceed the margin. A larger sample cannot repair those means. Corroboration changes the treatment and adds cost.

[PD] Base candidate: 94.3% joint success (95% Monte Carlo interval 93.7-94.9%); Corroborated redesign: 92.3% joint success (95% Monte Carlo interval 91.6-93.0%). Eight 6,000-trial runs test the full and boundary laws. Selected directional error estimates are 2.3-2.8% around nominal 2.5%; their Monte Carlo intervals are retained in the audit.

CALIBRATE BEFORE RECRUITING

[PD] The redesigned allocation is 3,072 independent domains and 737,280 original bookings. Source evidence establishes neither recruitment nor these probabilities. Begin with capture, identity, reference and resource calibration; known dangerous defects require remediation before live testing.

[PD] Usual modeled resource burden = 100; MDE and break-even are index points. NI denominator is 200 ordinary units/domain. Finite validation changes the primitive linkage law at the harm boundary; no uniform nuisance guarantee.

Charge the wrong search, not just the successful recovery

[PD] A physical miss costs 12 hypothetical resource units. Search costs 0.60 per acted record; each successful physical correction adds 0.80 handling work, including otherwise-on-time units. Corroboration costs 0.20 per emitted record, including failed checks. These are not historical dollars or withheld payments.

[PD] Both arms include common logging 0.025 and usual work 0.050 per booking. Base fixed cost K = 0.055 allocates setup 0.015, support 0.020 and independent quality 0.020. Redesign adds 0.005 maintenance. These one-period prototype allocations use the same original population at every sample size; research-only simulation costs are separate.

Avoidability a / non-overlap h	Base net	Poor link net	Redesign net
1.00 / 1.00	+4.30	-0.99	+1.36
0.75 / 0.90	-0.76	-4.57	-2.30
0.50 / 0.80	-5.04	-7.60	-5.39

[PD] $Net_raw = a * h * avoided\ physical\ harm - added\ ordinary\ harm - search - corroboration - recovery\ work - K$. $Net_index = 100 * Net_raw / 1.775$. Only favorable prevention is discounted; adverse effects and all work remain fully charged. The private grid also varies K independently.

[PD] With unrestricted 1% erroneous or unresolved receipt labels in each arm, physical contrasts can shift by 2 percentage points and resource contrasts by 0.24 raw units. Keep all original units and separately verify work costs. Later-vintage capture can differ by arm; equal elapsed time alone does not establish equal maturity.

FIELD VALUATION REQUIRES NEW EVIDENCE

[PD] An optional later observational rollout uses eligible treated volume times signed mature customer ATT contrasts, repriced by outcome, less all incremental work and fixed costs. No current inputs support that estimate; this randomized proposal targets original-cohort package ITT.

[PD] Table values are net index points; usual total resource burden = 100. Each category needs separate realization prices if a common favorable-prevention share is unsuitable. No double credit for logging, recovered units or avoided payments.

PROPOSED DECISION INFORMATION / 4 OF 4

Buy evidence that changes the next authorized step

[PD] A separate decision model asks whether to reconcile capture/linkage, authorize a bounded response test, or staff and retest. The state probabilities and utility scores below are invented, independent of trial resource gains.

Action / state	Link repair	Capacity gap	Ready
Reconcile capture/linkage	7	2	-2
Bounded response test	-8	1	13
Staff and retest	1	9	4

[PD] State prior = 0.30 / 0.30 / 0.40. Without new evidence, staff and retest has expected utility 4.60. Perfect information raises expected utility to 10.00, so EVPI = 5.40. Authority, reference validity and customer safeguards remain mandatory even when utility favors a test.

Signal accuracy	Gross EVSI	Evidence cost	Net EVSI
45%	0.2175	0.5000	-0.2825
70%	2.3400	1.4000	0.9400
90%	4.3800	2.6000	1.7800

[PD] A signal names the true state with the displayed probability; each other label receives half the remaining probability. Bayesian updating and all 27 signal-to-action policies reproduce the optimum. Higher accuracy is not automatically worth its price; the low-information purchase has negative net value.

DO NOT ADD INFORMATION UTILITY TO OPERATING VALUE

[PD] Evidence may redirect the next investment even when no deployment is justified. These scores cannot be combined with prevented physical failures, historical concession costs or the separate trial economics.

[PD] Signal accuracy is not declaration capture, field completeness or linkage accuracy. All payoffs, priors and evidence prices are hypothetical; neither sponsor acceptance nor an emitted record establishes physical truth.

REPRODUCIBILITY / READER PROTOCOL

Rebuild the population, record and outcome

[AI] The case separates the underlying declaration, its recorded representation, physical truth, authorized response and original customer outcome. Each connection needs evidence.

Review layer	Reproduction requirement
Source and versions	Reconcile selected cells with the immutable workbook. Preserve the original-artifact search, alternate figures, read times and unresolved semantics. Repeated derivative accounts are not independent authentication.
Unit and cohort	Rebuild row, key, item and financial-grain bridges. Keep event-anchored populations separate until actual identities prove overlap or nesting. Recheck every claimed floor, ceiling and maturity label.
Observation proofs	Reconstruct field-missingness configurations, event-capture denominator and alternative live-threshold worlds. Distinguish complete records from valid assertions and selected outcomes from live workload.
Prospective model	Rebuild original units, declaration opportunities, linked response, physical outcomes and ordinary-work harm. Preserve common logging and independent reference in both randomized arms.
Decision and information	Compare detectability with economic break-even and separate decision clearance. Recompute signed costs, sensitivity and finite information policies without adding EVSI to operating benefit.

Public conclusions and private evidence

[AI] Public numerical constructions are hypothetical and independent of historical quantities. The private package retains raw values, source pointers, conflicts, code and review bindings. It is not intended for external portfolio distribution. Positive indexing preserves relevant count inequalities only when the quantities share the same scale and population.

A future test does not rewrite the historical record

[AI] DOEC and its prospective evaluation are new analysis. A future effect would apply to the tested logging and response version, linked population and original-promise outcome. It would not retrospectively establish custody, authorship, implementation or realized savings in the recorded investigation.

PRACTICAL HANDOFF

[PD] Recover originals, enumerate declarations independently, validate identity and physical evidence, then obtain policy and operating acceptance for a bounded test. Retain the distinction between a proposed ask, a sent request and an accepted action.

Executable calculations and evidence mappings are retained privately. Source-semantic, numerical and actual-page reviews bind the released artifacts; substantive revisions require renewed review.

RESEARCH REFERENCES / EVENTS AND OBSERVATION

Validate the event before inferring the process

Primary research supports the method and proposed design. It does not authenticate project artifacts, provide local parameters or establish this project's causal effects.

Suriadi, S., Andrews, R., ter Hofstede, A. H. M., & Wynn, M. T. (2017). Event Log Imperfection Patterns for Process Mining: Towards a Systematic Approach to Cleaning Event Logs. *Information Systems*, 64, 132–150. Publisher-indexed abstract, introduction and summaries; full PDF unavailable. Event identity, duplicated rows and timestamp meaning need tests before sequence analysis. Passing a pattern library does not certify a complete or truthful log.

Hernán, M. A., Hernández-Díaz, S., & Robins, J. M. (2004). A Structural Approach to Selection Bias. *Epidemiology*, 15(5), 615–625. Primary abstract and metadata via PubMed. Conditioning on loss can open a path between its causes. Station and cycle adjustment alone does not remove selection or all confounding.

Mohan, K., Pearl, J., & Tian, J. (2013). Graphical Models for Inference with Missing Data. *Advances in Neural Information Processing Systems*, 26. Primary full PDF, sections 2–3 and conclusion. Recoverability depends on the target and the missingness assumptions. Event-table completeness cannot establish those assumptions or identify declarations never logged.

OpenTelemetry Authors. Logs Data Model. Living official specification, accessed October 2026; field sections read. Timestamp and ObservedTimestamp distinguish occurrence from observation, with trace and source scope. This informs the proposed schema; it does not establish physical custody or historical deployment.

Whiting, P. F., et al. (2011). QUADAS-2: A Revised Tool for the Quality Assessment of Diagnostic Accuracy Studies. *Annals of Internal Medicine*, 155(8), 529–536. Primary publisher-indexed four-domain text; direct page unavailable. By methodological analogy, separate unit selection, index classification, reference and timing in event validation. No clinical-study status or numerical QUADAS score is asserted.

Leemans, S. J. J., & Polyvyanyy, A. (2020). Stochastic-Aware Conformance Checking: An Entropy-Based Approach. *Advanced Information Systems Engineering*, LNCS 12127, 217–233. Primary full chapter, introduction and definitions. A possible transition and its observed frequency are different properties. Log conformity cannot supply missing capture or an external physical reference.

GS1 (2022). EPCIS Standard, Release 2.0, ratified June 2022. Official PDF at versioned 2.0.1 endpoint; sections 7.4.1–7.4.1.2 read. Asserted event time differs from repository record time; correction declarations preserve the earlier assertion. DOEC uses these distinctions as design analogies, without asserting historical EPCIS adoption or certified event truth.

Access scopes distinguish selected full text, abstracts, publisher records and indexed text. Applications are conceptual or methodological; the private memo records retrieval limits.

RESEARCH REFERENCES / EVALUATION AND UNCERTAINTY

Separate better measurement from better performance

Primary research supports the method and proposed design. It does not authenticate project artifacts, provide local parameters or establish this project's causal effects.

NIST/SEMATECH. e-Handbook of Statistical Methods, section 6.3.2.2: Individuals Control Charts. Official method. Tentative individual/moving-range limits require commensurate ordered points. Short revision sequences or differently matured cohorts do not create a stable process baseline; a signal in recording need not be a physical-process change.

Laney, D. B. (2002). Improved Control Charts for Attributes. *Quality Engineering*, 14(4), 531–537. Primary publisher abstract. Dispersion adjustment requires eligible counts and denominators. Rounded shares, cross-sectional percentiles and selected loss cohorts do not supply an all-declaration binary process.

Cohen, J. (1960). A Coefficient of Agreement for Nominal Scales. *Educational and Psychological Measurement*, 20, 37–46. Primary publisher record. Blinded independent coding should report agreement, prevalence, kappa and uncertainty. Agreement between coders can coexist with an invalid shared reference; sampling must include unlogged and unresolved decisions.

Barnett, A. G., van der Pols, J. C., & Dobson, A. J. (2005). Regression to the Mean: What It Is and How to Deal with It. *International Journal of Epidemiology*, 34, 215–220. Primary abstract. Worst-outcome selection can produce apparent reversion without intervention. Separate selected-site recovery from untreated expected reversion; retain assumed reliability ranges until repeated data identify them.

Hudgens, M. G., & Halloran, M. E. (2008). Toward Causal Inference with Interference. *Journal of the American Statistical Association*, 103, 832–842. Original manuscript. Shared search staff, routes and data services can transmit effects between units. Randomize independent response domains or redesign for spillover; package counts do not determine independent sample size.

Callaway, B., & Sant'Anna, P. H. C. (2021). Difference-in-Differences with Multiple Time Periods. *Journal of Econometrics*, 225, 200–230. Author manuscript. A later staggered observational rollout needs group-time effects, untreated comparisons and explicit identification conditions. It estimates a different quantity from the proposed randomized all-original-unit ITT.

Strong, M., Oakley, J. E., Brennan, A., & Breeze, P. (2015). Estimating the Expected Value of Sample Information Using the Probabilistic Sensitivity Analysis Sample. *Medical Decision Making*, 35, 570–583. Author repository. Information value compares feasible actions under declared priors, signals and payoffs. Deduct evidence cost, enforce the perfect-information bound and keep decision value separate from operational savings.

Access scopes distinguish selected full text, abstracts, publisher records and indexed text. Applications are conceptual or methodological; the private memo records retrieval limits.

RESEARCH REFERENCES / CONTRIBUTION AND GOVERNANCE

Make the measure serve the operating decision

Primary research supports the method and proposed design. It does not authenticate project artifacts, provide local parameters or establish this project's causal effects.

Collier, D. (2011). Understanding Process Tracing. *PS: Political Science & Politics*, 44, 823–830. Primary publication. Separate ownership of the question and deliverable from machine-executed analysis, system design and realized outcomes. Registry-mediated contribution receives provisional process-tracing grades until original artifacts are recovered.

Tucker, A. L., & Edmondson, A. C. (2003). Why Hospitals Don't Learn from Failures. *California Management Review*, 45(2), 55–72. Author manuscript. Workarounds can maintain immediate production while concealing recurring system problems. Link declaration evidence to a usable physical-verification workflow; a free-text actor string is not grounds for blame.

The W. Edwards Deming Institute. The Funnel Experiment. Official exposition. Reactive adjustment to routine variation can worsen performance. Establish consistent cohorts, clocks and operating phases before changing a threshold in response to a short sequence.

Campbell, D. T. (1976). Assessing the Impact of Planned Social Change. Original institutional record. Incentives can change both behavior and recorded metrics. A completeness target may reward placeholders or selective event emission; independent declaration enumeration protects the denominator.

Goodhart, C. A. E. (1992). The Objectives for, and Conduct of, Monetary Policy in the 1990s. Reserve Bank of Australia Annual Conference. Original author paper, section 1(b)(i). The relationship between a target and its intended outcome can change under adaptation. Filled fields or fewer coded losses require an independent bridge to mature customer performance.

Ittner, C. D., Larcker, D. F., & Randall, T. (2003). Performance Implications of Strategic Performance Measurement in Financial Services Firms. *Accounting, Organizations and Society*, 28, 715–741. Author manuscript. Strategic performance measurement requires a defensible relation between measures, action and outcome. An addressable cost pool, observed recording improvement and realized benefit cannot substitute for one another.

OECD / European Commission JRC (2008). Handbook on Constructing Composite Indicators. Official handbook. Aggregation depends on weights, definitions and permitted compensation. Keep capture, joint validity, harm and economic value visible separately; favorable monetary value cannot conceal a failed service safeguard.

Access scopes distinguish selected full text, abstracts, publisher records and indexed text. Applications are conceptual or methodological; the private memo records retrieval limits.

FINAL REFEREE REPORT / INTERNAL AGENT-ASSISTED REVIEW

Accept the diagnostic; verify the response

[AI] This author-led, agent-assisted report is not external peer review or client approval. Acceptance concerns the source-bounded analysis and proposed design, not certification of historical causal benefit.

Major issue	Disposition in the revised case
Different grains and clocks pooled	Preserve each entity grain, event anchor and read vintage. Require demonstrated nesting before cross-cohort bounds; report source conflicts and alternative conclusions.
Recorded state treated as custody	Separate asserted status from physical truth at the declaring moment. Later re-handling and missing records do not settle earlier location, intent or verification.
Selected counts size a live control	Show alternative live worlds with identical loss-selected evidence. Enumerate all declarations on the actual policy clock before threshold or workload calibration.
Complete fields treated as valid capture	Reproduce joint-completeness bounds and distinguish capture from accuracy. Validate against an independent reference that includes unlogged and unresolved events.
Addressable cost treated as savings	Use a mature physical-outcome contrast, signed harm, complete incremental work and overlap adjustment. Separate the information purchase from operating value.

Partner critique: can a COO act on page one?

[AI] Yes: assign an accepting owner to the declaration contract, establish the complete population and verify physical evidence before sizing a new control. Data, policy, operations, Quality and Finance have distinct acceptance tests. The recorded project owner receives bounded credit for direction and publication discipline.

Remaining conditions and minor issues

[AI] Original authenticity, live event capture, identity linkage, authoritative policy and mature costs remain field-validation needs. The finite model, covariance, service margin and recruitment assumptions require calibration. Internal checks establish reproducibility within those assumptions, not external endorsement or comparative firm ranking.

REVIEW DISPOSITION / PASS WITHIN STATED SCOPE

[AI] Accept the corrected inference boundaries and prospective evaluation. Historical implementation, causal recovery and realized cash remain unestablished. A failed event, authority or service condition prevents expansion under the proposed decision rule.

Internal source, methodological, numerical, executive and actual-page review. Acceptance covers the released analytical case and its stated scope; no external referee or firm-ranking claim is made.