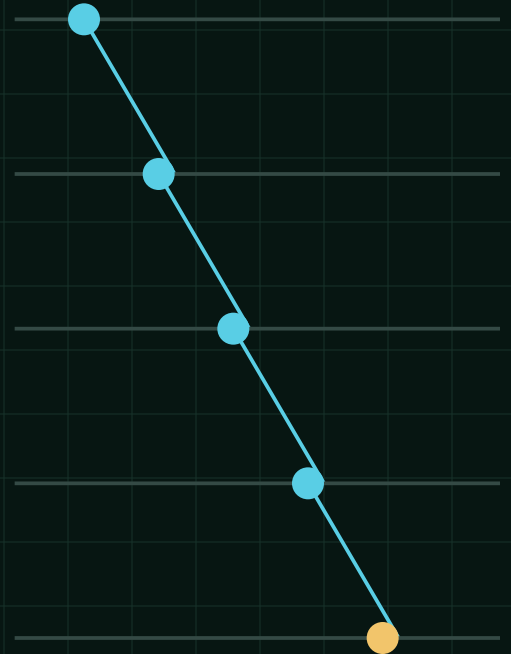


The Deliverable Commitment

Usable inventory, feasible production, transport cutoffs, accepted demand, and authority in one availability trace



SUPPLY CHAIN AND MANUFACTURING

Visibility becomes a deliverable commitment only when usable inventory, feasible production, movement before cutoff, accepted demand, evidence, and authority resolve together.

EVIDENCE AND AUTHORITY BOUNDARY

This guide does not establish physical or supplier truth, release held material, authorize production or substitution, procure or allocate supply, tender freight, accept or amend a commitment, prove delivery, provide advice, establish security or compliance, or evidence optimization, savings, service level, or outcome.

02 | OPERATING PROBLEM

Visible inventory is not executable availability

Network conditions, statistical freight flows, traceability events, plant records, transport capacity, and customer commitments are different evidence products with different owners and clocks.

INVENTORY**Usable now**

- Separate on-hand from held, reserved, disputed, or misidentified stock.
- Preserve item, revision, lot, location, unit, and observation time.
- A visible quantity is not a quality release.

PRODUCTION**Releasable before cutoff**

- Resolve material, eligible substitution, line time, rate, completion, and inspection.
- Expose the binding constraint.
- Feasibility is not authority to run or resequence.

MOVEMENT**Movable in time**

- Represent lane, equipment, capacity, staging, cutoff, handoff, and receipt state.
- A proposed move is not a tender.
- A booking or estimate is not delivery.

COMMITMENT**Accepted demand**

- Distinguish request, acceptance, priority, configuration, destination, and due time.
- Do not silently choose a customer.
- A computed answer cannot amend a promise.

DO NOT COLLAPSE

This guide does not establish physical or supplier truth, release held material, authorize production or substitution, procure or allocate supply, tender freight, accept or amend a commitment, prove delivery, provide advice, establish security or compliance, or evidence optimization, savings, service level, or outcome.

03 | DECISION TRACE

Six nodes turn signals into a commitment test

Every node stays inspectable so a correction can move the binding constraint without hiding what changed.

01 SOURCE OWNERS**Source revisions**

Bind item, unit, quantity, state, source, observation time, freshness, contradiction, and correction.

02 INVENTORY / QUALITY**Usable now**

Remove held, reserved, disputed, misidentified, or otherwise unreleasable inventory under accepted rules.

03 PRODUCTION MODEL**Planned output**

Resolve materials, work-center time, rate, completion, inspection, and release conditions.

04 LOGISTICS MODEL**Movable by cutoff**

Apply capacity, lane, staging, handoff, cutoff, and arrival constraints without claiming a booking.

05 GOVERNED MODEL**Commitment coverage**

Compare the deliverable quantity with exact accepted demand, configuration, destination, and due time.

06 ACCOUNTABLE PEOPLE**Authorized action**

Keep allocation, schedule, purchase, tender, promise, acknowledgment, and receipt distinct.

TRACE RULE

A green calculation means only that the represented facts and authored rules resolved for this revision. It is never a substitute for the external evidence or authority named at the final gate.

04 | MODEL CONTRACT

The availability contract preserves semantics

A quantity without its item, unit, state, time, source, rule, and owner is not safe input to a commitment.

Object	Required identity	State and time	Owner / gate
Inventory	Item, revision, lot, site, bin, unit, ownership	On-hand, held, reserved, released, stale	Inventory supplies; quality controls release
Production	BOM, substitution, line, window, rate, output unit	Planned, authorized, started, complete, inspected	Production owner retains schedule authority
Transport	Origin, destination, mode, lane, capacity, cutoff	Proposed, tendered, accepted, moving, received	Logistics owner retains movement authority
Demand	Customer or program, configuration, quantity, due time	Requested, accepted, revised, canceled	Commercial or program owner accepts commitment
Conclusion	Run ID, source set, rule revision, horizon	Feasible, short, unresolved, stale, superseded	Planner explains; accountable roles decide

STATE DISCIPLINE

Known, stale, missing, contradicted, and not-applicable are different states. A safe model does not coerce any of them to zero, false, available, or approved.

Paired use-case fixture: a commitment of 68 by 17:00

This distinct fixture comes from the paired use case; the canonical Insight also preserves Aster-4. Here, usable stock, component limits, line capacity, reserve, and outbound capacity stay separate.

FORMULA

deliverable = min(usable finished + planned releasable production, transport capacity before cutoff)

Constraint	Input	Calculation	Result
Usable finished	40 finished; 6 held; 4 allocated	40 - 6 - 4	30
Component A	80; one per unit	floor(80 / 1)	80 starts
Component B	100; two per unit	floor(100 / 2)	50 starts
Line	5 hours x 10/hour	5 x 10	50 starts
Planned release	50 potential; reserve 5	50 - 5	45
Deliverable	30 + 45; transport cap 72	min(75, 72)	72; margin 4

EXACT BASELINE

Against an accepted commitment of 68, the baseline delivers min(30 + 45, 72) = 72 and reports a four-unit margin. It does not release, schedule, tender, allocate, or promise anything.

06 | REVISION PROPAGATION

A correction moves the binding constraint

Exact propagation shows why a dashboard must expose the accepted source revision and the constraint that now determines the answer.

Revision	Accepted fact	Exact consequence	Commitment state
R0	Component B = 100	50 starts; 45 planned; deliverable 72	Margin = 4
R1	Component B = 84	42 starts; 37 planned; total 67	Short by 1
R2	Two held finished units released	Usable 32; 32 + 37 = 69	Margin = 1
R3	Transport capacity = 64	min(69, 64) = 64	Short by 4
F1	Pieces labeled as cases	Unit contract fails before arithmetic	Unresolved; no conversion

- R2 can occur only after the quality owner supplies an accepted release fact; a formula cannot release the two units.
- R3 does not choose which customer, order, or program loses four units.
- The prior result remains reconstructable after every accepted successor revision.

CORRECTION RULE

A correction changes only the dependencies it reaches. The system must expose stale derivatives, preserve the earlier release, and require the same configured review and authority gates for the successor.

Calculation stops before operating action

Connected reasoning can expose a constraint and compare authored alternatives without absorbing plant, logistics, procurement, quality, or commercial authority.

Accountable role	Supplies or decides	Grid boundary
Inventory steward	Supply quantity, location, reservation, unit, and correction	The model cannot attest to physical stock
Quality owner	Set hold, inspection, conformance, and release state	A formula cannot release held material
Production owner	Govern BOM, substitution, line window, rate, and schedule	Feasibility is not authorization to run
Logistics owner	Govern capacity, cutoff, tender, rebooking, and movement	A proposed move is not pickup or receipt
Commercial / program	Accept demand, priority, commitment, and communication	The model cannot accept or amend a promise
Procurement owner	Select sources and authorize purchases	A shortfall cannot create a purchase order
Planner	Run scenarios, calculations, comparisons, and explanations	Running the model grants no operating authority
Integration / security	Govern mapping, access, monitoring, exchange, and recovery	API success does not prove truth or execution

SEPARATION OF DUTY

Identity, permission, review, authorization, submission, external acknowledgment, and receipt are separate states. No computed result should silently advance across them.

08 | INTEROPERABILITY

Interoperate without semantic surrender

Standards and connectors can move records, but the decision layer must still govern meaning, provenance, correction, permission, and failure.

EVENTS**Visibility with provenance**

- Map EPCIS-style events without treating an assertion as physical truth.
- Retain source, event time, record time, correction, and derivation.
- Reject duplicates and conflicting identity.

UNITS**Typed quantities and clocks**

- Pieces, cases, mass, rate, duration, cutoff, and time zone stay explicit.
- No implicit conversion or optimistic rounding.
- Missing and stale remain first-class states.

SECURITY**Bound the connected edge**

- Least privilege, authenticated exchange, monitoring, revocation, and recovery.
- Test replay and timeout-after-effect.
- Do not infer approval from connectivity.

AI**Propose and explain**

- AI may suggest mappings, scenarios, tests, and explanations.
- It may not release, substitute, schedule, procure, allocate, tender, or commit.
- Human disposition remains recorded.

CONNECTED-EDGE RULE

A successful API call establishes only the observed protocol result. It does not prove semantic agreement, source truth, authorization, external execution, final receipt, security approval, or resilience.

Break the commitment before relying on it

The evaluation packet should prove arithmetic, revision propagation, role boundaries, and safe behavior at integration edges.

Failure injection	Required behavior	Passing evidence
Duplicate lot or event	No double count; duplicate identity is visible	Input ledger and invariant
Pieces / cases mismatch	No implicit conversion; conclusion becomes unresolved	Typed-unit failure
Stale quantity	Affected conclusion and views declare stale	Freshness clock and dependency trace
Unsupported release	Held units remain excluded	Quality-state and authority log
Overlapping line slot	Capacity cannot be counted twice	Schedule constraint test
Missed cutoff	Late output does not enter deliverable quantity	Time-window reperformance
Unauthorized allocation	Shortfall creates no customer choice or purchase	Role and action-surface inspection
Timeout after tender	Retry does not duplicate external effect	Idempotency and response reconciliation

EVALUATION GATE

Predeclare acceptance thresholds, roles, fixtures, clocks, failure injections, evidence, and stop conditions. Record every deviation; do not retrofit the success claim after seeing the result.

10 | SOURCES AND LIMITS

Public context, explicit scope

Use each source within its own date, institution, subject, and applicability. The maintained online Insight carries the fuller argument and current editorial context.

01 USDOT

Freight Logistics Optimization Works

www.transportation.gov/freight-infrastructure-and-policy/flow

02 FHWA

Freight Analysis Framework

ops.fhwa.dot.gov/freight/freight_analysis/fatf/

03 U.S. CENSUS

Commodity Flow Survey

www.census.gov/programs-surveys/cfs/about.html

04 NIST

IR 8419 - blockchain and related technologies for manufacturing traceability

csrc.nist.gov/pubs/ir/8419/final

05 GS1

EPCIS and CBV Standard 2.0.1

ref.gs1.org/standards/epcis/2.0.1/

06 W3C

PROV-O: The PROV Ontology

www.w3.org/TR/prov-o/

07 NIST

SP 800-161 Rev. 1 Update 1 - cybersecurity supply chain risk management

csrc.nist.gov/pubs/sp/800/161/r1/upd1/final

08 NIST

Cybersecurity Framework 2.0

www.nist.gov/cyberframework

FINAL LIMIT

The sources establish scoped public context, statistical products, interoperability vocabulary, provenance concepts, and risk-management guidance. They do not endorse Grid, prescribe this architecture, or prove a named lot, line, lane, commitment, delivery, security posture, or outcome.